THE ETHNOBOTANY OF WILD FOOD PLANT USE IN THE KONYA BASIN:
A QUANTITATIVE AND ETHNOARCHAEOLOGICAL APPROACH

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES
OF
MIDDLE EAST TECHNICAL UNIVERSITY

BY

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IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR
THE DEGREE OF MASTER OF SCIENCE
IN
ARCHAEOMETRY

SEPTEMBER 2006

Approval of the Graduate School of Natural and Applied Sciences

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ABSTRACT

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September 2006, 231 pages

In this ethnobotanical study, an ethnoarchaeological approach was adopted for the archaeological implications of the importance of wild food plants and their dietary uses in the Neolithic and Chalcolithic Periods in Central Anatolia by exploring the dietary uses of these plants by the modern villagers of Konya Basin. The study was based on the indigenous knowledge of the modern villagers of Konya of managing wild food plant resource in their surroundings for the dietary uses. This knowledge was explored through ethnobotanical research strategies. The study was limited by both the research subject and the area for a better focus on the research. The geographical borders were limited to Central Anatolia as it included Neolithic and Chalcolithic sites with detailed archaeological investigations and it made a comparison available between different geographical zones. Because it was possible to study similar environments today in the Konya Basin, nine modern villages to collect ethnobotanical data were chosen from three different environmental zones in this area, which included wetland, forest and steppe zones. The wild fruit, nut and tuber species recovered from the archaeological excavations were selected for study in their current natural environments. The different strategies of harvesting, processing and storage local people used for the consumption of each plant species provided useful implications to archaeological recoveries.

Key Words: Neolithic, Central Anatolia, Ethnobotany, Ethnoarchaeology, Konya Plain.

ÖZ

KONYA OVASINDA YENİLEBİLEN YABANi BiTKi
KULLANIMLARININ ETNOBOTANiSİ:
NİTEL VE ETNOARKEOLOJİK BİR YAKLAŞIM

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Eylül 2006, 231 sayfa

Bu etnobotanik çalışmada, yenebilen yabani bitkilerin Konya Ovası'nda yaşayan yerel halkımız tarafından kullanımlarının araştırılması vasıtasıyla Neolitik ve Kalkolitik Çağlarda İç Anadolu'da yaşamış olan halklar için bu bitkilerin öneminin arkeolojik olarak saptanmasında etnoarkeolojik bir yaklaşım benimsenmiştir. Bu çalışma Konya ve Karaman yerel halklarının çevrelerindeki yabani bitki kaynaklarını yiyecek maddesi olarak geleneksel kullanımları üzerine kurulmuştur. Bu geleneksel bilgi ethnobotanik araştırma stratejileri ile çalışılmıştır. Çalışmanın daha iyi anlaşılabilmesi için araştırma konusuna sınırlamalar getirilmiştir. Detaylı Neolitik ve Kalkolitik arkeolojik kazı projeleri içeren ve farklı coğrafi alanların karşılaştırmasını sağlayan İç Anadolu Bölgesi bu tezde coğrafi sınırdır. Benzer doğal çevreleri günümüz Konya Ovası'nda bulmak mümkün olduğundan, sulak, bozkır ve dağlık alandan dokuz köy etnobotanik veri toplamak üzere seçilmiştir. Arkeolojik kazılarda rastlanan yabani meyve, kabuklu yemiş ve yumru köklü bitki türleri doğal çevrelerinde çalışılmıştır. Her bir bitki türünün yerel halk tarafından toplanması, ayıklanması ve depolanması arkeolojik bulgular için yararlı öneriler getirmiştir. Tez sonuçları arkeologlara, antropologlara ve etnobotanikçilere olduğu kadar botanikçilere, ekonomistlere ve sosyologlara da yararlı bilgiler sunmaktadır.

Anahtar Kelimeler: Neolitik, İç Anadolu, Etnobotanik, Etnoarkeoloji, Konya Ovası.

To My Daughter and To Local People of Karaman and Konya

ACKNOWLEDGEMENTS

The author of this study is truely indebted to the thesis supervisor Prof. Musa Doğan and co-supervisor Asst. Prof. Dr. Geoffrey Summers for their useful insight, guidance and encouragement in writing this thesis and for their faith in me accomplishing my aims in this research. The Head of the Department of Archaeometry Prof. Dr. Şahinde Demirci, and Prof. Dr. Ay Melek Özer are indebted for their useful advices.

A study visit to British libraries, universities and botanical gardens as part of this thesis work was made possible by the grants from British Council and Çatalhöyük Research Funds to whom the author wish to thank.

Prof. Dr. Mecit Vural, Prof. Dr. Hayri Duman and Prof. Dr. Zeki Aytaç from Gazi University Botany Department are gladly acknowledged for their volunteer identification of all the voucher specimens collected for this research. The voucher specimens to be identified were many and sometimes they lacked certain parts necessary for the identification. The author is thankful for the patience and kind tutoring accompanied identification sessions.

The author is grateful to Dr. Mark Nesbitt, currently the botanist of Kew Botanical Gardens in London, without whom this project would never come to life. He introduced the author to the field of ethnobotany, taught many valuable information and guided for this study.

Prof. Christine Hastorf from UC Berkeley is gratefully acknowledged for teaching many things in the field of archaeobotany both through the excavation project as well as in the first year of the author's PhD education at UC Berkeley which transformed the author's mind in viewing of the fields specialized on. Her allowing the author to be included in the archaeobotany team of Çatalhöyük Projects is appreciated too.
Prof. Ian Hodder from Stanford for allowing the author to be included in the Çatalhöyük Projects, Prof. Ruth Tringham and Dr. Mira Stevanoviç for including the author in the BACH Projects between 1998-2003 are thanked.

Begümşen Ergenekon and Dr. Linda Donley-Reid are gratefully thanked for their faith in the author and in this study, and for them never giving up on the author. Without them, this study would never be completed.

Nurcan Yalman, the PhD candidate from İstanbul University, for prioritirizing this research over hers to supply transportation and useful guidance during the 1998 field season; Meltem Ağcabay, for her encouragements and for being the author's colleague from the beginning of this study; Michele Wollstonecroft for her contributions in 1999 season on the collective experimental work and for sharing her literature resources; Drs. Delwen Samuel and Eleni Asouti for their help and hospitability during the author's study visit in the UK; Dr. Gordon Hillman for his hospitability and his valuable guidance; British Institute of Archaeology staff for all their useful help; Drs. Sarah Mason and Ehud Weiss for sharing their literature resources; Dr. Mira Stevanoviç, Dr.Wendy Matthews, Dr. Başak Boz, Amanda Kennedy, Dr. Sonya Atalay, Adnan Baysal and Çatalhöyük Projects team members for their encouragements are heartily thanked.

The author expresses her deepest gratitude to the local people of Konya and Karaman, especially to the family who taught and took care of the author during her stay in Madenşehir village, and to two local people who believed in the author and put their hearts in this research by supplying all kinds of transportations from tracks and donkeys to motorcycles for trips to dried lakes, abandoned lands and the peaks of the mountains in October 1998. Their rich knowledge of the plants and of their environment were the key elements of this research. The author's family for emotional and financial support, her daughter for her existence, endurance and endless emotional support are indebted forever. This study is devoted to them.

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CHAPTER 1

INTRODUCTION

Food has been one of the basic needs of living organisms during their life-span. For consuming food, humans developed different strategies depending on what their environment offered them. Sometimes human groups were lucky enough to be surrounded by rich resources of trees with their edible and nutritious fruits, large mammals, and domesticable wild food plants bearing large seeds which were worth the effort of collecting them. This availability of gathering food resources from close vicinities enabled humans to increase their populations and to shift from mobile life with hunting-gathering strategies towards the adoption of less mobile life style leading to sedentarism. The ethnobotanical and archaeobotanical studies undertook in depth in recent years revealed the results of the possibility of the wild food plants taking an important place even in the diet of communities with advanced food economies. Such detailed studies also showed that, some studies undertaken in the past and related with the human subsistence economies were not paid enough attention. With the new insights gained from the recent abundant recoveries of plant remains from the archaeological sites, new studies and the readdressed previous studies allowed us learn much information about the past human diets and their effects on human groups that also changed our views of the subject in a considerable way. In this study, it was aimed to analyze the wild food plant use by the past societies, a subject not addressed enough when compared with the detailed studies of emergence of agriculture and the importance of cereals and other domesticated plants. It was necessary to limit the study for better focusing on the data sets used during the study. For this reason, Central Anatolia as one of the best studied areas with several Neolithic sites and as a geography encompassing different types of vegetation zones was chosen as the research area. Neolithic and Early Chalcolithic were the time periods selected to be examined in this study as important changes about the diets and subsistence strategies of human groups occurred in these periods. Here, the importance of wild food plants still continuing in these periods with their certain need by the past communities was addressed. This ethnoarchaeological study concerned several parts, which complete each other. Mainly it concerned the archaeological and ethnobotanical data. The degree of the importance of wild food plants was demonstrated with the archaeological evidence including the available archaeobotanical data. Ethnobotanical research encompassing ethnographic fieldwork was undertaken for analyzing the importance of wild food plants in the diets of modern villages which are located in the same geography with the Neolithic and Chalcolithic sites chosen to be studied. The relationship between the local people living in the modern villages of the Konya Basin and the wild food plants still growing in the region as in the past was studied in detail with the tools used alongside the taphonomic effects. Such a detailed ethnobotanical research offered very helpful interpretative models. Ethnoarchaeology made analogies possible to suggest interpretations to the archaeological evidence of the use of wild food plants in the surrounding environments of the past societies.

CHAPTER 2

ARCHAEOBOTANY, ETHNOARCHAEOLOGY, ETHNOBOTANY AND THE PARAMETERS OF THE STUDY

This study is based on the archaeological data collected from the Neolithic and Chalcolithic sites in the Central Anatolia and ethnobotanical data collected from nine modern villages in the Konya Basin. At this point, it is important to stress that ethnobotanical part of the research was undertaken individually from the archaeological data and only when the ethnobotanical data was complete comparisons were made available. The problem tried to be found answers for is the degree of the importance of the wild food plants in the diet of the Neolithic and Chalcolithic people. In exploring both the wild food plant use in the prehistoric diet and also the paleoenvironment exploited as source of the dietary use of these plants, the study used the results of the archaeobotanical analysis which included palynological, macrobotanical, charcoal and phytolith data, as well as results of other analyses such as geomorphological, nitrogene isotope and dental microwear data. As a wide variety of the wild food plants require to be processed prior to their consumption, the taphonomy of the archaeological tools recovered from the excavations in a possible relation with the harvesting, processing, storage and consumption of the wild food plants was one of the central foci of the research. Wild food plants collected as voucher specimens were studied in their natural environments and their coverage in the modern flora where they were available for their harvesting by the modern villagers were explored. The local people's using wild food plants growing in the region composed the ethnobotanical and ethnographic aspects of the study. Ethnoarchaeological theory and methods were the main body of the research, allowing the investigation of the dietary uses of the wild food plants by the Neolithic and Chalcolithic people by using the data of the exploitation of these same plants by the modern villagers in their environment.

Mainly, this study has three parts; archaeobotanical data made it available to understand the past uses of the wild food plants, while collecting and evaluating the modern data was made possible through ethnobotanical research strategies. Ethnoarchaeological research strategies were applied when comparing the modern data with the archaeological recoveries. This chapter of the study will focus on these three parts to explain their uses and their completing each other throughout the study.

2.1. Archaeobotany

This section of the chapter two is meant to discuss the general terms of the field of archaeobotany to put forward its relation to this thesis. More specific information concerning the taxa studied is given in a separate section under ‘how ethnobotany helps us to understand the importance of plants’.

Hastorf and Popper (1988) explained the differences between the two term commonly used interchangeably as; archaeobotany concerns collecting and analyzing plant data composed of human or non-human activities, while paleoethnobotany, grown out of ethnobotany, is ‘the analysis and interpretation of archaeobotanical remains to provide information about the interaction of human populations and plants’. Pearsall (1989) specified the term paleoethnobotany, part of the field of ethnobotany, as the study of archaeological plant remains i.e. pollen grains, phytoliths, charred wood, seeds to explain human-plant relations in the past. In European countries the term ‘archaeobotany’ is often used, considering ‘paleoethnobotany’ sounds associated with Paleolithic times. In this research the term ‘archaeobotany’ is preferred, as the research also included several non-human aspects, such as vegetation and pollen analysis, to help explain the environmental conditions in the Neolithic and Early Chalcolithic Periods which led people to inhabit different geographical zones with different vegetation and flora. The differences in the flora caused people who exploited its resources to develop different strategies for composing their diet.

Archaeological and ecological approaches are the two key factors of an archaeobotanical research (Pearsall 1989). Archaeological approach requires several methodological applications such as sampling, floating and sieving soil to recover charred, dessicated or waterlogged plant parts which later on need processing and botanical identification in laboratories (see Pearsall 1989; Hastorf and Popper 1988; Watson 1976 for details). Analyses of pollen and phytolith samples are also included in an archaeobotanical research. In the last decades, archaeological excavations use advanced technologies to recover and process plant remains. Although these meticulous application techniques make an excavation process much slower, as the excavation reports are published their benefit to the archaeological data is better understood. The mechanized flotation as an important technical contribution to archaeobotanical data recovery has helped recover plant remains through the process of more and larger samples in a shorter time and with much accuracy. In chapter three of this research, the differences between the sites using these methods and the sites not using them can be clearly seen as reflections in the archaeological data. It is partly due to the primary goals and the priorities of these excavations, since some such as Aşıklıhöyük first started as salvage excavations. Other differences can be observed between the short term and long term excavations. Long term excavations such as Aşıklıhöyük and Çatalhöyük are generally well supported and can use the advantages of a slower excavation process. This research benefits from the extensive archaeological data recovery which is organised better than the past by using current methodological techniques.

From the archaeobotanical point of view, taphonomy focuses on processes and patterns of the preservation of charred plant remains. Recently, we have better understanding of the archaeobotanical data owing to quantitative evaluation of interim states and pathways of plant remains through various analyses such as palynology, dental microwear, isotope, thin sections, and chemical analyses.

One of the advantages studying in the micro level such as phytolith and thin-section analysis is that, while in the past an existing trade at a site could only be deterred through recovered artifacts, today even the traces of some perishable items such as plant matters and ochre determined through these technologically advanced analyses reveals the clues of a trade network which might have affected the studied culture.

Ecological approach is needed to interpret the archaeological plant remains to reconstruct the past environments to reconstruct the past environments to better understand the interactions of humans with their surrounding habitats. Through geomorphological and palynological research helping to understand the soil types, geological changes and the paleovegetation, it is possible to suggest environmental availability to cultivation and to suggest the distances from where people in the past gathered their food plants. In this research, the Neolithic sites situated in the steppe and wetland zones such as Çatalhöyük, Can Hasan I-III and Pınarbaşı it was important to explore how far trees were from these sites for understanding the availability of wild fruits and nuts to these Neolithic societies and then by going back to their archaeobotanical record to see the percentage of these wild fruits and nuts in the overall food plant remains to understand their importance in the subsistence systems of these sites. In this research, the latter was investigated also for the other Neolithic and Chalcolithic sites which are located in different types of environmental zones, such as Aşıklıhöyük having been inhabited in a highland zone. For this reason, it was possible to compare the archaeobotanical records of these sites from different environmental zones to see the differences in the percentages of wild fruits and nuts. However, there were problems in these comparisons due to unbalances between the archaeobotanical records of the archaeological centers. While some of them were studied in detail, some were poorly sampled, not sampled or not published at all. This problem will be mentioned in depth in chapter 3. Pointed out by Pearsall (1989) within the ecological approach, other questions such as 'seasonality of plant availability affecting settlement systems' are also mentioned in the following chapters briefly. In this research, uses of wild plant foods by the past societies are discussed not only from the ecological point of view, but also taking cultural mechanisms into consideration.

Archaeobotany attempts to bring explanations to plant remains recovered from archaeological deposits by considering various ways people interact with plants. Mixture of crop plants, weeds and wild plants are the archaeological remains of the plants gathered for food. Sometimes it may not be very easy to distinguish which traces in the archaeological context belonged to food activities and which to non-food ones; thus several theories contributed by experimental works and ethnoarchaeological research have been developed concerning the interpretation of these archaeobotanical remains and site formation processes. Today, it is accepted by many researchers that, the safest way to explore the dietary status of the seeds recovered from archaeological deposits is to evaluate these remains in the cultural contexts of burnt storage pits or bins, and in utensils such as baskets and pots, or in human coprolites. Only then, their interpretation as food plants becomes valid. Ethnographic research conducted especially in steppe or wetland environments in the world acknowledges that dung has been used as fuel instead of wood which is not available. Seeds including crop grains and their by-products fed to animals appear as in their charred form alongside their source dung in oven/hearth, fire-pit and midden context; therefore becoming mixed with accidental charring of leftovers, food processing remains and spills during cooking. Detailed account of these theories and examples can be found in several articles and books written by archaeobotanists (i.e. Miller and Smart 1984; Pearsall 1989; van Zeist and Bakker-Heeres 1989; Miller 1996; Hillman, Legge and Rowley-Conwy 1997; Fairbairn *et al.* 2005). For this reason, it has been pointed out by researchers to take calculations of nutshell remains when to make safe comparisons between domesticated and wild plant distributions at an archaeological center (see Jones 2000).

Every living organism maintains various activities to answer their needs for food. These activities reflect on earth as leftovers which are processed by nature in different ways. Except for waterlogged or dessicated, plant remains mostly cannot survive unless they are subjected to fire, consequently charred; meaning it is not possible to recover all plant parts that were left in the past, to trace back to human activities with plants. For this reason, sometimes the charred plant remains are not enough in amount to represent the diet of people lived in that settlement in the past. There are several reasons why there are differences of the amount of charred plant remains recovered from archaeological contexts. Biases concerning the data recovery are 'depositional bias (what gets into the site in the first place), preservation bias (which deposited materials survive), and recovery bias (what comes out of the site)' (Pearsall 1989).

Human beings transfer their past experiences in every stages of supplying food to next generations by whom these experiences are bettered by updated techniques, circulation of information and materials and new discoveries. In result every generation leaves behind different types of leftovers as the outcome of several activities undertaken to have the food. The tools used in these activities are either inherited by the next generation or discarded. Successive tools and food types even expand geographically through trade and exchange network. Processes of the plants leave behind remains and tools used in processing, what is called taphonomy, just like how modern people continue their activities of which traces they leave. Taphonomy makes it possible to interpret the relationship between plant remains and tools recovered from archaeological excavations. Plant remains found in an oven, pit, or inside a pot can give

many clues about the diet, cooking, plant processing and preserving techniques of those people lived there in the past. Some plants simply consumed during collecting or which are brought to site, but eaten while fresh decay without leaving any trace behind. Van Zeist (1991) stresses this fact pointing to scarcity of recovered plant remains giving some examples from the wild food plants of hunter-gatherer societies: 'The fact that leaves, shoots, tubers, rhizomes and other soft plant tissues are usually not or only scarcely preserved in archaeological deposits, constitutes a serious handicap in assessing the role of vegetable food in hunter-gatherer economies.' Some plants survive due to processes with fire application, such as roasting, smoking and partly burning to separate inedible parts. (Also in the deposits burnt in a fire during the site settled so plants preserved) Accidental burning also happens through spilling food in the fire while cooking. Also, some leftovers might have been thrown into fire for getting rid of the garbage. Throwing plant parts into fire as refuse might also include animal fodder, inedible parts of plants like chaff, stem, fruit stalk and pip separated through processing and any other plant parts used in several activities other than for food and later on considered as garbage, like discarded baskets woven with reeds. Burning such plants is also part of the fuel and tinder use. Finally it reflects in the archaeological context as plant remains found in an oven.
Thus, archaeobotanical interpretation must always be tempered by consideration of biases in data (Pearsall 1989).

2.2. Ethnoarchaeology

Several ongoing debates concerning ethnoarchaeology took part in the history of archaeology. The center of these debates were what the researchers doing ethnoarchaeology actually meant by using this term, and in what ways they related their research to archaeological data. For some, it was too much detailed work to make any use of it in the archaeological context, and for some it was not a valid way of interpreting the archaeological evidence using living cultures which had so little or no common things with the past cultures. Then, what is really the right way to interpret the archaeological data? What would the archaeologists use to interpret their data if not using living cultures and their insight and observations through it? When one reads archaeological reports even with no ethnoarchaeological contributions, there are still many inspirations, experiments and observations from the living cultures in evaluating the archaeological findings in them, so why not doing it properly, rather than just using the crumples of inspirations, that means to use ethnoarchaeology as a research strategy in the aspects needed in making the archaeological remains sense. This idea has become the foundation of this research in demonstrating how people managed their lives in environments with similar geographic features, flora, and sometimes with little option to use any advantages of the modern technology. In this section of the 'parameters of the study' chapter, it is important to mention why ethnoarchaeology has been avoided by some archaeologists, why there have been continuous debates in doing the ethnoarchaeological research, what methods and aims the ethnoarchaeologists used and what results they have gained in the end.

Ethnographic methods and observations have a long history of use by researchers concerned with the reconstruction of prehistoric human behavior and cultural patterns based on the archaeological data. Ethnographic data was applied to archaeology as early as in the 17^{th} century by De Jussieu (1723) who compared prehistoric stone tools found in France with similar forms still in use. Ethnoarchaeological studies continued since then with increasing examples all over the world. In 1939 ethnographic modelling from an archaeological perspective was first used by D. F. Thompson by noting climate, vegetation and water sources of the northeast Queensland, Australia and seasonal cycle of subsistence, settlement patterns and principal food stuffs of the Aborigines who lived there (Stiles 1977). It was the first research as well showing how climatic conditions affected the people's strategies for managing their lives.

The definition and understanding of 'culture' in archaeology have had many changes too, sometimes parallel to the criticisms to the status of ethnoarchaeology. In 1930s archaeologists were focused on time-space frameworks needed in prehistory and ignored the culture concept (Watson 1995). Taylor's attempts (1948) in building parallels between archaeology and socio-cultural anthropology did not create much effect due to archaeology's different concerns those years (Watson 1995). Clark (1951) attempted to reconstruct the prehistoric subsistence at Star Carr, England by using the techniques of the systematic recovery of faunal and botanical remains, while at the same time having aid from the practices in the European folklore.

In 1960s and 1970s Binford brought a new understanding to archaeology with the idea supported by Taylor's earlier attempts that 'archaeology must be anthropology' in which the concept ‘culture’ was redefined by Leslie White, by means of humankind’s extrasomatic means of sustaining themselves in a wide array of physical environments through space and time. 1960s hunter-gatherer studies contributed much in prehistoric archaeology. The research on foragers with the emphasis on adaptive systems and long-term processual change was one of the hallmarks of the New Archaeology.

1970s was the use of ethnoarchaeology and experimental research even more extensively. Bringing new insights to archaeology, it was also criticized by some that applying the ethnographic data into archaeology needed adjustments yet, before ethnoarchaeological researches got used more extensively (see Stiles 1977). In this decade, researchers were more concerned in bringing definitions to ethnoarchaeology. Some regarded ethnoarchaeology ‘archaeological ethnography’ or ‘the use of ethnographic methods and information to aid in the interpretation and explanation of archaeological data’ (Stiles 1977). Gould (1974) used the term ‘living archaeology’ referring to ‘comparing ethnographic and archaeological patterning’. As well as criticisms, during this decade further ethnoarchaeological contributions were pioneered by Patty Jo Watson under ‘action archaeology’ not only studying modern settlements for the comparison of the past material culture but also attempting to test the limits of the deduction of non-material culture from the information collected which varied from artifact function and typology to subsistence techniques and social structure.

1970s ethnoarchaeological studies were long-term and they concerned the representation of the behavior of living people and its relation to material culture they studied in depth in the archaeological record. DeBoer and Lathrap’s ethnoarchaeological research (1979) on the Shipibo-Conibo ceramics is an example to such studies. DeBoer’s work included pots used by 17 Shipibo-Conibo households from five villages. While some of these analogies have applications in the archaeological record, some are culturally detailed; however it is a good example to show that many stages of material culture, such as processing, distribution of the products and their consumption by the village members, are affected by people’s economical situations, their natural environments from which they manage raw material resources and socio-cultural factors that make difference by people’s past experiences and how they respond to the former two.

From this decade on, the criticisms on the methods of the ethnoarchaeological studies affected researchers to be concerned about the strategies they followed and the methods included detailed mathematical and statistical calculations to justify their work; contrary to their failure to express the research qualifications and frames of the methods followed during their research. Binford's monographic research in a Nunamuit village based on the fauna and subsistence was one of the major examples concerning these ideas and the target of the criticism. These methodologies were influenced by the 'new' situation of the archaeology under the effect of 'processual archaeology'. Simultaneously, the definition of archaeology was also affected by the numerous ethnoarchaeological works and the attempts to broaden the term ethnoarchaeology. Despite the criticisms, Binford's research have important contributions to archaeology both theoretical and methodologically, which are still referred by many archaeologists.

In 1980s as the theoretical aspects took a wider space in archaeology, the definitions of culture and ethnoarchaeology have been modified as well. That decade Hodder modified the earlier defined culture concept 'to place artifacts, architecture, and archaeology in the center of anthropology and social theory', with the approach that artifacts do not just reflect behavior and organization, they actively structure social interaction (Hodder 1982), through their positions in daily cycle, special occasions and ritual activities, and the postprocessualist concept he pioneered stressed the main goal as 'archaeology is archaeology' (Watson 1995). Artifacts are themselves culture in the contextualist archaeology supported by the postprocessual agenda.

In spite of the fact that starting in 1960s ethnoarchaeology took its place in archaeology as an indispensable archaeological technique, processual archaeologists evaluated ethnographic techniques 'documenting the interplay of climatic, topographic, floral, faunal, geological, and other natural factors with human hunter-gatherer-forager subsistence and technology', whereas postprocessualists to whom culture is mental, material, social behavioral and the relations among all three, pay special attention to important roles of artifacts as full participants in the creation, deployment, alteration, and fading away of symbol complexes; and locate artifacts in the complex, dynamic tensions characterizing human social and societal encounters (Watson 1995).

Affected by the new situation of the theoretical aspects, archaeology and material culture were stressed as in the center of the research in the definition of ethnoachaeology and a more systematic model for the use of ethnographic analogy has been improved. Schiffer (1983) expressed his concern of using ethnographic data for interpreting prehistoric societies. When a direct historical continuity between the ethnographic data and the archaeological data in the research area is discovered, ethnographic analogy can be built; and if there is no historical continuity, a general comparative approach is followed (Schiffer 1983). However, ethnoarchaeology is not the pluging-in ethnographic parallels derived from the literature to archaeological record. Thus, the term 'ethnohistory' was developed by the researchers who have meant to outline their work by referring the knowledge of the previous generations lived in the research area. Today as well, many archaeologists concerned with similar ideas are cautious when using ethnographic analogies for the interpretation of the prehistoric sites, so that in their research they strongly stress the fact that their ethnoarchaeological research strategies are not to build any ethnographic parallels to the prehistoric culture they study.

In the 1990's ethnoarchaeology was redefined with the words of Kramer (1996) as 'ethnographic fieldwork carried out with the express purpose of enhancing archaeological research by documenting aspects of socio-cultural behavior likely to leave identifiable residues in the archaeological record'. In 2001, in 'ethnoarchaeology in action' of David and Kramer the need of encompassing the culture as a whole in the ethnoarchaeological research was underlined. In this research too, as the fieldwork went on to further stages, this need stressed by the authors was justified.

Today interdisciplinary research is benefited by various disciplines. Ethnography, as the subdiscipline of anthropology, is maybe the most included one. Geertz stated that (*cited in* Watson 1995), 50 to 75 years from now academic anthropology departments will have evolved into several disciplines but as noted by Watson (1995), with research methods and research results of enormous global importance and great essential interest.

The dismissed ethnographic case studies of the previous decades are being paid attention as well, through the theoretical debates and changing perspectives now that researchers can admit their mistakes, and can change their approaches to improve their research strategies for the better, such case studies are not disturbances of varied assumptions anymore to the hypothesis of the archaeologist he/she tries to build in the framework of universally applicable laws. On the contrary, they are teaching elements in the sense of showing there are no social laws molded into one single frame, and inspiring elements in the sense of distributing the varieties of the models. Ethnographic methods, applications and ethics especially in archaeology have improved recently, although today there are still complications about its methods, publications and the right of protecting information, sometimes claimed that ethnographic data is simply out there to be included in one's publication without needing to quote any reference.

Most recently, David and Kramer stated (2001) ethnoarchaeology, shortly the ethnographic study of living cultures from archaeological perspectives, is neither a theory nor a method, but a research strategy using varied approaches to understanding the relationships of material culture to culture as a whole, both in the living context and as it enters the archaeological record, and to exploiting such understandings in order to inform archaeological concepts and to improve interpretation. A socio-cultural anthropologist might as well define ethnoarchaeology from another perspective to study it as a form of anthropological inquiry giving a privileged position to the evidence of material culture and behavior relating to it (David and Kramer 2001). The most recent studies in ethnoarchaeology encompass both post-processualist and processualist archaeological thoughts. The studies of material culture under the term ethnoarchaeology were also criticized as not considering the cultural systems as a whole in which they interact with each other in an operational chain built up on interconnected relations between power, daily life, and their material conditions (see David and Kramer 2001).

Ethnoarchaeology can bring explanations to archaeological remains left by people who lived in the past. Archaeologists have extensively used ethnographic, ethnobotanical, experimental and historical literature in seeking assistance for reconstructing the past environments and 'for their particular archaeological questions in mind' (David and Kramer 2001). Taphonomy is 'the study of the transition' of biological remains 'from the biosphere into the lithosphere' as Efremov first used the term in 1940. Taphonomy is commonly focused on a geobiological understanding of the earth, grounded on the postmortem processes that recycle biological materials and attempt in reconstructing past environments and biotas (Behrensmeyer *et al.* 2000). Use of taphonomy in the ethnoarchaeological approach was expressed by Stiles (1977) as 'aspects of organized human activity of the kind which will leave preservable traces in the archaeological record and understanding of the relationship of the patterns of these traces to the patterns of activities which produce them.'

It is essential that studies of formation processes come to be conducted routinely; for unless the genesis of deposits is understood one cannot infer the behaviors of interest from artifact patterns in those deposits (cf. Schiffer 1983). Formation processes, cultural and environmental, create the evidence of past societies and environments that remain for the archaeologist to study (cf. Schiffer 1983).

Faunal and subsistence studies including hunter-gatherer studies in different continents have been paid an increasing attention since 1960s. Processes of the plants and fauna leave behind remains and tools used in processing for the archaeologist to examine, just like how modern people continue their daily activities of which traces they leave; however with a difference that the recycling and entrance of these remains into the archaeological context complicates their evaluation by the researchers. Because faunal remains often reveal butchery practices, evidences of the type of the prehistoric settlement are gathered through them. In a permanent settlement it is possible to recover the bones of the edible parts of animals, whereas in a hunting camp or in a seasonal settlement, inedible parts, which are burdens to carry back, are left behind. Although faunal remains are less subject to decay than plant remains, affected by external factors such as carnivores, destruction and human manipulation, their entrance to the site is as complicated as the latter. In the last decade the increasing studies concerning the relationship between taphonomy and behaviors which have included both faunal and plant remains use the main starting point of Binford as he used ethnographic analogies to understanding the system properties and based on the middle range theory understanding the relationship between behavior and archaeological context, rather than applying them to archaeological materials. Ethnoarchaeological research was undertaken by Hodder as well, the pioneer of the post-processual agenda. According to Hodder's research among the local people living in the Nuba Hills, Sudan there are treatment differentiations between pigs linked with women and dirt, and cattle linked with men and fertility. It is possible to see the effects of such symbolic examples in the recent articles of his too.

Starting from 1980s, archaeobotanists have become widely concerned with the experimental studies and ethnographic observations to interpret the plant remains recovered from the archaeological record. Organisms not only produce potential archaeobotanical remains but also are highly effective recyclers of plant material. States of preservation of archaeobotanical remains are not only indicators of how faithfully archaeobotanical history has been recorded, but are also testaments to environmental conditions and evidence of important aspects of botanical evolution (wild progenitors of species and their domestications, origins, distributions and trade routes).

Until the last decades archaeobotanists have the similar problems with archaeologists who interpreted their archaeological data using ethnographic analogies which did not bring clear explanations to archaeologists' questions in their mind. Glynis Jones (1983; 1984) and Gordon Hillman (1984; 2000) were the first archaeobotanists who used experimental research and ethnographic analogy undertook in Turkish and Greek agricultural communities, respectively, to understand plant processing and disposal. Miller and Smart (1984), in a comparative approach investigated various fuel resources and their possible effect on taphonomy of the charred seeds. In the last decade there is an increase in hunter-gatherer studies, especially paid much attention by some archaeobotanists who believe they can bring better explanations to the archaeobotanical record of the prehistoric sites by gaining the ethnobotanical data concerning the uses of plants by hunter-gatherers as the closest living variations of the prehistoric societies.

The new trend in the recent decade has been the coming back theme of the studies undertook in the earlier decades and their appreciation as well as that of new projects under 'the reconceptualization and the broadening range of subject matter, the growing sophistication of research design and implementation, the development of new techniques, and the increasing scales, synchronic or diachronic, of ethnoarchaeological projects' (David and Kramer 2001).

2.3. Ethnobotany

Today, ethnobotany separates into 'salvage ethnobotany', the preservation of plant knowledge from the few remaining non-literate cultures before it is lost forever under the effect of modernization; 'applied ethnobotany', the use of local knowledge of plant conservation to preserve the rain forest, endemic species or land races of domesticated plants; and 'village-based ethnobotany', the investigation of people-plant interaction using ethnographic field methods (see Ford 1994). The former two have been dominated by those with academic training in botany, and the latter has been dominated by the ones with academic training in anthropology. Ford, in his same book, criticized the new standpoint of ethnobotany by stating the need that ethnobotany must return to investigate the meaning of the plants, one of its more productive historic roots. While he gave examples from the previous and the beginnings of the present century of ethnobotanical works which documented the plant knowledge of the non-literate cultures from their point of view with as little westernized approach as possible added by the researcher himself. However, the problem with such works was that, their methodology lacked a systematical data collecting and botanical descriptions and identifications of the plants described by the local people. Ethnobotanical fieldwork was originally conceived as an art and skill practiced by outsiders who traveled to distant lands to document customs and beliefs (cf. Martin 1994). As the western scientific approach developed the field of ethnobotany with standard research methods applied in fieldworks mostly undertaken by American, European, Australian or Canadian researchers for a long time, these approaches criticized by Ford (1994) as the loss of the very definition of what a plant is through the rejection of the spiritual basis of the culture under the organizing principle for a fuller understanding of the plants in the culture, are now changing with the introduction of the new issues for research and alternative models for interpretation by many more ethnobotanists from other nations. While until last decades these intellectuals were basically used as translators in the ethnobotanical fieldworks undertook by western researchers, it is now changing that indigenous intellectuals investigate plants and people in their own culture. At present, many people have adopted ethnobotanical methods to carry out studies of their own communities.

Martin contributed much to the field with his book ‘ethnobotany, a field manual’ (1994) where he defined ethnobotany as exploring local people’s perception of cultural significance and studying the interactions between people and plants. He placed ethnobotany in a subdiscipline of ethnoecology which describes local people’s interaction with the natural environment, including plants and animals, landforms, forest types and soils, etc. For this reason, an ethnobotanist needs to have some understanding of a broad range of academic disciplines. This range varies depending on the study subject. In this research ethnobotanical research strategies used by the present author required to have the knowledge of making voucher specimens, using them during the research, the knowledge of the botanical taxonomy of the plants studied, their geographical locations, and their definitions and characters throughout seasons, the nutritious and chemical values of these plants, and the ethnographic field methods for the availability of the ethnographic analogies. The research methods are demonstrated in detail in the methodology chapter.

2.3.1. How Ethnobotany Helps Us to Understand the Importance of Plants

People living in rural areas today still use plants in various ways as well as for food. They make use of every plant part in construction, fuel, animal fodder, weaving clothes, mats, baskets and various utensils, leathering, insect repellents, cosmetics, decorations, various tools including plant harvesting, storage, processing and food serving, painting, cleaning, healing, protection, symbolizing anything including expressing feelings and the ones which cannot be explicitly talked about, rituals including birth, initiation, pregnancy and death, and even functioning as a toy. A saying in Anatolia summarizes it as ‘from cradle to funeral’ pointing to importance of wood and wooden objects in the entire life of a human. Studying ethnobotany can reveal as much possibilities of the use of a plant as possible. Ethnobotanical methods and theoretical viewpoints have improved to offer researchers very systematical interdisciplinary research strategies.

2.3.1.1. Taphonomy

Taphonomy helps us understand how processing affect the archaeobotanical record and artifacts related to usage of wild foods. Some of the collected wild plant parts, such as fruits, nuts, tubers and seeds in their fresh form are delicious while others are unpalatable. Among wild plant species on the earth, only some are edible. While many are poisonous and indigestible, others, especially some edible seeds are too small with their time consuming collecting. There are several cooking and processing methods people apply to plants in order to make them edible and digestible. Such a transformation changes the chemistry of the plant as well. There has been various experimental research undertook for testing the processing methods applied to plants. While some processing methods make plant foods more durable, others are applied to make them softer and also edible by reducing the unwanted tastes such as bitterness and extreme sourness. Several drying, heating, rinsing and soaking methods were applied to blackberries, elderberries, sloes and crab apples in an experimental work undertook by Wiltshire (1995) to explore the kinds of foods exploited by Neolithic peoples in Britain. It was concluded at the end of several applications of these methods that, in spite of the fact that individuals appreciated different food taste, fruit types certainly demanded diverse methods to be palatable and tasty. While soaking some types of dry fruits decomposed them, it reduced the acid and bitterness in some other types.

Cooking was the common invariable process which improved the taste and smell of the fruits, since it changed the temperature, moisture and pH regime of food as well as its surface texture to make them edible and desirable both chemically and physically (Wandsnider 1997), and the most important to make fruits and all other types of food digestible to obtain more energy and nutrients (Stahl 1989). According to Wiltshire (1995), heating, drying and soaking processes affected taste and flavor and reduced the astringency of the wild fruits by changing their chemical composition. A heat treatment to food also kills food-borne and spoilage bacteria and parasites by reducing the water amount in the plant which is needed by bacteria growth and makes the food storable for longer periods (Wandsnider 1997). Heat makes the plants edible also by means of changing the chemical structure of the plants including tissues in which some toxins develop. In the case of such fruit types which kept their astringency in their mature state as well, such as sloes and crab apples as indicated by Wiltshire (1995), certain drying or heating processes need to be applied in order to make the fruit palatable. Heating and drying of fruits, also improving the taste and reducing the toxicity of acid, astringent fruit whether they are eaten dried or rehydrated fruit, allow them to be stored for considerable periods by inhibiting microbial growth, particularly that of the most prevalent food spoilage fungi. Fermented fruits and beverages might have represented a safely stored and important source of calories and nutrients. The processing of the fruits would enhance fermentation by increasing available sugars and reducing tannin activity, and there is little doubt that alcoholic beverages, or fruits steeped in an alcoholic liquid, would have been very palatable (cf. Wiltshire 1995).

In the experimental work of Wiltshire (1995), fruit types were first dried in doors under room temperature which resulted in developing mould. Only when were these fruits heated in higher degrees than room temperature, they did not develop mould. In rural areas, and possibly in the past as well, such plant processing techniques have generally been applied in outdoors for supplying enough air circulation and heat. Rooftops are still the preferred domestic areas for food processing, because such places have good air circulation and are away from being stepped on both by people and livestock. Today, even in summer resorts of Turkey where working or retired people living in towns spend their summers, vegetables are always processed in open air. For this reason, almost all houses in some areas, such as in Aydın, Kuşadası, have flat rooftops designed as modern balconies made from cement. Here, almost all households dry vegetables and fruits in great amounts including the wild ones that they grow in their garden. The drying process is always applied in open air either on rooftops or in the house verandas. Making tomato sauce is one of the most common processes here for preserving summer plants during the year. Every summer, a large proportion of the gardens are used for tomato growth for producing tomato sauce. Around one hundred kilograms of tomato fruits are processed by each household to make 7-8 glass jars of tomato sauce. The process included cutting tomatoes into pieces, storing them in large plastic containers for 5-6 days for fermentation (some tomato juice start to accumulate below the container), leaking the accumulated tomato juice out by help of a hose, leaving the tomatoes still stored for 2 more days for more fermentation, sieving the tomatoes for both separating the seeds and the shell (this mixture was generally dumped in the garbage, and rarely given to animals, since the inhabitants did not own animals) and also making it into a mush and finally prior to storage leaving the mush for drying on a metal pan for 4 days by stirring it once a day. It was experienced by the new inhabitants that every time they processed tomato sauce in doors, it produced mould. Such a process would leave no plant remains behind, but the various tools used during the processing. Tomato sauce production in the mountain villages of Karadağ is almost the same. In house gardens there are fire installations surrounded by stones on which tomato sauces are boiled in large pots. The rest of the process is very similar to that of Kuşadası summer resorts. The shell and seeds of tomatoes are also generally thrown to the garbage next to the house. Rarely is it given to sheep, goat and donkeys. In this case dung used as fuel including tomato seeds first gets charred either in garden ovens or in house ovens, and is finally dumped in the garbage. Such a process would produce results of macro plant remains which reflect as only animal fodder.

Some wild fruits, nuts and seeds taste bitter caused by their high tannin the plant produces to protect itself from the predators. Once their tannin is removed, they become edible, nutritious and yield high calories. There are several processing methods people apply to such wild fruits to reduce their tannin. Kernels of most races of almonds, particularly the oriental almond, cannot be eaten without de-toxification to remove the dangerous prussic acid called cyanogenic glucocide (Zohary and Hopf 2000). Experimental works to de-toxificate were done by fermentating the almonds (Mc Laren 1995), or by roasting followed by grinding and leaching (Hillman 2000). It was stated by Ribereau-Gayon (1972) that, the heat treatment in the presence of water was reported to enhance polymerization of condensed tannins in vitro. 50 ºC of temperature is enough to fix tannins irreversibly to other cell polymers (Swain 1979), hence the binding activity of the tannins with proteins and other compounds are held back (Wiltshire 1995).

Heating is the food processing technique producing most of the archaeological evidence concerning plant remains. Through heat, burnt plant parts which are not so brittle like leaves can remain and are recovered in the archaeological excavations. Plants which are collected for food and whose most often charred remains are recovered from the archaeological excavations are the mixture of crop plants, weeds and wild plants. It is also important to evaluate on site and off site taphonomy of plant remains. Consumption and processing of some plants happens off site and do not reflect in the archaeological context. The plant remains recovered are composed of only the plant parts brought into households. For this reason, further archaeological investigations on a larger scale encompassing the household surroundings and site catchment area are required especially for the prehistoric periods.

There are also several complex processes applied to wild food plants which would not reflect in the archaeological context. When dry plant parts, especially seeds and fruit kernels, are grounded or pounded in their fresh form, spilled or unused proportion simply decay. For this reason, the taphonomy of the artifacts becomes the central focus in search for archaeological evidence of the consumption of these plants.

Wild fruits are also suitable for storage as dry food types, similar to seeds. Storage techniques developed not only help to preserve food for longer periods but also process the food for reducing its tannin to make it edible. Storage pits are the most common architectural feature recovered from early periods of archaeological sites. Before storing wild fruits, there are additional processing methods applied for preserving them from spoilage fungi, which make the fruit bad tasted and poisonous through produced mycotoxins and for preserving them from cold, hot and humid weather conditions. Drying and mixing salt are two common processes applied prior to wild fruit storage. Although drying process could have been rarely detected from the taphonomy of the wild fruits recovered from the archaeological excavations (see Wiltshire 1995); there are other methods applied for preserving food. At Çatalhöyük excavations, mat remains sealed with clay on top preserved various stored seeds including wheat grains both from weather conditions and from predators such as bugs and mice (Rosen 2005).

It was suggested by Byrd (1989) that, as its examples are seen in California, while querns and handstones pointed to their function of processing cereal grains, mortars and pestles preceding the querns and handstones recovered from sites in Levant have been generalized to nut-processing tools. The impossibility of attributing certain functions to these tools was questioned with later research (Wright 1991). Byrd (1989) addressed this chronological tool occurrence in Levant as the representation of the technological improvement which was affected by the development of agricultural economies, also stressing the fact that such a change does not necessarily show processing different plant types than the previous ones. In the Natufian Negev the change from mortars and pestles to quernstones indicating the cereals as late addition to nut-based diet was also concluded (Goring-Morris 1987). Solecki reported that (1969), the abundant recovery of the querns, handstones, and quern-mortars from the early sedentary Zawi Chemi Shanidar site situated in the Zagros Mountains in Northern Iraq with the plentiful fruit tree resources was related to acorn processing as their major use. The use of bedrock mortars bearing cupmarks or cupholes recovered from the early Neolithic settlements of Southwest Asia was interpreted as plant processing tools (Wright 1991). Ethnographically similar cases from acorn pounders of California and the Zagros Mountains in western Iran were studied with the analogies to their uses in the past (Younker 1989). Younker's study drew analogies by using the ethnographic data collected from acorn pounder communities of California with its similar climate, plant genera and environmental conditions to attempt identifying potential acorn processing locations in the Near East. The description of areas of past woodland owning surface bedrock with cupmarks and near water sources for leaching the ground acorns as possible acorn processing locations fit many sites such as Tell el-'Umeiri in Jordan and several sites of which were caves as ideal for acorn storage in Mt. Carmel area in Israel; however no acorn remains were recovered from these sites.

2.3.1.2. The Balance between Wild and Cultivated Plants

Before the human manipulation, there existed no domesticated plants in the world. Why people needed to domesticate the plants and how this process happened has been debated for decades (Flannery 1973; Harlan 1992; MacNeish 1992; Smith 1995). The domestication of wild plants by humans triggered important changes in the geographies where the domestication happened. In the Last Glacial Period, many climatic changes happened with the periods of drought, humidity, warming and cooling. The Near East was the less affected geographical area from the dramatical changes in climate. It being affected from the mildness of the Mediterranean climate also played the factor of wild cereals growing in this region. Before cultivating plants, humans collected wild plants from their wild stands. When some wild plants were selected to be grown nearby the human inhabited lands, it was made possible to grow more edible plants per hectare which meant more calories. Collecting these plants required less energy as well, by going to the location they were grown, instead of wandering in longer distance to reach and fetch them. With the domestication of the plant species individually happening in several parts of the world, subsistence strategies of people shifted from hunter-gathering to agriculture. Cultural contacts and trades carried these domesticated plants over long distances and limited the lands of hunter-gatherers. The domestication of these suitable wild species gave rise to food surpluses and food storage. Food surpluses allowed human groups to expand their populations. With the plus energy and calories gained, human groups put their time, energy and labor to discover and improve new strategies to advance their war, transportation and construction technologies, hence living standards (see Diamond 1999 for details).

Wild plant remains of seeds, hard shells, pips, tubers and stones along with cultivated ones have been found frequently in archaeological sites from various periods. Although some were man-follower seeds and some were mixed in the collected plants, most of these plant parts were intentionally collected from the wild. Plants collected for food differed from one group to another. Human groups generally tend to make use of every edible food resource in their surroundings. Especially in times of food stress, several types of plants which would not sound tasty in a western culture were used as food.

While the chances of recovering plant remains are mostly dependent on them to be subjected to fire either intentionally or accidentally, archaeobotanical data is most of the time limited to on site plant consumption excluding leaves, fresh greens and many dry or fresh herbs which would decay. As a result, the fresh consumption of various wild food plants many times do not reflect in the archaeological record, since these plants do not pass through the firing process; therefore the distribution and proportion of the charred plant remains sometimes is not as the archaeologists hoped them to be. The studies for reconstructing the paleovegetation in the areas including charcoal, pollen and phytolith analyses, and current vegetation of these areas show that these food plants absent from archaeological records grew in the surroundings of the early settlements. Ethnobotanical researches in these geographical zones also reveal the results that these plants still growing in the area are consumed and used by local people either raw or processed. Hillman notes that (2000), 'vagaries of the taphonomy of charred remains of many plant foods make it unsafe to assume that their apparent absence in the remains is an automatic indication that they were not used. This is particularly true of foods such as soft fruits like wild grapes and figs which are likely to have been consumed off-site, and soft root and leaf foods which have a relatively poor chance of being preserved by charring in identifiable form.' On the contrary of this situation, large recovery of wild plants collected for their seeds, berries, or nuts indicates that, long after the firm establishment of agricultural practices, collection from the wild continued to supplement food production on a substantial scale. In most ancient cultures wild plants seem to have provided a major parallel source for food.

Wild food plant parts such as seeds recovered as in their charred condition have several complications in their interpretations, for whether they are consumed by humans or fed to animals and in result charred in dung. Today, in steppic and wetland environments dung is often used as fuel, because steppes have expanded through the time due to the facts such as wood cutting, fires, land clearing and modernization. In the past, steppes were much narrower with available tree resources for fuel in closer distances. For this reason, sources of charred seeds in the prehistoric context need careful interpretation especially in cases of abundant charcoal being present. Wild fruits and tubers are less likely to be used as animal fodder. Unless fallen fruits are grazed by animals, people do not put so much effort to gather fruits from trees or uproot plants for their tubers, and then to process them for fodder use. For this reason, most of the wild fruit and tuber remains recovered from the archaeological excavations represent human consumption. Although better indicator for Neolithic was 60 years ago before the mechanized agriculture was introduced to these areas, today in many villages consumption of wild food plants are still important part of the diet of local people. Activities by human groups leave tiny or a lot of traces behind changing the surface of the earth and most of the time local plant species are being replaced by others which can adapt to human controlled and altered environmental conditions better. With the increasing population in the world, people need more space to grow domesticated plants which also destroy the original flora and plant diversity of the regions.

Archaeobotanical analysis of the large and diverse plant remains recovered from early agrarian settlements in the Near East showed some parallels to wild food plant use. Hillman *et al.* (1989) concluded that most of the edible seed types identified for Abu Hureyra must have been used as food. Van Zeist (1991) considered this conclusion applicable to the interpretation of the plant record of Near Eastern early farming sites, pointing to widespread recovery of the wild food plant remains, such as Leguminosae seeds from Ramad, Aswad, Ganj Dareh Tepe; chenopodiaceous seeds from Bouqras, cyperaceous fruits from Aswad and small grass fruits from Ramad. This abundance and commonness showed intentional gathering of these seeds and fruits for human consumption and that they were not the by-product of crop processing or of any other domestic practice (van Zeist 1991).

According to the results of analysed samples from Çatalhöyük Neolithic site, total number of charred cereal grain and domestic pulse seed was 624 whereas total number of hackberry stones was 235, and fruit and nut remains was 295 (Fairbairn *et al*. 2002), which is also an evidence for the extensive wild food plant consumption even at this site whose inhabitants practiced agriculture. *Celtis* sp was also recovered extensively from Neolithic and Chalcolithic levels of various archaeological sites in or near the currently and previously woodlands of Near East. It was discussed recently that (Asouti and Fairbairn 2001), because siliceous fruit stones of hackberry (*Celtis* sp) could survive without being subject to fire, they were not directly comparable to the abundance values of cereal and pulse remains in their charred form which could otherwise not survive. A more realistic approach should involve comparing only charred nutshell and cereal/pulse grain as representatives of wild and domestic plant foods respectively, assuming that nuts and grains/pulses are good candidates for storable foods from each group (Jones 2000). But then, there are other biases in archaeobotanical data. As stated above, many wild food plants including nuts, fruits and green edibles are largely consumed during other activities and during casual gathering off site. On the other hand, storable food, such as cereal grains are always brought on site. Off site cereal processing can be argued as well, still some of the processed parts are brought on site mixed in grains. Comparisons of consumption so far made between the wild food plants and domesticated plants need to be investigated better through ethnobotanical research and larger scale excavation strategies.

Although wild food plant consumption is limited to herbs and spices in the industrialized world, in rural parts of the world there are still millions of people whose diet is dependent on these plant resources. Several works undertaken in Anatolia and Greece are proofs of it (see this chapter for further detail). Friedl and Loeffler (1994) conducted a research in a settled farming village in the Southern Zagros Mountains in Iran and concluded that people living in this area were heavily dependent on a hunting-gathering subsistence strategy which also included acorn gathering.

2.3.1.3. Nutritional potential of wild plants

2.3.1.3.1. Cal (energy)

In this section, the percentage of energy which comes out from the amount of wild fruits, nuts and tubers is mentioned.

Energy released from body by oxidation is either used by the body, or it is stored as fat against a period of scarce resources. Calories used for energy can be obtained from carbohydrates, lipids (fats), proteins, and alcohol. Lipids generally yield the highest energy value (cf. Wing and Brown 1979). If carbohydrate and fat cannot be consumed regularly, human body suffers from protein toxemia which in serious cases causes dimentia; however the body recovers in a few days with the consumption of carbohydrate and fat (Crowe 2005).

Wild plant foods, previously played a pivotal role in the evolution of the primates including humans, continue to sustain some of the few surviving hunter-gatherer societies (cf. Crowe 2005). The edible wild plant species make a low percentage among the total species on the earth. While some are poisonous and indigestible, others, especially some edible seeds are too small and their collecting is time consuming. Human groups took every opportunity to feed on a nutritious diet which included all edible food plants available in their surroundings. Detailed ethnobotanical research in the world showed that people living in rural areas still consume a diverse range of wild plants alongside the domesticated ones (Ertuğ 1997; Forbes 1976; Moerman 1998; several articles in Economic Botany issues). These populations have had the chance of consuming a range of foods sometimes collected from far which is justified by their energy and nutrition values. Small seeds need more energy to collect and process and the calories spent for getting this type of food is sometimes more than the calories gained from the food. For this reason, human groups selecting larger seeded plants for consumption have led to their domestication. According to a theory, the reason why agriculture and animal husbandry emerged in different geographies is the exploitation of natural resources (Crowe 2005).

Owing to diverse food resources, if one fruit or nut genera fails for one or more years due to unexpected changes in the climate such as drought, early snow fall or a long winter season, there are always other fruit or nut species to collect plentiful amounts. When the diets of people living in urban areas are compared with such examples from rural environments, it is concluded that diversity in diet becomes poorer in the former one. Mechanized agricultural economies have less energy, vitamin and mineral intake than the mixed economies which have to support their crop based diet with wild food plants. An unbalanced carbohydrate based diet causes obesities, today's one of the biggest health problems, and other severe diseases such as hearth, vascular system, high blood pressure problems. Skeletal measurements of prehistoric Mexican and Guatemalan populations showed a reduced height which became most distinct in the Classical Period of central and southern Mesoamerica whose diet depended on intensive food production and who apparently suffered from severely imbalanced nutrition (Wing and Brown 1979). A shift from a hunting and gathering subsistence pattern to an intensive agricultural way of life in these geographies also caused dental and bone abnormalities associated with malnutrition (Nickens 1976).

Glucose needed for energy is produced from carbohydrates in the body. Populations living in marginal zones such as in the Arctic have genetically adapted to nutritional stress in lack of carbohydrate sources by transforming glucose from proteins and fat (Wing and Brown 1979). Such populations adapted to a certain diet will suffer from obesity when shifted to a high carbohydrate diet (Wing and Brown 1979).

If wild almonds were eaten in the mature state, the oil-rich kernels could have made a massive contribution to caloric needs (cf. Hillman 2000). They are about %35 fat by weight, and fats yield about four times as much energy as the same weight of starch (cf. Hillman 2000). Oil rich terebinth fruitlets are also a good energy source. As it is recorded on the table 1 and table 2, N-free carbohydrate values for acorns constitute the highest energy value. According to Turkish dieticians (Saraç 2005), plums constitute high energy values, but these numbers are missing in the literature. A diet composed of all these different food types is very nutritious and yields high energy. If this diversity is reduced to a grain based diet, it is apparent that the human body suffers from malnutrition and energy loss which would limit activities.

Stored and fresh acorns were analysed by Korstian (1927) to compare their fat and carbohydrate values and it was observed that fat decreased in stored acorns while carbohydrate increased. On table 1, when nutrition values are compared between bread made from *Q. robur* mixed with clay and without clay it is concluded that, clay adds fat to bread and this extra value is balanced by the reduction of carbohydrate N-free extract. The nutrition values between roasted and raw acorns collected from the same tree were analysed by Mason (1992). According to these values when acorns are roasted, protein value increases through the metabolization by the released fat. Further nutritional tests are needed to analyze other wild nuts in their raw and roasted condition. In the same way, when terebinth fruitlets are roasted the fat inside the nut is released. Whether this change also increases the protein value is unknown yet.

Table 1. AMEn and TMEn values of *Q. brantii, Pistacia atlantica* and *P. khinjuk*. (after Saffarzadeh *et.al.* 2000)

N-corrected carbohydrate values	**Acorn**	**P.at**	**P.kh**	**wheat**	**barley**	**triticale**	**rye**	**corn**
AMEn (apparent metabolisable energy)	14.1	13.5	17.3	12.6	11.1	13.2	10.9	14.0
TMEn (true metabolisable energy)	13.3	16.8	21.1	13.3	12.1	13.2	12.3	14.5

Table 2. Nutritional values of wild fruits, nuts and tubers. *Quercus* species in this table grow in Southwest Asia including Turkey.

taxonomic list	energy kJ/g	carbohydrate N-free extract	fibre	fats	protein	source
Pistacia atlantica terebinth fruitlets	26.11	17.75	---	---	---	Saffarzadeh *et.al.* 2000
Pistacia khinjuk terebinth fruitlets	26.37	21.05	---	---	---	Saffarzadeh *et.al.* 2000
Pistacia sp. fruitlets	21.1	24.8	21.6	42.6	8.1	Kuzayli *et. al.* 1966
Quercus brantii acorns	17.6	86.1	---	8.4	4.2	Mason 1992
Q. cerris acorns	15.8	82.3	4.5	4.2	6.3	Petrucci 1947
Q. ithaburensis ssp. *macrolepis*	17.1	88.1	---	6.0	4.4	Mason 1992
Q. infectoria ssp. *boissieri*	16.2	94.3	---	1.8	2.6	Mason 1992
Q. ilex	17.6	78.5	1.6	10.9	5.9	Mazuelos Vela *et.al.* 1967
Q. robur	16.3	84.1	2.8	5.2	5.6	Gaussen& Rouquette 1949
Q. robur roasted	16.8	85.3	---	5.4	7.0	Mason 1992
Q. robur bread with clay	15.5	83.6	---	2.6	6.8	Mason 1992
Q. robur bread without clay	16.1	89.4	---	1.5	7.5	Mason 1992
Q. pubescens	16.3	85.7	2.5	4.7	4.9	Gaussen& Rouquette 1949
Prunus dulcis almond kernels	27.2	17.5	3.2	57.2	19.2	Kuzayli *et. al.* 1966
P. dulcis dried	27.2	17.7	2.7	56.9	19.5	Watt&Merrill 1963
P. dulcis sweet variety	27.5	15.0	3.2	57.7	22.1	Winton& Winton 1932
Scirpus maritimus tubers						

Table 3. Nutritional values of various grains, wild seeds, nuts and meat. (Febrel and Cabrallido 1965; Sheffer 1972; Ash & Ash 1994). * = fiber is included in the carbohydrate value.

Species	energy cal/100 g	protein	fat	carbohydrates N-free	fiber
Triticum vulgare wheat grain	326	10.20	2.00	69.80	--
Hordeum vulgare barley grain	339	12.00	2.00	68.00	--
Sorghum vulgare Sorghum	332	11.00	3.30	71.30	--
Setaria italica foxtail millet	355	10.00	2.50	73.00	--
Typha latifolia Cattail rootstock flour	367	6.90	3.10	79.80	*
Quercus alba white oak	221	2.80	3.30	43.90	1.30
Quercus rubra red oak	299	3.40	12.90	42.10	1.90
Juglans nigra black walnut	621	24.10	58.50	10.80	1.00
Odocoileus sp. deer	126	21.00	4.00	.00	.00
Anas platyrhynchos wild duck	233	21.10	15.80	.00	.00
Helianthus annus Sunflower (oil rich)	560	24	47.30	16.10	3.80
Chenopodium album Lambsquarters (starch rich)	320	13.30	5.60	45.90	14.60

2.3.1.3.2. Vitamins and Minerals

Hawthorn fruits are rich in vitamin C (Townsend and Guest 1966). They include procyanidin oligomers which have positive effects on heart and vascular system (Saraç 2005). Plums, considered helping dispose excessive water in body, are high in potassium, iron and vitamin B (Saraç 2005). Rosehips include licopen, vitamin C and E, and iron. They have been considered as strengthening body immune system against flu and cold, and tea made from them is drunk commonly in Turkey for it. Walnut, peanut and hazelnut include vitamin B and E, zinc and iron; they are mentioned as stress defenders and relaxants (Saraç 2005). Rosehips and hawthorns are also known as antioxidants which is a popular topic in modern dietetics. Acorns were mentioned as good source of vitamin C and B (for details see Mason 1992).

Sour taste of *Rhus coriaria*, *Prunus cocomilia, Prunus divaricata* and *Pyrus elaeagnifolia* as in other sour fruits is associated with hydrogen ions in organic acids. *Rhus coriaria* also includes limonene, sugar, 4% tannin, organic acids and their salts (Saraç 2005).

Sweetness of *Celtis tournefortii* and *Celtis glabrata* is caused by some compounds containing hydroxyl, carbonyl and amino groups such as gycerol, sugars, and some amino acids (Wiltshire 1995).

Bitterness of acorns of some oak species and wild almond are caused by tannin which creates an overwhelming dryness in the mouth. Unlike a true taste where specific areas of the buccal cavity are stimulated, astringency is perceived as a diffuse sensation, and has even considered being a feeling factor (cf. Wiltshire 1995; Joslyn & Goldstein 1964). The astringency is caused by tannins binding to proteins and glycoproteins in saliva and reducing its lubricant qualities; this causes the mouth dryness and puckering (cf. Wiltshire 1995; Joslyn & Goldstein 1964). According to Swain (1979), cow, sheep, deer and various animals showed similar response to levels of tannins; and if the concentration of the tannin in a food was higher than 2% dry weight, the food was rejected. Mole and Waterman (1987) reported that, birds, herbivorous reptiles and mammals consumed less food when fed with tannin rich food which decreased their growth rate. Tannin is confined to certain cells in fruit tissues (Joslyn & Goldstein 1964). They do not occur in bacteria, fungi or animals (Swain 1979). Condensed tannins, in other words proanthocyanidins, compose the main tannins in fruit tissues and as they are relatively resistant to microbial attack, only few microorganisms are able to use them as carbon source (Wiltshire 1995; Scalbert 1991). However, it was also reported that, every plant so far investigated has several different tannin-like compounds with great variation in the molecular structure of the plants (Joslyn & Goldstein 1964; see Wiltshire 1995). Although many immature fruits are astringent, after several mechanisms occurring differently for each plant species during the maturity process such as loss of solubility and binding ability of the enlarged tannin molecules, the ripe fruit is no more astringent (see Joslyn & Goldstein 1964). While astringency diminishes during the maturity process for many fruit species, some fruit species such as acorns and almonds keep their tannin content even when they are ripe. For some fruit species the tannin percentage is so high that the fruit becomes unpalatable. It was stated by Zohary that, just 20-25 kernels of the oriental almond could have proved fatal. Inspite of the fact that kernels of wild almonds protect themselves against predators by including tannin which is called prussic acid (cyanogenic glucocide) their oil-rich content makes them valuable for energy income. The green fruit loses its astringency when it matures, and the sour taste of the fruit is apprecaited by local people. However, the green part is not as nutritious as the kernel part (Hillman 2000).

2.3.1.4. Cultural Significance

People all over the world interact with plants to different degrees. In big metropols people generally do not observe any food processes or tools used in obtaining these foods, so the big masses of people's interaction with plants is only on social consumption level, while the food production and processing are centralized and specialized in technologically armed buildings or factories. On the other hand, in industrialized societies like Türkiye, Greece, Balkans, Russia and several others, there are still millions of people who supply their food by gathering and processing plants and by animal herding, hunting and fishing. Resources of food vary according to environmental factors. While some areas have plentiful food resources, others may not have enough to feed people dependent on them. Also, while an area supported the people living on it with rich varieties of food, the exceeding population limit exploits its food resource.

Cultural significance of a plant is affected by the geographical situation of the area people live in, nutritional and chemical properties of the plant, technical advancement and the interrelations of the culture, fertility of the soil and the floral diversity of the area, and the economical situation of the people living in the area. People living by the water sources are luckier than the ones living in the arid zones from the point of the plant diversity. While an area with available water resource might seem advantageous, it might have other geographical disadvantages to prevent people cultivate plants. Living spaces in the high elevations of the mountaneous areas is an example to it. Such

cultures generally shift between the lower and higher zones in different seasons, arising land ownership problems. Plant species which are culturally significant which grow in another part of the area often leads tension between neighboring groups. Spices were a major cause of warfare between European nations as they sought to break the Asian monopoly. Spices were important in those days, because they made decaying food palatable. Often wild plants used for the medicinal purposes become indispensable in a culture. The knowledge of the medicinal practices using the plant parts are transferred to the next generations with the result of protecting the plant's habitat in the area. Sometimes, people attribute a sacred position to a plant. Such practices especially concerning wild tree species are common in Turkey and Turkish Republics of Russia.
Plants and plant parts in diet become culturally significant during the centuries with the locally developed variations of the processing and cooking techniques. Through time, local variations of consuming a plant create some forms of cooking that, while a plant is cooked with some other plants, it cannot be mixed with any others. Such varieties are engaged with the identities of cultures and some groups interconnected with each other continue cooking the plant in the same way. The variations of the cooking are also affected by the struggles and tensions with neighboring groups and their ways of cooking the plant is attested.

In Konya, oak tree is included in circumcision presents, as something valuable, among other presents such as poplar tree, gold, land, livestock and a lot of money (Halıcı 1985). In the same town in wedding feasts, the big fruit dish is placed in the middle of the feast table. This big cup with fruits sits on a 'sac' with legs, so fruits are placed in a higher level than other meals (Halıcı 1985). In religious days children go from house to house and they are given nuts, fresh or dry fruits; such as roasted broken chickpeas, dry grape, walnut, almond, peanut, hazelnut, oleaster, dry apricot and plum. Tubers are sometimes ritually important as well. In Central Anatolia, when the spring comes the first appearing flowers of *Crocus* sp. are collected by children using digging sticks called 'küsküç'. Every child has his/her own digging stick carved from wood. The child first seeing the *Crocus* flower strokes her face and eyes with the flower and cheers up. They collect *Crocus* flowers and tubers in their special bag their mothers prepared. Then, children cut a big wild Russian oleaster (*Elaeagnus angustifolia*) stick which they decorate with the *Crocus* flowers. They visit every household and ask for oil and raw pounded bread wheat. Rhymes and prayers accompany these visits. The child carrying the bag is called 'wonderer' (abdal). The tubers and flowers are cooked with bulgur meal. Sultan Navruz is a sign of spring like Hıdırellez. In the past, in early spring season people could not find fresh fruits, and Navruz feast required to eat fresh fruits or vegetables to celebrate the resurrecting nature. For this reason, every household keeps some fruits in their storage rooms in winters to eat it fresh in Navruz. For newborns, fruits are important food resource as well. When the baby is about 40 days old, Russian oleaster flour, sesame oil and sugar is mixed; this mixture is put in a piece of soft mesh to use it as a pacifier and also a feeding bottle for the baby. Also, almond is mixed with sugar and smeared on the baby's palate three times a day (Halıcı 1985). Apparently, these mixtures are thought to nurture the baby. Russian oleaster twigs are also used as amulets attached on young children's shoulders to protect them from the evil eye.

Wild fruits and nuts are also important part in the diet of children. In rural parts of Anatolia, children spend most of their time playing outside. Sometimes their parents are so busy that they feed themselves on snack food. Especially Russian oleaster and wild plums commonly found in many areas are collected from branches or under trees and edible tubers of some plants are uprooted. Many fresh greens of herbs and shrubs, and resins of trees are nibbled on. Dry fruits and roasted chickpeas, sunflower seeds, chestnuts, hazelnuts, walnuts and in villages acorns are as well as nutritionally, socially important food sources, which are consumed in entertainments and happy times. For example, sunflower seeds are an inseparable part of spending time in parks; this is why there are sunflower seed peddlers in parks, funfairs and tea garden entrances. The habit of throwing seed husks away in villages and wherever they are consumed has the continuity in parks built in towns, so that one can see the grounds of parks or narrow streets between houses covered with sunflower seed husks. In addition, in the cinema in small towns the sound of cracking sunflower seeds can be overwhelming for those who try to watch the movie (Tezcan 1984). In the old times when sugar was rare, in villages and towns in special days like religious festivals, weddings and circumcision ceremonies, guests were served plenty of nuts, seeds and dry fruits (Tezcan 1984). The same tradition continues in villages today. In weddings children, in the henna night in the wedding eve young women eat nuts and seeds. When drinking alcohol during meals, in meetings and parties, nuts, dry fruits and seeds are again indispensable. In villages especially in winter nights dry nuts, seeds and fruits are consumed by households and guests a lot. In the past when tea and coffee were not common, they were served in plates. When children go to school they take dry fruits, seeds and nuts in their bags. In 1980's, in lunchtimes students at school were given these foods for free by the government (Tezcan 1984). Common dry nuts are: hazelnut, peanut, *Pinus* nut, roasted chickpeas and wheat grains, dry grapes and plums; pumpkin, sunflower, melon, watermelon, apricot, almond, walnut, acorn seeds; oleaster, corn, mulberry, carob, fig and date. In Anatolia, wild fruits and nuts are trip foods to take along especially by shepherds, hunters and farmers who work in their farm all day. As a continuation of this habit, in trips by buses dry fruits, nuts and seeds are consumed a lot too, and peddlers sell them in bus stations.

It is also interesting to note that, in Anatolia in death and birth, it is traditional and widespread to cook and serve 'helva' dessert prepared with sugar and either pounded sesame seeds or bread wheat flour, pointing that people are welcomed and farewelled with sesame seeds and wheat grains.

Seasonal fruits are also served in baths before weddings. If the bridegroom's family prepares a 'rice feast', onions and sumac are mixed in meat dish which is cooked with dry slices of bread. This meal is served to close relatives after the bath (Halıcı 1985).

There are also symbolic importance attributed to some trees; however trees become the paraphernalia of the whole universal system in the symbolic mechanism of a central object. Especially graves of ancestors, religious people, and individuals as sources of myths make an area sacred as well as their burials. Trees near them become sacred as well (see Günay 2003 for details).

2.3.2. Ethnobotanical Studies in the World

Until 1978, ethnobotanical studies undertook in different geographic areas in the world were mostly ethnographic field cases (Ford 1978). This has been the case in Turkey except for a few exceptions. Plant use by the indigenous people in the world was extensively studied by anthropologists, linguists, folklorists and pharmacologists (Alcorn 1984; Turner *et al*. 1990; Kuhnlein and Turner 1991; Krauss 1993; see Ford 1994 for details). Moerman (1998) documented food plant use by Native Americans according to taxonomic classification of plants which was also very useful for this study. It has been especially important to record the indigenous knowledge of plant uses within the cultural context, since plant uses differ culturally even from one person to another (Ford 1994). Documenting plant names with their cultural meanings reflects several aspects of culture including their symbolic meaning (Ford 1994). Gender relations in biodiversity management and conservation were recently studied as the relationship between women and plants by several researchers (see Howard 2003). Several ethnobotanical studies from all over the world have been published in the Journal of Economic Botany published by The Society for Economy Botany since 1950s. Wild food plants previously played a pivotal role also in the evolution of the primates including humans today continue to sustain some of the few surviving hunter-gatherer societies (cf. Crowe 2005); hence ethnobotanical studies conducted in hunter-gatherer groups are still popular and important to understand pre-agricultural diet and subsistence strategies of human populations.

Forbes (1976) conducted an ethnobotanical research from a cultural ecological perspective on subsistence strategies of a Greek village to bring a better understanding to exploitation strategies of the Upper Paleolithic-Neolithic inhabitants of Franchthi Cave. In her research she explored seasonality and scheduling, techniques of management of food resource, and consumption of several food types from various resources. Her work also made an example to show the high diversity of people’s diet in 1970’s Aegean rural areas and the importance of village based ethnobotanical research on subsistence strategies to ‘make sound reconstructions of prehistoric subsistence systems ’ (Forbes 1976).

2.3.3. Ethnobotanical studies in Turkey

Füsun Ertuğ (1997), who conducted an ethnobotanical research as her PhD thesis mainly focusing on Kızılkaya village and its surroundings, where Aşıklıhöyük Neolithic site is located too, and various other villages in the Melendiz Valley during 18 months, collected information about the economical resources of these villages concerning the titles of agriculture, animal husbandry and hunting and gathering. When analysed, it was observed that 12 of the wild food plants collected have very high nutritional values being rich in protein, calcium, magnesium, sodium, potassium, iron and phosphate (Ertuğ 1997: table 22). Among wild food plants were 41% leaves, 27% fruits, 6% mushrooms, 5% tubers and the rest were seeds, flowers, rhizomes, and stems parts of various plants. Most of the wild edible fruits (28 species) belonged to *Rosaceae*.

According to Ertuğ's research results (1997), even today in the steppic environment of Central Anatolia, there are hundreds of plant species local people use in their daily life having parallels with the variety of the resources prehistoric societies used, especially the ones of which plant remains were well preserved and studied in depth such as Abu Hureyra Epipaleolithic settlement (see Hillman 2000).

As the typical Anatolian villages do, the villages where Ertuğ conducted her research have shifted to mechanized agriculture and marketing economy following 1960s. The ethnobotanical research in Turkey was not systematical until recently due to their methodological problems including local names of plants varying from one village to another, and their taxonomical misplacing; therefore there are so few ethnobotanical research done except medicinal values of plants largely studied by pharmacologists (Sezik *et al*. 1997; 1991). Öztürk and Özçelik (1991) conducted research on the plant use in Eastern Anatolia. Baytop (1994) extensively recorded wild, cultivated and domesticated plant use which is commonly used by paleoethnobotanists and ethnobotanists. Lyle-Kalças (1974) studied wild food plants sold in Aegean markets.

CHAPTER 3

THEORETICAL APPROACHES AND LIMITATIONS OF ARCHAEOLOGICAL EVIDENCE

3.1. The Data Sets Being Presented and Used in the Research

3.1.1. Neolithic and Early Chalcolithic Centers in Central Anatolia Studied in the Research

Central Highland

a) Aşıklıhöyük (good preliminary reports)

b) Musular

Konya Basin

a) Can Hasan I

b) Can Hasan III

c) Pınarbaşı A

d) Çatalhöyük

e) Pınarbaşı B (no available data)

Lake District

a) Erbaba

b) Suberde

c) Hacılar

d) Kuruçay

e) Höyücek

f) Bademağacı (no available data)

Table 4. Radiocarbon dates and periods of the Neolithic and Early Chalcolithic centers in Central Anatolia

CENTERS	DATES cal BC	PERIODS
Central Highland		
Aşıklıhöyük	phase 2: 8210-7480	Aceramic Neolithic
Musular A	8420-7980?	Aceramic Neolithic (part of Aşıklıhöyük)
Musular B	7480-7080	Early Neolithic Pottery (mixed context)
Konya Basin		
Pınarbaşı A	8540-8230	Aceramic Neolithic Camp Site
Can Hasan III	7600-6650	Aceramic Neolithic
Çatalhöyük East	7400-6200	Early Neolithic Pottery/ Late Neolithic
Pınarbaşı B	6400-6230 6070-5920	Late Neolithic Rock Shelter
Can Hasan I	(7-4) (3-2B)5710-5640	Late Neolithic Early Chalcolithic Pottery
Lake District		
Hacılar	8200-7550 6240-6060 6050-5730	Aceramic Neolithic Late Neolithic Early Chalcolithic
Suberde	III: 7460-6770	Aceramic Neolithic
Höyücek	7440-7100	Early Neolithic
Bademağacı	1/8: 7030-6690 II/4A-1: 6450-6100	Early Neolithic Late Neolithic/Early Chalcolithic
Erbaba	6690-6440	Late Neolithic
Kuruçay	13-11: ?6210-5920	Late Neolithic/Early Chalcolithic

Figure 1. The map showing the Neolithic and Chalcolithic Centers studied in this research (Arkeotlas issue: 1, year: 2002). The rectangular area is where the ethnobotanical research for this thesis was undertaken.

Neolithic levels excavated

3.1.2. The Archaeological Evidence

This part consists of the archaeological evidence for wild food plants at Neolithic and Chalcolithic sites in the Konya Basin. For each center, the percentage of wild food plants and domestic ones are distributed. The difference between the sites concerning their wild food plant remains can be viewed at table 5. The preservation and sample collecting biases for each center are mentioned in the following part under 'the biases of the archaeological evidence'.

In the last decade, there have been several technological advances appreciated by archaeologists. The analyses used in an archaeological excavation such as pollen, phytolith, nitrogen and stable isotope, dental microwear, and chemical and SEM analyses on the artifacts found contributed much in understanding the diet of the past societies, especially when the archaeological recovery techniques allowed the use of mechanical flotation machines to process an extensive amount of the excavated soil to be analysed in several dimensions including above. Restarting Çatalhöyük excavations in 1993 took advantage of all these techniques used by several specialists in evaluation of the archaeological data. An exhaustive amount of data and their interpretation were recently published by the team members (Hodder 2005). While other sites lack much of such analyses, only some of which data are recently analysed with new techniques, yet unpublished (such as reexcavated Pınarbaşı, and Aşıklıhöyük dental microwear and thin section analyses).

At Çatalhöyük, Nitrogen isotope values from human bones indicated that, the diet of the settlement inhabitants was mainly based on plant and sheep and goat (Hodder 2005). Dental microwear analysis showed that, the grains, nuts, berries and meat consumed by the inhabitants was not ground very often (Hodder 2005). SEM studies of the chewing surfaces of the molar teeth suggested that food was not often cooked, was large particle size, and was not abrasive (Hodder 2005). There is a considerable amount of wear probably resulting from regular consumption of hard things like tubers and uncooked grain(Hodder 2005). The cooking activity can be derived from the charred remains of the plants, as well as other evidence such as clay balls abundantly recovered from lower levels of the site (Fairbairn *et al*. 2005; Atalay 2005).

Chemical analysis was undertaken on the artifacts related with cooking. According to the results, sheep and goat fats and grease were cooked in pots (Hodder 2005). Phytolith analysis results indicate the use of baskets for storing or cooking wheat and maybe acorns as well (Rosen 2005). Hodder (2005), talks about the classification of the artifact utilization for cooking plants and meat, by going to separation as pots for cooking meat and baskets for cooking plants. There is interesting evidence from potsherd analysis of plant parts used in the pot fabrics that, one sherd contained many charred grain fragments but nearly no chaff used as temper (Fairbairn *et al.* 2005), which may point to various pot utilization.

The numerous analyses concerning different types of remains coming from the midden areas showed that, ash and other burnt food fragments from the ovens were dumped in the middens which were located in the large areas between the houses (Fairbairn *et al.* 2005; Martin and Russel 2005). It is possible that, ovens were being cleaned regularly. One of the clues suggesting this result is that, while there were unburnt eggshell fragments inside houses, burnt fragments of eggshell were found in the middens (Hodder 2005). There is also evidence of throwing tuber pieces that were possibly used as construction material in mudbricks in the oven fire for cleaning purpose. We understand this from the findings of burnt and whole tubers, as well as burnt fragments of mudbrick material. Relatively low degree of decomposition in animal bones recovered from middens was interpreted by their fast deposition perhaps resulting from feasting activities (Martin and Russel 2005). Baysal and Wright (2005) reports that, low proportion of groundstone fragments found in middens do not suggest feasting.

Table 5. Presence/absence of the major cereal, pulse and oil crops in Neolithic and Early Chalcolithic centers in Central Anatolia. (?= the archaeobotanist is not sure about the identification of the species, R= rachis fragments. No seeds from Pınarbaşı sites.)

	T. diccocum (emmer wheat)	*T. boeoticum* (wild einkorn)	*T. monococcum* (eincorn wheat)	*T. aestivum* (free-threshing bread wheat)	*T. durum* (free-threshing durum wheat)	*Tiriticum* as clay impressions	*H. vulgare* (naked barley)	*Hordeum* sp (hulled barley)	*H. distichum* (two-rowed hulled barley)	*Hordeum* as clay impressions	*Secale cereale* (rye)	*Lens* sp (lentil)	*Vicia ervilia* (bitter vetch)	*Pisum* sp (pea)	*L. sativus / cicera* (grasspea)	*Lathyrus* as clay impressions	*Cicer* sp. (chickpea)	*Linum* sp. (flax)
Aşıklıhöyük Aceramic N	x	-	x	-	x		x	x	x		-	x	x	x	-		?	-
CanHasan III Ac.N	x	-	x	x	-		x	-	x		x	x	x	x	-		-	-
Musular	x	-	-	x	-		x		-		-	x	-	-	-		x	-
Höyücek EN	x	x	-	x	?		x	x			x	x	x	x	x		x	
Hacılar Aceramic N	x	?	-	-	-		x	x	-		-	x	-	-	-		-	-
Hacılar N	x	-	x	x	-		x	x	x		-	x	x	x	-		x	-
Hacılar Chalcolithic	x	x	x	x	-		x	x	x		-	x	x	x	-		-	-
Çatalhöyük Aceramic N	x	x	x	x	x		x	-	R		x	x	x	x	x		x	x
Çatalhöyük East EN	x	x	x	x	x		x	-	R		x	x	x	x	x		x	x
Suberde Aceramic N						x				x						x		
Erbaba LN	x	-	x	-	x		x	-	x		-	x	x	x	x		x	-
Can Hasan I LN+Early C	x	-	-	x	-		x	x	-		x	-	-	x	-		-	-
Kuruçay Ch	x	-	x	x	x		x	x	-		-	x	-	x	x		x	x

Table 6. Wild nuts, tubers and fruits recovered from Neolithic and Early Chalcolithic levels of the archaeological centers ($+^{1}$ = cherry fruit stones, $+^{2}$ = plum fruit stones, $+^{3}$ = seeds, $+^{4}$= both seeds and tubers. += rare, ++= frequent, +++= abundant)

	Amygdalus sp.	*Pistacia sp.*	*Celtis sp.*	*Prunus sp.^{1,2}*	*Rhus sp.*	*Pyrus sp.*	*Crataegus sp.*	*Quercus sp.*	*Scirpus sp.*
Pınarbaşı A Aceramic N	+	--	+	--	--	--	--	--	$+^{3}$
Aşıklıhöyük Aceramic N	+	++	+++	--	--	--	--	--	$+^{3}$
CanHasanIII Aceramic N	--	--	+	$+^{1}$	--	--	+	--	$+^{3}$
Musular Aceramic N	+	+	++	--	--	--	--	--	--
Höyücek EN	--	+	--	--	--	--	--	--	--
Hacılar Aceramic N	--	--	--	--	--	--	--	--	--
Hacılar LateNeolithic	--	+	+++	--	--	--	--	--	--
Hacılar Chalcolithic	+	--	--	--	--	--	--	--	$++^{3}$
Çatalhöyük East Aceramic N	+++	+++	+++	+	+	--	--	+	$+++^{4}$
Çatalhöyük East Early N	+++	+++	+++	$+^{1}$ $++^{2}$	--	--	--	+++	$+++^{4}$
Suberde Aceramic N	--	+	--	--	--	--	--	--	--
Erbaba LateNeolithic	--	--	--	--	--	--	--	--	$+^{3}$
Can Hasan I LateNeolithic	--	+	--	--	--	--	+	+	$+^{4}$
Kuruçay Chalcolithic	--	++	--	--	--	--	--	--	--

Table 7. Archaeological features and utensils recovered from Neolithic and Early Chalcolithic centers and related with food processing, preservation and storage activities (?=the definition is not clear).

X = Basket impressions on clay.

	Ceramic caps	Storage pots	Large jars / pots	Storage pots in pits	Storage pits	Storage rooms / silos	Grinding stones	Sickles	Ovens / Hearths	Fire pits	Clay balls	Baskets	Ladles / Spoons	Mortars / Pestles	Querns / Mills	Handstones	Heavy stones
Pınarbaşı A Aceramic N	--	--	--	--	--	--	X	--	--	--	--	--	--	--	--	X	X
Aşıklıhöyük Aceramic N	--	--	--	--	X	X	X	--	X	--	--	--	--	X	--	X	X
Can Hasan III Aceramic N									X								
Musular Ac.N	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	X	X
Musular (mixed context)	X	X	X	--	?	X	X	--	X	--	--	--	X	X	X	X	--
Bademağacı EN	X	X	--	--	--	X	X	--	X	X	X	--	X	--	--	X	
Höyücek EN	X	X	--	X	X	--	X	--	X	X	X	X	X	X		X	
Hacılar Aceramic N																	
Hacılar Late Neolithic	X	X	--	X	X		X	X	X		X			X	X	X	X
Hacılar Chalcolithic																	
Kuruçay LN	X	X	--	X		X	X	X	X				X				
Kuruçay Chalc.																	
Çatalhöyük East Aceramic PXII																	
Çatalhöyük East LN II-XII	--	X	--	X	X	--	X	?	X	X	X	X		X		X	--
Suberde Aceramic N	--	--	--	X	X	--	X	X	X	--	X	--		X		X	
Erbaba LN	X	X	--	X	--	--	X	X	X	--	--	--	X	X	X	X	
Pınarbaşı B LN	--	--	--	--	--	--	--	--	--	X	--	--	--	--	--	--	--
Can Hasan I (7-4) LN	--	--	--	--	X	X	X	--	X	--	--	--	--	X	X	--	

3.2. Biases and Limitations of the Archaeological Data

In practice, taphonomy serves a broader role in stimulating research on all types of biases affecting archaeological information, including those introduced by collecting, publication, and curation methods on the one hand, and stratigraphic completeness on the other (Behrensmeyer *et al.* 2000; also see Lyman 1994; Donovan and Paul 1998; Holland 2000). For a paleoetnobotanist to evaluate the plant remains, knowledge of topography, hydrology and the flora of the terrain are important factors to understand the ecology and its products (Helbaek 1970) and their use by people living there. Preferably, he is expected to be present at the excavation and he must make his own observations even prior to the sample collecting (cf. Helbaek 1970).

Sampling strategies and the conditions of the preservation of the archaeological material have played an important role in how much of the actual material lying beneath the soil was recovered and how much it in fact represents the whole site. Among the archaeological centers whose data are presented here, the ones most recently excavated are sampled extensively, some levels of a few were poorly sampled and the samples were sent to the archaeobotanist, and one was not sampled.

Konya Basin includes the extensively sampled archaeological centers. The first flotation machine in the world was set up at Can Hasan III to recover macro-plant and animal remains (French *et al.* 1972). However, the archaeobotanist (Hillman 1972) stated that, four representative samples out of *c.* 350 samples in total were briefly examined for a preliminary report of the site. From Can Hasan I, numerous small samples were collected mainly by dry sieving (Renfrew 1968; Nesbitt and Samuel 1996; Nesbitt unpublished).

Pınarbaşı Neolithic Rock Shelter was sampled and machine flotation recovered large quantities of charcoal, but only few seeds (Nesbitt and Samuel 1996; Nesbitt unpublished). The site is being reexcavated recently and the archaeobotanical analysis report is unpublished yet.

Among all, Çatalhöyük is the site most extensively recovers such remains through machine floating a large amount of the soil excavated. In 1960's the site was excavated by Mellart and archaeobotanical samples were collected in presence of the archaeobotanist from *in situ* clay storage bins and visible charred remains in levels II, III, IV, V and VI including the remains of wooden boxes, cups and fabrics (Helbaek 1963; 1964; Mellaart 1963; 1967). With the start of the new excavation project, over four thousand flotation samples were collected from all recovered contexts between 1995 and 1999 (Fairbairn *et al.* 2002; Hastorf 2005). Recently published archaeobotanical reports (Fairbairn *et al*. 2002; Fairbairn *et al*. 2005) were the results from the macrobotanical analysis of 61 sampled units (plus wood charcoal analysis results from 48 excavated midden units) representing occupation areas and fills of buildings in levels VII-X from Early Neolithic Period (areas around hearths/ovens contained dense plant remains), and middens containing numerous macrobotanical remains rich in diversity in levels VII, VIII, IX, XI, XII from Early Neolithic Period and pre-level XII from Aceramic Period (phases A-D). Among them only Building 1 in level VII was partially burnt and the sole burnt storage bin containing lentils was recovered from these burnt contexts (Hodder 2005). Although 334 excavated contexts were sampled and machine floated, the plant remains were only classified according to the type of the plant part without their botanical identifications (Fairbairn *et al*. 2002). Archaeobotanical investigations still continue with a different team at the site.

Aşıklıhöyük plant remains were recovered by manual flotation in the field (van Zeist and de Roller 1995). From the site, totally one hundred and fifty soil samples were processed and examined; however a small number of samples were analysed in part (van Zeist and de Roller 1995). It was noted by the archaeobotanists (van Zeist and de Roller 1995) that, the plant part counts were not converted for the whole of the sample in case of partly examined samples, and also weight values of *Celtis* and *Pistacia* nutshell fragments were converted to whole specimens.
Musular was sampled frequently too, but the preservation conditions were not as favorable as in the other Central Anatolian Neolithic sites (Özbaşaran 2000).

In the Lake District, Suberde (Bordaz 1977) was not sampled and its reflections are visible in the archaeological record.

From Erbaba (van Zeist and Buitenhuis 1983), no fruit remains were recovered possibly showing the sampling bias, rather than bad preservation conditions. A fairly great number of archaeobotanical samples were collected from features with visible botanical materials and black colored deposits suggesting organic remains and some portion of them were processed through manual flotation, while a large volume of them were dry sieved and some were floated at the laboratory (van Zeist and Buitenhuis 1983).

Only one small sample from an ashy layer in the Aceramic level VI, and some samples subject to high fire from partly burned five houses containing bins and querns, and a well disused as storage pit in Late Neolithic levels III, II and I were collected in Hacılar and sent to the archaeobotanist (Mellaart 1970; Helbaek 1970).

From Kuruçay about 50 botanical samples were collected by Duru from the burnt areas of the Late Chalcolithic period and sent to the archaeobotanist; however Neolithic and Early Chalcolithic periods which would make necessary comparisons to the Hacılar Aceramic and Late Neolithic levels were not sampled (Duru 1996). Level 3, extensively excavated level 6A and the earliest phase of level 6 yielded the identifiable charred plant remains. The sampled soil came from ‘shrine 2’ and a house adjacent to the same ‘shrine’ in level 3. Due to the recovery of many jars the latter was perhaps used as a storage room (Nesbitt 1996). Some houses interpreted as shrines by Duru (1996) in this level also contained a central stele alongside a hearth and oven, mills, pots and fragments of a grinding stone. Other samples were collected from ‘shrine 1’, two rooms one of which was next to the same shrine containing many pots, and an area with unknown function between houses yet including two large pots containing grain (Nesbitt 1996). The sample derived from the earliest phase of the level 6 belonged to a room as well (Nesbitt 1996). Because the labels of the other samples were mixed during the excavation, they were not processed for the analysis (Nesbitt 1996).
Limited number of samples were collected from Bademağacı by the archaeologist too (Duru 1996), but its archaeobotanical report is unpublished yet.

Höyücek samples were limited too, and were sent to the archaeobotanist whose report was recently published (Martinoli and Nesbitt 2003). Nine samples were picked from a ‘shrine’ because it included clay storage bins, one sample was picked from the adjoining room, and one sample was collected from the nearby ‘workshop’ area; in total eleven samples were collected from charred deposits by the archaeologist (Martinoli and Nesbitt 2003). The samples were dry sieved into >2mm, >1mm and <1mm sizes and the plant parts were identified with aids from compared reference collection at the UCL archaeobotany laboratory (Martinoli and Nesbitt 2003).

3.3. Wild Food Plants Recovered in the Neolithic and Chalcolithic Sites of Central Anatolia

3.3.1. *Scirpus maritimus* (club-rush, bulrush)

From Can Hasan III Neolithic deposits relatively numerous seeds of *Scirpus* cf. *lacustris* (bulrush) were recovered and *Carex* seed was present too in their charred form (Hillman 1972). The existence of the seeds was interpreted as clues to past vegetation cover and environmental factors; however more samples for the analysis needed be processed. Can Hasan I plant remains included *Scirpus maritimus* tubers.
54 achenes of club-rush (*Scirpus maritimus*) were also recovered in the 'well deposit' of the Chalcolithic levels of Hacılar (Helbaek 1970), indicating the plant was present around Beyşehir Lake and possibly by streams and rivers as well. In the Late Chalcolithic Levels of Kuruçay, this plant seems absent. Unfortunately, no samples were collected from the earlier levels of Kuruçay, which would help to make comparisons with Hacılar Neolithic and Early Chalcolithic Levels. However, no recovery of *Scirpus* tubers from all these sites except the Çatalhöyük Neolithic and Can Hasan I Neolithic and Chalcolithic levels under the examination in this research might be an indicative of methodological bias, as mechanized flotation allowed >4 mm dry sieve of the heavy residue to capture the tubers as whole and large pieces (see Fairbairn *et al*. 2005).

The following archaeobotanical information is derived from several sources (Helbaek 1970; Fairbairn *et al.* 2002), and mainly from the recently published archaeobotany report concerning the analysis of macrobotanical remains recovered from Çatalhöyük Neolithic deposits (see Fairbairn *et al*. 2005).
There is an abundance of charred tubers and charred or mineralised seeds of *Scirpus maritimus* all over the Çatalhöyük Neolithic deposits, considered to be of various uses.
A large variety of Cyperaceae seeds (many seeds which cannot be identified to species level-two of thirds recovered between level VI and VIII) were recovered from Çatalhöyük Neolithic deposits (many *Carex* seeds and a great amount of *Scirpus maritimus* seeds, in addition to many *Polygonum* and both silicified and charred *Eleocharis* seeds). The recovery of the many of the wetland charred plant seeds, especially that of *Scirpus maritimus*, from Neolithic Çatalhöyük was interpreted by Fairbairn *et al.* (2002) as either the derivation from animal graze and fodder or mixing

with arable weeds and chaff used as fodder; or the admixture in dung to increase the quality of this fuel. Although not included here, due to their incomplete data, archaeobotanical analysis from the early levels of BACH excavations at Çatalhöyük also revealed abundance of club-rush as well as other sedge species. Helbaek reported that (1970) club rush tubers were recovered from two locations. Pieces of possibly *Scirpus maritimus* tubers, as inferred from the surface context, were found commonly in several deposits, including fills, hearths/ovens, pits and bins.

Many complete and broken parts of *Scirpus maritimus* tubers were recovered from some earlier levels, such as Building 6 (Level VIII) where various fire installations (firebases, fire use, fire-pit and rake-outs possibly from oven/hearth) happened. Fairbairn *et al.* (2005) considered these remains from possible fuel or food use. One sample from a midden in space 115 in the same level also revealed the mixture of little wood charcoal and a large quantity of *Scirpus maritimus* tubers which was interpreted as 'possible unmixed deposits from specific burning events linked to consumption or processing or use of non-wood fuels such as dung or tubers' (Fairbairn *et al.* 2005). All the fills from space 115 midden contained high percentage of tubers.

A sample from ashy spread related to oven and a cluster of obsidian debitage in Level IX from building 16 were analyzed and in conclusion wood and pieces of club rush tubers in large quantities were preserved. Fairbairn *et al.* (2005) concluded here as well the use of this source as fuel or wood. From level IX building 17 another rake-out sample also contained a large concentration of club-rush tubers, considered by Fairbairn *et al.* (2005) from an episode of use. Adjacent hearth fill contained wood dominantly, and a relatively large cereal and pulse seed assemblage, inferred by the archaeobotanists as crop seed preparation or consumption. Hearths and rake-outs also included pieces of *Scirpus maritimus* tuber in the mixture of charred cereal, pulse, wood and wild seed, what is called as standard profile 1 by the same authors.

Level X also contained the standard profile 1 composition. Rake outs associated with hearths revealed mixed abundant wood, obsidian hoards and large pieces of parenchyma which are possibly tuber remains. Tuber harvesting was suggested for this composition (Fairbairn *et al*. 2005).

A large, diverse seed assemblage of chaff, cereal grains and seeds from various species dominated by *Scirpus maritimus*, *Astragalus/Trigonella* and Gramineae was found in level XI. Sample composition also included traces of dung fuel use as in level pre-XII.B. Most samples in this space are considered to have derived from animal pen deposits.

In level XII, mineralized seeds found in several samples were dominated by club rush seeds also contained *Rumex, Stachys, Alyssum* and *Astragalus/Trigonella*. Throughout the space, charred seed assemblages were dominated by club-rush and *Astragalus/Trigonella* seeds with a mixture of grasses and broad-leaved herbs from wetland and dryland locations. Although mineralized seeds were also found in earlier levels, in this level they were many.

In level pre-XII.B lime-burning deposits mixed with mineralised and charred sheep dung pellets containing fine charred particles of wild plant seeds dominated by those of *Scirpus maritimus*, *Astragalus/Trigonella* and grasses, also cereal chaff, grain and pulses were found.

Phytolith analysis showed that, a large number of phytoliths from the platforms was also from *Scirpus* sp. (Rosen 2005). All of the adult burial mats examined from the 1998 season were composed of *Scirpus* sp (Rosen 2005). Their abundance also points to their use as temper in floor packing (Rosen 2005). In storage pits in the 'kitchen area' (space and unit numbers?), relatively small amount of cereal grains were recovered in mixed condition with chaff, sedge seeds of mostly *Scirpus maritimus,* and *Carex* species in a considerable amount, including herbaceous material apparently from the sedge stems. Despite their charred condition in store, there was no trace of the storage area being burnt. The storage pit was sealed with clay on top. From the phytolith analysis, a strong relationship was found between the wheat and basket phytolihs in many cases recovered in association with each other. In addition, at least one of the bins contained matting made from *Scirpus* sp (Rosen 2005). Rosen (2005) suggests that, matting was used to extra-line the bin to preserve the stored wheat grains (little amount-possibly waiting for the replantation) from mildew and predation by rodents. In this case club-rush seeds and herbaceous matter might have originated from the matting.

Baskets were mainly made of *Scirpus* in addition to other wild plants, dry-land grasses and cereal straw (Rosen 2005).

In space 187 wheat husk, *Phragmites* and *Scirpus* phytoliths were found mixed near the oven, interpreted as the remains of fuel (Rosen 2005). Here, high concentrations of wheat-husk phytoliths were found in association with basket phytoliths indicating the use of basket for storing and/or cooking wheat grains and other possible food plants such as acorns of which charred, large fragments were also recovered from the same spot; therefore baskets at the site might have been used for cooking several food plants including wheat grains. It was also suggested that (Atalay 2005), plants were cooked inside baskets containing heated clayballs which functioned to transfer heat into baskets.

3.3.2. *Crataegus* sp. (hawthorn)

Although its fruit stones were not recovered from Çatalhöyük, charred wood pieces from hawthorn tree was represented under the family Maloideae due to identification difficulties (Fairbairn *et al.* 2005; Asouti 2005). The charcoal from Maloideae family has an increase towards the later levels (Asouti 2005).

Crataegus sp. existed in the Can Hasan III deposits as well (Hillman 1972), pointing to its presence in the site surroundings. In Can Hasan I deposits too, where archaeobotanical samples were rich in wild fruits, *Crataegus* sp. was reported (Nesbitt and Samuel 1996).

3.3.3. *Pistacia* sp. (terebinth)

Charred fragments of terebinth fruitlets were recovered in considerable numbers (with a decrease towards later levels) alongside its charcoal remains in an increasing percentage from early to later levels (except for the earliest level representing moderate numbers of fragments) from Çatalhöyük Neolithic deposits. The recovery of one single terebinth fruitlet from the earlier excavation shows the critical effects of sampling and recovery bias on the archaeobotanical data.

Despite the presence of wild fruit remains from five different species, *Pistacia* sp. was absent from the archaeobotanical records of Aceramic Neolithic Can Hasan III. However, fragments of terebinth fruitlets were recovered from Pottery Neolithic and Early Chalcolithic levels of Can Hasan I (Renfrew 1968; the quantity is unknown, although the sample derived from the site is described as 'rich in fruits' in Nesbitt and Samuel 1996).

Terebinth fruitlets were 'almost exclusively' recovered from all levels of Aşıklıhöyük (van Zeist and de Roller 1995). They are present in Musular as well.

Pistacia fruitlet remains were found in almost all Neolithic and Chalcolithic centers in the Lake District. Identified as *Pistacia atlantica* by Helbaek (1970), charred terebinth fruitlets were recovered from Late Neolithic levels of Hacılar. Similarly, the charred fruitlets were also recovered from Höyücek Neolithic and Kuruçay Chalcolithic levels and the species was present at Suberde as well; nevertheless it was not possible to evaluate the plant remains in their archaeological context due to lack of published data. Also, the absence of terebinth as well as other fruit and nut remains from Erbaba is interesting to note. The charcoal data missing from Erbaba made a comparison unavailable.

3.3.4. ***Prunus*** **sp. (wild plum)**

Charred fragments of *Prunus* stones as well as charcoal pieces of *Prunus* type were recovered from Çatalhöyük, although it was stated that (Asouti and Hather 2001), identifying *Prunus* charcoal to species level was not possible due to taphonomic problems. 1 whole fruit of *Prunus* sp. in charred form was recovered from the Can Hasan III Aceramic Neolithic deposits. The recoveries of the delicate fruit stone from these sites again points to the favor of machine floatation of large samples.

3.3.5. ***Rhus*** **sp. (sumac)**

The only *Rhus coriaria* seeds recovered belong to Çatalhöyük Aceramic Neolithic levels.

3.3.6. *Pyrus* sp. (wild pear)

This species is absent from these archaeological centers. Still, *Pyrus* species was represented under Maloideae charcoal remains recovered from Çatalhöyük Neolithic deposits, but differentiating *Pyrus* charcoals from that of *Crataegus* sp was not possible (Asouti 2005).

3.3.7. *Amygdalus* sp. (wild almond)

Charred remains of *Amygdalus orientalis* nutshells were recovered from a well functioned as a storage pit in the Chalcolithic levels (level II-I) of Hacılar. It was mentioned by Helbaek (1970) that, fruits of this genus were exploited in prehistoric times wherever they occured, but many times due to their bad situation their identification was not possible. In the Lake District, only Erbaba was extensively sampled. This is why it is not surprising fragile nutshells of wild almond remains were not recovered much in this region.

Nutshell fragments of wild almond were found in small numbers in Aşıklıhöyük and Musular Aceramic Neolithic settlements. They were also recovered from Çatalhöyük, in some cases including charred kernels and in one case in a single pile (Helbaek 1964; Fairbairn *et al.* 2005). They were found in Pınarbaşı A Neolithic hunting camp too.

3.3.8. *Quercus* sp. (acorn)

Hilum and acorn fragments, in a few cases as complete fruit, of *Quercus* sp. in low abundance were recovered from Çatalhöyük. The macrobotanical results from one unit indicate large concentrations of acorn. Some whole acorns were also found adjacent to a hearth, and they were 'as if about to be roasted' (Helbaek 1964). An extensive amount of material thought as nutmeats of acorn having similarities to the previously mentioned entry was found in level pre-XII.C, one of the earliest sub-phases of Aceramic Neolithic levels at the site. Clusters of acorn 'nutmeat' were found possibly in a small basket in building 1.

Also, it was indicated that, *Quercus* sp. (deciduous oak) was the most commonly used species for timber in constructions, whereas *Juniper* sp. (juniper) and *Ulmus* sp. (elm) were used less (Melaart 1967; Newton 1996; Fairbairn *et al.* 2002).

Although *Quercus* sp. is absent from the Can Hasan III archaeobotanical records, 1 nutshell fragment of *Juglans regia* (walnut) was recovered.

3.3.9. *Celtis* sp. (hackberry)

Silicified fruit stones of *Celtis* sp can survive in archaeological deposits without need of charring, such as seeds of *Lithospermum* sp and Boraginaceae family, hence the abundant recovery of hackberry (*Celtis tournefortii*) fruit stones from many Neolithic and Early Chalcolithic occupation levels. Can Hasan III Aceramic Neolithic center, located in a potential park-woodland with lots of hackberries, is an example of it. In Pınarbaşı A Neolithic rock shelter, 10 km north of Can Hasan sites, many fruit stones of hackberry were recovered as well.

They were largely recovered (70.4% of the total analysed samples) from midden deposits in Çatalhöyük Neolithic levels too, most abundantly from the earliest levels. A small part of these siliceous fruit stones were subject to fire, while others seem to be just thrown away. In the burnt phase of Building 1, ‘grinding-installation’ contained high density of hackberry fruit stones interpreted as possible food processing (Fairbairn *et al*. 2005). An ashy layer in level VII where a bear paw was found was dominated by hackberry and wood. Ash deposition containing hackberry processing by-products or consumption leftovers was interpreted as deliberate placing of feast or meal item as part of ‘closure celebrations’ (Fairbairn *et al*. 2005). In the same level, cereal and hackberry mixtures were considered by the same authors as consumption remains. Hearths and rake-outs in Level IX contained many fragments of nut shell and hackberry fruit stone pointed out by Fairbairn *et al.* (2005) as seasonal use of hearths for nut processing or consumption. Abundant remains of wood and hackberry were recovered from possibly animal pen deposits in Level XI. Middens in Aceramic levels also included high remains of wood and hackberry interpreted as nut oil production (Fairbairn *et al*. 2005). One fire spot contained high densities of hackberry stones and terebinth fruitlets accompanied by fragments of almond shells and acorns. Although samples from the ‘basal’ pre-XII.D level were dominated by hackberry, the overall density of the plant remains in this level was lower than the later levels. Samples derived from the KOPAL area were also dominated by cereal grains and hackberry fruit stones, and in some cases they included cereal awns.

Charcoal remains of hackberry were also recovered from Çatalhöyük relatively in considerable numbers. While there was an increase in the percentage of charred hackberry wood toward the later levels, a slight decrease of it from earliest to late Aceramic levels was found (Fairbairn *et al*. 2002). Similarly, analysed samples from the midden deposits of Çatalhöyük Neolithic levels showed that, there was a decrease of hackberry fruit stones towards the later levels (Killackey 1999).

From the Late Neolithic level (level VI) of Hacilar, fruit stones of *Celtis* (hackberry) were recovered. The most commonly found hackberry fruit stones were described as ‘coarsely reticulate with two ridges meeting at right angles, dividing the surface into even quarters’ and identified as *Celtis australis* by Helbaek (1970). He interpreted the results as the possible alcoholic possibilites of the fruits (Helbaek 1970).

Abundant recovery of the fruit stones of *Celtis tournefortii* in all levels of Aşıklıhöyük Aceramic Neolithic site pointed to intensive gathering of hackberry from woodlands in the area (van Zeist and de Roller 1995).

3.4. Seasonality and the Nature of the Settlements

In the Lake District, Hacılar was considered as a prosperous agricultural settlement already exploited the closeby forest resources which reflected in the archaeobotanical record as lesser arboreal plant remains than expected (see Helbaek 1970). However, six species of shrubs and trees present in the archaeobotanical record indicates that the woodlands closeby the settlement were exploited by the Hacılar inhabitants.

At Asiklihoyuk Aceramic Neolithic site, both dryland and wetland plant species were recovered including cultivated cereal and pulse crops, and sedges such as Carex sp, Eleocharis sp, and Scirpus maritimus. Indicated by the weed flora as well, the inhabitants of Asikli probably practiced rainfed cultivation on raised surfaces by the

Melendiz River and/or hillsides and dry areas in the valley, close to the settlement (van Zeist and de Roller 1995). The remains of cultivated cereal and pulse species including the evidence for threshing process occurred on site, it was suggested that the inhabitants of Asiklihoyuk had a sedentary life. The seasonal or year-round occupation of the site is not discussed in detail yet. The inhabitants of Asiklihoyuk used all the food plant resources available in their surroundings, which included various wild fruit species grew on the woodlands nearby the settlement. Charcoal analysis undertook by Woldring and Cappers (2001) showed that *Pistacia*, *Celtis*, riverine species (poplar, willow, elm) and *Quercus* species, all being locally available, were used for supplying wood resource.

For infant burials, a special type of basket made from the wild grass *Agropyron* species (wheat grass) with the floral part included was used. The edibility of the seeds of this plant by North American Indians was cited by Moerman (1998). The floral part having been included in basket making shows that, the basket was made in spring. (pointing to their construction in spring-when the people immigrate to meadows for animal grazing-yayla and then they carry their infants in baskets)

The phytoliths of date palm (Phoenix dactylifera) leaves were found (Rosen 2005), indicating trade.

3.5. Archaeological Evidence of Wild Food Plants from Other Neolithic and Chalcolithic Centers in the Near East

In the late-Paleolithic Wadi Kubbaniya (20,000-19,300 BC) in Egypt charred remains of *Cyperus rotundus* (wild nut grass) and *Scirpus maritimus* (club-rush) tubers were recovered relatively in high numbers. The latter was also recovered from Neolithic and Early Chalcolithic deposits of Erbaba, Çatalhöyük, Aşıklıhöyük and Hacılar in Central Anatolia.

Charred fruitlets of *Pistacia terebinthus* and *P. atlantica* were extensively recovered from various Neolithic and Early Chalcolithic sites of the Near East, suggesting the collection of these fruits in great amounts. The common environmental characteristic of these sites is them generally having been located on or near woodlands, such as in

Girikhaciyan (van Zeist 1980) and in its neighboring Çayönü (van Zeist 1991); in Epipaleolithic Abu Hureyra in Syria (Hillman et al. 2000); in Tell Sabi Abyad (van Zeist and van Rooijen 1989); in Ganj Dareh Tepe of Iran (van Zeist *et al.*); in Epipaleolithic Hallan Çemi of Batman (Nesbitt 1995) and in several more. Mastic gum of terebinth tree was extensively burnt as incense in the New Kingdom period of Ancient Egypt (1500 to 1100 BC).

Although *Crataegus* (hawthorn) trees can still be found in forested areas and in forest-steppe zones in the Near East today, the numbers of its recovered charred seeds from the archaeological centers located in these zones were very low. Fruit stones of hawthorn were recovered from Girikhaciyan, located in today's Diyarbakır in Eastern Turkey. Large amount of soil from the site was floated. They were also found in Assyrian Colony Period of Kaman Kalehöyük situated in Central Anatolia. The remains of *C. azarolus* were recovered from Korucutepe situated in Altınova, neighboring Diyarbakir in the north. Wild grape remains recovered from the site suggested a riverine forest by the settlement (the settlement was located by the Murat River.).

Pre-Neolithic remains of carbonized plum-stones discovered in the Upper Rhine and the Danube regions closely resemble the stones of present day spontaneous *domestica* plums (Zohary and Hopf 2000). These finds led the researchers consider the domestication of the species before agriculture was introduced in that region and that plums should be taken as an indigenous element in Middle Europe (Werneck and Bertsch 1959) as well as in the Balkans and Turkey (Zohary and Hopf 2000). A large quantity of *P. domestica* ssp. *insititia* stones was uncovered in Bronze Age Tell Mudrets (Popova 1995). Also, *P. cocomilia* stones (the species commonly found in Konya Basin) appear in several Neolithic and Bronze Age sites in Europe (Zohary and Hopf 2000). All these finds seem to represent fruit collected from the wild (Zohary and Hopf 2000).

Pears were collected from the wild long before their introduction into cultivation. Carbonized remains of small fruits, sometimes halved and very probably dried, were found in several Neolithic and Bronze Age sites in Europe (Hopf 1978; Schultze-Motel 1968-94; Kroll 1983; 1995-2000; Janushevich 1975). Although when the pear started to be domesticated is unknown, reliable information on pear cultivation through propagation by grafting first appears in works of the Greek and Roman writers (Hendrick *et al.* 1921; White 1970).

Rhus sp. was rarely recovered from archaeological excavations.

Charred almond shells were uncovered in several Mesolithic and Neolithic archaeological sites such as, in Franchthi Cave in South Greece (Hansen 1991); in Öküzini in South Turkey (); in Jerf al Ahmar (Willcox 1996); in Hallan Çemi (Rosenberg *et al.* 1995); in Aceramic Neolithic Çayönü (van Zeist and de Roller 1991-92); in Halaf site of Girikhaciyan (van Zeist 1980); in Halaf levels of Tell Sabi Abyad (van Zeist and Waterbolk-van Rooijen 1989) and in several Bronze Age sites. According to Zohary and Hopf (2000), along with olive, grape vine and date palm, almonds appear to have been the members of the earliest cultivated fruit-tree assemblage in the Old World with the possibility of their domestication even before the introduction of grafting. At sites revealing abundant plant remains such as Epipaleolithic Abu Hureyra, nut shells of wild fruits were largely recovered as well. In the woodland-steppe vegetation of Abu Hureyra, as was indicated from the ecological models and charcoal remains, four or so species of almond were thought to have grown along with the great terebinth (Hillman 2000).

Acorns have been largely consumed since very early times. In temperate Europe, hazelnuts (*Corylus avellana*) and acorns (*Quercus* sp.) may have been staple crops of Mesolithic food gatherers (cf. Marinval 1988: 118). Charred, and dessicated (Q. macrolepis ssp. ithaburensis from Nahal Hemar cave (Kislev 1988) acorn fruits including as impressions in clay (identified by Helbaek from Beidha, 1966) were also recovered from sites of formerly or still today oak-forested parts of Southwest Asia. Acorns were recovered in the case of mixed with other wild food plants, and often with remains of domesticated cereals and pulses i.e. at Çayönü, Southeastern Turkey; at Jarmo, Iraq; at Arad, Negev (van Zeist et al. 1984; Dolukhanov 1979; Zohary and Hopf 2000). The charcoal remains of Quercus calliprinos-type (kermes oak) and Quercus infectoria-type (deciduous oak) were recovered from Selenkahiye and Hadidi. The latter was also recovered from Ramad. Acorn fruit was absent from these sites. Oak was one of the tree species thought to have been present as occasional scatters nearby Abu Hureyra Epipaleolithic site (11,500-10,000 BP), allowing a small-scale use of acornsş however acorns and almonds are absent from the rich archaeobotanical record of Abu Hureyra (Hillman 2000). Mason (1990), doing her PhD thesis on the acorn use, discovered that thin shells of the acorns exposed to fire rarely survive.

Stones of *Celtis* sp. fruits were found commonly in Neolithic and Chalcolithic sites in the Near East, the geographical area it grows abundantly, indicating their significant contribution to the prehistoric human diet. From the earliest phase of Abu Hureyra Epipaleolithic site, only a few *Celtis tournefortii* fruit stones were recovered. This scarcity was interpreted by Hillman (2000) that, the park-woodland including various wild fruit trees was perhaps at 15 km distance from the settlement, suggested by the oak remains.

3.6. Ethnobotanical Data Concerning Wild Food Plants from Other Research

3.6.1. Cyperaceae

Certain species of Cyperus L. genus are or have been cultivated, most notably *Papyrus*, the Egyptian Paper Plant or Paper Reed (C. papyrus L., syn. *Papyrus antiquorum* Willd.) which was once grown on a very large scale in Egypt but is now hardly to be found there; papyrus was cultivated to produce writing-as well as packing-paper, and also to make mats. Täckholm and Drar (1950) consider that writing started in Egypt some 7000 years ago (*c.* 5000 BC) and there was at one time great demand for the material for export. A few species of Chufa or Tiger Nut (*C. esculantus* L.) occasionally cultivated for its edible tubers in S. Europe, India and elsewhere; also Nut-grass (*C. rotundus*), the Umbrella Plant (*C. alternifolius*) and *C. diffusus* Vahl, which is sometimes grown in damp greenhouses for use as table decoration (Townsend and Guest 1985).

According to Täckholm and Drar (1950), *C. rotundus* tubers are sold in the drug markets of Egypt. They are reported as stomachic, emmenagogue and, when fresh, diaphoretic, diuretic and astringent. Arab and Persian writers have prescribed the drug in febrile and dyspeptic affections and large doses as anthelmintic. They are also applied to ulcers and used as an ingredient of warm plasters. Paiute use its stems for wefts and binding tule items; for securing the edges of skirts; as the warps and ties for sandals; as the warps and the twining wefts for clothing; for securing the edges of mats; for making twined mats for the insides of houses; in a simple pile for seating (Moerman 1998). Täckholm and Drar mention the drug was esteemed by the ancient Greek pharmacologists; the tubers have been found in ancient tombs in Egypt. The tubers yield from half to almost 1% of essential oil in distillation; it has a most agreeable smell and it is suggested that it might be used in the perfume industry. Chakravarty (1976) gives some analyses of this oil. This plant is well known as an invasive weed of the tropics and subtropics, perennating readily by tubers, the release of which is hastened by cultivation. It is generally known as Nut Grass, and once introduced, it is hard to eradicate except by applications of sodium chlorate and calcium thiocyanate. Hassawi, Tammimi & Alizzi (1968) consider this species is of low feeding value for livestock (Townsend and Guest 1985).

Täckholm and Drar (1950) consider this species to have been one of the most ancient foodstuffs in Egypt where its tubers have been found in tombs of all epochs including the pre-dynastic age. There is evidence that the cultivation of this species was introduced into Southern Europe (Sicily, Spain, etc.) by the Arabs. Campbell Thompson (1949) found evidence in the ancient Assyrian medical texts that this plant was cultivated in Iraq for its medical properties many centuries ago (Townsend and Guest 1985). Among Paiute Native Americans its seeds are parched, ground into flour, and made into mash. Seeds used for food. For winter use, parched seeds are stored for later use. Among Pima occupants by the Gila River roots are eaten raw. Pomo use root stock fibers as design material for baskets and its grass for basketry. Also it is used as a natural dye since the color of the central coal black section can be deepened by burying in manure or in blue mud.

3.6.2. *Scirpus* Species with or Without Tubers Widely Used by American Indians

3.6.2.1. Seeds, Tubers, Roots, Rhizomes and Stems Used As Food

Pollen is used to make cakes and seeds eaten raw or ground into mush by Cahuilla. Seeds are ground lightly into flour and boiled into a mush; also parched and stored for winter use by Paiute. Seeds are also used as food by Klamath and Montana Indians.

Autumn tubers are used for food by Montana Indians. Tubers are eaten as snack food primarily by Pima children. Sweet bulbs are eaten raw in midsummer by Chippewa. Inner part of stems and fresh stems are eaten raw by Cheyenne, Cree, Dakota, Gosiute, Hopi and Paiute.

3.6.2.2. Other Uses

By many tribes stems are used to make mats and excellent mattresses, pillows; baskets; berry picking and root digging baskets; basket handles and lids; for weaving hats; to make fishing nets; to make sleeping compartments, tents, temporary shelters, windows and doors, entrance covers, curtains, windbreaks, as a mat for drying salmon and other various food; as a building material to build houses; to make boats and rafts; stems woven and sawn with hemp twine to make capes, shopping bags, storage bags to store dried meat, fish and berries; Indian doctor headdresses; as floor covering in lodges, as a blanket on wooden mattresses, as place mats for eating; tablemats, meat platters; over and under food for steaming pits; for roofing; as room partitions in pit houses, as walls for summer lodges, as interior and exterior walls in house construction; as wall filler in house construction; for thatch and foundation material, as cradle lining; dry plants are used to make brooms. Long stems made into a ball and used as an instrument in children's games. These long stems are also used as swinging handle. The plant is used by children to make tiny snares to catch small fish. Plant braided by children to make a whip. Plant areas are used by nesting water fowl and used as indicator by hunters of game. Hollow stems are made into pipes.

3.6.2.3. Ceremonial Uses

Grass is used to cut a newborn baby's umbilical cord. Plant used to make ceremonial bundles and images for image burning ceremonies. They are used to make images representing the deceased in the ceremony for the dead.

3.6.3. Other Tuberous Plants in the Study Region

Other plants with bulbs are commonly consumed throughout the world, some of which are bulbs of lileaceous plants and orchids. Such root foods grow abundantly in woodland-steppe and moist-steppe of Syria as well, where they are gathered by Bedouin today (Hilman 2000). In Turkey, consumption of bulbs of *Crocus* sp in spring

is widespread in every region. 30 different *Crocus* species grow in Turkey. The present author is one of the local people of Black Sea Region who consumed bulbs of lileaceous plants including those of *Crocus* sp during childhood years. Such roots are either consumed at the collection point, or gathered and taken home. At home they are cooked 1) alone, 2) with bulgur 3) with whole bread wheat grains; or 4) buried in ash and roasted. In Rize *Crocus* bulbs are called 'meadow walnut' (Baytop 1997), and even in such woodland areas with abundant and diverse food capacity, these bulbs are appreciated much as food resource. In Gemerek of Sivas, *C. cancellatus* bulbs are collected in bunches in spring season and brought to Southeastarn towns such as Gaziantep to be sold in bazaars (Baytop 1997). These sweet tasting bulbs are very easy to pull, and once they are pulled, the only process they need is to hand peel the outer layer. It was reported by Baytop (1997) that, in Central Anatolia there is a special tool made of wood with a sharp end, in shape of an adze (called 'kıskıç' in Ankara and 'kıskıs' in Yozgat) only used for collecting *Crocus* bulbs from the ground. The bulbs are generally not stored, because of the problems concerning their durability.
Talk about how women and small daughters collect greens from around their houses and in gardens. And these wild plants naturally grow there. As people continue collecting these plants, their seeds are spread around making them grow again increasing their chance to survive in their habitat.

3.6.4. ***Crataegus*** **sp. (hawthorn)**

The fruit is edible, though of most species hardly palatable as dessert, and has a high content of vitamin C. For this reason children in England were encouraged to collect haws for jam and jelly in the latter years of World War II (Townsend and Guest 1966). In autumn season in Turkey it is widespread to row often big, yellow hawthorn fruits on a string sold in market or by individual street sellers coming from their villages and wear it like a long necklace and eat, especially among kids.

Baytop (1997) informs that in Gaziantep, Yeşilkent *C. aronia* with yellow, 12-18 mm fruits are called sarı alıç (yellow hawthorn) and consumed. In Tunceli red, 10-12 mm fruits of *C. pseudoheterophylla* aluç are eaten. *C. tanacetifolia* having 18-20 mm, yellow colored with red dots fruits are called in Zara, Sivas ayva alıcı, çakır alıcı, godon alıcı, göden alıcı or kotan alıcı and consumed. It is common in North and

Central Anatolia. Its fruits are sold in market in autumn. Again in Zara, Sivas *C. szovitsii* fruits yellow-orange in color, 15-25 mm, named koyun alıcı (sheep hawthorn) are consumed.

Daniel Moerman (1998) mentions about the several uses of *Crataegus* sp. as well. Concerning *C. chrysocarpa* in his book he also mentions about a research by Hellson (1974) about a tree cult among Blackfoot Native Americans. Unless the tree was offered a gift, the people who ate its fruits would have stomach cramps. Boys' gift, a little bow and arrow made from the thorns; girls' gift a pair of miniature moccasins fashioned from the leaves must have been placed on the tree to collect fruits to have the tree not allowed its berries to 'bite' the stomach. While some *Crataegus* species are eaten as starvation food by some tribes, generally all species are eaten fresh by all. Pressing the fruits into cakes for the purpose of preservation is very common as well. *C. chrysocarpa, C. douglasii, C. columbiana, C. erythropada, C. pruinosa* and *C. submollis* fruits are pressed or mashed into cakes and stored and/or consumed as crackers or snacks to dip into soups. *C. columbiana* hawthorns mixed with other fruits are pressed into cakes and dried for winter use by Montana Indians.

The medicinal value of fluid extract of hawthorn as a cardiac remedy and tonic was appreciated long before vitamins were known. For many centuries the hawthorn has been a favourite hedge or park plant in Europe. For hedge-planting, if seed is used it must be treated to accelerate germination: normally the seeds lie dormant till the second spring and even may not germinate till the third or fourth. Its long durable rigid thorns render the hawthorn particularly suitable as a hedgerow, and it bears trimming well. Hawthorns are sold in markets in Iraq, Turkey, Syria, Iran as well as in many countries Although there are not certain record, R. D. Meikle informs *C. azarolus* (azarole) is probably sometimes cultivated on the Mezopotamian plains as well as in the mountain region (Townsend and Guest 1966). It is reported by Ertuğ-Yaraş that *Crataegus sp.* was one of the tree species used as fuel in Anatolia (2000). *C. rivularis* is the single hawthorn species, of which wood is used as fuel among American Indian tribes reported by Moerman (1998). Its fruits are used as principal food.

3.6.4.1. *C. monogyna*

This species is cultivated in irrigated gardens and orchards in Lower Iraq as an ornamental tree with edible fruits. In Europe *C. monogyna* is often employed as rootstock for grafts of garden varieties: it is the common hedge-plant in England. According to Watt (1888-96) the hawthorn was a favourite tree to plant near tombs in Afghanistan and N.W. Himalaya where its hard durable wood was appreciated for axe handles and staves: it was also much cultivated there for its flowers and edible fruit. In the encyclopedia of Wealth of India (1950), quoted from Watt's work, the fruit is made into preserves and sweetmeats, that hawthorn marmelade has high vitamin C content and serves as a valuable source of vitamin: also that a beverage made from the rind and pips is rich in vitamin. An intoxicating fermented liquor is said to have been made from the fruits at the turn of the century in many parts of France (Townsend and Guest 1966).

3.6.4.2. *C. orientalis* var. *orientalis*

The fruits (it alıcı (dog hawthorn) in Zara, Sivas; kırmızı alıç (red hawthorn) in Çepni and Gemerek, Sivas) are 18-20 mm, reddish orange, and consumed (Baytop 1997). It has generally red fruits in Konya Basin and grows especially on rocky or due to overexploitation of forests disturbed, steppic slopes of mountains. It is distinguishable at first sight standing alone and few on naked, overgrazed, in autumn dry grass dominant slopes of Karadağ and some parts of Toros slopes.

3.6.4.3. *Crataegus aronia*

The fruits (sarı alıç in Gaziantep) are 12-18 mm, yellow, and consumed (Baytop 1997).

3.6.5. *Pyrus* sp. (wild plum)

It is noted by the authors that *P. communis* and *P. malus* have each once been found wild in Iraq remote from any existing village, they could be subspontaneous and not truly native, both being cultivated in Iraq (Townsend and Guest 1966).

P. communis is a domesticated species widespread all over the world. The authors mention the fruit being sold in the market of Iraq for the luxury trade generally imported from Syria, the Lebanon and elsewhere. This species has long been cultivated: it has often escaped and become naturalized. The earlier cultivated pears were hard and gritty but these defects have largely been eliminated from later varieties. Besides its use as a luscious dessert fruit, the pear is used for stewing, baking and compotes: also sometimes for the manifacture of "perry" an alcoholic beverage akin to cider. There is also a note by the authors concerning the consumption of 'unpalatable' *Pyrus syriaca* fruits by mountain people (Townsend and Guest 1966). Fruits of *Pyrus communis* are mashed, made into small cakes and dried for future use; also raw or cooked fruit sun or fire dried and stored for future use; dried fruit taken as a hunting food; dried fruit cakes soaked in warm water and cooked as a sauce or mixed with corn bread; *Pyrus sp.* fruits cut up in thin slices, strung on twine, dried and used for food; fruits boiled or baked and eaten; fruits cut up and used as sauce by Iroquois (Moerman 1998).

3.6.6. *Pistacia* sp. (terebinth)

The true Pistache (*Pistacia vera*) is well-known for its edible fruits-the pistache of commerce, widely used in confectionery and for table dessert (Townsend and Guest 1966). As the authors acknowledged its popularity in Iraq, *Pistacia vera*, as a valuable ingredient for its flavor especially in desserts, is economically very important and much preferred in eastern and southeastern Turkey. As in Iraq, pistachio nuts either in shell or as roasted and salted kernels are sold in markets. It is the ingredient for the well-known Turkish desserts baklava and lokum. Pistachio trees are so popular that when fruits are ripe they are sold in the market costly. Trees having this valuable economical supply are guarded by the land owners. Growing a pistachio tree to collect its ripe fruits takes around 10 years. This is why, every pistachio tree in the southeastern Turkey is treated with a special care. The process of building dams, alongside their much profit to the people living in the region, has also cost to the local people losing many pistachio trees under the dam water. Excavations in the region required the trees to be cut as well. While salvage excavations went on rigorously in the region prior to bulding dams, local people struggled with harvesting their last pistachio fruits. They prefered losing their houses to losing pistachio trees, as it was the only economical resource for many families. Each tree was compensated by the government, however the local people stated that this money was only the cost of that year's products. Much tear was run for the trees, when a dam was soon to be completed, with the last hope that their last product would be ripe and ready to collect before all are buried under the dam water. Finally, when it was understood the trees carrying the fruits would not be able to be survived, their branches were cut and carried to the safer parts of the lands. If the fruits were not ripe yet, the branches were used as fuel and for grafting. The most recent example of this case was when many villagers tried to save their pistachio trees grew in abundance on both sides of the Euphrates both from the increasing water level of the Birecik Dam and also from the Zeugma salvage excavation clearing the area from trees. While the archaeologists tried to recover the unique Roman mosaics, which would be buried under the dam water forever, the local people struggled to rescue something still living, as the resource their lives depended on. Wild *Pistacia* trees also grow extensively in the mountains of eastern and southeastern Turkey, and along the Toros Mountains range.

Wild *Pistacia* trees in the mountains provide excellent rootstocks for *Pistacia vera.* According to Watt (1891) the wood of the tree used to be appreciated in Iran and Afghanistan for making agricultural implements, spoons and other objects. The resin obtained by tapping the stems and larger branches of the tree is similar to mastic, the galls and pericarp of the fruit were employed to dye silk in India and the fruit husks used as a mordant and tan. The fruit contains some 60% of greenish fatty oil, sweet-flavored and aromatic, which is sometimes extracted for medicinal use. Linchevsky (1949) says the yield of resin is not generally high; but considering its value for high-quality paints and nitro-lacquers, he suggests that a moderate exploitation of male trees for resin may prove worthwhile. He also noted this tree has been widely known and valued since ancient times (Townsend and Guest 1966).

Wild fruits of *Pistacia* are smaller than pistachio nuts. They are round with a softer shell which does not require to be removed when consumed. This is why, they are consumed both fresh and roasted and eaten whole in the Near East. Townsend and Guest stated that (1966), the names terebinth and turpentine tree were applied primarily to an east Mediterranean species (*Pistacia terebinthus*), which was the source of the medicinal product known as Chian turpentine, an oleo-resin stimulant and diuretic; this primitive turpentine substitute came mainly from the Aegean island of Scio (Chios). Extensive plantations of the mastic tree cover the southern part of the island (Minter 2005).

Townsend and Guest also introduced *P. khinjuk* as Terebinth, Turpentine Tree, Iraqi Terebinth whose fruits turn a kind of coppery green color on dyeing, sold in local markets of Iraq and used for washing and making soap. On the contrary of the fruits of the two great terebinths, *P. terebinthus* and *P. atlantica*, the flesh of the *P. khinjuk* fruit is said to be bitter and inedible. As for most of the fruit trees, every possible part of the terebinth trees is used by local people and even exported to other regions and countries. According to Townsend and Guest (1966), the kernels of the stones are eaten, like pistachio, usually after roasting. Townsend and Guest informed us that, the resinous juice of the tree is the source of a local chewing gum, and the leaves are collected as fodder for livestock and also used for tanning and dyeing. As the terebinth trees supply dependable food resource on a regular basis, only the dry branches are used as fuel good in quality. Similar economic uses for products of this and other species of *Pistacia* have been recorded by various authors from Cyprus, Turkey, Syria, Iran, W. Pakistan and Afghanistan.

According to Linchevsky (1949) the fruits of *P. eurycarpa* contain 60% of oil suitable for combustion and soap making. Same with the other fruit trees, those that fall from the tree and lie on the ground in autumn provide useful food for domestic animals. There is much rasin in the bark and wood of these trees which can be obtained by tapping and used in the lacquer-paint industry. The dried rasin is chewed as a masticatory in the Caucasus and in Iran (Townsend and Guest 1966).

The Mastic Tree or Lentisk Pistache is another Mediterranean species (*P. lentiscus*); it is the source of mastic, an agreeable resin known and much prized in medicine, and used as picture varnish in the arts from an early period. Mastic was widely employed as a masticatory to preserve, or even to stop cavities in teeth and to sweeten the breath. It is much used in Iraq to flavor the local date-spirit (’Araq) commonly known as mustaki to distinguish it from Zahlāwi, the anise-flavored grape-spirit of the Lebanon (Townsend and Guest 1966).In Turkey as well, arak (’Araq in this literature) is a well known type of rakı, an alcoholic drink, which is prepared from *Pistacia* sp.

In Anatolia, chewing the tree resins including that of terebinth trees for their sugar content is very common among local people, especially favored by children. Another widespread use in the eastern and southeastern Turkey is to pound or grind the roasted terebinth fruitlets for making a greasy mush which is mixed with water to make coffee. The terebinth coffee (menengiç kahvesi) with its strong smell and the taste is preferred to the coffee prepared with coffee beans.

It was stated by Hillman's experimental work (2000) that, the fruitlets of the terebinth trees, especially those of *P. atlantica* and *P. terebinthus*, were best eaten while still unripe with the reason that at maturity shell tissue predominates. In Anatolia, the fruitlets of *Pistacia* are generally eaten when mature; no matter the shell tissue needs to be chewed. Unripe ones are especially separated from the ripe ones, with the reason that they are infected, or actually bitter. When roasted, the shell tissue of *Pistacia* fruitlets becomes even thinner and much crunchy. According to ethnographic record mentioned by Hillman (2000), they were used primarily as a flavoring and preservative-always after roasting. According to Hillman's experiments (2000) the after-effects of eating large quantities of wild *Pistacia* fruitlets on occasions makes one need to consume other foods as well, implying that they are unlikely to have served as a staple.

3.6.7. *Rhus coriaria* (sumac)

Rhus coriaria is native to the Mediterranean region and Middle East. Its acid fruits are dried, powdered and used as a condiment on foods such as kebabs and pilaffs. The sour, lemon-like flavor is particularly valued in those parts of the Middle East where lemons are rare. The leaves and stems of this species are used in tanning (Pickersgill 2005). (Barbara Pickersgill. Spices. 2005.

Rhus sp. has been extensively used by American Indian tribes. By several tribes various species of *Rhus* fruits are pounded and eaten. They are appreciated by children as well. Iroquois boil *Rhus* fruits and drink it as a bevarage in winter. Berries and sugar were used to make a cooling drink in the summertime and stored for winter use by Meskwaki. By Ojibwa, fresh or dried berries sweetened with maple sugar and made into a hot or cool bevarage like lemonade. Menominee dry berries for winter use. Potawatomi eat berries to satisfy a natural craving for something acid or tart. Mahuna eat berries to quench the thirst. Apache eat fruits for food. Apache, Chiricahua and Mescalero grind dried fruits, they mix the pulp with water and sugar and cook it to make jam. Berries are eaten fresh, dried or ground into flour for mush by Cahuilla. Yavapai mash raw berries for consumption. There is also several food types prepared with sumac fruits. The fruits are sometimes mixed with other types of flour and consumed. There is a long list of them available in the Native American Ethnobotany book of Daniel Moerman (Moerman 1998).

Spices, like herbs, add interest to a diet containing mostly bland carbohydrates and mask unpleasant flavors in imprefectly preserved meat. They are characteristically aromatic, usually but not always because they contain volatile oils or resins. Virtually any part of the plant may be used: rhizomes (ginger, turmeric), bark (cinnamon), leaves (curry plant), flower buds (cloves, capers), stigmas (saffron), arils (mace), but most often fruits and\or seeds are used. Spices are usually dried before use. They can then be stored for long periods and are light and easy to transport. They have figured in long-distance trade since very early times and the great value placed on many of them means that spices have played a significant role in world history (Pickersgill. 2005).

3.6.8. *Amygdalus* sp. (wild almond)

In Turkey, the domesticated *Amygdalus communis* fruits are sold in markets and by street sellers complete with the fleshy outer layer, which is called çağla. It was stated by Hillman, they were also called can bademi (=soul of almond) and eaten with a pinch of salt. In this case detoxification is not necessary, since the plant produces prussic acid to protect the kernel. It is also stated by Ertuğ (1997) that, green almonds of *Amygdalus orientalis* are consumed by local people of Nevşehir.

3.6.9. *Quercus* sp. (acorn)

In Nevşehir, acorns of many oak species are both consumed raw and roasted, buried in earth to reduce their tannin and stored for winter use (Ertuğ 2000). Edible *Quercus* species (pelit ağacı/meşe) were listed by Ertuğ (2000) as *Q. cerris* L., *Q. infectoria* Oliver ssp. *boissieri* (Reuter) O. Schwarz, *Q. ithaburensis* Decne. ssp. *macrolepis* (Kotschy) Hedge et Yalt., *Q. pubescens* Willd., *Q. trojana* P.B. Webb, *Q. vulcanica* (Boiss. Et Heldr. ex) Kotschy. (consumed by mountain villages) and *Q. robur* L. ssp. *robur.*

The practice of leaving heavy stone grinders and pestles and mortars at seasonal processing camps was reported for the Cahuilla by Bean and Saubel (1972) and for various Aboriginal peoples of Australia by Smith (1989) and Levitt (1981).

Today, American Indian tribes and villagers in the Near East (Bean and Saubel 1972; Mason 1990) 1) crack open tannin-rich species of acorn hitting with a handstone against a stone, 2) dry acorns in the sun, 3) dehusk them, 4) grind the kernels into a flour with a grinder or pounded in a pestle and mortar, 5) leach the acorn flour by putting the flour in a basket and running water through it until most of the bitter tannins are flushed out. Also, acorns collected in sacks were leached in running water, or soaked in hot springs prior to them being dried and grounded. Today, as noted by Mason (1992), Boisser's oak and Brandt's oak are consumed without leaching. Hillman's observations in Karaman in 1971 showed that (Hillman 2000), Boisser's oak was being sold for human consumption. It was noted by Mason and Nesbitt (cited by Hillman 2000) that, Assyrian sect of Christians near Mardin in Southeast Turkey consumed Boisser's oak after simple roasting. These communities preferred the acorns of Brandt's oak which they ate roasted after cutting off the tannin rich embryo end. It was suggested by Hillman that (2000), as with all nut and seed foods, grinding or pounding them with pestles and mortars (generally after roasting) offered an adequate digestion.

3.6.10. *Celtis* sp.

In Ihlara valley villages *Celtis* fruits are dried in the sun and stored for winter consumption (Ertuğ 2000).

It was mentioned by Pliny that, the wood of *Celtis* tree was good for making flutes and its fruits were collected and used for a popular kind of wine (*cited in* Helbaek 1970).

Native Americans used these fruits either as a fresh fruit, to flavor meat, or by pounding the berries and mixing them with fat and parched corn (Pieroni 2005). *Celtis occientalis* (common hackberry) fruits are dried and pounded to make a condiment used for seasoning meat in cooking by Dakota. By Western Keres berries are extensively used for food. Meskwaki grind hard berries to make into a mush. Omaha use berries occasionally for food. Pawnee pound berries and mix them with a little fat, and parched corn and use them for food. Kiowa pound *Celtis occidentalis* L. var. *occidentalis* (western hackberry) berries into a paste-like consistency and mold onto a stick, and bake them over an open fire. Other *Celtis* sp. are also used for food by American Indians, including ground, caked and dried fruits preserved for winter use (Moerman 1998).

CHAPTER 4

STUDY METHODS

4.1. Subject Definition

Recently, ethnobotanical research in the world has gained a lot of interest for their importance in conservation of the natural environment and urgency for recording the information of people's interactions with plants. As the world is changing in many ways due to increasing human population and modernization, it results in changing the earth's surface in disadvantage of the animals and plants. Many animal and plant species having existed for millions of years become extinct in the last century. Because of the overuse of the natural resources such as ground water, lakes, rivers and trees, there has been a dramatical desertification and rise in natural hazards all over the world. While it is the environmental aspect of the rapid change, there have also been changes in people's living styles. People need to adapt to these changes, by less and less interacting with plants as they used to do in their traditional ways. This causes them to forget their skills and the various knowledge they own about managing the natural resources that form their traditions. Recording the information of how local people interact with the natural environment, before it is lost forever is vital.

Such ethnobotanical studies can be benefited from by other various disciplines, archaeology being one of them. Archaeobotany studies the plant remains recovered from archaeological contexts. To interpret these remains we need to gather information about the plants, their environment and use by local people.

In Turkey, although ethnobotanical research conducted by mainly sociologists and ethnologists date back to 1960's, systematical research in ethnopharmacology and ethnobotany have developed in the last decade. In Turkey, in archaeobotanical projects as part of archaeological excavations, an ethnobotanical research has not been done except for Ertuğ's thorough study in Nevşehir, a town in Central Highland, often called Cappadocia. In this study, rather than using one data set of an archaeological settlement, many data sets from various archaeological settlements were used for a better availability of comparison and application of the data into different contexts. For this reason, Neolithic Period was chosen to be studied as wild food plants were still abundantly consumed by people in this period. There are questions for this period waiting to be answered:

While the transition into agriculture occurred in this period, did people still consumed wild food plants?
Was there any decrease in the amount of wild food plants in people's diet?
How did people in these periods harvest, process and store wild food plants and what tools did they use while doing these?
Did people process wild food plants prior to consumption?
What parts of the plants were left from these processes? Where and how were they discarded?
Did people's knowledge of plants extended beyond the area they lived in? If it did, did it include plants they had known through exchange and contacts with settlements located in other vegetation zones?
How much did people eat wild food plants and what was their importance in the total amount of foods?

While archaeobotanical researches gathered much data trying to answer these questions, searching for answers to the same questions through an ethnobotanical study in the areas where archaeological settlements are, can help in understanding the diet of people lived in the past. Although 60 years ago before the introduction of the mechanized agriculture to the country, the natural environment would be a better indicator for the Neolithic Period; the plant species, of which remains are recovered from the excavations of Neolithic and Chalcolithic settlements in the region, still grow in their current natural environment. From the recovery of the tools in archaeological excavations, we see the similar tools still in use by local people living in the region. Observing and recording in what ways these tools being used by local people today in processing plants helps us understand their uses by past societies.

As a result, the subject of the research can be defined as 'ethnobotany of wild food plant use and their archaeological implications in Neolithic and Chalcolithic Periods'.

4.2. Ethnobotanical Data

Ethnobotanical data set consisted of a broad range of information on people's interactions with the natural environment (Martin 1997), while managing their lives using the environment in various ways changing the landscape; therefore changing their living style and adapting tools and their use to it, and how they identify themselves interacting with this environment.

The data set used slides, maps, plant drawings, sketches of geographical landmarks with their natural resource capacities and local names, plant identification manuals, voucher specimens, collection of plants, recorded interviews, spice shops field research and experimental works.

In content of the field data emic, and for the general frame of the research etic categories were used when compiling the data set. Local people perceive the world around them and the materials used as single inseparable item, completing and adapting each other in every chance. Many times local people's world does not fit in the researcher's perceptions and classifications when attempting to separate 'the world' into pieces and study it. Inspite of the fact that this research aimed to study wild food plants from their dietary aspect, during the fieldworks it was inevitable to include more data of the plants and plant parts, for their other uses. These data are shown under 'other uses' and 'export' subsections in the 'results' chapter. When observing activities and asking questions to local people regarding the plants, these new categories were added by them in every chance as perceived to be closely linked with the dietary system.

However, studying everything in a society in one research is time-consuming and an aim difficult to accomplish. This is why; the research required some limitations and data organization. First limitation has been in choice of the location of the study.

4.3. Choice of Location of the Study

Turkey has currently 64 Neolithic and Early Chalcolithic Period settlements recovered until now. Many of these settlements are located in Southeast and Central Anatolia, also the regions studied in most detail.

From two, Central Anatolia is today discussed to be the area of transition of domesticated plants and agriculture from where they first appeared, Levant and Southeastern Anatolia, to Europe. Central Anatolia, Lake District and Central Highland having several Neolithic and Early Chalcolithic settlements close to each other make an excellent location for making comparisons. It is possible to divide them into different vegetation zones where local people live today in mudbrick buildings similar of the past. The local people living in the region still use similar tools; gather wild plants and hunt, although their economies are mostly based on agricultural products.

Second limitation in the research has been in making a taxon list to study.

4.4. Preparing a Taxon List

Although there are many wild food plants growing in the region, this research focuses only on wild fruits, nuts and tubers, of which seeds, kernels and tubers can be extensively recovered from the archaeological deposits. Some of these species such as *Berberis, Ranunculus, Rosa, Elaeagnus, Castanea* and tuberous plants except for *Scirpus sp.* were also eliminated to be studied in another research, as their remains seem missing from the deposits of Neolithic and Early Chalcolithic occupation levels in the region, not allowing their archaeological implications using comparisons with the available modern data. Only one wild *Malus* tree was seen in the areas studied, and no ethnographic information relating with it could be gathered. The data concerning Russian oleander, *Elaeagnus,* were mentioned in the discussion chapter, as considered to have existed in the archaeological context, but consequently missing. As a result, nine plant genera as the most commonly grown and being consumed by people today, as well as their remains being recovered the most abundantly from the archaeological context in the region were selected to be studied. For detailing the study further to gain more accurate results, species of each genus were picked based on the information of their locations of distribution, gathered from the literature work on mainly Flora of Turkey written by P.H. Davis *et al*. (1965-1981), and other botanists' researches in the region. Accordingly, the taxon list in the study consisted of nine genera.

Table 8. The List of Taxa Made in the Preliminary Study

	Family	**Genus**	**Species**
Wild Food Plants with Tubers	*Cyperaceae*	Scirpus L.	*Scirpus maritimus*
Wild shrubs with edible fruits	*Anacardiaceae*	Pistacia L.	*Pistacia terebinthus*
		Rhus L.	*Rhus coriaria*
	Rosaceae	Amygdalus L.	*Amygdalus orientalis*
Wild trees with edible fruits	*Rosaceae*	Pyrus L.	*Pyrus amygdaliformis*
		Prunus L.	*Prunus divaricata*
		Crataegus L.	*Crataegus monogyna*
	Ulmaceae	Celtis L.	*Celtis tournefortii*
Wild trees with edible nuts	*Fagaceae*	Quercus L.	*Quercus robur*
			Quercus vulcanica
			Quercus pubescens

After defining the research subject and making the limitations, the approach best suiting this subject, budget and schedule have been selected.

4.5. Ethnobotanical Approach

A thorough ethnobotanical research in the Konya Basin regarding wild fruits, nuts and tubers has not been done before. In spite of the rich flora in the region, due to heavy drying, modernization and need for more space for agricultural areas, plant species in the region are in danger of extinct. In the archaeobotanical remains recovered from the archaeological sites in Konya Basin, we see that these species still growing in the region today have been used by people since Neolithic. To be able to understand their uses and importance in societies lived in the past, a detailed ethnobotanical research has been conducted in the region.

To make this multidisciplinary ethnobotanical study, several fields of study were included in the research, such as botany, anthropology, economy, forestry, geography, history, archaeology, archaeobotany, chemistry and geology. For identifying plant species, studying the flora and the forest resources: botany and forestry; for applying ethnographic part of the fieldworks to document traditional botanical knowledge: anthropology; for quantitative understanding and visualizing the use, management and exchange of botanical resources: economy; for drawing maps, spotting natural resources and their impact during different seasons and years: geography; for the past use of plants as one of the main parts of this study: history, archaeology and archaeobotany; for understanding natural resources used by people and explaining the environment of the region today and in the past: geology; and for including nutritional data of the plants: chemistry have been contributed. There have been some problems met when accomplishing this approach, due to high rate of unemployment in the country and therefore managing the research budget.

'Local people' term is used for residents of the region under study who have gained their ecological knowledge from emprical observation of nature and from communication with other people in the culture. 'Researchers' term, relating with this research, is used for people usually trained at a university, who document the traditional knowledge in collaboration with local people, knowledge of the past and its related fields. Calling one group 'scientific' implies that the emprical knowledge of the others lack rigor, whereas labelling some people 'traditional' may promote the mistaken notion that their partners are more modern. For this reason, the specialized vocabulary that ethnobotanists employ makes it difficult to describe the participants in our joint venture. As used in Martin's method manual, traditional knowledge or folk knowledge terms are used to refer to what local people know about the natural environment, whereas scientific knowledge term is used to describe the information derived from the research. Some people think that science provides the correct model of the natural world and should be adopted by everybody. For this reason, they give little credit to self-taught naturalists who lack a formal education. Others feel that the right to cultural self-determination is pre-eminent and that science can only corrupt the purity of indigenous knowledge. Ethnoecologists, not seeking to judge systems of knowledge, declaring one superior to other, do researches to reveal both the wealth of detailed information continued in folk systems of natural science and the utility of using scientific classification as a looking glass through which various indigenous systems can be observed and compared. By employing techniques, we can bring our understanding and appreciation of traditional knowledge into sharper focus.

4.6. Preparation Prior To Fieldwork

Before the fieldworks, topographic maps of the region showing longitude and latitude, elevations, borders, physical features, roads, settlements and archaeological centers were obtained. On the maps, the region was studied in detail to decide two important aspects: 1) how many different ecological zones the region has; 2) which villages could be the best choices to work at from their best representing these ecological zones and being less subjected to modernization and the damage of the natural environment point of view.

Before and during the fieldwork periods related literature and several databases including herbarium collections, botanical gardens, charred seed collections and internet herbarium web pages were searched. Identification of the plant species included in the research was studied for their recognition and comparisons in the field. It has been especially helpful studying botanical identifications, as plants' different appearances in different seasons; such as for recognizing trees with mature, immature or without fruits and some tree species under the same genus bearing fruits with different shape, size and color; with varying leaf colors from orange to yellow and green; for plant species with tubers some seasons having no flowers having their recognition harder. A small voucher specimen file was made including dry plant samples of each species in the research, to carry along the fieldworks and show local people for documenting their traditional botanical knowledge. While preparing it, picking the tree branches with their mature fruits or nuts and leaves and the sedge with its rhizomes, tubers and flowers with seed pots were carefully done. Wooden presses were borrowed from the British Institute of Archaeology in Ankara and newspaper sheets were used to dry the plants collected between the presses. Pieces of rope to wrap around the presses to not let air in otherwise causing decomposition of plants, tags to label plants, and a notebook to record the data of collected plants were prepared. Prior to fieldworks, a trip accompanied by the thesis advisor was made to the region to survey these wetland, steppe and forest zones. During this initial trip how to make voucher specimens and collect and record botanical data were learned and practised. The flora of the region was observed and the tree species were seen in their natural habitat. In every trip local and official authorities were made aware of the fieldwork. As the trips were done, the villages having been visited and their use of lands when harvesting and processing plants were marked on the map. Any recent physical changes such as drying lakes and village name changes that did not show on the map were marked and revised as well.

4.7. Ethnobotanical Fieldwork and the Use of Ethnographic Methodology

Participant observation was adopted as methodology during the ethnobotanical fieldwork. The methodology used in the research consists of visits to local people in villages. Harvesting, processing and consumption of each wild food plants in the list were discussed with the local people by also accompanying them to the habitats where these plants grow in different seasons.

For this reason, during the ethnobotanical fieldworks, nine villages chosen in three different vegetation zones were visited several times, also living two weeks with a family in Madenşehir village in Karadağ Mountain during harvesting and processing times, and much precious help were supplied by the families in these villages. As stated in Martin, when the visits to the areas started, the complexity of the local ecological knowledge and the diversity of the flora and fauna (Martin 1997) have required more trips to be made to many important harvesting, farming, hunting, herding and migration activity zones (since wild food plant gathering takes place in these activities too and they are closely connected with each other), as well as need to follow the local people's activities with these plants in different seasons. During the trips, local people were joined by to observe how they harvest and process the plants varying in seasons and what tools they use to do so. In each trip to harvesting or activity zones, voucher specimens were collected to be identified at the Botany Department of Gazi University. When collecting voucher specimens, three samples were picked from the same species for donating them to herbarium collections and archiving the research.

At the and of each day spent in the field, notes composed of observations and answers given by local people for each wild food plant species were studied and classified into harvesting, pre-storage processing, storage, pre-consumption processing, consumption, other uses and export categories. These *etic categories* from the researcher's perspective and classification of the world were created under wild food plant's Latin names to make the results easy to follow by the other researchers, and yet, the concept of these categories were filled with the data collected by using *emic categories* including plant's local names, from the point of local people's viewing the plants and the environment.

In these participant observations, specimens from different ecological zones were showed to local people and it was attempted to see if their knowledge of plants extended beyond the area they live in, and included plants they have known through exchange and contacts with settlements located in other vegetation zones. Since it has been impossible to talk with every single local people in the villages visited, a subsample of people were selected to be participated in the research. As well as people's willingness to take part in the research, their expertise with the natural environment and varieties from different sex, age, economical situation and job played an important role in selecting the subsamples. Throughout the observations and communication with local people, questions in the checklist written according to classifications concerning harvesting, processing, storage, social consumption and trading were asked and noted. Every classification for each plant and village were photographed.

During the excavation seasons, accommodation was supplied by Çatalhöyük Project. For the trips to villages from the excavation house, either other researchers visiting the same areas or farmers and any villagers going to the same direction were joined, thus, travel expenses during summers were also partially supplied by Çatalhöyük Project. In other seasons for joining the local communities especially in harvesting and processing times, accommodation and food were offered by the villagers, the travel expense some

required tools in daily life of the households were supplied and one family's daughter's educational expenses were contributed in by the present researcher.
When starting the fieldwork, it was decided to be continued in 1998 summer season for six weeks, however for some fruits and nuts were not collected by the local people yet when the excavation season ended, a self-funding fieldwork was done for two weeks in autumn season of the same year. The following year in the summer season, the region was revisited for another six weeks to complete missing information including an experimental work with the sedge species, *Scirpus maritimus*. These periods spent in the field were as best benefited as possible also taking place in many seasonal activities, especially every stage of the wild food plant harvesting, process, storage and social consumptions, as well as ritual occasions, festivals, hunting and collecting other raw material activities such as fuel, building, matting and storage materials, herding and supplying water, consequently allowing to evaluate ecological knowledge in its various social contexts. In the trips, the time people spend in harvesting and processing plants and the time length plants are able to be kept in storage including the seasons for each of these steps, the quantity of plants collected by local people, the frequency of the distribution of plants in the village vicinities were recorded. Benefited from all these factors, results of the desirability of the plant in the region, people's economic and dietary dependence, cultivating or overexploiting plant species were also noted.

In collection of the voucher specimens, initials and the number of the specimen collected were on the tags, each of which was tied to plant collected. To be analysed in the future projects, when collecting voucher specimens, samples were taken in a glass jar of each wild fruit, nut and tuber collected before and after their process by the local people. These samples were tagged and numbered as well. The numbered samples were recorded with the same order in a notebook to add their detailed information, such as location, altitude, and natural habitat, local and after their analyses, Latin names.

4.8. Analysis

Back at home in Ankara, the data and plants collected were analysed, and results were noted. The voucher specimens collected were identified by the botany professors of the Botany Department of Gazi University. The specimens were labeled carrying the information of scientific name, local name, locality, description, collector and the name of the specialist doing the identification. Each of the plant species collected were donated to Gazi University Herbarium. One set of voucher specimens also remain at the PEB lab of Department of Anthropology of UC Berkeley. Learned much from this research by completing the process of adapting a technique for the field site selected, collecting the data and analysing the results, in future projects a complementary approach will have been better able to be chosen.

When the voucher specimens collected during the fieldworks were identified by the botanists at Botany Department of Gazi University, based on the 9 genera chosen to be studied, the table consisted of 11 species before starting the fieldworks has expanded to 21 species by the end of analyses of the wild food plants collected in the fieldworks.

Table 9. The List of Taxa Identified and Studied in the Ethnobotanical Reseach

	Family	Genus	Species
Wild Food Plants with Tubers	*Cyperaceae*	Scirpus L.	*S. maritimus* (L.) Palla var. *maritimus*
Wild shrubs with edible fruits	*Anacardiaceae*	Pistacia L.	*P. terebinthus* L. ssp. *palaestina* (Boiss.) Engler
		Rhus L.	*R.. coriaria*
	Rosaceae	Amygdalus L.	*A. orientalis* Miller
Wild trees with edible fruits	*Rosaceae*	Pyrus L.	*Pyrus amygdaliformis*
			Pyrus elaeagnifolia Pallas
		Prunus L.	*Prunus divaricata*
			Prunus cocomilia Ten
		Crataegus L.	*Crataegus monogyna* Jacq. subsp. *monogyna*
			Crataegus aronia (L.) Bosc. ex Dc. var. *aronia*
			Crataegus orientalis Pallas ex var. *orientalis* Bieb.
	Ulmaceae	Celtis L.	*Celtis tournefortii* Lam.
			Celtis glabrata Steven ex Planchon
Wild trees with edible nuts	*Fagaceae*	Quercus L.	*Q. robur* L. ssp. *robur*
			Q. vulcanica Boiss.&Heldr. ex Kotschy
			Q. pubescens Willd.
			Q. cerris L. var. *cerris*
			Q. ithaburensis Decne. ssp. *macrolepis* (Kotschy)
			Q. infectoria ssp. *boissieri*
			Q. ilex
			Q. trojana P.B. Webb

CHAPTER 5.

RESULTS

The villages of Konya have different ethnic identities which is important to mention here for seasonality. While Türkmen, Circassian, Tatar and Balkanian (muhacir) villages are generally situated on the plain area, Yörük villages are on the mountaneous areas. Such organization is caused by the events in the Ottoman Empire time. Nomadic or semi-sedentary villagers were always seen as a danger to the empire which feared unexpected raids of these mobile, therefore hard to be controlled groups. Similar events also happened in the neighboring countries, such as in Iranian states located on or near the Zagros Mountains (see Beck 1991).

The houses are clustered in the center of fields which they themselves own, and most of the people in the village are engaged in intensive agricultural production (Shankland 1998). Shankland was surprised to discover that, the village’s agricultural production appeared to provide a degree of economic plenty far greater than in many parts of central Anatolia. The fields are unusually fertile, a return in wheat may be as high as forty to one, whilst melons and sugar beet are grown as cash-crops. Not all families are wealthy, but most have twenty to thirty dönüm (the amount of land traditionally ploughed by one pair of oxen in a day). Animal husbandry is also extensively practised, for dairy produce, meat and for market. It appears that many villagers are substantially better off than the great majority of the civil servants in the town (Shankland 1998).

The villages were generally built a few hundred years ago. Süleymanhacı village was first inhabited 550 years ago. Ortaoba village was included in this village in the past. Today, the village has 200 households. The mosque in the village has been built 7 times. Although people of other villages call Suleymanhaci villagers ‘Türkmen’, the villagers do not accept this identity.

5.1. Cyperaceae

Sedge. The family *Cyperaceae* includes 90 genera and some 4,000 species with a preponderance of tropical genera and a preference for wet, open habitats.

C. rotundus is another tuberous species growing in Konya Basin and being used by local people for its tubers, stems and leaves. For this reason it has similarities with *S. maritimus*. In various wetland areas of Konya Basin these both species grow. Their tubers used to be consumed often by local people, however today due to modernization and change in the diet with the introduction of new types of foods from different regions and supermarkets in every town these tubers are consumed rarely. *C. rotundus* tubers are sold in spice and drug markets and in open bazaars in Konya and Karaman and used for medicinal purposes.

5.1.1. *Scirpus maritimus* and Its Environment in the Konya Basin

It is a glabrous, rhizomatous perennial with fleshy roots. Rhizome often long-creeping, c. 2 mm. Wide, branching, covered with sheath-like scales, becoming hard and black, forming round or ellipsoid, scale-clad, rooting tubers up to 15 mm. across the stem bases. Stems solitary, sometimes curved, leafy to about halfway, triangular with the angles sharp or narrowly winged and the sides concave above, flat below and ribbed. Leaf-sheaths often long, tight, herbaceous, membraneous, red-dotted on the ventral side below the shallowly convex, eligulate mouth, lowermost sheaths bladeless (Townsend and Guest 1985). The inflorescence normally bears large numbers of the shiny, dark brown, angular seeds (Hillman 2000). It grows by streams, along ditches, edge of swamps, shallow pools from irrigation canal overflow etc., sometimes in saline places, also as a weed in ricefields; up to alt. c. 750(-950) m.; fl.&fr.(Apr.-) May-Aug.(-Nov.) (Townsend and Guest 1985).

The species was abundant in the Konya Basin twenty years ago. In Küçükköy and Dedemoğlu surroundings by Çatalhöyük mounds, *S. maritimus* grew in large stands. On the lands where now Çatalhöyük excavation buildings are dense *S. maritimus* habitat was used as midden area by Küçükköy villagers.Today, due to heavy drying of the wetland ecological zones of the region, they grow only as patches; in Taşağıl, Pınarbaşı, Karahöyük and Adakale villages by now almost totally dry Hotamış Gölü on the north of Can Hasan sites, by Acı Göl (dried totally ten years ago) by Pınarbaşı sites, on the north and west of Dedemoğlu village in Kocaçay River and in Arpa Çayırı located on the west of Çatalhöyük, on the northern border of Konya in Astın Meadow, on the southern border of Konya closeby Toros slopes, and in the western borders of Konya, neighboring the Lake District by Beyşehir Lake.

The steppes where *S. maritimus* used to grow are today extensively covered with *Juncus* sp*,* another sedge species without tubers, shorter than *S. maritimus* in size. Villages in steppe zones which were until 20 years ago wetlands, and in today very narrow wetland zones use *Juncus* species as tinder and roofing material instead of hay (Dedemoğlu and Adakale respectively).

Today, *S. maritimus* grows along the irrigation ditches as occasionally dense and homogenous groups (some 10 m. in length) between mixed *Phragmities* and *Typha* groups. Villagers in the wetlands of Konya Basin name *S. maritimus* 'kovalık'meaning 'one bucket of something', or 'for making baskets'. Both meanings make sense, as local people sometimes collect sedges in buckets, and they also weave baskets from it. In some villages the name changed from kovalık to kovalak, which means repelling. Indeed, today many sedge species are burnt by people openlands and the smoke works as an insect repellent.

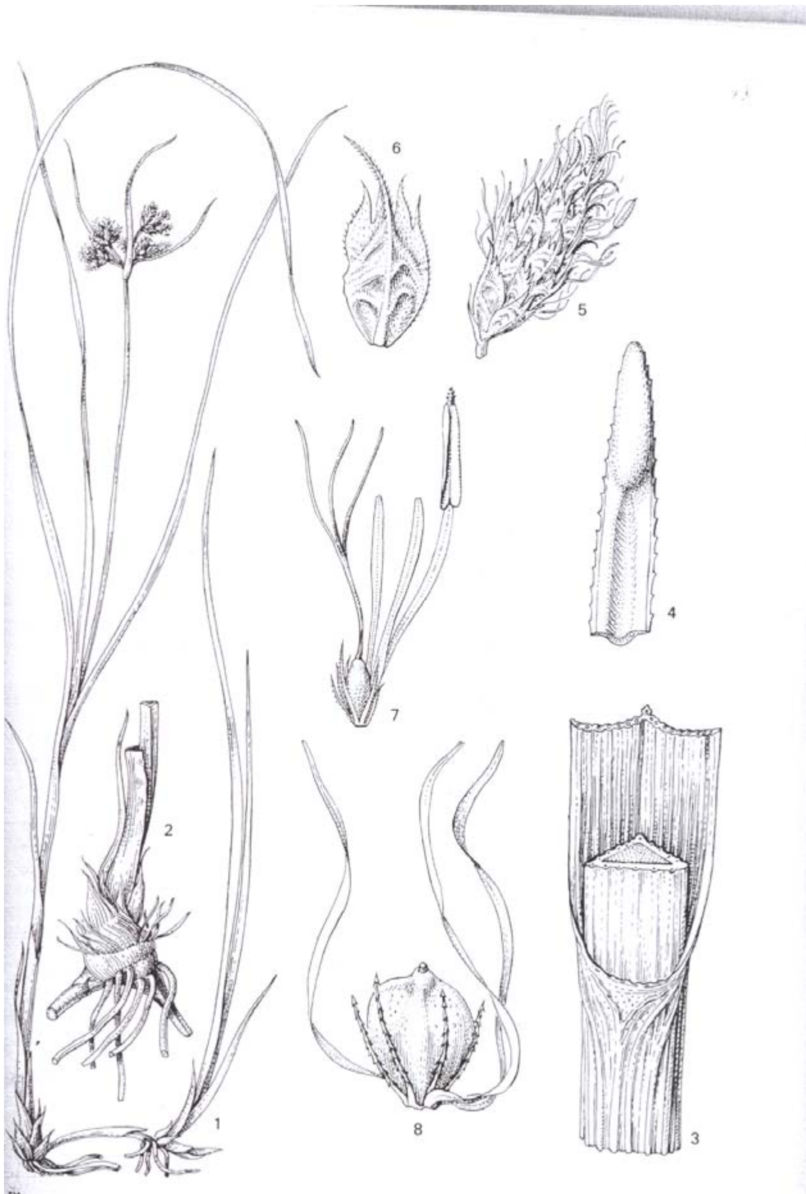


Fig. 2. ***Scirpus maritimus*** **(Townsend and Guest 1966)**

Fig. 3. *Scirpus maritimus* in irrigation ditch

Scirpus maritimus (sea club-rush, saltmarsh, bulrush)

S1) Küçükköy:

Local name: Bapra. Recently it is commonly called **bafra** in this village.

Harvesting:

1) In april-may, besides the other tasks such as sowing crop fields, people especially children collect young tubers of *S. maritimus* from irrigation canals. When the tubers and rhizomes are fresh in early spring it is easy to hand-pull the plant out of the muddy water and to peel the tubers using only hands.

2) A few households stated, in May while tubers are fresh, they pick the mud including the plant's tubers and rhizomes by pushing a wooden frame into wet mud with foot to give mud a rectangular shape and 'cutt the mud out' by lifting the rectangular shape with help of wide, wooden spatula type tools, so it makes a mudbrick to build garden walls. Other households collected the mud containing tubers in spring season and applied the standard mudbrick making techniques.

Pre-storage processing: none.

Storage: Mudbricks cut out of the ground including tubers and rhizomes are stored in fuel and dungcake storage rooms or sections in gardens to be used for repairments of garden walls.

Pre-consumption processing: Peeling the outer layers for consuming tuber nutlets. There are three main reasons for the peeling process: to clean the mud off of the tubers; to get rid of the bitter tasted slimy layers (tasting like onion); to reach the sweet, fresh and soft gloves of tubers (the tuber nutlets resemble garlic gloves and they grow attached to the rhizomes.).

Pre-consumption processing:

Peeled tuber nutlets are washed.

Consumption: Children eat young tubers when they play around. Although the tubers were collected for food by the villagers, today children and rarely adults eat them as snack. When parents do other tasks of the season such as cutting reed and club-rush stems, sowing seeds, gathering greens or making dungcakes, children are encouraged to keep themselves busy collecting, processing and eating tubers.

Scirpus maritimus tubers are not eaten commonly today, however people in this village used to eat them 20 years ago. They organised harvesting schedules with a crowded group from the villages in spring. Women, men, children or aged people harvested *Scirpus* tubers when they were fresh, so it was easy to pull the plant with its tubers. They ate fresh tubers.

In the region, local people are shy to admit they consume wild plants, and especially *S. maritimus* as it is accepted a sign of poverty. It has also been one of the subjects most hesitated to talk by villagers, because of the plant's growing environments, and its connection with unsterility. It admittedly needs in depth research with a longer term participating in the village life.

Other uses:

1) While the villagers prefer chaff and hay as binder inside mudbricks on their house walls, they use mudbricks with tubers to build their garden walls. The plant's stems, leaves and flowers cannot develop well in these muddy, almost dry patches on steppes, yet fresh tubers and rhizomes develop well in the mud. The reason of making mudbricks including tubers is the good quality of tubers and rhizomes as binder in mudbricks. This also saves from hay used as fodder, as *Scirpus maritimus* is abundant and it naturally grows in the village surroundings.

Dry tubers inside of mudbricks fall out of the walls due to deterioration. People then burn them along with the fallen soil to get rid of the dirt created on their garden floors. This, however, is not to be considered of use of the plant for fuel, but is a simple form of cleaning floors from the waste disposal.

2) People fill in their cushions with the *Scirpus maritimus* stems. As it is a tradition to sit on the floor, there are two types of cushions: Softer one to sit on, harder one to place against walls to lean against. Floor cushion is made from wool, various grasses, hay, *Scirpus* stems etc. For wall cushions *Scirpus* stems are used. These long, rectangular, hard cushions are called 'bapra' which is where the plant takes its name from in this village.

3) Dry stems of *Scirpus* are used as tinder.

4) Dry stems are burnt and the smoke works as insect repellent.

5) Twenty years before today in the village vicinity *Scirpus sp.* and other sedges such as *Typha, Phragmities* and other *Cyperaceae* species grew abundant. When the villagers first settled on their current lands, they had to cut and burn these plants to open space. On the other hand, these plants by their gardens and house surroundings have been useful, as it helps them hide their garbage that they dump among these reeds. It also provides the solution of getting rid of the garbage and cleaning their environment by burning the refuse.

Export: *S. maritimus* as well as other sedge species was exchanged for wood, especially for oak species twenty years ago by the villagers living in steppes when the plant was abundant in the region. Villagers from Toros Mountains exported wood. According to the information given by the local people of Toros Mountain villages, until twenty years ago people could transfer wood through Çarşamba River.

Fig. 4. *Scirpus maritimus* with *Typha latifolia.*

S2) Dedemoğlu:

Local name: Kovalık.

Harvesting:

1) People harvest *Scirpus sp.* along with other sedges such as *Juncus sp.* for their stems.

2) Local people used to harvest *Scirpus sp.* for its tubers twenty years ago when the plant grew abundantly in large stands in the river called Kocaçay. Today sedge species grow in the irrigation ditches and on the north of the village vicinity.

Pre-storage processing: none.

Storage: none.

Although twenty years ago the storage of edible fresh tubers might have taken place, today no storage activities are observed.

Pre-consumption processing: none.

Used to peel off the outer layers and wash the tuber nutlets prior to their consumption.

Consumption: none.

Local people consumed fresh tubers twenty years ago. In order to tell the amount consumed, a further study is needed in the area.

Other uses: *Scirpus sp.* stems along with *Juncus sp.* are used as construction material to build roofs. The former is also used for its soft stems on floors under rugs or carpets.

Export: Villagers exchanged *Scirpus* sp. for *Juniperus* wood that came from the villages in Toros Mountains.

S3) Eminler:

Local name: Kovalık.

Harvesting: none.

In Eminler village, harvesting the *Scirpus maritimus* plant was practiced in the past. This village is closer to wetland areas. Although these areas are dry now, 20 years ago the wetland area on Hamidiye and Kabahasanöreni near the village had valuable plant resources including *Scirpus* sp.

Pre-storage processing: none.

Storage: Stem parts are stored for the use as building material and tinder.

Consumption: none.

Other uses:

1) *Scirpus maritimus* stems are used on floors under carpets.

2) Stems are used in weaving mats to use on floors.

Export: Various domesticated vegetables were exchanged for club-rush stems.

W1) Süleymanhacı:

Local name: Kovalık.

Harvesting:

1) Uprooting the plant with its tubers. Many people in the village collect the plant. The plant is collected especially by the lakes and in the vineyards where it is plenty. Harvesting occurs in march-april.

2) Harvesting the plant stems in August. The stems are reaped using metal sickles.

Pre-storage processing: The tuber and rhizome parts are cut and separated from stems where it is collected.

Storage:

1) Keeping tubers in kitchen or storage room next to kitchen, wrapped in a wool fabric.

2) Storing stems in fuel storage rooms for other uses.

Pre-consumption processing: Handpeeling outer layers of young tubers followed by their washing.

Consumption:

1) Young tubers eaten when fresh in spring.

2) Tubers are also used for medicinal purposes which are boiled in water until the color of water turns dark yellow. They drink it for painful illnesses of bladder.

Other uses: Weaving mats for floors and roofs is common.

Export: Exchange for wood with Karadağ villages.

W2) Adakale:

Local name: Kovalık.

Harvesting:

1) Uprooting the plant with its tubers in spring when tubers are young.

2) In summer when the plant is relatively dry, workers specialized in harvesting the plant are hired by the villagers. In this season the extensive amounts of the plant collected is no different than that of staple crops. The plant is reaped with sickles. Since tubers are dry in this season, it is harvested only for its stem. Casual harvesting of dry stems by shepherds with help of knife for fuel purposes during grazing periods.

Pre-storage processing:

1) In summer, workers and villagers collect many reed species including *Scirpus sp*. They separate flower parts bearing seeds from stems and make small mounds of the collected stems of the plant, as they do the same with wheat and barley, only that with *Scirpus sp.* they give a special care for not breaking the stems, and piles of club-rush stems are left to dry in the sun.

2) Washing and dehusking the tubers for fresh consumption.

3) Tubers are buried in storage pits in the ground of household gardens.

Storage:

1) Dehusked tubers are stored in wool clothes or sacks in storage rooms or under the shade of trees in gardens for immediate use.

2) Dry stems are stored in fuel storage rooms.

Pre-consumption processing:

1) In spring, when the tubers are young, people peel the outer layers of tubers using their hands. It is easy to dehusk fresh tubers, while it is quite difficult to dehusk dry and starchy tubers. Except for the small ones, *Scirpus maritimus* tubers generally become starchy and dry after May.

2) Tubers buried in storage pits in gardens are taken when needed in early summer and roasted in oven fire. Then, the outer layers of the tubers are peeled off until the fresh kernel is clean of layers.

Consumption:

1) Young tubers used to be eaten in excessive amounts, sometimes alone, sometimes as mixture with cooked wheat grains. Today local people occasionally eat it, although the information needs to be checked through in depth research. Bad labelling wild food plant consumption, especially concerning *Scirpus* tubers gathered from muddy irrigation canals outside its natural habitat by the lakes affects the research results.

2) Fresh kernels of tubers are consumed with roasted or boiled wheat grains.

Other uses:

1) Weaving mats for floors and roofs is common.

2) Villagers used to weave baskets too.

3) Discarded tubers are used as animal fodder. Villagers do not collect tubers specially for animal fodder, as the tuber collecting and processing are time consuming to be only used as animal fodder.

Export: People exchanged *Scirpus maritimus* stems as well as other sedges for wood with the villagers from Karadağ Mountain. Adakale village is one of the central reed distribution areas in the reed trade network of Konya Basin. No information could be collected yet about the export of tubers.

W3) Hamidiye:

Local name: Kovalık.

Harvesting: None.

People in this village harvested *Scirpus sp.* 15 years ago when it was a wetland.

Storage: None.

Consumption: None.

Although people harvested the plant in the past, no information obtained about the consumption or other uses of the plant yet.

People in this village recognise the plant but they do not use it today.

Fig. 5. Club rush stems used on the ceiling.

F1) Madenşehir:

Local name: Kovalak. Berde.

Harvesting: Until ten years ago some households collected *Scirpus* stems from nearby Hotamış Lake. The stems are cut above water. Tubers are not collected.

Storage: None.

Consumption: None.

Other uses:

1) Stems of *Scirpus* sp. are used for building roofs.

2) *Scirpus* sp. might have grown closer to the village in the past. *Scirpus* sp. as in the case for other sedge species is called 'kovalak'. These sedges are burnt and the smoke keeps the bugs away. Today, *Scirpus* sp. does not have this use, because of its rarity. Other plants in abundance such as *Juncus* sp. are preferred for it.

3) *Scirpus* stems are used for making cushions.

Export: Wood, especially oak wood is exported to steppe and wetland villages as an exchange material for *Scirpus* sp. as well as other sedges such as *Phragmites* sp. for building roofs.

Fig.6. Club rush stems used as floor matting.

F2) Kızılöz:

Local name: Kovalak

Harvesting: None.

Storage: None.

Consumption: None.

Other uses: Same as in Madenşehir village.

Export: Same as in Madenşehir village.

Woods used to be exported to steppe villages by the Çarşamba River until very recent (twenty years ago when the heavy drying of the lakes and rivers had not started yet.).

F3) Güneysınır:

Local name: Kındıra. It used to be called kovalak.

Harvesting: None.

Storage: Dry stems are stored in the fuel storage rooms.

Consumption: None.

Other uses:

1) Matting for floors and matting for roofs.

2) Putting the stems on the floors in living rooms under rugs. Villagers stated that they do not use club rush stems on the roof, on the floor or in mudbrick, because their village has never been in danger of flood. According to the villagers, the villages under the danger of flood used club rush as construction material for its durability against water. In Güneysınır while terebinth and juniper trees and oaks have been used as fuel, juniper is used as construction material for its durability in their environmental conditions.

Export: Sellers from Pınarbaşı, Taşağıl, Karahöyük villages by the Hotamış Lake come to Güneysınır to sell or trade dry *Scirpus* stems.

Fig. 7. *Scirpus maritimus* used in and on mudbrick wall.

Fig.8. *Scirpus maritimus* in mudbrick.

5.2. Rosaceae

5.2.1. Crataegus L.

Deciduous trees or shrubs, usually with thorns. Leaves alternate, simple, lobed to subpinnate, entire or serrate. Inflorescence corymbose, borne on spur shoots. Flowers 5-merous, epicalyx absent; hypanthium adnate to the carpels; petals white or pinkish, usually longer than the persistent sepals (Browicz 1972), some of the cultivated ornamental varieties have brilliant clusters of fragrant pink to crimson flowers (Townsend and Guest 1966); carpels united on the inner margin, at least near the base. Fruit drupaceous, yellow red, dark purple or black, usually with a mealy flesh. Hybrids are frequent (Browicz 1972).

Crataegus (from ancient Greek *kratos*, strength, referring to hardness of wood), Thorn, Hawthorn. Ornamental trees of attractive habit, with handsome foliage, clusters of white heavily- scented flowers and decorative red to yellow fruit, known as “haws” (Townsend and Guest 1966).

5.2.1.1. *Crataegus monogyna*

Shrub or small tree up to 10 m, axillary spines; leafy spines longer, scanty. Leaves ovate or obovate in outline, base cuneate or subtruncate, dark green above, glaucous beneath, glabrous to pubescent; lobes deeply divided, acute or obtuse, entire or sparsely dentate near the apices; lower leaves on fruiting shoots sometimes only shallowly lobed or coarsely dentate; flowers white or pinkish, sepals triangular, reflexed in fruit; fruit red or brownish-red, subglobose or ovoid, glabrous. It grows in hillsides, macchie, Quercus scrub, mixed forests, roadsides, s.l.-1800(-2000) m. (Browicz 1972). In oak forest, on limestone and metamorphic rock, often by streams; alt. 600-1300 m. (Townsend and Guest 1966).

5.2.1.2. *Crataegus orientalis* var. *orientalis*

Shrub or small tree, 3-5 m; spines usually elongated and bearing leaves. Leaves rhombic or obovate-oblong, bilaterally adpressed grey-villous, cuneate at base; Flowers triangular-cuspidate, reflexed in fruit; fruit reddish orange, subglobose, sparingly pubescent or glabrous. Leaf lobes narrow oblong, incised serrate at apex with 1-3 teeth. It grows in rocky places, forests, 750-2240 m. (Browicz 1972).

C. aronia and *C. orientalis* grow in Karadağ and Toros Mountains, sometimes standing alone on the steppic vegetation of now naked slopes or among groups of other wild fruit trees, very commonly with *Prunus, Pyrus, Amygdalus* and *Quercus*. *C. monogyna* commonly grows in the steppe zone.

***C. monogyna* Jacq. subsp. *monogyna, C. orientalis* Pallas ex var. *orientalis* Bieb., *C. aronia* (L.) Bosc. ex Dc. var. *aronia* (hawthorn)**

S1) Küçükköy S2) Dedemoğlu W3) Hamidiye:

C. monogyna* Jacq. subsp. *monogyna

Local name: Alıç.

Harvesting: None.

Storage: None.

Consumption: None.

Although *Crataegus* sp. exists in these villages, villagers do not eat the fruits.

S3) Eminler:

***C. aronia* (L.) Bosc. ex Dc. var. *aronia, C. orientalis* Pallas ex var. *orientalis* Bieb.**

Local name: Alıç.

Harvesting: Villagers go to forest to harvest *Crataegus* sp. fruits. Although in Karadağ Mountain there are *Crataegus* trees, inhabitants of Eminler prefer to organise trips to Morcalı village in Karaman vicinity, located on the fertile lands with numerous streams in Toros Mountains, where they said *Crataegus* trees were abundant. Morcalı village vicinity is the source of *Crataegus* for steppe villages in the Konya Basin to go and collect its fruits. When the fruits are ripe, they go to collect as groups. All family members join it. They used to travel with their donkeys and use animals to carry sacks of fruits. Now with modernization, they travel with bus services. They harvest fruits by handpicking from trees, or they pick fallen fruits under trees.

Pre-storage processing: Mashed fruits with their unbroken seeds in 'bread shape' are dried under sun.

Storage: Bread shaped mashed fruits are stored wrapped in clothes in storage rooms.

Pre-consumption processing: Two types of processing occur. Generally women in families do the process:

1) Add water to make juice.

2) Fermentation of fresh fruits.

Consumption:

1) Juice drunk daily as a beverage.

2) Fermented fruits eaten as pickle.

W1) Süleymanhacı:

C. orientalis* Pallas ex var. *orientalis* Bieb., *C. monogyna* Jacq. subsp. *monogyna

Local name: Alıç.

Harvesting: *C. orientalis* fruits are handpicked from/under trees in village lands. All fruits are not harvested at one time. Instead, harvesting happens a few times during the season, so fruits eaten while fresh. Casual harvesting and consuming takes place too. *C. monogyna* fruits are not picked.

Pre-storage processing:

1) Washing fresh fruits.

2) Fermentation of the fruits in glass jars in kitchens or storage rooms.

Storage:

1) Fresh fruits stored in jars or in cloth sacks in storage rooms or in kitchens.

2) Fruits are preservable in fermentation in jars for four months. Fermentation process takes around one month.

Consumption:

1) Fresh fruits eaten+seeds spit out. Eaten during the winter season.

2) Fermented fruits eaten as pickle during the year. Seeds thrown away.

W2) Adakale:

C. orientalis Pallas ex var. *orientalis* Bieb., *C. monogyna* Jacq. subsp. *monogyna*

Local name: Alıç.

Harvesting: *C. orientalis* fruits are handpicked from/under trees near village lands. Casual harvesting occurs as well. *C. monogyna* fruits are not picked.

Pre-storage processing:

1) Fresh fruits are washed.

2) Fermentation. When people prepare pickles from fresh pepper, beans, tomato, cucumber, parsley and garlic they add 30-40 *Crataegus* fruits for each 1 kg. The reason to add *Crataegus* fruits is to have the pickle taste sour. They prepare around 15-20 kg. pickle for each household, meaning they fermentate around 600 fruits. Lettuce fermentation for pickle happens in a separate jar.

Storage:

1) Fresh fruits stored in jars or in cloth sacks in storage rooms or in kitchens.

2) Fruits stay in fermentation in glass jars during 1 year, in storage rooms.

Consumption:

1) Fresh fruits eaten during the winter season.

2) Pickles eaten during the year. Seeds thrown away.

3) Fresh consumption of fruits during casual harvesting.

F1) Madenşehir:

***C. orientalis* Pallas ex var. *orientalis* Bieb., *C. aronia* (L.) Bosc. ex Dc. var. *aronia*:**

Local name: Alıç.

Harvesting: Handpicked from/under trees in village lands and in Karadağ forest. Two different species of *Crataegus* fruits are collected. *C. orientalis* yields both red and yellow fruits, which are used for different purposes. Also, when shepherds herd their cattle they collect *Crataegus* branches to make sticks to use it for herding animals. Because *Crataegus* trees are common in village vicinities, there are not organised trips especially for harvesting *Crataegus* sp.

Pre-storage processing:

1) Washing fresh fruits.

2) Red fruits of *Crataegus orientalis* are fermented for making wine. Seeds are later on dumped in rubbish.

3) In Binbirkilise church ruins in the village, yellow fruits of *C. orientalis* and *C. aronia* collected by each household are boiled in water in deep bowls. Then they are shared by the village members and spread on clothes for drying in the sun in every house's rooftops. When they are dry but still fleshy, they are mashed with help of wooden pestles by adding water to soften it more. The fruit mash is separated from its seeds through strainers.

4) Stone pestles are used to mash *C. orientalis* and *C. aronia* fruits (with seeds unbroken). Mashed fruits are given a round and thin 'bread shape' for it to dry more efficiently and without mold. They are put on rooftops to dry in the sun. Seeds are not separated from the bread shaped fruit mash.

Storage:

1) Fresh fruits of both species are stored in cloth sacks in storage rooms or in kitchens.

2) Wine is stored in ceramic, plastic or glass jars in storage rooms.

3) Marmelade made from boiled, mashed fruits is stored in plastic jars in storage rooms.

4) Bread shaped mashed fruits are wrapped in clothes and kept in storage rooms.

Consumption:

1) Fresh fruits of both species eaten while fresh during winter season. Seeds spit out.

2) Wine drank especially in cold days for warmth. Women and men including young boys drink it. Children, girls and young women are not allowed to drink it. It is a treat for guests and in special days like 'bayram' too.

3) Marmelade eaten during the year.

4) Water added in mashed fruits to make beverages. Seeds are separated through strainers. Drunk during the year.

Fig. 9. Consuming hawthorns under a hawthorn tree in Karadağ

F2) Kızılöz:

C. orientalis* Pallas ex var. *orientalis* Bieb., *C. aronia* (L.) Bosc. ex Dc. var. *aronia

Local name: Alıç.

Harvesting:

1) As part of the activities in trips to forest in autumn. A crowded group of men, women and children from every household join the trips. Fruits handpicked from/under trees in village lands and in slopes of Toros Mountain. Casual harvesting often happens as well.

2) Sometimes hunting birds, rabbits and wolves is included in these activities in a single trip. 1-2 separate hunting trips are organized by men in autumn that is also when hunters feed themselves with wild fruits. *Crataegus* fruits are an important part of it.

Pre-storage processing:

1) Washing fresh fruits.

2) Fruits mashed with help of stone pestles (with seeds unbroken) are given 'bread shape' for it to dry more efficiently and without mold. They are put on rooftops to dry in the sun.

Storage:

1) Fresh fruits are stored in cloth sacks in storage rooms or in kitchens.

2) Bread shaped mashed fruits are wrapped in clothes and kept in storage rooms.

Consumption:

1) Fresh fruits are consumed in great amounts during the autumn and winter seasons in households. Fruits are favored for their taste.

2) Fresh fruits are eaten during hunting activities.

3) Water added in mashed fruits to make beverages. Drank daily during the year by all family members.

F3) Güneysınır:

***C. orientalis* Pallas ex var. *orientalis* Bieb.**

Local name: Alıç.

Harvesting: Handpicked from/under trees in village lands and in slopes of Toros Mountain.

Pre-storage processing:

1) Washing fresh fruits.

2) Fruits mashed with help of stone pestles (with seeds unbroken) are given 'bread shape' for it to dry more efficiently and without mold. They are put on rooftops to dry in the sun.

Storage:

1) Fresh fruits are stored in cloth sacks in storage rooms or in kitchens.

2) Bread shaped mashed fruits are wrapped in clothes and kept in storage rooms.

Consumption:

1) Fresh fruits are consumed during the winter season.

2) Water added in mashed fruits to make beverages. Drank daily during the year by all family members.

5.2.3. Pyrus L.

Unarmed or spinescent trees or shrubs. Leaves deciduous, simple. Inflorescence an umbellate raceme. Flowers white; sepals deciduous or persistent; stamens 20-30; ovary inferior. Fruit fleshy with numerous grit cells. Hybridization is widespread in Turkey within *Pyrus*, though more extensive samples are required to confirm its extent (Browicz: 1972). Fruit brownish or greenish, sometimes yellow or reddish when ripe, flesh juicy or woody, with or without grit cells. About 50 species in temperate regions of the northern hemisphere (Townsend and Guest: 1966).

Pyrus (Latin name of pear tree, sometimes written in the classic spelling *Pirus*) includes the Pome Fruits, as all kinds of apples, pears, crab-apples: also many small trees and bushes grown for their handsome early flowers and their attractive habit, foliageand ornamental fruits (Townsend and Guest: 1966).

5.2.3.1. *Pyrus elaeagnifolia* Pallas

Tree up to 10-15 m, spinescent or unarmed; young twigs grayish- or whitish-tomentose. Leaves narrowly elliptic or ovate-oblong, obtuse or shortly acute, entire, bilaterally grayish- or whitish-pubescent, cuneate and decurrent or rounded at base. Inflorescence many-flowered. Fruit single or in pairs, pyriform or subglobose, yellowish green, at first white-villous, later glabrous or with a few hairs near the base and apex; sepals persistent (Browicz: 1972).

5.2.3.2. *Pyrus elaeagnifolia* subsp. *elaeagnifolia*

Usually spinescent; leaves broadest at the middle or in the upper half, narrowly cuneate at the base, grayish-pubescent (Browicz: 1972).

***Pyrus elaeagnifolia* subsp. *elaeagnifolia, Pyrus elaeagnifolia* Pallas (wild pear)**

S1) Küçükköy:

***Pyrus elaeagnifolia* Pallas:**

Local name: Boz armut (gray pear), çörtük, dağ armudu (mountain pear), yaban armudu (wild pear).

Harvesting:

Although there are plenty of wild *Pyrus* trees in big gardens in the village, villagers grafted them with domesticated pear trees, so they are able to get numerous sweeter and bigger fruits. Due to dramatical drop in the ground water level many trees in gardens dried around 1995. Before 1995, growing in the village vicinity wild pear fruits called 'karaca' ('dark colored') were consumed during autumn, starting from september. Villagers also used to collect *Pyrus* fruits in Toros Mountains in autumn when they were fermented (when they are softer and dark in color). Due to strong winds in september-autumn, fruits are fallen to ground. In occasions they do not villagers beat pear tree branches with wooden sticks. Anyone even the kids who are tall enough to reach the branches with fruits can do this task in the village. Every family collected a few sacks of fruits during breaks from their other tasks, such as sowing seeds. Also, when they finish such tasks of the day, they collect the fruits in their saddlebag and bring them to the village. Especially women organise the harvest trips. They herd their donkeys to the lands with abundant pear trees. 25-30 years ago wild pear trees grew abundant close to the village vicinity, making harvesting trips available during task breaks. Thus, we can talk about two types of harvesting; casual and organised harvesting, still occurring occasionally today.

In 1998 wild pear trees in the Konya Basin did not yield well. The villagers went to the pasture by the river belonging to their village lands and there they collected wild pear fruits fallen to ground. Livestocks ate the fruits which the villagers did not want to waste. Since domesticated pears which wild pears cannot compete with are abundant in the region today, they did not consume these wild pears. There used to grow more pear trees by the Çarşamba River in the past than today.

Pre-storage processing:

1) Fermentation of the fruits for preparing pickle.

2) When ripe wild pears are collected, back in the village 2-3 sacks of them are processed. Sometimes pounding corncob task accompanied wild pear pounding. Corncobs used to be pounded in the village center in big grinding stones remained from the Byzantine Period. Stone pestles were also used for it. To process wild pears; first, stalks of wild pear fruits are broken, and then fruits are pounded. The villagers have different types of stone and wooden tools for the process. One flat ground stone and smaller hand stones or wooden pestles are used to pound fruits. The fruits are pounded hit by handstones or wooden pestles on this ground stone. Mashed fruits laid on a piece of sack are left to dry in the sun and then mixed with wheat grains. This mixture is ground in water mills in need of refining the flour. Similarly, for refining the corncob flour too, it was ground either in hand mills or in water mills.

Storage:

1) Wild pears are stored in jars for fermentation. Fruits stay in fermentation in glass jars in storage rooms for a few months.

2) Wild pear flour is kept in sacks in storage rooms during the year.

Pre-consumption processing: Wild pear flour is mixed with water in a large wooden bowl simply carved from wood. Salt is added in the dough separated to lumps. Medium size, flat, round and reddish colored bread, a little larger than what is called gözleme (a common type of bread in Anatolia), is made. This bread is called the 'bread of pounded'. Today this bread is made only in mountain villages. A separate type of bread is made from corncob flour.

Consumption:

1) Fresh fruits are consumed in autumn.

2) Pickle is consumed until summer.

3) The 'bread of pounded' is consumed during the year.

Other uses: Raw wild pears are used for medicinal purposes. Eating a few of them helps diarrhea stopped.

Export: Men from mountain villages used to trade wild pear flour 20-25 years ago. Two types of wild pear trade occurred: Traders carried the flour sacks on their back and sundries pedlars brought the fruits in horse carts. Along with pear flour they also traded *Elaeagnus* (oleaster = iğde), *Crataegus* and *Prunus* fruits they brought to the villages. As they were passing through the villages, they called out: 'Dağ armudu var! (mountain pear!) Yonus eriği var! (wild plum!) ' The villagers exchanged wheat, barley and wool for wild pear fruits and flour. Below, an exchange example from 20-25 ago is given:

1 egg = a little cotton candy

2 eggs = a lot of cotton candy

1 egg = ice cream, chewing gum

5-6 eggs = 1 kg. tomatoes or 1 kg. squash

1 kg. wool = 1 kg. wild pear

25 years ago there were no open bazaars in today's towns. When the summer ended, it was not possible to gather any fruits and vegetables. According to what is stated by the

local people, in the northern steppe villages like Küçükköy fruits and other crops are ripe later than other parts of the Konya Basin. For this reason, when the summer started mountain villagers came to steppe and wetland villages to trade vegetables and fruits. Although wild pear trees grew in the village vicinity, 45-50 years ago the irrigation system was not sufficient enough for the villagers to grow plentiful food products, as a result, the villagers still needed to buy fruits and vegetables from the mountain villagers.

For 25 years the villagers have been travelling with trucks to Çumra, the closest town to the village, to do shopping in the bazaar open on Mondays. Young generation in the village is not familiar with the wild pear flour, except for the brides from mountain and wetland villages, such as Ermenek in Toros Mountains, and the neighboring Dedemoğlu situated in a wetter land.

S2) Dedemoğlu:

Local name: Boz armut, çörtük, dağ armudu, yaban armudu.

Harvesting: None.

Storage: Flour of wild *Pyrus* is stored in storage rooms or kitchens.

Consumption: The flour was consumed alone. Favorable for its sour taste.

Export: Villagers from Toros Mountains used to trade food and raw materials with Dedemoğlu villagers 30-35 years ago. They sold *Juniperus* wood and exchanged sheep wool or 1 kg. bread wheat flour for wild *Pyrus* flour. The amount of wild pear flour they exchanged varied from half an 'okka', 50 'dirhem' to 100 'dirhem'.

1 okka=1282 gr.

1 okka=400 dirhem

Fig. 10. Dry pears in Madenşehir village garden.

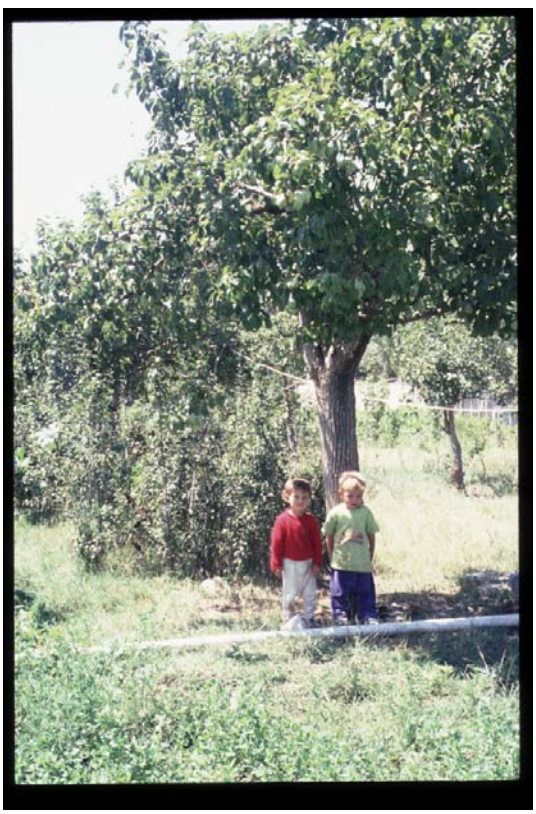


Fig.11. Wild and domesticated pear trees in Küçükköy

S3) Eminler:

Local name: Yaban armudu, boz armut, çörtük, dağ armudu.

Harvesting: None.

Storage: They used to store wild pear flour in the food storage rooms in sacks.

Consumption: During the years especially when bread wheat did not yield well, the villagers were dependent on wild pear flour, as the main source for bread making.

Export: Wild pear flour played an important role in exchange 20-25 years ago. Villagers from Toros and Karadağ Mountains traded the flour. Circassians in this village reasons their not harvesting *Pyrus* fruits for being lazy to make pear flour. They prefer to exchange for the flour rather than prepare it.

W1) Süleymanhacı:

***Pyrus elaeagnifolia* subsp. *elaeagnifolia, Pyrus elaeagnifolia* Pallas:**

Local name: Boz armut, dağ armudu, yaban armudu.

Harvesting: Organised trips to Karadağ slopes to collect wild pear in autumn.

Pre-storage processing: Wild pear fruits are chopped fine. Seeds are winnowed with help of a mesh and thrown away. Chopped pieces are left to dry in the sun.

Storage: Chopped dry fruits are stored in sacks in food storage rooms.

Consumption:

1) Dry fruits are consumed during the winter season as admixture in main courses, especially in soups, instead of bread.

2) Dry fruits are soaked in water to make beverages.

3) Dry fruits are boiled in water, served cold and consumed in meals daily.

Export: Exceptional to this village, mountain villagers brought only *Pyrus* fruits instead of its flour to Süleymanhacı as an exchange material. They did not make wild pear flour in this village.

W2) Adakale:

Local name: Dağ armudu (mountain pear).

Harvesting: Organised trips to Karadağ with the neighboring Madenşehir village. Totally 30-40 people from both villages join the trip. Recently two villages' inhabitants stopped their strong relations causing Adakale villagers to end their harvesting *Pyrus* fruit trips.

Pre-storage processing:

Pyrus fruits are chopped fine. They are dried in the sun. Seeds winnowed with help of a mesh are thrown away. Dry pieces are;

- **a)** Pounded with help of stone pestles in stone mortars in each household,
- **b)** Ground with grinding stone,

to produce flour.

Storage:

1) Fresh fruits are stored in storage rooms or in kitchens.

2) Fruit flour is stored in sacks in storage rooms.

Pre-consumption processing:

1) Water and sugar added in fruit flour to make a purèe.

2) Yeast added in purèe to prepare the dough for bread making.

<u>Preparation of the yeast:</u>

A handful of chickpeas are added in a small cup (120-150 cc.) of water and left for 3-4 days. This water is added in flour as yeast to make bread.

The bread preparation is the same as that of bread with wheat flour.

The bread from *Pyrus* fruit flour is consumed throughout the year. Especially when wheat and barley do not yield well, *Pyrus* fruit flour is very precious as a carbohydrate source.

Consumption:

1) Fresh fruits are consumed when they are fermented. Otherwise they are considered raw making tongue roll. They are consumed during the winter season.

2) The purèe is consumed during the year.

3) The bread from *Pyrus* fruit flour is consumed throughout the year. Especially when wheat and barley do not yield well, *Pyrus* fruit flour is very precious as a carbohydrate source.

W3) Hamidiye:

Local name: Dağ armudu, boz armut.

Harvesting: When the fruits are ripe in September-October they organize a trip to slopes of Toros Mountain. 20-25 years ago, there were *Pyrus* trees close to the village vicinity, and the area was a wetland.

Storage: Flour is stored in sacks in storage rooms.

Consumption: Bread is made from the fruit flour. Consumed during the year.

The villagers' main food source is wheat and bread made from wheat and barley flour. Agricultural practices in the village have developed in the last 20 years. According to villagers, 50-60 years ago the main food source in the area was *Pyrus* fruits.

Export: 20-25 years ago, *Pyrus* fruit flour was very often traded especially by the villagers of Morcalı, who lived in Toros Mountains. Each household in Hamidiye exchanged for about 50-100 kg. pear flour, depending on how many kg. fruits the trees yield that year.

F1) Madenşehir:

Local name: Boz armut, yaban armudu, dağ amudu.

Harvesting: 30-40 people join the organised trips to collect wild pear in Karadağ when fruits are ripe in autumn. About 50-100 kg. fruits are collected by each household during the trips (depending on the amount the trees yield that year).

Pre-storage processing:

1) Ripe wild pears are left to dry in the sun. Pear stalks drop during drying and are either thrown in ovens or in garbage.

2) After 2-3 months when pears are very dark in color local people grind them with grinding stones (around 50 kg. for each household). Broken pips are sieved and either thrown away or given to animals. The flour is called 'kavut'.

3) Fresh wild pears are used to make pickles.

Storage:

1) The flour is stored in sacks in storage rooms. It can be kept in storage for 2 years.

2) Fresh fruits are buried in the acorn leaves in the storage rooms. Here they are fermented in 10-15 days.

3) Pickled fruits are stored in plastic containers in storage rooms.

Consumption:

1) When wild pears are ripe, rather fermented and dark in color, villagers eat them fresh. These fruits are consumed fresh from autumn when they are collected to almost end of winter season.

2) The wild pear flour is consumed alone either using hands, or spoons. It is consumed throughout the year.

3) Bread is made from the flour as well.

4) Wine is made from the fermented wild pears.

5) Wild pear is used to make pickles, which is consumed until the temperature increase (late spring) so that the pickle cannot be preserved anymore.

6) A type of dessert is made from wild pears. The grape or apple molasses are mixed with pounded walnut. Fermented wild pear fruits are chopped and sieved to separate the seeds. The seeds are thrown away to the garbage. The chopped fruits are added to the mixture.

Export: When in the past the steppe lands of Konya Basin was covered with wet areas and the mechanized agriculture had not started yet in the region, local people of Madenşehir sold wild pear flour to steppe villages in great amounts. According to the villagers of Madenşehir, that period the diet of steppe villagers heavily depended on wild pear flour.

F2) Kızılöz:

Local name: Boz armut, dağ armudu.

Harvesting: Organised trips to village surroundings in September-October. There are two different kinds of wild pear: Summer pear and winter pear. Summer pear is harvested in September. Winter pear is harvested in October.

Pre-storage processing:

1) In October when the winter pear is harvested, it is buried in dry oak leaves called 'gazel' for ripening fruits. Fruits stay buried until they are fermented and ready for making flour.

2) Flour making from fermented 'winter' *Pyrus* fruits was a common practice in 1945-1950 (before the mechanized agriculture). Fermented winter pear was chopped fine and left to dry in the sun. Chickpea, barley and wheat were spread in the sun to dry. They all were pounded in big stone mortars with stone pestles to produce flour.

Today although villagers still prepare *Pyrus* fruit flour the same way, they prepare it in small amounts by pounding the fruit in small stone mortars, which is called 'hand mortar'. After pounding the chopped fruits, they sieve the flour to remove pieces of broken pips. They toast chickpea, wheat and barley for 10-15 minutes in a large metal pan mixed with small pebbles. Pebbles are mixed in to prevent the food from being overcooked. Toasted chickpeas, called 'kavut', wheat and barley are pounded in small stone mortars and added in pear flour. Mixed flour is used for making bread.

Storage:

1) When the summer pear is harvested in September, it is stored in storage rooms or in kitchens.

2) Winter pear flour is stored in baskets in storage rooms.

Consumption:

1) Fresh 'summer' pear is consumed in a few weeks after the harvest.

2) Winter *Pyrus* fruit flour is used for making bread during the year.

F3) Güneysınır:

Local name: Boz armut, dağ armudu.

Harvesting: Organised trips to village surroundings.

Pre-storage processing: Fruit flour is produced in traditional ways. Chopped fermented fruits are dried and pounded in stone mortars, sieved and mixed with pounded chickpea, wheat and barley to produce flour. Mixed flour is used to make bread.

Storage:

1) Fresh fruits are stored in storage rooms in baskets.

2) Fruit flour is stored in sacks.

Consumption:

1) Fresh fruits are consumed in a few weeks after the harvest.

2) Bread from fruit flour is prepared and consumed during the year.

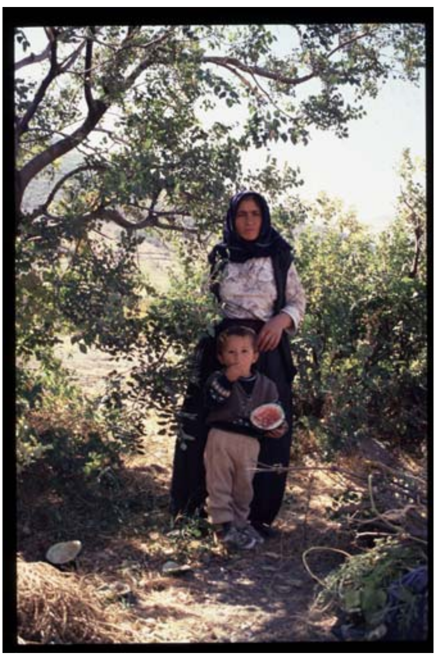


Fig. 12. Melon consuming under the tree in village gardens.

Fig.13. Tomato sauce boiling in the garden in Madenşehir village.

5.2.4. Prunus L.

Tree and shrubs, unarmed or spiny. Leaves deciduous, convulate in bud. Flowers solitary, in pairs or in clusters, borne before or simultaneous with leaves; sepals and petals 5; ovary superior; stamens numerous. Drupe fleshy and juicy, indehiscent, pruinose. Stone more or less compressed (Browicz 1972).

The closest non-cultivated relative of the hexaploid common plum are the spontaneous, somewhat spinescent, *insititia*-like populations of *Prunus domestica,* bearing small (2-3 cm) subglobose fruits, which are quite common in many parts of temperate Europe and Turkey. They thrive in woods, cleared hillsides, edges of cultivatation, and hedges (Zohary and Hopf 2000).

5.2.4.1. *Prunus cocomilia*

Shrub or small tree 2-5 m; usually unarmed; twigs glabrous or sparsely adpressed-pubescent. Leaves obovate-elliptic, glandular-crenulate, glabrous or adpressed-pubescent. Flowers white, in clusters of 2-4, appearing with the leaves. Fruits pendant, ellipsoid, ovoid or globose, up to 40 mm long; in cultivated forms even to 80 mm, yellow flushed with red (Browicz 1972).

Closely related to *P. domestica*, *P. cocomilia* Ten. is one of the two additional wild plums with yellow, sometimes reddish yellow, almost sessile round fruits that ripen much later than those of the wild cherry plum, native to western Turkey (Zohary and Hopf 2000). They are variable in shape, although they fall within the morphological range of present-day *cerasifera* and *insititia* plums (Bertsch and Bertsch 1949; Körber-Grohne 1996). It grows in pine forests, 100-1000 m (Browicz 1972).

5.2.4.2. *Prunus divaricata*

Shrub or small tree up to 10 m, unarmed or spinescent. Leaves ovate-elliptic to obovate, finely crenate, serrate, glabrous above, glabrous to villous beneath. Flowers white, appearing before the leaves, mainly solitary or in pairs; sepals in mature flowers revolute. Drupes pendant, globose to ovoid-oblong, yellow or red to violet; stones smooth, scabrous or grooved. It grows in open woodland, steep slopes and among rocks, s.l. -2450 m. (Browicz 1972).

***Prunus cocomilia* Ten, *Prunus divaricata* (wild plum)**

S1) Küçükköy, S2) Dedemoğlu, S3) Eminler, W3) Hamidiye:

Local name: Dağ eriği (mountain plum), yaban eriği (wild plum), yunus eriği (dolphin plum), yonus eriği (dolphin plum).

Harvesting: Although there are wild plum trees in village lands, villagers do not collect its fruits in large amounts today. Only casual harvesting occurs. No information about how many kg. of the fruits they collected in the past.

Storage: none.

Consumption: none.

Export: 20-25 years ago sundries pedlars from mountain villages brought the fruits in horse carts. Along with *Prunus* fruits they also traded *Elaeagnus* (oleaster = iğde), wild pear fruits and flour, and *Crataegus* fruits. As they were passing through the villages, they called out: 'Dağ armudu var! (mountain pear!) Yonus eriği var! (dolphin plum!) '. In this research it is not known yet what was exchanged for wild plums.

W1) Süleymanhacı, W2) Adakale:

Local name: Dağ eriği, yaban eriği.

Harvesting: Each household collects fruits in village lands. Casual collection by household members, including kids as well.

Collected:

1) Under trees.

2) Some pieces of cloth are spread under trees. By climbing trees and beating branches with wooden sticks fruits are collected in these clothes. After collection these clothes are tied, by carrying them on their back, in baskets or on donkeys they are brought home.

Pre-storage processing:

1) Fruits are grouped in for different purposes. Some are left for fresh consumption. Some are wrapped in clothes and gently pounded on a flat stone with help of wooden pestles to separate seeds. Then seeds are handpicked and either thrown away, or used as fuel in ovens for creating low fire for slow cooking. The remaining fruit fleshes are spread on a piece cloth in gardens to dry.

2) Wild plums are boiled in water. When the fruits are soft enough to separate their stones, the fruit mush is sieved to make marmelade. Fruit stones are thrown away.

Storage:

1) In sacks in storage rooms.

2) Marmelade is stored in jars. It is preservable for 1-2 years.

Consumption:

1) Eaten fresh during the season.

2) Dry fruits are used to add sour taste to foods such as soups especially in winters. The villagers cannot afford to buy lemons from markets, and instead of lemons, they use wild plums.

3) Fruit marmelade is added in various meals including ‘arabaşı’ soup prepared from sheep or goat meat, and ‘mısırga’ soup prepared from turkey fed in gardens.

F1) Madenşehir, F2) Kızılöz, F3) Güneysınır:

Local name: Dağ eriği, yaban eriği.

Harvesting: Organised trips to collect fruits in village surroundings in the forest. A few households join the trip. Casual collection in village lands as well.

Collected:

1) Under/from lower branches of trees.

2) Some pieces of cloth are spread under trees. By climbing trees and beating branches with wooden sticks fruits are collected in these clothes. After collection these clothes are tied, by carrying them on the back, in baskets or on donkeys they are brought home. Sometimes villagers break branches with fruits to bring them home too.

Pre-storage processing:

1) Broken branches are laid on clothes spread in gardens. These branches are either beaten with help of tree branches or stripped off to separate fruits.

2) After separation, fruits are grouped in for different purposes. Some are left for consuming fresh.

3) Some are wrapped in clothes and gently pounded with help of wooden pestles to separate seeds. Then seeds are handpicked and either thrown away, or used as fuel in ovens for creating low fire for slow cooking. The remaining fruit fleshes are spread on a piece of cloth on the roof to dry.

4) Wild plums are boiled well. The boiled fruit juice is filled in bottles to be used as seasoning meals. The rest of the fruits are sieved to separate the fruit seeds which are thrown away. The fruit mush is used as marmelade.

Storage:

1) Fresh and dry fruits are kept in separate sacks. Dry fruits can be preserved in storage during the year.

2) Boiled fruit juice filled in bottles is kept in storage during the year.

Consumption:

1) Fresh fruits are consumed seasonally.

2) Dry fruits are used to add sour taste to foods, such as soups especially in winters. The villagers cannot afford to buy lemons from markets, and instead of lemons, they use wild plums.

When the villagers cook soup, as often they do not have bread to eat, flour of which can be produced from any plant; if possible primarily from bread wheat, is mixed in water in a metal pan and put in fridges to freeze. In the past, instead of fridges the villagers dug a pit in winters and left the mixture in the open air to freeze. The mixture needs to be jelly to be cut and shared by people. Half a matchbox sizes of these jelly pieces are added in the soup. Dry wild plums are added in too. This food called arabaşı (food of Arab) is consumed in special occasions with relatives and neighbours invited. During its consumption a game is played: One is supposed to catch these jelly pieces as quick as possible when they eat the soup. Whoever drops any piece from the spoon is their turn to prepare and serve this food to the relatives and neighbors next time.

3) Çirli is a traditional meal made throughout the year in these villages. It is a meat meal seasoned with fruits. Goat meat and sheep meat, figs, grapes and wild plums (a subspecies of *Prunus cocomilia* or *Prunus divaricata* whose fruits are dark purple in color) are chopped and roasted in a pan. While figs and grapes sweeten the meal, wild plums add a sour taste to the meal.

4) Stored fruit juice is used for seasoning meals.

5) Marmelade is consumed during the year.

5.2.5. Amygdalus L.

Deciduous shrubs or small trees, unarmed, or subspinescent to strongly spinescent. Leaves conduplicate or convulate in bud; petioles often glandular. Flowers appearing before the leaves, solitary or in pairs, sessile or shortly stalked; hypanthium cylindrical, obconical, campanulate or hemispherical; petals white or pink. Fruit a drupe, pericarp dry, glabrous or pubescent, splitting on one side when ripe. Stone separate from the pericarp, smooth or ± distinctly grooved or pitted. Seeds sweet or bitter (Browicz 1972).

The almonds, which comprise this predominantly Irano-Turanian genus, are very variable species, and although sterile material can sometimes be determined, this is not always the case (Browicz 1972). Ripe stones are sometimes obligatory for correct determinations, as some of this variation is undoubtedly due to hybridization (*ibid*). This hybridization can be also observed at the variable tastes of the kernel; from very bitter to moderately bitter and sweet.

The cultivated almond is closely related to an aggregate of wild forms native to the Levant countries. These wild almonds, placed taxonomically (Browicz and Zohary 1996) within *A. communis,* fall into two intergrading eco-geographic zones as *A. communis* ssp. *spontanea* in Mediterranean environments with relatively large wild and weedy forms; and *A. communis* ssp. *microphylla* in drier steppe forests *or* steppe-like environments with more xeric, smaller wild forms. Wild ssp. *spontanea* progenitors of the cultivated varieties, described by Zohary and Hopf (2000) as having smaller fruits with bitter tasting seeds and harder shells with fewer pits, have a chemical defence system of transforming glycoside amygdalin into hydrogen cyanide, a deadly prussic acid, when its seed is crushed, chewed or gets any other injury. The authors also state that, the consumption of few dozen bitter seeds yields enough prussic acid to prove fatal for human beings. Reported by Browicz and Zohary (1996), several other *Amygdalus* species are quite close to the crop and are interconnected to it by sporadic hybridization. Today, possibly there are hybrids of *Amygdalus communis* growing in village gardens and vicinities with various degrees of bitterness. Some of these bitter kernels are consumed fresh by local people in high amounts.

5.2.5.1. *Amygdalus orientalis*

Much-branched, shoots subspinescent or spinescent. Young shoots densely white-tomentose, at least below. Leaves on both surfaces white-tomentose, entire to crenate, acute or obtuse at the top and obovate, oblanceolate, spathulate or elliptic. Flowers pale pink, with short pedicels. Stones smooth, obtusely keeled, or indistinctly grooved along keels, not pitted. It grows on rocky calcerous slopes, 600-1500 m (Browicz: 1972).

On rocky calcerous slopes of Karadağ and northern slopes of Toros Mountains *Amygdalus orientalis* with spinescent shoots and white-tomentose leaves grows in oak-pistacia-hawthorn forest steppes. As many steppic plants do, *Amygdalus orientalis* growing on overgrazed slopes too must have developed spinescent shoots as a protective system against being grazed. Kernels are generally very bitter and thought by several researchers (Zohary 2000; Hillman 2000; van Zeist et al. 1985?) inedible unless some process of de-toxification were applied to remove the dangerous prussic acid called cyanogenic glucocide.

***Amygdalus orientalis* (wild almond)**

S1) Küçükköy, S2) Dedemoğlu, S3) Eminler, W3) Hamidiye:

Local name: Badem.

Harvesting: These villages rarely buy domesticated almonds from markets in close towns.

Storage: none.

Consumption: none.

W1) Süleymanhacı, W2) Adakale:

Local name: Badem, yaban bademi, çalı bademi, acı payam.

Harvesting: Organised trips to Karadağ Mountain slopes to harvest *Amygdalus orientalis.* 3-4 kg. almond fruits for each household are hand picked. During the harvest period, the fruit's fleshy mesocarp is totally dry. The fruit is collected for its seeds. As the fruit is dry, it is easy to handpick them, although the shrub is spinescent. 15-20 years ago, around 20 kg wild almonds were collected especially for their bitter taste.

Pre-storage processing: Hard shells of almond kernels are broken by hitting with hand stone in village gardens.

Storage: Dry kernels are stored in small sacks in storage rooms.

Consumption:

1) Kernels are roasted in pans or buried in low fire in cold winter days. They are told to give energy. Especially consumed early in the mornings or evenings.

2) Roasted kernels are mixed in cooked bulgur.

3) Roasted kernels are ground with querns.

4) In Adakale village roasted almond kernels are pounded in hand mortars and they are added in water to cook coffee. Dung is used as fuel to cook almond coffee in oven fire. 40 years ago, villagers cooked almond and terebinth coffee in cups placed in ash after cooking activities.

F1) Madenşehir, F2) Kızılöz, F3) Güneysınır:

Local name: Badem, yaban bademi, çalı bademi, çağla, acı payam, çakır bademi.

Harvesting: Madenşehir villagers organise trips to Karadağ Mountain, Kızılöz and Güneysınır villagers to Toros slopes to harvest *Amygdalus orientalis.* The harvesting process is the same as in Süleymanhacı and Adakale villages. As a difference, these villages casually harvest wild almonds during hunting and other collecting trips as well. These villages also collect *Amygdalus communis* fruits grown in gardens for its kernels and for the fleshy fruit part (mesocarp). The fleshy fruit is called çağla, and eaten while fresh and ripe. When the fruit is ripe, the kernel is edible too. The kernel is eaten either fresh or roasted. Some species are a hybrid of domesticated and wild species and taste bitter. These fruit kernels sometimes need to be roasted to sweeten the flavor.

Villagers often collect these fruits casually, therefore it is difficult to estimate the harvested amount. When collecting as groups happen, each household collect 5-6 kg fruits. The fruits are separated from their dry greens when picked from branches. Dry green of the fruit is removed by itself naturally many times.

Pre-storage processing: Same as in Süleymanhacı and Adakale villages.

Storage: Same as in Süleymanhacı and Adakale villages.

Consumption:

1) Same as in Süleymanhacı and Adakale villages. As this fruit is sometimes consumed alone, especially for warming the body, it is eaten mixed with other fruits such as wild pistachios and acorns especially before starting the day as an energy food. The mixture can be either consumed raw or roasted.

2) Roasted seeds are pounded in wooden mortars and mixed in batırık. Wild almonds together with their hard shells are buried in the low fire in oven or kernels are roasted on metal pans on ovens.

3) In Güneysınır village dry wild almond kernels are mixed in cooked bulgur.

4) During especially hunting activities, casually collected wild almond fruits are buried in low fire set in a shallow, small pit and roasted. They are preferred in cold hunting days as an energy food and to warm the body.

5) In Madenşehir and Kızılöz villages, casually collected dry *Amygdalus orientalis, Amygdalus? (hybrid species)* fruit kernels are also consumed raw to give energy. Hard shells are broken with help of a hand stone on the collecting spot by the tree and kernels are consumed. Although they taste bitter, villagers like this taste and prefer it especially in cold days.

6) Some households stated that, wild almond kernels were only edible when dried in the sun.

7) Wild almond kernels are roasted. They are consumed with boiled wheat grains and roasted terebinth kernels.

Other uses: Wild almond and oak branches are used as fuel to burn lime. The limestones are built like a chimney on the ground. The dry branches of wild almond trees and oaks are filled in the chimney and burnt. In winters it also serves as warming spot for the villagers who have to work outside.

5.3. Anacardiaceae

Trees or shrubs, often with resinous bark. Fruit often oblique and rather dry (Davis: 1982). Leaves mostly alternate, pinnately compound, trifoliolate, or simple, exstipulate.

Inflorescences usually paniculate, axillary or terminal. Flowers small, regular, hypogynus or sometimes ± perigynous, hermaphrodite or more often unisexual by reduction; sepals 3-5 or rarely absent; petals 3-5 or absent. Fruit a drupe (Townsend and Guest: 1966).

A moderately large family of about 70 genera and 600 species widespread in warmer regions, economically important for certain fruits and resins and characterized by possession of resin ducts, a prominent intrastaminal disk, and a drupaceous fruit (Townsend and Guest: 1966). Three species are reported by Browicz in Turkey: *Cotinus*, *Rhus* and *Pistacia* (Browicz: 1982).

5.3.1. Pistacia L.

Dioecious trees or shrubs. Leaves alternate, deciduous or evergreen, pinnate, rarely trifoliolate or simple. Flowers in branched panicles or racemes, unisexual, apetalous or naked. Male flowers with 4-5 anthers inserted on disc. Female flowers with a short, 3-fid style. Fruit a 1-seeded oblique drupe (Davis: 1982). *Pistacia* (from the ancient Gr. Name); Pistache, Terebinth, Turpentine Tree. Mainly a subtropical genus of about 12 species, the majority in Asia and the Mediterranean region, but one species extending into tropical Africa and another in Central America (Townsend and Guest : 1966). The varoius species of terebinth range from small to large trees in the great terebinth, *Pistacia atlantica,* and shrubs of 1-3 m in the lesser terebinths, *P. terebinthus* and *P. palaestina* (Hillman 2000). The fruitlets are mostly reddish and (occasionally turquoise-blue) in color with a fleshy outer skin overlying a thin shell and an oily little kernel (Hillman 2000).

5.3.1.1. *Pistacia terebinthus*

Shrub 2-3 m., or small tree up to 6 m., often galled (Browicz 1982). Leaves deciduous, imparipinnate or paripinnate; leaflets ovate-oblong or oblong-lanceolate, acute or acuminate, always mucronate, glabrous; rachis not winged, glabrous (Browicz). Fruit paniculate, globose or broadly obovate (Browicz); when the fruitlets are mature a shell tissue predomintes (Hillman 2000); beige and turning reddish-pinkish in color when unripe, and turquise-blue when mature. Two subspecies may be recognised, though intermediates are rather common in Turkey (Browicz). It grows on rocky slopes, macchie and pseudo-macchie, Pinus brutia forest (50-1500 m.).(Davis: 1982)

Pistacia terebinthus ssp *palaestina* (wild pistachio)

S1) Küçükköy, S2) Dedemoğlu:

Local name: Menengiç.

Harvesting: Some years a few women from each village who has relatives in villages in Toros Mountains go to collect the fruit generally in September-October. Harvesting and trips take a few days. According to villagers, trees mostly grow in slopes of forests. Each woman collects 4-5 handfuls of fruit.

Only a few households buy the fruits from the open bazaar in Karkın, the neighboring town in the North. Reason given for not harvesting the fruit from forest is, not finding time for such an organised trip.

Pre-storage processing:

1) Dehusked sunflower and pumpkin seeds, corn, chickpea, wheat and *Pistacia* fruits are toasted in large pans. Sometimes apricot seeds are added too. All are grounded with ground stones or handmills. Prepared in late September.

2) Sometimes *Pistacia* fruits are toasted alone. Then they are pounded.

Storage: The mixture is stored in plastic or glass jars. Fresh *Pistacia* fruits are stored in sacks.

Consumption:

1) Fresh fruits are consumed in small amounts (1 kg. for each person in a year).

2) The mixture of seeds and fruit is consumed from late september to may. It is used for medicinal purposes as a treatment for asthma and bronchite.

3) Pounded *Pistacia* is mixed in desserts. It is preferred for its oil and smell. For 1 kg. of dessert ingredients, 300 gr. *Pistacia* fruit is added.

S3) Eminler:

Local name: Menengiç.

Harvesting: In August, fruits are harvested by a few households who have relatives in villages located in slopes of Toros Mountain. Each households harvest about 3-4 kilos.

Storage: Fresh fruits are stored in small sacks in storage rooms.

Consumption: Consumed during the year.

W1) Süleymanhacı:

Local name: Menengiç, çitlembik.

Harvesting: 5-6 households organise trips to Toros Mountain slopes in august.

Storage: Fresh fruits are stored in small sacks in storage rooms.

Consumption: Consumed fresh during the year.

Other uses: Terebinth tree branches are used as fuel.

W2) Adakale:

Local name: Menengiç, çıtlık.

Harvesting: A few households harvest *Pistacia* fruits from Karadağ slopes. Each household collect about 3 kg. fruits. 15-20 years ago, trips were organised to Karadağ with a neighboring village called Madenşehir. Totally 30-40 people from both villages joined the trip.

Pre-storage processing: Fruits are added in water in a plastic washbowl. Red and beige colored fruits floating on the surface are hand separated and thrown away. Washed fruits are laid on clothes and left to dry.

Storage: Fruits are stored in sacks.

Consumption:

1) Fruits are consumed during the year. The individuals who have healthy teeth eat the fruit together with its stone. The ones, especially aged people, spit out the fruit stone.

2) *Pistacia* fruits are roasted and pounded. Oily fruit mash is added in various types of food and mixed in cooked wheat.

3) *Pistacia* fruitlets are roasted and pounded well in hand mortars. Wild almond kernels (*Amygdalus orientalis*) are roasted and pounded well either alone, or mixed with *Pistacia* fruitlets. Dung is used as fuel in ovens to supply low fire. The mixture is added in water to cook coffee. If desired, terebinth coffee or almond coffee can be cooked separately. 40 years ago, coffee was cooked in cups in ash in ovens especially following cooking actvities such as breadmaking.

4) Terebinth fruitlets are the main ingredient in ‘batırık’. Terebinth fruitlets are roasted and pounded in hand mortars. Raw bulgur (döğürcek) is kneaded with hot water first, and mixed with tomato, sesame oil, chopped pepper, onion, pounded terebinth and roasted hemp seeds. 3-4 kg bulgur is mixed with 250-300 gr pounded terebinth. For 5 people, 5 glasses of bulgur is required.

5) Chickpeas, wheat grains and wild pistachio fruitlets are roasted together in a pan on oven fire. The food is called ‘kavurga’.

Other uses: Terebinth fruitlets are boiled in water to drink as tea everyday for healing shortness of breath.

W3) Hamidiye:

Local name: Menengiç.

Harvesting: None.

Villagers used to make trips to Toros Mountains to harvest fruits 15-20 years ago.

Storage: None.

Consumption: None.

F1) Madenşehir:

Local name: Melengiç.

Harvesting: Organised trips to Karadağ forest as two-three neighboring households. Men, women and children go. Fruits are stripped off their branches into a sieve that villagers hang from shoulders. Fruits are sieved in sacks and baskets while collected, so they separate branches and leaves from fruits (small stalks may remain attached to fruits). Collected fruits are carried in sacks and baskets either on donkeys, or hung on each side of a stick carried on shoulders. Sometimes villagers carry fruits in clothes wrapped on their back.

Villagers often harvest seasonal wild fruits including *Pistacia* fruits casually during hunting, herding, fuel collecting, etc. Fruits are consumed during these tasks.

Pre-storage processing: In each household's garden, collected fruits are soaked in water, so ripe, dark colored fruits sink, light, yellow or red ones float. This process aims to separate ripe fruits from raw or parasite infected ones. Then, raw or infected ones white or pink to red in color are spread on a piece of cloth in gardens later to be used as animal fodder, and ripe fruits, dark turqoise blue (similar to blueberries), are spread on a piece of cloth on rooftops to dry in the sun.

Storage: After 2-3 days of drying period in the sun, ripe fruits are stored in sacks in storage rooms.

Consumption:

1) Harvested fruits are consumed during the year. Especially during the early breakfast before sunrise fruitlets are consumed raw with other wild fruits such as almonds, hackberries and acorns to give energy. During winter and spring seasonal tasks (herding, hunting, fuel managing etc.) such wild fruits are carried along.

2) *Pistacia* fruits as one of ingredients, a special food called ‘batırık’ is prepared to serve guests. To prepare it, *Pistacia* fruits are first roasted for 1-2 minutes in a pan, then well pounded in wooden mortars with help of wooden pestles made from *Celtis* tree. Finely grounded wheat is mixed and worked up with this oily fruit mash. The purpose is to soften the wheat, because it is uncooked. Other wild plants and fruits such as pounded mixture of roasted seeds of *Amygdalus orientalis*, raw seeds of *Amygdalus communis,* raw apricot seeds, leaves of *Malva* sp. (mallow = ebegümeci) are added in this mixture. If wished, tomato, parsley and mint are added too. Batırık is kneaded well and separated into small meatballs. Served in a large bowl.

3) Roasted terebinth fruitlets are many times pounded in hand mortars. Some households stated they grind the fruitlets with querns. The oily fruit mash can be added in several meals as oil resource.

4) Roasted terebinth fruitlets are consumed along with boiled or roasted wheat grains called ‘kavurga’ and roasted wild almond kernels especially at night visits. Consuming roasted wild fruits are inseparable parts of social gathering.

Other uses: Terebinth leaves are boiled in water and drunk as tea occasionally by some households in the village.

Export: Terebinth fruitlets are traded in steppe and wetland villages. They are exchanged for sugar and other types of oil extracted from sesame, sunflower and hemp seeds.

It was noted by Gordon Hillman (2000), the villagers of Madenşehir, like villagers from many other villages, ‘always added a sprinkling of terebinth fruits (did not matter which species) when they roasted wheat grain to make the crunchy snack called kavurmaç’ (=roasted wheat grain meal. In Central Anatolian steppe villages, roasted wheat, corn, or chickpeas are called kavurga.). Here Hillman mentions a food type observed by the present author in Madenşehir and in villages by the gallery forests in wetlands such as Süleymanhacı; or steppe forest villages, such as Güneysınır. It also proves the fact that, types of food consumption in 1970’s still continue today. In the years Hillman recorded this ethnographic information Madenşehir villagers must still have held their agricultural lands by the Kılbasan-Madenşehir border yielding plentiful amount of cereal grains; so that just a sprinkle of terebinth in the roasted wheat grain meal would do. Today, having lost these agricultural lands in the battle with Kılbasan village, Madenşehir villagers have small patches of agricultural lands left, yielding much lesser amount of cereal grains. The households without lands exchange stuff or do several tasks for bread wheat bulgur. Mountain villages such as Madenşehir have generally suffered from shortage of cereals; thus villagers enrich cereal foods with various wild fruits, both for the reason of nutritious values, and for multiplying the amount of food.

Hillman (2000) also informs that, wives of shepherds near steppic Karaman first roasted the fruits of the lesser terebinth *P. palaestina* (mavi merlengeç=blue terebinth. A close relative of the great terebinth.) in an up-turned metal sac, then crushed these roasted fruitlets and mixed them into both meat-balls and bulgur-cakes to prevent them going bad during the two or more days the shepherds were out on the steppe with their flocks. Hillman here must have been talking about ‘batırık’ and its use as travel food to take along with, as hunters and animal herders in Central Anatolia often do. but in pre-metal and pre-ceramic times they could have used flat stones beside hearth, or rolled hot round stones around in a basket containing the fruitlets.

Fig.13. Terebinth floating.

Fig. 14. Roasted terebinth pounding.

Fig.15. The traditional meal batırık.

Fig. 16. Batırık made from raw pounded wheat grains

F2) Kızılöz:

Local name**:** Melengiç.

Harvesting: Organised trips to village surroundings. 2-3 neighboring households join the trip. The harvesting methods are the same as Madenşehir villagers'.

Pre-storage processing: Same with Madenşehir village.

Storage: Same with Madenşehir village.

Consumption:

1) Harvested wild fruits are consumed with other wild fruits throughout the year.

2) 'Batırık' is prepared here too; some years when wheat does not yield well, grounded barley and wheat are mixed. As a difference from Madenşehir village, roasted and pounded acorns are added as well in this mixture.

F3) Güneysınır:

Local name: Menengiç.

Harvesting: Organised trips to Toros Mountain slopes. Around 15 people group together and join the trip. There are a few groups doing the harvest in different days of August-September. Harvesting methods are same with Madenşehir and Kızılöz villages.

Pre-storage processing: Same with Madenşehir and Kızılöz villages.

Storage: Same with Madenşehir and Kızılöz villages.

Consumption:

1) Fruits are consumed raw during the year.
2) Roasted and pounded fruits are used in various foods as an oil source.

5.3.2. *Rhus coriaria*

Shrub. It is native to the Mediterranean Region and Middle East. Leaves pinnate with toothed leaflets, the rachis often slightly winged. Young branches densely brownish tomentose. Inflorescence paniculate. Flowers functionally unisexual, 5-merous; petals present. Petals greenish white, 3-4-5 mm. Fruit a globose, 1-seeded drupe, villose, reddish. It grows in scrubs, banks and forest (600-1900 m.) (Davis: 1982).

***Rhus coriaria* (sumac)**

S1) Küçükköy, S2) Dedemoğlu, S3) Eminler, W3) Hamidiye:

Local name: Sumak.

Harvesting: None.

The villagers sometimes buy sumac from bazaars in nearby towns in autumn and winter seasons. Using sumac is not common in these villages. For the villages Süleymanhacı, Adakale and Eminler which are closer to forest areas, sumac use is more common than the villages Küçükköy, Dedemoğlu and Hamidiye.

Storage: Sumac bought from bazaars is stored in small amounts in either storage rooms or in kitchens.

Consumption: Eaten during the year as a spice mixed in meals, such as salads, bulgur, rice, meatballs etc.

W1) Süleymanhacı:

Local name: Sumak.

Harvesting: Villagers go to collect 2-3 kg sumac fruits from the Toros Mountain skirts, generally when they visit their relatives there. Collected fruits are separated from their branches and leaves on the collection spot.

Pre-storage processing: Fruits brought to the village are pounded in the hand mortars to separate from their seeds. The seeds are thrown away. Pounded sumac is laid on the garden ground or on the roofs to dry.
Storage: Few individuals store the limited amount of fruit they collect in their kitchen for yearly use.
Consumption: Pounded sumac is used as a spice in several types of vegetable and meat meals.

W2) Adakale:

Local name: Sumak.
Harvesting: 30-40 villagers used to go for harvesting sumac together with Madenşehir villagers to Karadağ Mountain. Today only individuals go and collect sumac mostly from the Toros Mountain skirts.
Pre-storage processing: Sumac fruits are pounded in mortars and sieved to be separated from their seeds.
Storage: Sumac was a very important fruit in the diet of Adakale villagers. In the kitchens, there were separate shelves only to store sumac and called 'sumaklık'. Today, limited amount of pounded sumac is stored in storage rooms. It is preservable for 2-3 years.
Consumption: Sumac is used as a spice in several meals. Especially the meal called 'papara' cannot be imagined without sumac by the villagers. Papara is prepared with parched bread or yufka cooked with parched meat. Prior to serving hot, sumac is sprinkled on the food.

F1) Madenşehir:

Local name: Sumak.
Harvesting: Organised trips to village surroundings herding or riding donkeys and carrying baskets, clothes and sacks. Three or four households join the trip. Fruits are collected by stripping off the branches with hands. In two hours there are enough amounts of fruits collected for a household's yearly sumac needs (generally 1 sack is enough).
Pre-storage processing: When sumac fruits are brought to the village, all the collected fruits in that trip are poured in the big stone mortar remained from the Byzantine Period and stood in the village center. Young men pound the fruits with a big stone pestle until fruits become powdery. The reason of pounding is to separate hard seeds from the

fleshy part of the fruit. Seeds are broken while 30% remain whole during this process. Then this mixture is sieved and sumac is spread in the sun to dry for 1-2 days. The remaining seeds are used as fodder.

Storage: Pounded sumac is kept in sacks either in storage rooms, or in niches into the outer walls of the house.

Consumption: It is consumed during the year as a spice mixed in bulgur, batırık, soup, salads and meat. It is not eaten alone. Sumac is favored for its sour taste especially in winter.

Other uses:

Sumac leaves are boiled in water and drunk as tea occasionally by some households in the village.

Fig.17. Sumak collecting.

Fig.18. Sumac pounding in stone mortars.

Fig.19. Sumak grinding in hand querns.

Fig. 20. Sumak pounding in the village.

Fig.21. Pounded sumak separated from the seeds.

F2) Kızılöz, F3) Güneysınır:

Local name: Sumak.

Harvesting: Same as in Madenşehir village.

Pre-storage processing: Same as in Madenşehir village. Villagers in these villages often prefer to grind the collected fruits in their grinding stones in gardens.

Storage: Sumac is stored in sacks in storage rooms.

Consumption: Same as in Madenşehir village.

5.4. Ulmaceae

5.4.1. Celtis L.

Trees, rarely shrubs. Bark smooth, not scaling. Leaves deciduous, 3-nerved at base, distinctly petiolate. Flowers polygamous, appearing with leaves on young growth. Anthers yellow. Fruit subglobose or ovoid, drupe fleshy, distinctly pedicellate. Stone bony. Species of this genus are very variable, and their determination is possible only by considering a combination of characters. Species limits are also complicated by intermediate forms, probably of hybrid origin, especially between *C. glabrata* and *C. tournefortii,* and between *C. tournefortii* and *C. caucasica* (Browicz and Zeliński: 1972).

5.4.1.1. *Celtis glabrata*

Shrub or tree, 3-5 m. Twigs glabrous, shining, chestnut-brown, with distinct, whitish lenticels. Leaves glabrous, or if hairs present then scabrous, never soft and yellowish to glaucous green beneath, broadly ovate to narrowly ovate, distinctly oblique, acute to cuspidate, serrate or sometimes crenate-serrate. Drupe globose, yellow to orange. Stone weakly reticulate. It grows on open rocky slopes, 650-1370 (-1800) m. Widespread except W. Anatolia. In some cases the determination of this species is difficult because intermediates with *C. tournefortii* occur (Browicz and Zeliński: 1972).

5.4.1.2. *Celtis tournefortii*

Shrub or small tree to 6 m. Twigs pubescent. Leaves pubescent, at least on veins; soft hairs always present and not more than twice as long as broad, broadly ovate, often strongly oblique, sometimes subcordate, acute to subacuminate, serrate to serrate-crenate, minutely pubescent beneath, glaucous or glaucous-green but lighter beneath. Teeth broad and short, often scarce. Ripe fruit yellow or orange; leaves broadly obovate, crenate to serrate-crenate. Stone almost smooth with 4 ridges. It grows on open rocky places, 300-1500 m. Intermediate forms between *C. tournefortii* and *C. caucasica* occur in E. Anatolia, where the ranges of these two taxa overlap in some places (Browicz and Zeliński: 1972).

***Celtis glabrata, Celtis tournefortii* (hackberry)**

S1) Küçükköy, S2) Dedemoğlu, S3) Eminler, W3) Hamidiye:

Local name: The villages are not familiar with the plant and cannot name the fruit.

Harvesting: none

Storage: none.

Consumption: none.

W1) Süleymanhacı:

Local name: Çitlembik.

Harvesting: Some households go and collect 5-6 kg. fruits when they visit their relatives or friends who live in Toros Mountains or in Karadağ villages. They do casual collecting as well during their visits. These villages used to organise trips to Karadağ slopes, however they rarely go and collect fruits now.

According to Gordon Hillman, near Adakale village located by Hotamış Lake, in early 1980's there was a big *Celtis* tree on which branches people tied pieces of clothes to make wishes (for having a child, house, livestock, lands, for getting married etc.); so many branches of the tree were covered with pieces of clothes (*pers. comm.*Hillman: 1999).

Storage: Some households store the limited amount of fruit they collect in their kitchen for immediate use.

Consumption:

1) Fruits are consumed in the following days of collecting.

2) Fruits including fruit stones are pounded in hand mortars and consumed.

W2) Adakale:

Local name: Dağdağan.

Harvesting: Groups go and collect 5-10 kg. fruits when they visit their relatives or friends who live in Toros Mountains or in Karadağ villages. They do casual collecting as well during their visits. These villages used to organise trips to Karadağ slopes, however they occasionally go and collect fruits now. During the harvesting, fruits are separated from the branches in the collection spot and fruits are filled in sacks to bring back to the village.

According to Gordon Hillman, near Adakale village located by Hotamış Lake, in early 1980's there was a big *Celtis* tree on which branches people tied pieces of clothes to make wishes (for having a child, house, livestock, lands, for getting married etc.); so many branches of the tree were covered with pieces of clothes (*pers. comm.*Hillman: 1999).

Pre-storage processing: 2/3 of collected hackberry fruits are boiled in water in caps on ovens to prepare jam. During the boiling, fruit stones naturally come out of the fruit. It is left to cool. Then the boiled fruits are sieved to separate fruit stones which are thrown away to the garbage.

Storage:

1) Households store the limited amount of fruit they collect in their kitchen for immediate use.

2) Fruit jam is stored in jars in storage rooms. It is preservable for 1-2 years.

Consumption:

1) Fruits are consumed in the following days of collecting. In the recent years fruit stones are spit out whereever the fruits are consumed. They generally end up in the garbage after the garden is swept. However, until 15 years ago oil extracted from fruit stones was an important resource in the diet. Local people of Adakale broke the hackberry fruit stones with their teeth and sucked the oil inside. For this reason, fruit stones were never wasted. Broken fruit stones were dumped in the garbage.

2) Jam is consumed throughout the year.

F1) Madenşehir, F2) Kızılöz, F3) Güneysınır:

Local name: Dağdağan.

Harvesting: Villagers organise trips to village vicinities. The fruit is a very important dietary resource for these villages. When local people settled in these mountain villages, they planted this tree nearby their village lands and gardens. Compared with *Rhus, Pistacia* and *Pyrus* trees, some *Celtis* trees are in a closer distance to the villages. Many times people, even aged people carry a lot of harvested *Celtis* branches on their back to their village. It is collected by breaking branches with fruits, many times by climbing the trees. Branches are carried back to villages and processed in gardens. Some households stated that they stripped off the branches into their napkins on the collecting point in order not to carry heavy loads.

Pre-storage processing:

1) Branches spread on a piece of cloth in house gardens are beaten gently with help of a wooden stick, rubbed with hands and stripped off to separate fruits from branches. Next, hand separated thick branches are used as fuel and the rest is winnowed to separate leaves and tiny branches from fruits. The households stripped off the branches on the collecting point dry the collected fruits spread on clothes on roofs.

2) Fruits are processed into flour in three different ways;

a) Ground with grinding stones including their seeds,

b) Pounded in stone mortars including their seeds,

c) Mashed in a sieve to exclude seed fragments. Seeds thrown away.

Then bread shaped mashed fruits are spread on rooftops to dry in the sun.

Storage:

1) Fresh fruits are stored in sacks in storage rooms.

2) Bread shaped dry mashed fruits are stored wrapped in clothes in kitchens or storage rooms.

3) The flour is stored in sacks in storage rooms.

Consumption:

1) Fruits are eaten fresh during the autumn and winter seasons, sometimes even in spring, as they remain still edible though rougher. They are carried along when the villagers wander around. Aged people need to pound the fruits in hand mortars. The pounding process is undertaken by several members of the village.

2) The flour is used as a sugar source in meals. Most commonly it is consumed with ‘kavurga’ (boiled or roasted wheat grains) or bulgur. Instead of mixing in bulgur or kavurga meals, it is more common to put the hackberry flour in a separate bowl and consume it as side dish.

3) When to use dry mashed fruits, they are;

a) Soaked in water to make marmelade,

b) Mixed in water to prepare bevarages.

4) Some households pound hackberry fruits well in hand mortars. The fruit mash is either consumed alone or mixed in 'kavurga' prepared from roasted grains of wheat, chickpea and corn.

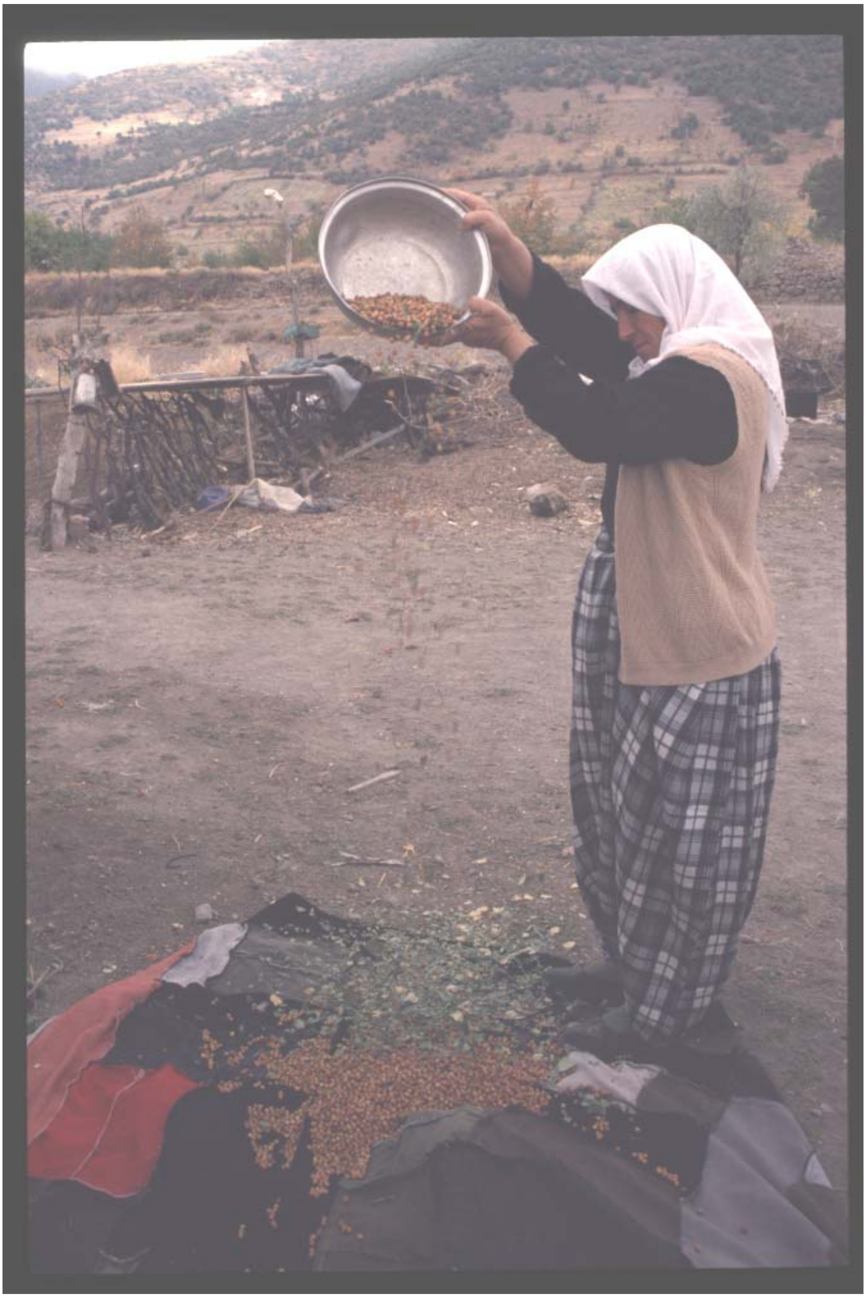
Other uses: When *Celtis* trees were abundant in the region, villagers used to make wooden objects such as mortars from the tree bark, as it is a strong but easily carved wood.

Fig.22. Hackberry harvesting by breaking the branches.

Fig. 23. Hackberry transportation to the village.

Fig.24. Celtis processing.

Fig.25. Hackberry winnowing.



5.5. Fagaceae

5.5.1. Quercus L.

Deciduous or evergreen trees, rarely shrubs; buds spirally arranged, with imbricate scales, clustered at shoot apices. Leaves subsessile or petiolate, penni-nerved, serrate, dentate, pinnatifid or lobed, lobes rounded without bristles at their tips, rarely entire. Staminate flowers in long slender pendulous catskins. Pistillate flowers solitary or 2 to several on a very short to fairly elongate peduncle. Fruit a nut (acorn), subglobose to oblong or cylindrical, surrounded at base or sometimes nearly enclosed by cup-shaped cupule covered outside with numerous imbricate scales (in Turkish species); pericarp thin or thick, endocarp glabrous or pubescent; acorn maturing in one season or two years, sweet or bitter to taste.

For the phytogeographer, forester and ecologist, an extremely important genus. It is one of the most problematic woody groups in the Turkish flora; widespread hybridization and introgression have much obscured specific limits. Many of the Turkish species are heavily grazed, cut for fuel or otherwise represented by deformed specimens. In some areas, especially the east, it is often difficult to find a gfruiting specimen in anthropogenic steppe where *Quercus* scrub may be dominant. Original descriptions and type specimens (if they exist at all) are often far from ideal. Several problems of nomenclature and typification are still unresolved, particularly in the wide-ranging groups (e.g. *petraea, robur* and *ithaburensis* complexes).

The indumentum in Turkish species of oak consists simple and/or apparently stellate or dendroid hairs. The latter, however, are 'pseudo-' stellate or dendroid in that they comprise closely fasciculate simple hairs (Davis 1966-1982).

5.5.1.1. Q. robur L

Widespread in South and East Anatolia. Irano-Turanian element. Deciduous tree to c. 25 m. wide-spreading at top; young shoots glabrous or pubescent, light brown to reddish-brown; buds to 4 mm. glabrous, ciliate-margined or tomentose, reddish-brown. Leaves usually crowded at apex of shoots, obovate, sessile and auriculate or stalked, with 5-8 entire, irregularly rounded, deep lobes, occasionally with secondary lobes; indumentum of dendroid-stellate hairs, ± dense beneath or occasionally sparse, grayish or yellowish-green, glabrous above or with some stellate hairs, rarely glabrous on both surfaces. Cupule hemispherical, rarely cyathiform, grayish-brown; scales concentric, concrescent except for triangular reddish apices, flat or convex. A widespread and frequent species throughout Europe, Turkey and Caucasia whose taxonomy is still far from clear. It grows on rocky, often limestone slopes in moist places, 1200-1800 m. (Davis 1966-1982). The species includes many hybrids and subspecies indicated by the authors.

5.5.1.2. *Q. pubescens Willd.*

It is common on coastlines, in north-east Anatolia and in Central Anatolian mountains. Deciduous small tree to 10 m. round-topped; young shoots densely pubescent (sometimes glabrous); buds reddish-brown, pubescent. Leaves most variable but generally oblong-obovate, grayish-green above, brownish-gray beneath, asymmetrically subcordate or rounded, thick-textured, with 3-6 strongly undulate forwardly-pointing irregular acute lobes with ± revolute margins; indumentum densely to thinly stellate-tomentose beneath, with mainly scattered minute stellate hairs above. Peduncle absent. Cupule shallow; scales adpressed, lanceolate, pubescent, brownish-gray. Usually associated with *Pinus nigra, Q. cerris, Fagus, Castanea, Pyrus elaeagnifolia, Cistus laurifolius, Paliurus spinachristi* in anthropogenic steppe or semi-steppe; rarely in macchie, nr s.l.-1700 m. Hybrids are evidently common, particularly with *Q. infectoria, Q. petraea* s.l., and *Q. macranthera* subsp. *syspirensis.*

5.5.1.3. *Q. cerris* var. *cerris*

Common in Mediterranean, Aegean and in Toros slopes facing Central Anatolia, some Central Anatolian mountains such as Erciyas and Hasan Mountains, Sultan Mountains and South-eastern Anatolia. Deciduous tree to c. 25 m. usually round-topped; bark on old trees deeply fissured, grayish-white; young shoots densely tomentose to glabrescent, light brownish to reddish-brown; buds tomentose or glabrescent, surrounded by persistent stipules, rarely deciduous. Leaves distributed over shoots, ± oblong-elliptic in outline, very variable, from simple with entire small shallow lobes to deeply pinnatilobed with or without secondary lobes; lobes 4-9, mucronulate; indumentum beneath usually densely stellate-pubescent, pale green to greenish-white, above with many stellate hairs regularly dispersed over surface, rarely subglabrous, dark green. Fruit maturing in second year. Cupule hemispherical or cyathiform, yellowish-brown; scales linear subulate, irregularly spreading to reflexed, pubescent. It grows in mixed and deciduous forest with other *Quercus* spp. (e.g. *Q. frainetto, Q. pubescens, Q. infectoria, Q. petraea), Carpinus, Fagus, Castanea, Pinus nigra, P. brutia, P. pinea,* or forming pure stands, nr s.l.-1500(-1900)m. Scattered throughout the southern parts of the species' range in Europe and in Syria and Lebanon. Medit. Element. By far the commoner variety in Turkey, with a wide range in leaf shape, even on the same tree. The 'Turkey Oak' is widespread and variable; the two varieties recognised here occur throughout the total range of the species, but there are also numerous local forms. The species hybridizes with *Q. pubescens, Q. libani* and *Q. ithaburensis* subsp. *macrolepis.*

5.5.1.4. *Q. vulcanica*

Common in south and west Anatolia. Endemic. Eastern Mediterranean element. Deciduous tree to c. 25-30 m. with a trunk at breast high of up to 1.6 m. diam., wide-spreading at top; young shoots yellowish to reddish-brown, pubescent, becoming glabrous; buds large, ciliate-margined or pubescent. Leaves ± evenly distributed over shoots, obovate, ± parallel and sometimes overlapping ± regular acute or rounded lobes, with secondary lobes; indumentum adpressed-stellate-tomentose beneath, yellowish-green or gray, glabrous above or with some stellate hairs, dark green. Peduncle absent or almost so. Cupule hemispherical to cyathiform, grayish-brown; scales ovate-lanceolate, flat, adpressed, tomentose. Associated with *Cedrus libani, Acer hyrcanum, Quercus cerris, Pinus nigra,* 1300-1800 m. Endemic. E. Medit. (mt.) element. Similar in facies to *Q. petraea* subsp. *pinnatiloba* but also with affinities to *Q. frainetto.*

5.5.1.5. *Q. ithaburensis* Decne. subsp. *macrolepis* (Kotschy)

Common generally in west and south Anatolia. Eastern Anatolia element. Deciduous tree to 10(-15) m. with a broad crown, sometimes in old specimens with a massive trunk; young shoots densely tomentose, grayish or yellowish-brown. Buds ovoid, tomentose. Leaves distributed over

5.5.1.6. *Q. trojana*

Coomon in north-west, west and south-west Anatolia.

5.5.1.7. *Q. ilex*

Mediterranean element.

5.5.1.8. *Q. infectoria* subsp. *boissieri*

Common generally in coastlines and eastern Anatolia.

Fig. 26 Different species of acorns.

***Quercus robur, Q. pubescens, Q. cerris, Q. vulcanica, Q. ithaburensis* Decne. subsp. *macrolepis* (Kotschy), *Q. trojana, Q. ilex, Q. infectoria* subsp. *boissieri* (oak)**

S1) Küçükköy:

<u>Quercus pubescens, Quercus robur</u>

Local name: Fruit :Pelit (acorn). Leaves :Pelit yaprağı (pelit leaf). Tree :Pelit ağacı (Pelit tree).

Harvesting:

Outside the village: Organised trips to Toros Mountain slopes. 1/3 of the village population makes groups with their friends and kins to harvest acorns. Acorns are collected from Toros Mountains generally when the *Q. robur* trees in the village do not

yield sweet fruits that year. Everytime harvesting happens in the same spots, since the land ownership does not let people from other villages wander around in the mountain skirts. Collecting acorns under tree is the primary stage of harvesting, because it is easier. Then, people climb trees and collect some more acorns either by beating the branches with a dry branch of tree they can find anywehere close to the collecting point, or by hand. Sometimes, branches are broken during collecting. Harvesting is followed by separating the fruits from its branches and cups (the cup-like base of the fruit). Such remains are used to make a camp fire for giving a meal break prior to going back to the village. A few kg. acorns are deshelled by hitting with a handstone, and they are buried in fire for roasting. These acorns are consumed along with the meal prior to going back to the village. Every household brings back to the village 1 sack of acorns. Collected acorn species are most often *Q. robur*. Acorns collected for winter consumption are deshelled back in the village. Although not deshelling the collected acorns at the collecting point makes the carrying the load back to the village a burden, there are reasons for not doing the separation task out of the village. Acorns are consumed in various ways. When acorns are cooked, the cooking process includes the acorns with their shells. The present author has not observed acorn kernels were separated from shells prior to their cooking. Also, as many times acorns need pit-storing, they are stored without being deshelled for the preservation advantages.
During acorn collecting, other seasonal wild fruits are collected as well.
In the village: There is at least one oak tree in each garden, approximately three *Quercus* trees for each, although the villagers tell they do not want these trees in their gardens. 2/3 of the oak trees in gardens are *Quercus robur,* and 1/3 is *Quercus pubescens.* In spite of this stock of fruits in their gardens, it is kept a secret from outsiders people actually eat them, as eating wild fruits in the steppic lands of Konya Basin is accepted as sign of poverty and humiliation.

Every household in the village collects acorns in their gardens.
Acorn fruits are very important in diet and a special part of social life.

According to some villagers (12 interviewed households) *Quercus robur* trees in their gardens yield some years bitter fruits and some other years sweet fruits. When they yield bitter fruits, in recent years, ¼ of the total households use them as fodder for cattle, sheep, goats and turkeys. ¾ of the total households use the bitter fruits dropped under trees as fodder and they consume the rest. The households lacking sweet acorns that year ask for a bucket of sweet acorns from their neighbors in autumn. Two households informed that, before they immigrated to Konya, all villagers fed on acorns of one 100 year-old, and four 150 year-old *Quercus robur* trees in their gardens. The collecting, processing and cooking were done by many villagers as well. One of the oldest trees in the village, which was also 150 years old, was called 'sacred oak' by the villagers. This was the first tree planted in the village when the villagers came to settle here. One of the oldest trees was recently cut for fuel when the villagers were short in fuel supply.

Almost all households use *Quercus pubescens* acorns as fodder, as the acorns are unpalatable. The fruits of *Quercus pubescens* are very valuable as animal fodder, because animals feeding on it grow strong and healthy, give more milk and their meat is more delicious.

Generally each household consumes 2-3 sacks of fruits in a year. 3-4 sacks of *Quercus pubescens* acorns are collected as fodder (1 sack=approx.20 kg. acorns). While a medium size oak tree produced approx. 6 kg. acorns, bigger trees produced more than 20 kg. acorns. Acorns are collected when their color turns from green to darker brown which is described as 'red color' by all villagers in Konya Basin.

Acorns fallen on ground or grown on low branches are handpicked and filled in sacks. Local people climb trees to collect acorns in higher branches and they beat branches with a thick stick. Fallen acorns are collected.
Because *Quercus* trees are in the village vicinities and gardens, villagers do not have difficulties carrying them back to their houses; therefore harvesting includes separating only the branches and cups from the fruits.

Pre-storage processing:

1) In village gardens acorns are separated from their leaves, branches and cups (the cup-like base of the fruit). These remains are used as fuel. If the household has livestock, leaves and cups are used as animal fodder. Fifteen years ago the villagers collected and processed acorns of big trees in their garden together.

2) If the acorns of *Quercus robur* are sweet, they are not necessarily processed prior to their storage. If the acorns are bitter, they are buried in storage pits following the harvesting days in November and December. Sometimes local people store even sweet acorns of *Quercus robur* to have it taste even sweeter.

Local people find a place in their garden that is far from the daily pathway, so not often stepped on. (storage pits in the open are generally in the 'kitchen area' serving the same purpose. Not to be stepped on) They bury acorns in a 30-40 cm. deep pit. Decision-making of the pit-stored fruit amount depends on the amount they collected that year. It may vary from 1 bucket to 1-2 sacks. After placing the acorns in storage pits, they are either;

a) covered with a plastic sheet or sacks

or;

b) after placing thick sticks side by side on top of acorns, they are sealed with mud for the purpose of keeping it separate from soil. Then the pit is covered with soil.

A similar process is applied to radish.

While the reason for storing acorns in pits is primarily to sweeten acorns and then to preserve them fresh, burying radish has the reason of preserving it. The storage pit functions as a modern refrigerator to keep the vegetable fresh and protect it from freezing. Sometimes, when radishes are ripe, instead of collecting, they are left and covered with dung. While they still feed in soil, they are kept from freezing as well.

Again, fifteen years ago villagers buried acorns in pits together.

Storage:

1) Fresh acorns of *Quercus robur* are stored in small sacks in storage rooms for immediate use.

2) Fresh acorns of *Quercus pubescens* are stored as fodder in a separate corner from other edible foods.

3) In january-february acorns are taken out of the storage pits where buried. They are re-stored in storage rooms in sacks.

Consumption:

1) Fresh *Quercus robur* fruits are consumed between november-december (on collecting spot as well) and april-may (when they start consuming pit stored acorns). The hard shell of acorn is broken by hitting with a stone, and sometimes people break acorn shells with their teeth too. However, the shell is hard when the acorns are collected and are not processed at all. After they are pit-stored, acorn shells become softer. The villagers then generally break the shells with their teeth. Sometimes after eating acorns people prefer drinking water to have it taste better.

2) Fresh acorns are boiled with their shells in large pots about 45 minutes. This process is applied to soften the shell and/or sweeten the taste of acorns. Then the softened shell is peeled with hand.

3) When the fire is low in stoves or ovens in gardens low fire is carried in shallow pits in gardens. Acorns are buried in this low fire and roasted there especially for the reason of sweetening the taste.

4) Acorns are toasted on stoves or on a thin sheet iron on ovens. Prior to toasting, either hard shells of acorns need to be cracked by hitting with handstones, or the embryo end has to be cut off to prevent acorns popping in fire.

5) Fresh, boiled or roasted acorns are either consumed as they are, or mixed in many different dishes, such as bulgur, meat meals and desserts. Most common is eating acorns with bulgur. When consuming acorns, the villagers take a bite from pelit and eat a spoonful bulgur.

Villagers perceive consuming acorns as a social and enjoyable event while it is also nutritious and satisfying.

S2) Dedemoğlu:

Quercus pubescens, Quercus robur

Local name: Fruit: Pelit. Leaves: Pelit yaprağı (pelit leaf). Tree: Pelit ağacı (Pelit tree).

Harvesting: Harvesting process is the same as in Küçükköy. Here, there are few *Quercus* trees. Numbers of *Quercus pubescens* and *Quercus robur* trees are equal. When the local people of Dedemoğlu village need acorns, they have to fetch some from the neighboring Küçükköy village. They both collect and take it from Küçükköy villagers. The amount collected is much less than in Küçükköy. Mostly, sweet *Quercus robur* acorns are brought to the village. Acorns of *Quercus pubescens* are used as fodder for goats.

Pre-storage processing:

1) Collected acorns are separated from their cups and branches in gardens.

2) This process is the same as in Küçükköy village. Here too, local people first store acorns in storage pits in their gardens. The difference here is, sweet or bitter all acorns brought from Küçükköy are buried in storage pits.

Just like in Küçükköy, in Dedemoğlu too, radishes are stored in pits for preservation as in Küçükköy.

Storage: Secondary storage takes place. In February-March, acorns taken from storage pits are re-stored in sacks in storage rooms.

Consumption:

1) Acorns sweetened in storage pits are consumed from february-march to mid july. Due to storage in ground shells becoming softer are peeled off by hand just before their consumption, and kernels are consumed as they are.

2) Acorns are buried in low fire in ovens, sometimes just thrown in ovens contained diminishing fire. Shells of roasted acorns are peeled off with hand.

3) Acorns taken from storage pits are consumed as a side dish with bulgur meal after acorn shells are peeled off with hand.

S3) Eminler:

<u>Quercus pubescens, Quercus robur</u>

Local name: Fruit: Pelit. Leaves: Pelit yaprağı (pelit leaf). Tree: Pelit ağacı (Pelit tree).

Harvesting:

Outside the village: 20-25 years ago, the village had many horses. Villagers harvested acorns when herding horses beside their livestocks in grazing areas in Toros Mountain skirts. Today they still collect acorns during the herding activities in november in Toros slopes. Acorns are collected both for consumption during herding and for bringing back to the village. They collect about 3-4 sacks per household. Cups and branches are separated from acorns and left in the collecting point. Acorns are deshelled back in the village prior to fresh consumption. They cannot separate bitter *Quercus robur* acorns from sweet *Quercus robur* ones by telling from which tree it is, although they can differentiate *Quercus robur* and *Quercus pubescens,* and know *Quercus pubescens* acorns are bitter. Back in the village, bitter acorns are used as fodder. The way they use to differ *Quercus* tree species is first to look at color and shape of tree leaves.

In the village: In the past (20-25 years ago) the village had *Quercus robur* trees with sweet acorns. Today they only have *Quercus robur* trees with bitter acorns and *Quercus pubescens* trees. Almost every household has a flat, heavy stone on a corner of their garden they use as a base to break the nut shells.

Pre-storage processing:

1) Before any storage takes place, cups, leaves and branches are separated from fruits.

2) When acorns are ripe, Eminler villagers leave aside some amount of acorns for immediate use, and they store the rest in storage pits in their gardens as in the way other villages do.

Storage: Two types of storage take place:

1) Fresh acorns are stored in sacks in storage rooms following their harvest.

2) In march, acorns taken from storage pits are re-stored in sacks in storage rooms for their seasonal consumption.

Consumption:

1) Fresh acorns are consumed during herding activities and back in the village by everyone. During fresh acorn consumption, hard shells are broken by hitting with a handstone. Shells, rotten fruits, branches, acorn cups etc. are thrown in oven fire.

2) Starting from march, acorns taken from storage pits are consumed after they are hand-peeled.

3) Acorns are boiled in large pots on ovens about 15-20 minutes. Then softened shells are easily dehusked by hand. The thinner shell of the kernel is also peeled off by hand. They are eaten either alone or as a side dish with bulgur meal.

4) Acorns are buried in low fire in ovens or in small fire pits in gardens. Shells of roasted acorns are peeled off.

5) During herding activities shepherds sometimes prefer to consume roasted acorns buried or thrown in low fire whenever they set a fire. They especially prefer roasted acorns to fresh ones both when they want warm food in cold days and as it is a process to reduce the bitterness of the fruits.

W1) Süleymanhacı:

Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus trojana

Local name:

Quercus pubescens acorn and tree: gerpelit. *Quercus pubescens* leaves: şırlak yaprak (meaning: shiny and light colored)

Quercus robur acorn and tree: tatlı pelit (sweet acorn).

Quercus vulcanica acorn and tree: çet. *Quercus vulcanica* acorns also: acı pelit (bitter acorn).

Quercus trojana acorn and tree: karapelit (black acorn).

Harvesting:

Outside the village: Acorn collecting from woodlands close to and from Toros skirts takes place accompanying several seasonal activities, including a large variety of processes of different parts of oak trees. The main harvesting trips for only collecting large amounts of acorns start when the temperature decreases much in November. According to villagers' experience, it is when acorns taste sweeter due to cold weather. Casual harvesting and trips with smaller groups continue until it snows. Local people of Süleymanhacı mainly harvest and consume acorns of *Quercus pubescens* and *Quercus* *robur. Quercus pubescens* trees are dominant and their acorns are consumed the most. *Quercus vulcanica* acorns are also collected. Small parklands near the village are collecting points as well. Check it with eleni's, neal's articles, orman mudurlukleri ve gazi univers botani bolumunden kaynaklar.

1) Organized trips to woodlands on steppe nearby Toros and on Toros slopes. These trips are a single activity to collect and be able to carry acorns back home in large amounts.

2) Casual harvesting throughout seasonal activities such as herding, hunting and collecting raw materials of mainly firewood and building materials around November and December.

3) Included in some seasonal activities, when villagers go to woodlands and Toros Mountains they also cut oak wood and break oak branches with acorns to carry back to the village either on their back, or with donkeys (in the past with horses).

In the village: In village vicinities all four species of *Quercus pubescens, Quercus robur, Quercus vulcanica* and *Quercus trojana* grow. *Quercus trojana* acorns are the only species not consumed, although they are collected for fodder. As the village vicinity is neighboring the woodlands, it is sometimes difficult to differentiate if the acorns were collected outside the village lands. However, here 'the village vicinity' term is used to mean inside the borders of the settlement. Otherwise, the vicinity of a village could sometimes extend to kilometres away including agricultural fields and meadows.

Pre-storage processing:

1) Collected acorns are separated from their cups and branches in gardens.

2) Acorns of *Quercus pubescens, Quercus robur* and *Quercus vulcanica* are buried in storage pits in gardens and are left there until spring. Storage pits may function for growing oak trees too when desired. Next year another storage pit is dug for acorns.

Storage:

1) Fresh acorns are stored in sacks in storage rooms for quick consumption.

2) Acorns taken from storage pits in spring are re-stored in storage rooms.

3) Removed cups of acorns, oak wood, branches and dry leaves are separately stored in fuel storage rooms.

4) Bitter acorns and leaves of *Quercus trojana*, some *Quercus vulcanica* leftovers and leaves are stored in fuel storage rooms or in a separate corner to use as fodder.

Consumption:

1) Fresh acorns are consumed alone in large amounts as well as taking place of bread, with various foods during activities and in the village. *Quercus pubescens* and *Quercus robur* are the species of which sweet acorns are consumed fresh. Acorns of *Quercus vulcanica* are sometimes consumed fresh too by people who like its bitter taste. Fresh acorns are also consumed with bulgur meal.

2) To sweeten the taste of *Quercus vulcanica* acorns people drink water following its consumption.

3) Acorns are roasted burying or throwing in low fire during activities or in gardens. Shells peeled off after roasting.

Other uses:

1) Leftovers and some portions of bitter acorns (*Quercus vulcanica* and *Quercus trojana*) are used as fodder for livestock.

2) Especially the cups of *Quercus vulcanica* are preferred as fuel.

3) Collected *Quercus vulcanica* and *Quercus trojana* wood are used as fuel.

4) Ash of oak wood is used for tanning leather. Ash is rubbed against leather and wait for one week.

5) Oak wood and wild almond wood are prefered as fuel for burning lime which is one of the main building materials. In open area, limestones are built in shape of a chimney. In the middle, woods are placed and burnt. Some of these chimneys function as a heater for people who have to work outside especially in cold days for processing materials and food.

6) In spring a type of parasite (called 'gezer böceği (wandering bug)' by villagers) grows on *Quercus vulcanica* and *Quercus trojana* trees. It settles and starts sucking on leaves. One day after it settles, the produced gum feeds honey bees villagers keep.

W2) Adakale:

Quercus pubescens, Quercus robur, Quercus cerris

Local name:

Quercus robur: tatlı pelit.

Quercus pubescens: acı pelit.

Quercus cerris: palamut.

Harvesting: As a wetland village harvesting acorns in Adakale is very similar to Küçükköy village. In Adakale people harvest acorns in Karadağ and Toros slopes. Such trips need to take limited time due to ownership of territories in mountains by other villages. In the vast sedge and reed landscape of Adakale village lands, people want trees on the contrary of steppe villages and Hamidiye as a wetland village.

Pre-storage processing: Same as in Küçükköy village. The process includes *Quercus cerris.*

Storage: Same as in Küçükköy village. *Quercus cerris* acorns are mostly used and stored as fodder, while fresh acorns of *Quercus pubescens* is stored for consumption.

Consumption: Same as in Küçükköy village except fresh acorn consumption includes *Quercus pubescens,* and occasionally *Quercus cerris* acorns too.

W3) Hamidiye:

<u>Quercus pubescens, Quercus robur</u>

Local name:

Quercus robur: tatlı pelit.

Quercus pubescens: acı pelit.

Harvesting: Same as in Eminler village.

Pre-storage processing: Same as in Eminler village.

Storage: Same as in Eminler village.

Consumption: Same as in Eminler village.

F1) Madenşehir:

<u>Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus trojana, Quercus ithaburensis macrolepis, Quercus cerris</u>

Local name:

Quercus pubescens: gerpelit.

Quercus robur: tatlı pelit.

Quercus vulcanica: kasnak peliti.

Quercus trojana: karapelit.

Quercus ithaburensis macrolepis (*Quercus macrocarpa)*: palamut.

Quercus cerris: bozpelit.

Harvesting: Very similarly to Kızılöz village, Madenşehir villagers use oak trees and acorns in many ways. It is one of their most valuable raw material sources. All harvesting applications are the same with Kızılöz. *Quercus pubescens, Quercus robur* and *Quercus cerris* are abundant in village gardens. *Quercus vulcanica* and *Quercus ithaburensis macrolepis* acorns are collected from Karadağ Mountain. In Başdağ, the highest hill of Karadağ, oak trees are abundant. Villagers also collect oak wood and acorns during hunting and herding activities. To collect acorns they climb trees and sometimes break branches for fuel too. Branches with acorns are brought back to village.

Pre-storage processing:

1) Collected acorns are separated from their cups and branches in gardens.

2) In April villagers bury *Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus ithaburensis macrolepis* and *Quercus cerris* acorns in storage pits in their gardens.

Storage:

1) Fresh acorns of *Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus ithaburensis macrolepis* and *Quercus cerris* are stored in sacks in storage rooms for quick consumption.

2) Acorns taken from storage pits in early summer are re-stored in storage rooms.

3) Removed cups of acorns, oak wood, branches and dry leaves are separately stored in fuel storage rooms.

4) Bitter acorns and leaves of *Quercus trojana* and *Quercus ithaburensis macrolepis,* and *Quercus cerris* leftovers and leaves are stored in fuel storage rooms or in a separate corner to use as fodder.

5) If there are enough sweet acorns of *Quercus pubescens* and *Quercus robur* for consumption, bitter acorns of *Quercus ithaburensis macrolepis* and *Quercus cerris* might also be used and stored as fodder in fuel storage room or in a separate corner.

Pre-consumption processing:

1) Acorn shells consumed fresh are broken by hitting with a handstone. If the consumption is on the collecting spot, generally there are larger stones around to use them as the base to place the fruits. In the village, every household has such heavy and flat stones for the use of breaking nuts.

2) Prior to roasting any species of acorn fruits including *Q. robur*, the embryo end is cut off; however the villagers explained the reason of cutting this part for preventing acorns bursting in the fire (Hillman (2000) observed the same process in 1970s, and explained that the tannin rich embryo ends were cut off to remove the bitterness caused by tannin).

Consumption:

1) As a mountain village Madenşehir does not have plain areas to produce enough cereals, this is why, as in Kızılöz fresh acorns are consumed alone in large amounts as well as taking place of bread, with various foods during activities and in the village.

Quercus pubescens and *Quercus robur* are the species of sweet acorns that are consumed fresh. Acorns of *Quercus vulcanica, Quercus ithaburensis macrolepis* and *Quercus cerris* are sometimes consumed fresh too by people who like its bitter taste. Fresh acorns are also consumed with bulgur meal.

2) All edible acorn species are buried in hot ash (low fire) for 5-10 minutes. When the shells of acorns are slightly burned, the fruit is ready for consumption. Shepherds and hunters mostly use this technique to eat acorns in mountains. Also, after bread cooking in houses or gardens, the following process is to roast acorns in the faded fire.

3) Eating acorns is a big part of breakfast. They take cereals' places mixed with other wild fruits such as *Pistacia sp.* and *Amygdalus sp.* nuts. Villagers have breakfast before sunrise when the weather is cool in summers and below zero in winters. They eat wild fruits for energy and warming body.

4) When they go on a trip for various tasks i.e. hunting or herding, wild fruits are the primary food stock they carry.

5) During hunting or herding activities wild fruits are the main food source in mountains they rely on, either raw or roasted.

Other uses:

1) As in Kızılöz, villagers benefit from acorns and young shoots of oak trees as animal fodder with similar activities. Similarly, *Quercus pubescens* and *Quercus cerris* acorns are very valuable as animal fodder here too.

2) *Quercus vulcanica* ('kasnak'=hoop) has same uses as in Kızılöz. Generally all oak woods are used as beams

3) Here too, flour made from oak wood is edible.

4) Villagers are careful about using their oak wood resources in mountains as fuel. They especially collect dry oak wood on trips in November before it gets colder

5) During acorn harvesting trips, galls caused by parasites and growing on *Quercus ithaburensis macrolepis* branches are collected too. Back in the village they are pounded and made powder from them to use as baby powder.

6) Villagers use oak wood branches to build shades in their garden. To build them, four columns are prepared from oak and a roof on columns is build from branches and leaves. These shades function both as a storage room and a watch tower especially for women to climb on and watch the hills surrounding the village. Although village houses have flat rooftops and stairs to climb on, these small watchtowers seem more practical to climb.

7) Wild almond and oak branches are used as fuel to burn lime. The limestones are built like a chimney on the ground. The dry branches of wild almond trees and oaks are filled in the chimney and burnt. In winters it also serves as warming spot for the villagers who have to work outside.

F2) Kızılöz:

Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus trojana **P. B. Webb, *Quercus ilex, Quercus ithaburensis macrolepis, Quercus cerris***

Local name with localities:

Quercus pubescens Willd. frequent in association with *Juniperus excelsa* Bieb. starting from the border of steppe on the south of Elmasun-Armusun villages (Güneysınır is the new name, meaning south border, correctly describing the vegetation zone border) and dense between Kızılöz and Durayda villages : gerpelit.

Quercus robur : tatlı pelit.

Quercus vulcanica: kasnak peliti.

Quercus trojana P.B. Webb dominant species in dense oak woodlands on the hills around the village: karapelit.

Quercus ilex : bozpelit.

Quercus ithaburensis macrolepis Decne ssp. *macrolepis* occational on the pass from Güneysınır to Kızılöz, frequent between Kızılöz and Durayda villages : meşe.

Quercus cerris : palamut.

Harvesting: Kızılöz, as a mountain village, uses oak trees and acorns in many ways. It is one of the main sources in the village. Harvesting acorns starts in November when they are ripe, and continues until it snows. As oak trees are nearby and in the village lands individual households collect acorns in large amounts, whenever they need to, for fun, or casually. Children collect acorns under trees while they play around. There are seven recognised *Quercus* species whose parts are used and collected for several purposes, since as well as acorns, other parts of oak trees are very important too. Among them, *Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus ithaburensis macrolepis* and *Quercus cerris* acorns take place in Kızılöz villagers' diet. During harvesting first acorns under tree are collected, then people climb trees and beat branches with thick sticks sometimes made of oak tree branches as well. Fallen acorns are collected in baskets or in clothes. Tree parts and acorns are supplied from the oak woodland with various oak species stretching from Kızılöz to Durayda (a neighboring village about 5 km. away).

Pre-storage processing:

1) Collected acorns are separated from their cups and branches in gardens.

2) In April villagers bury *Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus ithaburensis macrolepis* and *Quercus cerris* acorns in storage pits in their gardens.

Storage:

1) Fresh acorns of *Quercus pubescens, Quercus robur, Quercus vulcanica, Quercus ithaburensis macrolepis* and *Quercus cerris* are stored in sacks in storage rooms for quick consumption.

2) Acorns taken from storage pits in early summer are re-stored in storage rooms.

3) Removed cups of acorns, oak wood, branches and dry leaves are separately stored in fuel storage rooms.

4) Bitter acorns and leaves of *Quercus trojana* and *Quercus ilex* leftovers and leaves are stored in fuel storage rooms or in a separate corner to use as fodder.

5) If there are enough sweet acorns of *Quercus pubescens* and *Quercus robur* for consumption, bitter acorns of *Quercus ithaburensis macrolepis* and *Quercus cerris* might also be used and stored as fodder in fuel storage room or in a separate corner.

Pre-consumption processing:

1) Acorn shells are removed from kernels by hitting with handstones to crack the shell open. The process happens either in the collecting point or back in the village.

Consumption:

1) As in Süleymanhacı village, fresh acorns are consumed alone in large amounts as well as taking place of bread, with various foods during activities and in the village. *Quercus pubescens* and *Quercus robur* are the species of sweet acorns that are consumed fresh. Acorns of *Quercus vulcanica* are sometimes consumed fresh too by people who like its bitter taste. Fresh acorns are also consumed with bulgur meal.

2) All edible acorn species are buried in hot ash (low fire) for 5-10 minutes. When the shells of acorns are slightly burned, the fruit is ready for consumption. Shepherds and hunters mostly use this technique to eat acorns in mountains. Also, after bread cooking in houses or gardens, the following process is to roast acorns in the faded fire.

3) People with diabetes eat especially bitter acorns raw, as a medicinal use.

4) When there is shortage of cereals for breadmaking as in many mountain villages, acorns are pounded and the flour is used to make bread.

Other uses:

1) Local people pound any species of oak tree bark. They spread this bark powder on leather of a goat, and beat the leather with a stick. Then they soak the leather in water. Swollen leather is called 'tuluk'. In a separate mortar, people pound this time oak leaves. Leaf powder is mixed with water and smeared inside a large wooden bowl. Then the leather is put in this bowl. This process softens the leather which is later stretched from its corners and hung to dry. After sown in shape of a sack, it is used to store yogurt or butter. While the process of working the leather is a job of men, women do the sewing and the yogurt or butter storing works.

2) During the last days of harvesting acorns people herd their sheep and goats in oak woodlands. They climb oak trees to help animals reach their branches now without acorns. Animals also benefit from the leftovers of fallen acorns under trees. Back in the village, people chop acorn leftovers to feed turkeys and cattles for them to grow faster and bigger. *Quercus pubescens* and *Quercus cerris* acorns are very valuable as animal fodder.

3) Some oak woods, preferably *Quercus vulcanica* (as its name bears, 'kasnak' (hoop), is used to make tools such as plough and handle for tools. Shepherds make their sticks from oak wood as well. Beams of house roofs are also made of oak wood. Oak wood is described as a very strong wood by villagers. There is an idiom meaning, 'oak wood is a wood of bravery.'

4) Oak wood is edible as well. It is common among mountain villages in Konya Basin to make oak wood flour. Oak wood is grated with help of sharp tools, until it becomes powdery. Sometimes wood pieces chopped fine are pounded in stone mortars or ground with grinding stones as well. This flour is used to make bread.

5) As a medicinal use, people who catch cold or flu eat a few tea spoonful ash of oak wood.

6) Oak wood is very precious to cut and use it as a fuel, but people collect dry and useless parts of oak trees and woods of *Quercus trojana* and *Quercus ilex* as fuel. Close to village lands it is possible to observe shrubby *Quercus trojana* and *Quercus ilex* trees due to their overuse. *Quercus trojana* is called black oak for its darker leaves, bark and acorns. There is also a curse meaning, 'be as blackened as the black oak'.

CHAPTER 6

ENVIRONMENT

Environment provides mainly three types of resource-rich elements usable by human economy and settlements, activities and movements: The quantity and availability of air, water and soil resources interacting in turn with fauna and flora depend directly on climatic factors, as much as on surface and subsurface characteristics of rock and soil covers (cf.Kuzucuoğlu 2002). However, the availability -and thus the 'value'- of water and soil resources also depend on the techniques and social organisation involved for their explotation and management. In relation with their social organisation, human societies are able or unable to take advantage, react, adapt themselves, or ignore changing environments. This means that the constraints within which human exploitation and management of resources develop depend as much on the environment as on the socio-economic organization of the human societies concerned. Water and soil availability as well as plant expansion also depend on human choices, techniques and organization involved for their agricultural exploitation, a dynamic interpretation can only rely on the confrontation of both environmentalists' and archaeologists' knowledge of what may have happened during each period (cf. Kuzucuoğlu 2002).

6.1. Current Day Vegetation

6.1.1. Konya Basin

The climate of the Konya Basin today is semi-arid, with average precipitation below 300 mm. The plain experiences substantial seasonal temperature changes, with winter temperatures around freezing (mean winter temperature -15 ºC, some days almost -30 ºC. Around 59 days snowy in winters) and mean summer temperatures greater than 20 ºC (some days more than 40 ºC). Konya Basin is the area where dry farming is applied most commonly. Despite the low precipitation in the area, it rains most in the spring, when plants needed it. In summers it almost does not rain, as an advantage for cereal growth.

From Konya to Karaman in the south, average temperature increases, because the latter is slightly lower and it also benefits from Mediterranean Region's climate. South and West of Karaman are higher and their lower temperature does not go parallel with the height, while precipitation increases parellel with the height. Ereğli-Ayrancı-Karapınar, situated in the east of Konya-Karaman, has very low amount of rainfall and average temperature in low degrees. It is the driest zone of Central Anatolia, because both this zone is farther to Aegean Sea which brings rain to the region, and also the Bolkar and the rest of Toros Mountains draw the border between Central Anatolia and Mediterranean like a wall (Çetik 1985). As a result, Ereğli-Ayrancı-Karapınar is the zone which cannot take the advantage of warm climate effect of the seas.

Annual rainfall percentage in Konya, Çumra, Karapınar and Karaman is 35.7%-40.1 in winters, 31.4-34.0% in spring, and 17.2-21.8% in autumn. The summers are very dry and the highest rainfall in summer is seen in Konya, followed by Karaman, Çumra and Karapınar respectively (Çetik 1985). The drought and its frequent occurence in the area is an important factor in shaping the flora and vegetation of the region. Drought is caused by several factors, such as shortage of water in soil, the inbalanced rainfall during the year, the type of soil, the type of vegetation covering soil and the amount of evaporation (Çetik 1985). The natural cover of the Konya Basin is steppe or open vegetation. Today the Konya Basin is partly occupied by patches of swamps and sand dunes (Erinç 1962). *Pinus nigra* and *Abies clicia* dominate the mountains in the south and southeast of the plain, whereas *Pinus brutia* forests are found over the watershed region. Oak is also common along the slopes of volcanoes that rise from the plain (Yakar 1994:180). According to Walter (1972), in steppic Central Anatolia biennial plants and geophytes are very common and *Artemisia santonicum* has been the dominant species due to overgrazing for thousands of years. Small and big climatic changes and anthropogenic factors have continuously changed the floristic composition of the vegetation in the region. Through time forests turned into forest-steppes, forest-steppes turned into low and high mountain steppes with different types of flora and physiognomy, and the lakes forming and drying in different times created saline and fresh water marshlands. With the spread of agriculture and herding activities, a big part of the plain and mountain steppes have been spared for fields and pastures.

In a disturbed forest, it is possible to observe *Pinus nigra, Cedrus, Abies, Juniperus excelsa,* different species of *Quercus* in forms of bushes*, Amygdalus orientalis,* wild pear, and wild plum trees. In a further level of disturbance of the same forest type, in open vegetation, it is possible to observe real steppe plant species such as geven, kirpi dikeni, kekik, *Salvia* and even Secalinitea species (Çetik 1985). All these dinamism in transformation from one type of vegetation to other creates a heterogenous flora in the region. Possible explanations to this heterogenoity are; rapid population increase, improvement in industry and agriculture; mechanized agriculture causing deforestation including mountain steppes; intentional deforestation of the forest-steppes and even high mountain forests for fuel, building material and industrial needs and wind and water erosion caused by plundering resulting in the area losing its soil and having regressive changes in habitat and soil conditions (Çetik 1985). Thus, about 70% of Turkey is potential forest region, but at present only 14% of the country is covered by arboreal vegetation, more than half of which is taken up by coppiced woodland (Kürschner 1984). At most some isolated trees or shrubs may witness the former presence of forest or woodland (van Zeist and Bottema 1991). Konya Basin's modern flora has not been fully studied yet. Research undertook in Aslım showed that (Çetik 1985), some tree species, such as apple, pear*,* maple*, aylantus,* ash*,* acacia*,* willow*, Gladicya* and in places where ground water level is 70-80 cm. *Pinus nigra* too can grow in Aslım marshland located in the north of Konya town center. According to the present author's field research, in village vicinities by streams such gallery forests and isolated trees and shrubs can grow in the Konya Basin. Küçükköy, situated by the Neolithic settlement Çatalhöyük, is one of these vicinities where shrubs, trees and bushes such as *Rosa canina* (rose)*, Prunus cocomilia* (wild plum)*, Quercus pubescens* (oak)*, Quercus robur* (oak)*, Pyrus elaeagnifolia* (wild pear), *Crataegus monogyna* (hawthorn) and *Elaeagnus angustifolia* (Russian oleaster) still grow today. Çarşamba River separates into forks in the south of the village creating a suitable environment for the tree growth. Eight kilometres to the south of Küçükköy, in Türkmencamili village in the steppe zone, again *Pyrus elaeagnifolia* (wild pear) trees are scattered on the plain. In the earlier times, wild pears were frequently grafted *in situ* and it is still common in Anatolia, where farmers frequently spare individuals of wild *P. communis, P. syriaca, P. spinosa,* and *P. elaeagnifolia* at the edges of cultivation, inside grain crop fields (Zohary and Hopf 2000) and in orchards. These trees are grafted with cultivated clones (Zohary and Hopf 2000), because it is always economical to use the wild tree bark already grown in the settlement area without any effort and irrigation. Often only one or a few main branches bear scions; the others are left as they are (Zohary and Hopf 2000), since a few are enough to answer the local people's pear fruit needs per household. The remaining wild pear tree shoots are either left as they are, or chopped to be used as fuel. In village vicinities wild pear trees growing by streams still supply fruits as animal fodder and for human consumption especially for poor who cannot afford to buy domesticated pear fruit sold in markets.

According to many botanists, Konya Basin is included in Irano-Turanian floristic region (Davis 1967; Zohary 1982; Walter 1972). Çetik (1985) describes Central Anatolian flora including steppe and steppe-forests in four big groups:

1) Plain steppes: It includes relatively deep earthed plains in the middle of the Central Anatolia Plateau. The elevation varies between 800 and 1100 m. above the sea level. Today, the Central Anatolian steppe is anthropogenic. In the past, this steppe area was much smaller. Due to destructive activities of humans such as plundering, fires and overgrazing, the forest-steppes adjacent to the steppes have moved uplands through the time and the forest area in general has been destroyed resulting in composing the secondary vegetation cover dominated by *Peganum harmala* and *Artemisia santonicum*. The forest steppes in low and moderate elevations of Central Anatolia, also very much damaged, became secondary steppes, so that even in low forest steppes protected from grazing for a period; such as Ankara Çubuk Dam (Çetik 1963) and Kepekli Gate (Çetik and Düzenli 1974), there is an abundancy of Gramineae making the area look like a meadow steppe (Çetik 1985).

Generally, the plain steppe's primary flora is disturbed and used as agricultural lands, so that today in many parts of the steppe there is an anthropogenic secondary flora. The plain steppe in the Konya Basin in the Neolithic was not as large as today and its vegetation was also very different than that of today. In most of the dry and wet marshes halophite and higrophyte plant species which favor saline soil type are dominant. In the rest of the natural plain steppe, there exists plain and low mountain steppes expanded with anthropogenic factors. Before the destruction of the steppe vegetation, although plants growing today in the area were among the plant species grew in the region then too, according to the botanists studied the flora of the region, pasture grasses dominated the plains which have the steppic vegetation today. Today in some areas under protection and in unploughed patches between fields it is possible to observe pasture grasses (Çetik 1985).

The areas which used to be lakes in late Pluvial, such as Konya, dried up to saline and fresh water marshlands. In these areas partly halophite plants such as *Typha, Sparganium, Phragmites, Juncus*, *Scirpus* and *Carex* species are dominant in fresh water marshlands.

In Konya Aslım-Kaşınhanı marshlands, today almost totally dry, dry vegetation zone plants are dominant. Konya-Karapınar and Çumra-Kaşınhanı areas, where late Pluvial lakes were, were marshlands until 15 years ago (Çetik 1985).

Today, in the Süleymanhacı village vicinities as one of the areas studied in this research, trees and shrubs such as *Crataegus orientalis, Amygdalus orientalis, Quercus robur, Quercus pubescens, Quercus cerris, Elaeagnus angustifolia*, *Rosa canina, Prunus cocomilia* and *Rhus coriaria* grow. According to the villagers, 40 years ago wild pistachio trees grew by the lake; however due to lime burning activities for construction material in the area the terebinth trees dried. However, the trees on the Karadag slopes are still within the reach distance, as the villagers go and collect terebinth tree branches for fuel. Very close to the area, one old *Celtis* tree, ritually important to the local people, still stands alone on the vast landscape of Adakale village by the old Hotamış Gölü covered by reeds (Gordon Hillman pers. comm.).

In a marshland vegetation zone recently dried up, it is possible to observe dry land plant communities quickly shaping a dry land flora. The marshland zones of the Central Anatolia in the drying up stages and their changing vegetation were examined by the Turkish botanists. Aslım marshland zone, where in depth research was conducted (Çetik 1985; Yılmaz 1975), is an example of it. In Aslım marshland and in marshlands between Karaaslan-Kaşınhanı *Juncus maritimus* is dominant and *Atropis distans* var. *convulata* and *Aleuropus littoralis* are abundant as patchy areas. In these marshlands, dry vegetation plants such as *Plantago crassifolia, Limonium globulifera, Salicornia europea, Salsola inermis, Limonium iconicum* and *Schoenus nigricens,* and fresh water plants such as *Cladium mariscus, Phragmites australis* and *Scirpus maritimus* are abundant as well. In dry and salty marshlands of Aslım, Kaşınhanı and Karaaslan *Limonium iconicum, Frankenia hirsuta, Obione portulacoides, Salsola inermis* and some other dry vegetatıon plants are very common. In the north of Aslım marshland, it is possible to observe both dry and wet environments with the highest absolute density, where *Halocnemum strobilaceum* grows on its own right and makes wide and dominant vegetation (Çetik 1985). In Aslım (Yılmaz 1975) plants grown for the animal fodder are distributed in the region as; cereals 3.0%, legumes 0.04% and other families 11.8%, totally 15.7% of the vegetation. In saline soils, the coverage of cereals, pulses and other plants on the surface differs according to percentage of salt and ground water level. In Aslım, as animal fodder *Agropyron elongatum, Puccinellia distans, Festuca arundinaceae, Eragrostis collina, Phalaris arundinacea, Lotus strictus* and *Lotus corniculatus* can be cultivated. According to Çetik (1985), some tree species, such as apple, pear, maple, *aylantus,* ash, acacia, willow, *Gladicya* and in places where ground water level is 70-80 cm. *Pinus nigra* too can grow in Aslım.

Some soils of Karapınar-Konya are composed of tiny mixtures of lake sediments, mollusc and volcano ashes. Karapınar-Konya vegetation was surveyed by Çetik (1985). According to his research results, on these soils generally *Artemisia santonicum, Salvia cryptantha, Astragalus microsephalus* and *Phlomis* are dominant. Annual or perennial plants such as *Trigonella monantha, Atriplex convulvulata, Alyssum strigosum, Moltkia coerulea, Centaurea picris* and *Briza humilis* etc. also exist frequently.

Often in sandy and dry places subjected to wind erosion, and very commonly in the triangle of Konya-Karapınar-Aksaray *Artemisia scoparia* is dominant. In these community areas, *Papaver argemone, Bromus madritensis, Anchusa hybrida, Marribum parviflorum, Astragalus strigillosus, Agropyron cristatum, Trigonella aurantica, Consolida orientale* etc. exist as well. The abandoned fields, in which *Salvia cryptantha* is dominant, have the most of these species commonly. In Konya, Çumra, Karapınar and Aksaray-Ereğli zone, where sand percentage of the soil is high and vegetation cover is very scarce causing the dry soil moved by wind easily, *Centaurea pulchella, Phleum exaratum, Thymus sipyleus, Scabiosa ucranica, Stipa lagascae* and *Alhagi pseudoalhagi* are dominant (Çetik 1985). According to Walter (1972), *Artemisia santonicum* is secondary in Anatolia and grew in the border of *Bromus-Stipa* dominant steppe zones. When the flora of these zones were highly damaged due to overgrazing, *Artemisia* took their places. As it is a bush and tolerant to dry climate of Central

Anatolia and overgrazing, it survived and expanded. According to Çetik's ongoing researches (Çetik 1985), due to the fact that *Artemisia* steppe is getting smaller because of mechanized agriculture and turning meadows into fields, *Peganum harmala* steppe and *Alhagi pseudoalhagi* population have expanded in the last 30 years.

Around Karapınar, where *Artemis santonicum* is dominant, *Poa bulbosa, Bromus tectorum, Noaea mucronata* ssp. *Mucronata, Bromus tomentellus, Achillea willhemsii, Anthemis fumariifolia, Stipa lagascae, Agropyron cristatum, Ceratocephalus falcatus, Cousinia birandiana* are abundant. *Centaurea urvillei, Agropyron orientale, Onobrychis armena, Kochia prostrata, Ziziphora tenuior, Astragalus ovalis, Phleum exaratum, Bromus squarrosus, Alyssum micranthum, Allium stamineum, Muscari longpines* are also exist (Çetik 1985).

When mechanized agriculture started in Karapınar and *Artemisia* steppe has been turned into agricultural lands, a strong wind erosion started in the area causing sand storms jeopardizing the crop fields and the town. The Directorship of Land and Water in Karapınar found a few solutions to the problem using natural resources in 1962. The area was partly fenced with reeds and many trees were planted for the purpose of protection from wind. By means of opening wells, ground water was used in irrigation to grow cereals. These areas were also used as picnic areas by the Karapınar local people.

Most of plain and low mountain steppes in Central Anatolia is agricultural lands where bread wheat, sugarbeet and barley are grown. In some parts linum, pulses and chickpeas are grown as well. In humid alluvial valleys, by streams and rivers and especially in low forest steppe areas vegetables and fruit trees are grown. There are also many types of mainly annual wild grasses which grow in fields among cereals and many times damaging the cereal grains. These are; mainly Compositae and commonly Cruciferae, Papillionaceae, Graminae, Labiatae, Boraginaceae followed by Ranunculaceae, Papaveraceae, Rubiaceae, Polygonaceae, Liliaceae, Euphorbiaceae, Chenopodiaceae in lesser frequency.

The earliest written source in Turkish literature concerning the Central Anatolian vegetation is official papers of Konya which date back to the Ottoman Period and can be found in Mevlana Museum. The Konya State, situated on the vast plain (today's

Konya city with its towns and villages. Larende (Karaman) and its towns and villages was part of Konya as well, until very recently.) in the Selçuklu Period, was very important to the empires governed these lands for centuries. Although Konya was accepted as a 'town' in Selçuklu and Ottoman Empire periods, local people living on these lands were farmers and animal herders. The same idiom has been used until today by the Konya Basin local people; 'wheat and sheep, and the rest is a pastime.' (buğdayınan koyun, gerisi oyun). During the Ottoman Empire Period, there was no wheat request from Konya. When the Empire lands experienced some years of drought, Konya plain was one of the last areas to demand wheat for the need of İstanbul. The first area to demand wheat for İstanbul was Çorum-Çankırı vast agricultural lands. The reason for Konya growing low amount of wheat was that the lands suitable for agriculture was very limited. Even though Konya owned some patches of agricultural lands in the plain, the fertility of these lands was very low, inspite of the suitable climatic conditions for dryland farming. Today, in this area wheat grain yields 1/12. (Local people today use approximately 16 kg. wheat grain seedlings per dönüm.)

The Konya Plain, today's steppic lands, was a vast marshland until 1950s. The limited dry patches on the whole plain had very high percentage of salt. For this reason, in comparison with other regions of Turkey, the human population is low on these lands even today. In 1950s, the distribution of soil use in Konya Plain was recorded as 30% marshlands and lakes, 31% meadows and pastures, and 31% agricultural lands (Dündar 1949).

Moltke states that (Örs 1969), he did not run across any villages or agricultural lands on his way to Konya from Aksaray in 1830s. Huart's statement (Huart 1943) agrees with Moltke's, describing the lands between Ilgın and Konya as marshlands of nearly dried Ilgın Lake surrounded by hills from which borders the large saline marshlands of the plain started.

In 1322 (Konya Vilayet-i Salname 1322), 13,866,520 dönüm out of the total 94,000,000 dönüm lands was cultivated areas (15% cultivated lands, 7% fallow lands, 78% marslands, lakes and unsuitable areas for any cultivation). The Konya State had agricultural lands, but did not produce more than its people's need. The Ottoman government did not see Konya State an important cereal center. On the other hand, the animal herding and livestocks was important in the state. There were large lands used as meadows and pastures.

The government policy gave the priority of the consumption and the use of materials to the state which produced it. If a state did not own a material needed by its people, that material must have been imported to the state from other regions. If a state had a surplus material, the surplus was sent primarily to İstanbul. In 1322, almost every village had a common patch of garden which local people cultivated adjacent to the village houses for urgent needs, enough to have people spend the winter or any years of drought. Apart from this patch of land, every village had vineyards/lands in the woodlands outside of Konya town, adjacent to the plain marshlands. Local people used these lands as gardens to grow mostly vegetables and they had agricultural fields as well. These lands were also important for herding animals. %42 of the total population of the Konya State had such lands in these woodlands. In the Konya State three types of wheat were grown and about 20 different types of food were produced from them. Wheat was very important for the people of Konya. In the fields, chickpeas and lentils were grown as well, but in the settlement areas, and especially in the center of the town having vineyards/gardens was more important. In these gardens of the center, vineyards, apricot, domesticated and wild plum, Russian oleaster, pear and apple trees and radish were some of the plants grew. Mentioning especially wild plum and pear shows how important these fruits were in diet. Pekmez was made from grapes as well. Despite the suitable climatic conditions for dryland farming, the cereal grain production depended on the amount of rainfalls in the spring. In the situation of lesser or delayed rainfalls there have been serious problems even today for the cereal growth. On the other hand, extensive rainfalls continuing for days caused floods and ruined the cereal products. The town center suffered from these floods as well. The most extensive floods until recent decades were caused both by the rivers born in the western mountaneous areas and by the excessive water accumulating in the plain after a heavy rainfall. The rainfalls running down the hills were very important for that period for irrigating the Konya State lands including vineyards/gardens and agricultural fields in the woodlands adjacent to Toros Mountain skirts. The unwarranted amount of this water resource irrigating the woodland belt alongside the Konya Basin border in the north of the Toros Mountain skirts was transferred to the east side of Konya. The accumulating water in such lands increased the water levels of some patches of marshlands, such as Aslım and Hotamış marshlands which dried in summers making these lands and their surroundings vast meadow and pasture lands. Before such marshlands dried, the vegetation cover growing with help of rains in the spring was a good resource for animal grazing. This type of meadows widespread in the Konya Basin were used in the town center and in the plain as pastures and meadows until recent decades, creating a livestock based economy for the region's people.

The Konya State situated in the vast Konya Basin surrounded by green vineyards and gardens looked like a 'vaha' town. In settlement types such as Konya, the town was constituted of three parts; trade center, settlement center, and the garden/field area as the furthest part in the town borders. Because 'the garden area' was not inhabited permanently, there were houses by the vineyards used as seasonal settlements in summers.

Today, in Konya Basin due to wrong irrigation policies, which in a very short time have aimed to harvest more products than the soil capacity can have, there has been a dramatical drought in the plain. There have been made several outlets from the lakes to draw water to irrigate Konya Basin and Lake District to turn it into a vast agricultural area. The irrigation diches have been built all over the plains to transfer excessive amount of water from the lakes; in result several lakes dried up (Hotamış and Acıgöl in Konya Basin, Suğla in Lake District as fast as taking one decade to totally dry) and their flora turned into an arid land with their unique variety of plant and animal, specially bird species were destroyed. The present author has wıtnessed this dramatical drying up period. While in 1993 local people were fishing in their boats floating on the Acıgöl Lake, in 1998 there was nothing left from a lake but a dry basin and wavecut cliffs. The steppic areas, where used to be marshlands too a century ago, were even further affected from the severe drop in the water table, causing thousands of trees to die. The desperate need to irrigate the plain with plenty of water has been, rather than cereals, to grow sugarbeets which need much water. Growing sugarbeet has also other risks, as sugarbeets store much of the soil's nutrition in their tubers; so that the next year the soil is already weak to carry another yield. Although it is good to have fourty to one wheat grain yield within a year, in the long run the system seems to fail. Geologically as well, especially Konya Basin seems to be under the risk, since dropping the water table has irrecoverable effects, as there is nothing to replace its place underneath the earth the ground is subject to collapse. Recently, a similar case happened in Isparta, located in the Lake District, and the collapsed ground injured people and damaged lands and buildings including a petrol station.

2) Low mountain steppes and steppe-forests: It includes deforestated or disturbed forest areas with an altitude of 1000-1250 above the sea level around the plain. In many of these areas as well, primary vegetation is totally disturbed and became steppe zone; or in some parts disturbed forest-steppes and bushes. For this reason, low mountain steppe vegetation is secondary as well in Central Anatolia. Forest-steppe belt today is very narrow and in many parts totally absent due to disturbance and drought, hence most parts of the vegetation is composed of oak species, Xeromorphic dwarf-shrubs and trees. It is possible to observe many species of plain steppes and especially low and high mountain steppes in these forest-steppes (Çetik 1985).

The flora of Toros Mountain slopes facing Central Anatolia is composed of Irano-Turanian, Eastern Mediterranean and Euro-Siberian elements, respectively (Zohary 1973; Davis 1982).

Between Ankara and Konya until 80-100 km to Konya town center plain steppes look like low mountain steppes. Soils in such areas around villages are subject to much trampling. For this reason, in these areas having less air *Peganum harmala* steppes are common. In abandoned fields *Acantholimon* is widespread. In disturbed areas due to ploughing *Alhagi* is dominant (Çetik 1985).

In the Konya Basin, there are few steppe-forests such as volcanic Karadağ Mountain in the southeast of the old Hotamış Lake, and Takke Mountain. The flora of Karadağ Mountain was studied by the present author during this research. Başdağ is the peak of the Karadağ Mountain with still relatively dense arboreal cover. According to this research, in Başdağ, tree species such as *Crataegus orientalis* Pallas ex var. *orientalis* Bieb. (voucher specimen collected by the present author (AE 149), the species identified by Hayri Duman 1999), *Quercus vulcanica* [Boiss.&Heldr. ex Kotschy (AE 148-identified by Hayri Duman 1999), *Acer hyrcanum* Fisch&Mey. (AE 146- id. H. Duman 1999), *Ribea orientale* Dent. (AE 147- id. H. Duman 1999), *Q. pubescens* Willd. (AE 145, AE 144, AE 130, AE 137- id. Hayri Duman 1999), *Malus sylvestris* Miller (AE 142- id. Zeki Aytaç 1999), *Celtis tournefortii* Lam. (AE 143- id. Hayri Duman 1999), *Crataegus aronia* (L.) Bosc. ex Dc. var. *aronia* (AE 141- id. Hayri

Duman 1999), *Pyrus elaeagnifolia* Pallas (AE 140- id. Zeki Aytaç 1999), *Quercus robur* L. ssp. *robur* (AE 138- id. Hayri Duman), *Quercus cerris* L. var. *cerris* (AE 139- id. Hayri Duman 1999), and *Sorbus umbellata* (Desf.) fritsch var. *umbellata* (AE 131- id. Zeki Aytaç) compose the arboreal vegetation. The arboreal vegetation on the other hills of Karadağö especially on the slopes is generally composed of wild fruit trees. Among them, in addition to the species above, there are also *Amygdalus orientalis, Crataegus orientalis, Rhus coriaria, Celtis glabrata* Steven ex Planchon (AE 155- id. H. Duman 1999), *Pyrus elaeagnifolia* Pallas (AE 140- id. Z.Aytaç 1999), *Prunus cocomilia* Ten. (AE 81- id. Z. Aytaç & H. Duman), *Prunus* cf. *divaricata* (AE 9), *Elaeagnus angustifolia* and *Pistacia terebinthus*.

On the mountain hills, *Triticum boeoticum* (wild einkorn) communities still grow. The wild einkorn species were collected for the voucher specimen on the pass from Kılbasan road to southeast of Madenşehir village with the altitude of 1300 m. It was in association with *Quercus pubescens*, *Celtis tournefortii* and *Pistacia terebinthus* ssp. *palaestina* wild fruit trees. *Hordeum bulbosum* (barley), another member of the Poaceae family, was also in association with wild einkorn in the same habitat.

Pyrus elaeagnifolia Pallas can be observed on the Kılbasan border to Madenşehir by the old fields. On Yassıtepe, where üçkuyu village is situated, *Q, vulcanica, Q, robur, Q. ithaburensis, Sorbus umbellata, Q. pubescens* and *Q, cerris* frequently grow.
Amygdalus orientalis is a common species in Central Anatolia and it also grows in dry zones of Mediterranean region. It makes associations with different plants. Querco-Cedretalia Order in an area is a sign of forest-steppe cover here in the past, being plundered and destroyed just recently. This order is characterized by *Cotoneaster, Jasminium, Crataegus monogyna* and *Capparis spinosa* (Çetik 1985). *Pistacia terebinthus* ssp. *palaestina* is a Mediterranean element, however it is often observed in places where Querco-Cedretalia Order is common (ibid). Especially in close catchment areas where lakes, dams and rivers are located, and in wetland stream valleys it frequently exists. For example, on Toros Mountain slopes facing Central Anaolia, on valleys where Çarşamba River flows, around Suğla Lake, in Seydişehir Maden area, in Balıklava grove in Bozkır, in south and west of Beyşehir Lake this species frequently occurs having different associations. As lakes and rivers soften the climate conditions in winters and increase the humidity in the air in summers, *Pistacia* can expand to such areas. Especially Çarşamba River valley in Toros Mountains cannot take the advantage

of Mediterranean mild climate with its closedness to the south. Consequently it is because of the surface water making the climate suitable here for *Pistacia* growth. Both *Pistacia* and *Amygdalus orientalis* make associations in recently disturbed and destroyed forest areas of oak and juniper in Central Anatolia (Çetik 1985).

For this reason, in Toros slopes facing Central Anatolia in juniper and oak groves *Amygdalus orientalis* frequently grows (present author's observations).

Pistacia generally exists by streams, rivers, lakes and in stream valleys in juniper and oak groves. In Çarşamba River valley in Toros Mountains parallel to Kızılöz, it is possible to see 30% *Q. pubescens,* 15% *Pistacia terebinthus* ssp. *palaestina,* 15% *Rhamnus oleoides,* 5% *Juniperus oxycedrus* as well as *Crataegus monogyna* and *Sorbus umbellata*. In this association the abundance of Artemisietalia santonicae and Thero-Brachypodietea and the frequency of Festuco-Brometea is an important sign showing these areas turning into mountain steppes. Being rich, floristic composition of the association includes 55 species and 40-70% vegetation cover. In comparison with the plain steppe with moderate humidity, the association here prefers rocky and permeable surfaces subjected to erosion.

Another association along this valley is *Amygdalo-Pistacietum palaestina* including *Amygdalus orientalis, Pistacia terebinthus* ssp. *palaestina, Rhamnus oleoides* ssp. *graecum* and *Celtis tournefortii* (Bakır 1964). Species of Quercetalia pubescentis and Querco-Cedretalia orders shows a recent destroyance of forest-steppes here and the percentage of bushes is also high (Çetik 1985).

Amygdaletum orientali Association is generally common in Central Anatolian low mountain steppes and in open areas in forest-steppes. *Amygdalus orientalis* makes different associations with different species depending on the type of habitat and whether it is steppe or forest. As result of this, characteristic subspecies and floristic compositions of *Amygdalus orientalis* are various. In Central Anatolia, *Amygdalus orientalis* association also grows commonly on grounds composed of calcerous bedrock (Çetik 1985). Among the wild forms of *Amygdalus sp*, *Amygdalus korshinskyi* was collected from the area 1 km. north of Sille in Konya Basin and *Amygdalus webbii* was collected from adjacent parts of Central Anatolia (Browicz 1972?).

The existence of species belonging to Querco-Cedretalia class is a sign of recent deforestation of the area from forest-steppe vegetation. If this class includes species such as *Lappula, Noaea, Ceratocephalus, Scandix* belonging to Ziziphoron tauricae Alliance, and *Convolvulus, Taeniatherum, Zosima, Androsacea* species belonging to Thero-Brachypodietea class, this vegetation type shows that these areas have been grazed continuously. Because of the crop fields nearby such areas, some Secalinitea species also join this community.

Typically, in Küçükköy (by Çatalhöyük), Eminler and Süleymanhacı (by Pınarbaşı) village vicinities located in the Konya Basin plain steppes today *Quercus pubescens* (oak), *Rosa canina* (wild rose), *Crataegus monogyna* (hawthorn), *Prunus divaricata* (wild plum), *Pyrus elaeagnifolia* (wild pear) and *Elaeagnus angustifolia* (Russian oleander) grow in patches especially close to river beds and marshlands, *Quercus pubescens* and *Pyrus elaeagnifolia* together representing the Quercion anatolicae alliance.

3) High mountain steppes and forest-steppes: It includes mountaneous areas with an altitude of 1200-2000 m. above the sea level. The Central Anatolia has few primary vegetation zones in these areas, such as *Pinus nigra* forests, *Abies cilicica* forests and *Abies-Cedrus, Pinus nigra-Cedrus* mixed forests. Primary vegetation of many mountaneous parts of Central Anatolia is disturbed and turned into high mountain steppes or disturbed forests.

Pinus nigra forests exist in some parts of Toros Mountains as undisturbed, in areas affected by Mediterranean and Black Sea climate and in semi-arid mountaneous areas of Central Anatolia at an altitude of 1200-1700 m. The species grows under climatic conditions with hot and long periods of drought in summers and annual rainfall is 450 mm. the least, long and cold winters. In dry slopes of mountains facing Central Anatolia at altitudes of 1200-1600 m. *Pinus nigra* grows alone or as mixed forest with *Q. cerris, Q. pubescens, Abies cilicica* and *Cedrus libani*. At altitudes of 1300-1600 m. it rarely exists with *Juniperus excelsa, Juniperus foetidissima, Abies, Cedrus* and *Q. infectoria.* In Toros slopes facing Central Anatolia most commonly, *Pinus nigra* are scarce and close to a bush form due to overgrazing and plundering. In such forests, among trees cushion steppe plants and *Juniperus oxycedrus* are abundant. The base of the forest flora has *J. oxycedrus, Q. cerris, Q. pubescens,* sometimes *Amygdalus* *orientalis, Pyrus elaeagnifolia* and other bushes, and scarcely *Crataegus* and *Berberis crataegina.* In parts affected by anthropogenic factors *Pinus nigra* forests first turn into *Q. pubescens* forests, then into bush flora with the dominance of *Amygdalus orientalis* and *Pyrus elaeagnifolia,* and finally into *Thymus sipyleus* and *Astragalus* dominated mountain steppes. On rocky surfaces destruction of *Pinus nigra* forest first causes to form *J. excelsa* and *J. oxycedrus* forest cover and then to form *B. crataegina, C. monogyna* bush cover, and finally *Astragalus* and *Asphodelina* steppe cover. Inner valleys close to south has the dominance of *Cedrus*.

In Ermenek, Dalmaçal area at an altitude of 1700-1750 m, *Cedrus libani* is dominant and *Abies cilicica* is frequent. Generally in high altitudes *Cedrus,* in lower altitudes *Abies* species grow. It is considered from the scattered flora in patches in Toros Mountains that, in the Prehistoric periods Hadim-Bazkır-Seydişehir-Doğanhisar-Akşehir-Çay (Afyon) belt was covered wıth the common formation of *Abies* standing alone and also mixed with *Cedrus*. According to Çetik (1973), especially around Dinek (20 km. south of Çatalhöyük) situated in Hadim-Bozkır area where *Juniperus excelsa* is widespread today, *Cedrus* forest covered the area in the Prehistoric times. Due to anthropogenic factors and dry climate through time *Cedrus* forests were generally replaced by *Juniperus excelsa,* and *Pinus nigra* forests were replaced by *Q. pubescens* and *Q. cerris.* With these changing conditions *Cedrus* and *Abies* forests moved upland zones in mountains.

4) In Central Anatolia, in alphinic steppes above forest levels, due to extreme climate conditions, only some alphinic bushes or alphinic grasses are common. Because of its short vegetation period and dry summer seasons, most of the plant species in its flora are arid zone plants. Most of the plant species growing in high mountain steppes are common here and due to these parts' vegetation physiognomi has steppic appearance, it can be described as steppes above forest level.

Today in Konya Basin, where the pluvial lake used to be, there are salt or tatlisu marshlands (Çetik 1985). Today around Seydişehir wild goats and in Eastern Konya wild sheep exist and protected. From charcoal analyses we infer that today's Cedar forests 250 km. far from South or Southeast of Konya Basin border might have existed till the border until recently. As result of researches, in Bozkır, Boyalı village (30 km.

far from the Konya Basin) 3, in Karacaardıç village 1 cedar tree at the age of 500-600 were found.

Today, as in the past, average precipitation and temperature differ over the seasons in Central Anatolia. The people of Central Anatolia have experienced some years of dry and rainy or very cold, snowy years even for the last two centuries (Ministry of Agriculture 1992). Patches of water pools and arid areas support this view (Çetik 1985). The short and long periods of changes in the climate in the region has played an important role on lives of both plants and animals and humans. Over the years and centuries of long periods of draughts steppe vegetation has expanded and steppe forests have decreased. During the years of rain and cool temperature steppe zones decreased, forest-steppes became relatively dense with trees, shrubs and bushes, and forests with needle-leaved and broad-leaved trees expanded. Anthropogenus factors relating with settlements has played a negatively important effect on the original vegetation of Turkey in the last 3-4 thousand years (Çetik 1985). These factors might have been more effectful in changing Central Anatolian vegetation causing the expansion of plain and mountain steppes, due to numerous settlements in its past. The region has been a passage for transferring goods to Western Anatolian harbors. In Chalcolithic Period, Central Anatolia's population was dense with many settlements. Wood resource in the region was used to make many tools and build houses. With the developing agriculture the areas started to be used extensively for growing plants and for animal grazing as well. According to pollen analyses results (van Zeist and Bottema 1991), between 3550 and 1550 BP in the Lake district, *Pinus* and deciduous *Quercus* were equally affected by the forest clearance. The pollen data showed that in this period *Juglans, Vitis* and *Fraxinus ornus* were cultivated. From the third millenium BC onwards there is textual evidence of the shipping of cedar logs from Levantine forests to Mesopotamia. Tied into rafts, the logs were floated down the Euphrates (*cited in* van Zeist and Bottema 1991; cf. Mikesell 1969). Similarly, floating logs down the rivers is a common practice in Anatolia. In Konya Basin, villagers in Toros Mountains traded logs with steppe villagers, by floating logs down Çarşamba Çayı until one decade ago, when the drought had not affected the water sources in the area yet.

During Hittite, Greek and Persian settlements, density of using trade roads passing through Central Anatolia and wars have contributed in damage of the flora in the region. According to Strabon, Tuz Gölü area and the areas between Konya and Aksaray were drier than today, so getting water from only very deep wells was possible in its many parts. The researchers believe what was mentioned in Strabon as Bağdonia might be Ulukışla in Ereğli, including Karapınar (Çetik 1985). According to Strabon, in these areas there were no wild fruit trees, but many wild donkeys. Around Karapınar there used to be Amintas's 300 sheep. During Izoria Kingdom, the forests and trees of today's Ulupınar village of Bozkır in Toros Mountains were plundered and burnt by Servillius, the Roman King of that period. Strabon mentions these areas having been treeless, but with vast vineyards of which wine was famous. Today, these areas are the same as it was described by Strabon. During the Roman Empire due to dense population, some parts of Toros Mountains, even including Isauria Toros areas, today some parts of which is covered with forest, were settled on and bread wheat was grown in small patches between rocks. Even today there are some piles of stones and rocks gathered for opening areas for agriculture at inner parts of Toros Mountains. During Selçuklu and Ottoman Periods the flora of these regions were damaged again. In Selçuklu Period, according to Konya official papers of that period, wood for fuel needs of Konya used to be brought from Takkeli Mountain. Today, in few parts of the now forest steppe mountain *Quercus robur* ssp. *pedunculiflora, Juniperus excelsa* and *Juniperus oxycedrus, Pistacia terebinthus* ssp. *palaestina, Colutea cilicica, Lonicera etrussa, Prunus divaricata, Rosa canina, Cotoneaster nummularia, Berberis crataegina, Pyrus eleagnifolia, Ulmus campestris* grow. Also, *Astragalus stereocalyx, Vicia cracca* spp. *steneophylla, Hieraceum pannosum, Pilosella hoppeanum* ssp. *troica, Astragalus squalidus, Cicer anatolicum,* characteristic species of Central Anatolia forest steppe, grow in this mountain. In some lower parts of the mountain *Thymus sipyleus* and on hard soiled slopes subjected to erosion *Convolvulus compactus* grow. In the mountain, according to researches, *Pinus nigra* ssp. *pallasiana* forests were destroyed in the last few centuries.

Çetik (1985) describes two samples in 20 km. south of Karaman in low mountain forest steppes:

1) *Juniperus oxycedrus* 40% dominant, *Berberis crataegina, Quercus, Salvia cryptantha, Asphodelina taurica, Festuca ovina, Bellevalia hispida* var. *glabrescens, Thymus hirsutus, Scorzonera cana, Helianthemum canum, Fumana procumbens, Teucrium polium, Scutellaria orientalis* ssp. *alpina, Viola kitabeliana, Ferula, Helianthemum lavandulifolium, Poa bulbosa* f. *vivipara, Alyssum lepidota-stellatum, Telephinum, Bungea trifida, Erysimum crassipes.* In this sample, bushes are dominant.

2) In 2000 m² sample area on a calcerous bedrock, the flora covers 40% of the area. *Juniperus oxycedrus* 10%, *Berberis crataegina, Convolvulus compactus* 20%, *Onosma tauricum, Bromus tomentellus, Jurinea pontica, Anchusa barralieri, Paracaryum racemosum* var. *racemosum, Androsacea maxima.* In this sample because of the severe erosion, low mountain steppe species are abundant.

Very close to these sample areas, *Pinus nigra* forest border begins, where *Juniperus excelsa* grow as well in abundance. *Abies* grow here scarcely of which place taken by *Juniperus excelsa* in slopes facing south.

In northern slopes of Toros Mountains where Konya Basin ends, in forest steppes *Juniperus excelsa* and *Quercus* grow either as mixed vegetation or alone.

According to Özmen's research (1977), Gramineae and Leguminoseae species of which could be considered as animal fodder are less than 1% of both families' sum growing in Çumra area. Among them, *Festuca* and *Trigonella* are the most abundant. *Artemisia santonicum* is the dominant species in the plain steppes. In Çumra, there are 7.858 dönüm (1 dönüm ~ 920 m²) meadow per cattle, meaning that the meadows in villages are grazed 71.3% more than the average grazing. Besides plain and low mountain steppes, steppes in higher elevations of mountains have also vast meadows partly or totally lacking trees and shrubs. Despite the high number of grazed animals, the grazing capacity is much lower in these areas. For this reason, forest-steppes in medium and high elevations of the mountains around Konya Basin are very much disturbed causing cushion plants such as *Astragalus, Acantholimon, Onobrychis cornuta* and spiny, pubescent and rough leaved plants that cannot be animal fodder have dominated the steppe. (saline soil preserves stored food better, protecting from parasites)

6.1.2. Central Highland

Van Zeist and de Roller (1995) described the climate of the area as moderately continental with not very cold winters and not excessively hot summers. According to Çetik (1985) Aksaray, Ulukışla, Bor and Çamardı in Niğde; Develi, İncesu, Bakır Mountain, Bünyan and Yeşilhisar in Kayseri; Avanos, Gülşehir and Ürgüp in Nevşehir are among dry zones of Central Anatolia. In these parts, spring and winter months have the ⅔ of the annual rainfall while summer and autumn seasons are quite dry (Çetik 1985). A mean annual precipitation of 330 mm points to rain-fed agriculture in the area is becoming marginal though still within limits (van Zeist and de Roller 1995).

According to Strabon, in Central Highlands where today's Niğde, Nevşehir and Kayseri are, only Erciyas (Argaios) Mountain was covered with forest. Those times all the settlements in the Central Highlands used the wood and fuel sources from Erciyas Mountains (Strabon 1969). Çetik (1985) infers that, at least most parts of the plain areas of the Cental Highlands must have been destroyed by that time. Van Zeist and de Roller (1995) suggests that the steppe may have borne scattered tree growth. Groves of *Celtis* (hackberry) mixed with oak stand at intervals in the alluvial valley of the Melendiz, opening from the slopes of the Hasandağ range (Esin 1998).

As stated in Strabon, there existed Karasaz Marshland, today's Turbiye Marshland, and even in Erciyas Mountain's skirts there existed Turbiye Marshlands. Turbiye Marshlands means burning bushes in wetland areas; due to lack of water the dry bushes start burning in the hot weather. Inside the forest of Erciyas when strangers and animals who did not know the area fell in these burning holes and died (Strabon 1969). It shows that those times the region suffered from drought. Today vast Turbiye marshlands of Karasaz, Kayseri cannot be aggregated. The marshland was attempted to be dried in 1950's causing some parts dry and salty and others wet and salty. In these areas *Suaeda carnosissima* and *Suaeda altissima* are dominant. From other dry vegetation plants *Frankenia hirsuta, Puccinella distans* and *Atriplex tatarica* exist in the area. In small pools, *Typha* and *Phragmites australis* are dominant and *Butomus umbellatus, Lemna* and *Scirpus maritimus* also exist. In some parts of the dry marshland, because of the salty and alcaline soil, the ground is very hard not allowing plant growth. On some parts of highly alcaline soils, dry vegetation plants such as *Frankenia hirsuta* and *Atriplex portulacoides* makes pure populations. In some humid and less salty parts *Juncus maritimus* is dominant (Çetik 1985). Today, only western part of the Erciyas Mountain has *Quercus cerris* and *Quercus pubescens* bushes in rarity. Close to Erciyas Mountain, Ali Mountain, owing to climbing to it being difficult, still owns *Quercus cerris* and *Quercus pubescens* bushes (Çetik 1981). In other parts of Central Highland, people's economy depended on orchards, agriculture and livestock. This region used trees in Mazaka, Kayseri for timber.

Hasan Dağı vegetation, researched by Düzenli in 1976, includes Irano-Turanian (36% dominant), Mediterranean, Euro-Siberian, Black Eastern and some unidentified elements. Perennial grasses such as Leguminosae and Compositae are dominant over other grass species. The mountain's eastern part connects with Melendiz Mountains. It is possible to separate the vegetation as forest, subalpine and alpine.

Forest part in 1300-1800 altitudes includes dominant and disturbed *Quercus cerris, Acer, Cotoneaster, Rosa canina, Prunus spinosa, Crataegus orientalis* var. *orientalis, Sorbus persica, Crataegus meyeri.* The recurrence and abundance percentage of bushes are quite low, while the abundance percentage of wild grasses is low but their recurrence percentage is high. In clear zones of *Q. cerris* bushes and in patches without *Quercus, Astragalus* is widespread. In two important high mountain steppes of generally alpine part of Hasan Dağı, *Astragalus* and *Acantholimon* are dominant. In alpine part, *Vicia* and *Onobrychis* are common up to 2600 m.

6.1.3. Lake District

From Konya to West Toros, in Beyşehir, Seydişehir and Akşehir, annual rainfall increases. Although these parts are higher than the Basin, temperature decrease does not sometimes go parallel with height.

Akşehir, being the furthest zone of Central Anatolia where Mediterranean flora penetrates into, has extreme temperature degrees, as the highest 40.0 ºC and the lowest -26.7 ºC. From Akşehir to west, except for Afyonkarahisar, despite the invariable average temperature, the highest temperature decreases, the lowest temperature increases. Annual rainfall is higher than that of Konya Basin (Çetik 1985).

Around Beyşehir area, where Erbaba Neolithic site is located too, the mean annual precipitation is 499 mm, for the coldest (January) and the warmest (August) month are below zero and ~22ºC and summers are dry with almost no rain (van Zeist and Buitenhuis 1983).

In Central Anatolia, by the streams, rivers and lakes it is possible to see Mediterranean elements. The mild climate of Mediterranean penetrates into Akşehir Lake and the west of Sultan Mountains as the most inner part of Toros Mountains. For this reason, it is possible to see *Quercus coccifera* and many plant species as a Mediterranean element in Sultan Mountains, stretching like a mountain corridor between Beyşehir-Eğridir and Akşehir-Eber Lakes. Stated by Ocakverdi and Çetik (1981), in Sultan Mountains before the heavy plundering, *Cedrus libani* and *Pinus nigra* forests were covering a wide area and today only in protected areas they can survive. Cutting down pine forest frequently results in an expansion of oak (van Zeist and Buitenhuis 1983). In the disturbed *Pinus nigra* forest, today *Cistus laurifolius, Quercus cerris* and *Quercus pubescens* replaced *Pinus nigra* (Ocakverdi and Çetik 1981). In its flora, 65% is perennial, 35% is annual and biennial plants (Ocakverdi and Çetik 1981).

The flora of Akşehir Lake surroundings includes species of Compositeae, Leguminoseae, Gramineae and Cyperaceae families, respectively. On dry and wet marsh zones of the lake surroundings the associations includes five species dominantly; *Schoenoplectus littoralis, Bolboschenus maritimus, Alisma gramineum, Eleocharis palustris* and *Cirsium creticum*. There are also other associations with their roots on the lake basin and their stems and fruits on the water such as *Polygonum amphibium, Typha angustifolia* and *Phragmites australis. Myriophyllum spicatum* makes associations on the water surface as dense populations. On the lake basin, *Potamogeton lucens* and *Ceratophyllum demersum* dominated associations have been identified. The water of this lake is not suitable for using it in irrigating fields (Çetik 1985).

According to Ocakverdi and Çetik (1985), from the plant geography point of view, Seydişehir Mining Area and its surroundings are on the transit zone between Irano-Turanian and Mediterranean zones. In the area under the effect of both humidity of the Mediterranean region and the dry climate of the Central Anatolia there exists both regions' characteristic plants and plant associations (Ocakverdi and Çetik 1985). In Beyşehir, Suğla, Akşehir, in some local wetlands by streams and irrigation ditches fresh water marshlands are common. In muds around these marshlands and lakes, by the streams, rivers and river beds and the plain steppes of Central Anatolia, the flora and vegetation cover includes 'gallery forests' (Çetik 1985). To the east of Beyşehir Lake, Xero-Euxinian steppe-forest region extends (Zohary 1973). The natural vegetation of Beyşehir Lake area varies from open forest with a tree and shrub cover of 50% and more to vegetations with only scattered trees; however due to cutting and grazing little is left of this vegetation type, and the present upland vegetation to the east of Beyşehir Lake is largely devoid of trees (van Zeist and Buitenhuis 1983). Situated in the transitional zone between two vegetational belts, Beyşehir Lake area includes Xero-Euxinian steppe-forest region with mixed broad-leaved and needle-leaved woodland resistant to cold in the east and in the north; at altitudes between 800 and 1200 m in the lower part of the Oro-Mediterranean vegetation belt, coniferous as well as deciduous forest including *Pinus nigra, Cedrus libani, Abies cilicica* and *Juniperus excelsa* tree species stretches to the west and south of the lake (but above 1200 m only coniferous forest is found); and well developed *Pinus nigra* forest covers the west of the lake (van Zeist and Bottema 1991; van Zeist and Buitenhuis 1983).

As part of Toros Mountains facing Central Anatolia, Dedegöl Mountains in the southwest of Beyşehir Lake was researched by Peşmen and surveyed by Çetik (1975; *cited in*: Çetik 1985). It is important to mention the vegetation cover of Dedegöl Mountains here, as it makes a good example to show how the flora is changeable along the Toros Mountain Range. Here, to the contrary of the southern Konya Basin, mountain ranges do not set a wall between the Mediterranean Region and the Central Anatolia. When compared with the eastern parts of the Toros Mountain facing Konya Basin, climate effect can be observed better with the Mediterranean species growing in this area and creating microclimates. For example Kapız Stream area of Dedegöl Mountains is, after Amanos Mountains, the second biggest Europe-Siberia enclave in Turkey having a special microclimate (Çetik 1985). The area from Beyşehir Lake to Dedegöl of which east the border of Konya starts, as the previously mentioned research describes, is covered with forest which includes *Quercus* species (*Quercus cerris* and *Quercus libani* dominant) and *Juniperus excelsa* grove in patchy parkland-forest form and in *Pinus nigra* forest (*ibid*). To the west of Beyşehir Lake a well developed *Pinus nigra* forest was observed by van Zeist in 1975 (van Zeist and Buitenhuis 1983). Due to continuous plundering of pine forests, *Euphorbia, Astragalus, Lamium, Phlomis* and *Berberis crataegina* grow on rocky steppes where *Juniperus excelsa* and *Pinus nigra* lack, while *Juniperus excelsa* grove on the slopes facing the lake includes *Quercus coccifera, Amygdalus orientalis, Euphorbia kotschyana* (dominant), and *Quercus cerris* groves in patches (Çetik 1985). The pollen diagram prepared for a sediment core to the south of the Beyşehir Lake points to predominantly pine forest (van Zeist *et* al. 1975). The higher levels of Dedegöl is covered with *Pinus nigra,* Mediterranean *Abies* and *Cedrus* (Çetik 1985). The Erbaba must have been attractive to prehistoric farmers (van Zeist and Buitenhuis 1983), as well as it does to the local people living in the area today. Precipitation is high enough to permit dry-farming (van Zeist and Buitenhuis 1983), higher than that of Konya Basin, and the rather open vegetation did not require large-scale deforestation for the laying out of fields (van Zeist and Buitenhuis 1983), at least during prehistoric times. Summers with almost no rain is also a desired characteristic of a region for the agrarian societies.

By Suberde (located by Suğla Lake), in clayey mud, where *Sparganium* is dominant, wetland plant species such as *Juncus, Schoenoplectus, Polygonum amphibium* and *Butomus* are widespread (Çetik 1985). Although it was not stated by Çetik, other wetland sedge and reed species must also be growing in this area, especially *Scirpus* sp. as the characteristic species of the wetland areas of Central Anatolia. Agricultural lands stretch along the area between Beyşehir and Karaağaç (Çetik 1985). In between fields in abandoned or spare patches wild grasses and aralik plants grow, and in unploughed patches *Bromus tomentellus* or *Salvia crypantha* are dominant (Çetik 1985). *Astragalus* is abundant as well (Çetik 1985).

Until 1913 the excessive water of Beyşehir Lake was running to Suğla Lake, and the excessive water of Suğla Lake was reaching Çarşamba River near Sarayköy; however due to human manipulation in 1913, the river called Çarşamba today merges into Beyşehir Irrigation River near Pınarcık situated in the northeast of Bozkır and ends near Çumra (Güler 1987). In Bozkır, Çarşamba River is called 'Uluçay' (sacred river). Çarşamba River starts extending in March and reaches its highest level in April. In August and September it reaches its lowest level. However, Beyşehir Irrigation River has the highest level in summer months under human control depending on the water needs in Konya Basin (Güler 1987; İnandık 1965).

We can better understand the shifts of lakes and their impact on people's lives from the in depth study of Suğla Lake undertook by several Turkish researchers and also recently by Uğur Doğan (1997) as his PhD thesis. It also makes a good example for the comparison of other dry lakes, such as Hotamış, and their great impact in a large area. Suğla Lake, situated in the south of Suğla Plain shifted in an area during some years or even some months. The lake covered an area of 160 km^2. This seasonal lake used to dry totally in a period of a year and become a vast fertile plain, with an area of 2700 hectar in the middle covered with reeds (Güldalı 1981). Today, these areas are clear from reeds as result of drenage works for making the lake basin an agricultural land (Doğan

1997). There is no literature available about the use of Suğla Lake reeds by the local people.

Strabon states that, in 1847 Beyşehir River could not reach Suğla (Tragitis) Lake, because the lake was totally dry. He also observed that, a village was located by the large depression of the lake, which dried a few years before (Pekman 1993). In that period, local people filed a petition for preventing water filling back the lake basin which made an excellent agricultural land. On the other hand, the fishers in the area were devastated with the possibilty of their lake not returning. As Strabon pointed out, in this place where boats used to float there was nothing but a vast area of mud (making the area valuable for cereal growth). Strabon states; 'Boat paddle and plough are in a competition; let us see which one of them the nature will favor.' (Alagöz 1944). Not nature, but human power decided that plough must have won this long lasting competition; and it won this race on Suğla Lake which totally dried in 2000.

The research undertook by Güler (1987) using Konya town official papers including Bozkır irrigation activities in 1317 showed that the name Suğla, meaning flooding ground or flooding plain, was first used then for the fertile land appeared on the lake basin after the Karaviran Lake (the name of the lake then) dried. In the Ottoman Empire time in some periods Suğla Lake totally dried giving hopes to people who wished the lake not returning. The local people many times looked for solutions for drying the lake totally with the reasons of using the lake basin as agricultural land; the lake level reaching high levels and threatening the villages; the marshlands occurring in different periods of years causing epidemic diseases and the hope for irrigating the Konya Basin (Güler 1987).

At the beginning of the 19th and 20th centuries, the excessive water of the Beyşehir Lake, running to Suğla through Beyşehir River, was receding through evaporation and natural canals around the Beyşehir Lake; however, reeds, grasses and mud sometimes blocked these canals; the excessive water could not flow out and the lake expanded in such times; thus the water was passing through Balıklava and Mavi Strait and reaching Çarşamba River (Doğan 1997). Some years this excessiveness threatened the village lands and flooded even the villages, and marshlands forming in the area caused epidemic diseases and destructions (Doğan 1997). Water was a matter of life or death for the Konya Plain people who suffered from shortage of rain causing drought and

thus famine (Afşin 1940). Between 1898 and 1902 Ferit Paşa, the governor of Konya, made attempts for drying Suğla Lake and irrigating Konya Plain. When considering the fertile land of 300,000 dönüm (~160 km^2) the lake covers (in April the circumference of the lake, which is in a shape of circle, is about 80 km.) (İnandık 1965; Afşin 1940), there was a huge amount of cereal growth supplied with aggregating the land. The sand and mud from the old shoreline beaches of the lake has been used by the local people as building material (Doğan 1997).
The movements of the lake extending or drying during the Holocene can be inferred from the mounds settling inner or outer parts of the ridges and wave-cut cliffs (Erol 1969; 1971). Saraçoğlu (1990) states that, Suğla Lake froze in minus temperatures in winter, in 1950 it totally dried except a small patch in the west; thus many fish in the lake died. Susuz (meaning 'no water') village was first located in early 1900's on the calcerous slopes of the lake in case of the danger of the lake flooding their village; however the following years after 1960 the village moves into the lake basin slowly; in 1964, the lake floods their village, and later on the level of the lake never exceeds 3m (Doğan 1997).

The village must have taken its name due to severe summer droughts in Suğla Plain and its surrounding pastures (Doğan 1997). To answer water needs, especially in Alacadağ and Bozkır several wells and cisterns were built (Doğan 1997). During 8 months in 1989 the lake was totally dry (Doğan 1997).

Çetik and Yurdakulol (1982) undertook a research in Geyik Mountains, south of Suğla Lake. According to its results, from Konya Basin border (Arpasaraycık Mountain) to the peak of Geyik Mountain, *Q. pubescens, Q. libani, Q. cerris, Juniperus excelsa, Abies cilicica* ssp. *isaurica* (dominant), *Cedrus libani* (abundant) grow. In bush level of forests and in areas partly or totally lacking trees, *Berberis crataegina, Juniperus oxycedrus, Daphne oleoides, Crataegus monogyna, Jasminum fruticans, Rhamnus petiolaris, Amygdalus orientalis* var. *salicifolia, Rosa glutinosa, Pistacia terebinthus, Rubus tomentellus, Cotoneaster nummularia, Rhamnus oleoides, Colutea cilicica, Prunus prostrata, Celtis glabrata, Lonicera caprifolia* grow.

Among trees, although *Pyrus elaeagnifolia* grow in some cases abundantly in borders of cereal fields-forest, *Fraxinus, Sorbus, Acer, Evonymus* are rare. While *Quercus* generally prefers stony but deep earthed surfaces, *Juniperus excelsa* grow on block rocks with little soil and covers large areas of northern slopes of Toros Mountains facing Central Anatolia. In parts where *Juniperus excelsa* habitat is disturbed on stony patches and most of block rocks *Amygdalus orientalis* and *Amygdalus greaca* are common. On surface flora of forests where *Juniperus excelsa* is common, *Sedum, Thymus, Stachys, Phlomis, Astragalus, Galium, Minuartia* and as patches *Stipa, Nepeta, Poa bulbosa, Euphorbia tinctoria* mountain steppe plant species are widespread. Where *Quercus libani* and *Abies cilicica* are common, *Dactylis, Lotus, Hieraceum, Centaurea, Euphorbia* are common. Where *Quercus libani* is dominant, the surface flora is very rich and includes generally *Galium, Asperula, Helianthemum, Briza, Scorzonera, Veronica* abundantly.

On areas recently plundered where *Juniperus excelsa* grow scarcely in 900-1700 m. height, bush species are rich including *Berberis crataegina, Jasminum fruticans, Crataegus monogyna, Pyrus elaeagnifolia, Daphne oleoides* commonly. In these mountain steppes rich with bushes most commonly growing grasses are *Euphorbia, Senecio, Poa bulbosa, Festuca, Valerianella, Cruciata* and some other steppe vegetation plants. *Euphorbia kotschyana* and *Poa bulbosa* grow in all steppe forests lacking trees. In steppe forests where *Daphne oleoides, Berberis crataegina* occasionally, and other bush species scarcely grow, *Astragalus micropetrus* is dominant. *Thymus, Alyssum, Phomis, Stachys, Teucrium, Astragalus* and *Marribium* are frequent.

In rocky and earthed steppe forests where trees and bushes do not grow anymore due to overgrazing and plundering, where *Asphodelina* is common, *Genista, Polygala, Crepis, Stachys, Poa bulbosa, Centaurea, Helianthemum, Teucrium* are frequent. By streams and deep valleys in mountains there are small groups of forests.

6.2. Paleovegetation

For the reconstruction of the past environments to better understand the environmental conditions of the Neolithic settlemets located in the Konya Basin, Lake District and Central Highland areas, a landscape classification was made by the geomorphologists and archaeobotanists (Kuzucuoğlu 2002):

According to this classification, **wetland areas**, located in karstic areas, included Beyşehir and Akgöl (today seasonal) perennial lakes; Suğla seasonal lake (dried in 2000); Konya, Sultansazlığı and Develi freshwater marshes at the apex of alluvial fans or in the vicinity of springs; and on the evaporative plains salt water wetlands of perennial Tuz Gölü and Yaygölü, and seasonal Sultaniye and Tuzla Gölü in Sultan Sazlığı. Wetlands were suitable as hunting grounds. Halophytes were the distinctive characteristic of the plant associations growing in such areas. They included *Alnus* (alder), *Phragmites* (reed), Cyperaceae, *Carex, Scirpus, Scirpus maritimus, Eleocharis* (spikerush), *Aeluropus, Alepocurus, Potamogeton,* Alismataceae, *Rumex, Tamarix* (tamarisk), Salicaceae (poplar), Chenopodiaceae (chenopods), *Vitex* (chaste tree), *Capparis* (caper).

Plains included karstic, seasonally inundated plains of Konya, Tuz Gölü, Beyşehir and Suğla. Their large size is related to tectonic subsidence and faulting; and it is covered with impermeable lacustrine marls or clay, except at the mouth of rivers constructing expansive alluvial fans. Grass rich parts of plains were available for animal husbandry. Plains have suitable and not suitable different areas for agriculture (cf. Kuzucuoglu 2002):

-The lake bottom marls are not suitable, due to impermeable, nutrient-poor, becoming salty at time of heavy evaporation (De Meester 1970). They were often used as steppe-covered rangelands.
-Water availability by flooding made light and wet soils of alluvial fans and weathered depressions (filled with sand and gravel material) suitable for agriculture.
Highlands included soft-limestone plateaus of clay filled surfaces suitable for agriculture and pasture; volcanoes of Central Highland, around Konya Basin and the volcanic complex between Konya and Beyşehir; and karstic limestone-rich high ranges of Toros from Beyşehir to Ereğli. Forest rich areas were suitable for hunting and animal husbandry.

Geomorphological work in the last decades has showed that the area around Çatalhöyük Neolithic site in the Konya Basin was subjected to extensive flooding. Palynological research pointed to climatic changes including some periods of drought as well as humidity. According to palynological data, the paleoenvironment of the Konya Basin between 13,000 and 11,000 can be characterised as very extreme

(Bottema 1987:299). The low arboreal pollen percentages show that due to the drought in the area concluded from the herb pollen levels, the plain was devoid of trees during this time. Between 11,200 and 11,000 BP moisture levels increased in the plain. From 11,200-10,500 BP drier conditions returned. After 10,500 BP, forest cover spread over the Toros Mountains bordering the Konya Plain, *Betula* dominated, but was eventually replaced by Quercus at about 9,000 BP (Bottema 1987:300). After 10,000 BP, *Gramineae* pollen increased and at the same time *Chenopodiaceae* pollen decreased.

In the last four decades there have been an increasing number of palynological researches for reconstructing the late quaternary vegetation of the Near East. It has been especially important to reconstruct the vegetation of the Near East in the Late Pleistocene and Early Holocene to better understand the environmental conditions in which the food production started and expanded to other geographical areas. According to van Zeist and Bottema (1991), it is possible that in the Late Pleistocene and Holocene the topography did not differ essentially from that of today, while the climate during the last 20,000 years or so must have changed considerably. The researchers state that, regional differences in the present-day climate due to topographic features may provide clues to similar differences in the prehistoric times and a proper knowledge of the current natural vegetation can help for the reconstruction of the vegetal cover of ancient times.

There are contraversial ideas about the pollen data retrieved from several environmental zones. One example is from the Northern and Eastern Syria. According to a research undertook by van Zeist and Bakker Heeres in 1984, Late Palaeolithic levels at Tell Mureybit, situated on the Northern Euphrates, yielded charcoals of poplar, tamarisk and ash indicating that poplar-dominated forest was found in the annually flooded river valley. Evidence of riverine forest is also provided by the Neolithic Bouqras, on the edge of the Euphrates valley in eastern Syria, similarly yielding abundant charcoals of poplar and tamarisk (van Zeist and Waterbolk-van Rooijen 1985). Bronze Age settlement layers from the Northern Euphrates continued to yield abundant quantities of poplar, elm and ash charcoals supplying the evidence for a floodplain forest (van Zeist and Bakker Heeres 1985). At the same time, timber was also imported from the mountains of western Syria and/or south-central Turkey (van Zeist and Bakker-Heeres 1985). Van Zeist and Bottema states that (1991), in the

Pleistocene as well this forest must have been found along the Euphrates and other large rivers in the Near East.

6.2.1. Konya Basin

At the time of the last glacial maximum (c. 25,000 to 18,000 BP), a huge shallow inland lake filled the whole of the Konya Plain (Roberts *et al.* 1999). Shoreline beaches, ridges and wave-cut cliffs are evidences of the shallow but extensive paleolake (Erol 1987). During the Holocene and in the Late Pleistocene major climatic changes occurred.

Based on palynological data, the paleoenvironment of the Konya Basin between 13,000 and 11,000 BP can be characterised as very extreme. The low arboreal pollen percentages indicate that the plain was devoid of trees during this time. The herb pollen levels indicate that it was very dry during the period; conditions that would have prevented tree growth. Between 11,200 and 11,000 BP, moisture levels rose on the plain. However, from 11,200-10,500 BP drier conditions returned (Bottema 1987: 300). As the climate recovered towards that of today in the last millennia of the Pleistocene Period, the lake dried out. At the end of the Pleistocene, in the Younger Dryas period, there was a short-lived phase of moister conditions, and several smaller lakes formed within the basin. However, the lakes had dried out by the beginning of the Holocene. Some alluvial deposition started at the end of the Pleistocene (Roberts *et al.* 1996:19). A lithostratigraphic sequence from the alluvial fan of Ibrala located near Karaman provided evidence of changing sedimentary regimes. The fan underwent an extensive program of hand auguring, showing that the Holocene alluvium was fine-grained, moderately sorted, and was underlain by a coarse-grained and poorly sorted lower alluvium of the late Pleistocene age. On the distal part of the fan, a wedge of lacustrine marls and silty sand of probable deltaic origin separated two alluvial units. There was thus a sharp contrast between the alluvial regime of the Ibrala fan during the Holocene and in the Late Pleistocene, which appears to be related to major climatic changes at the end of the last glaciation (Roberts *et al.* 1996: 20). In the early Holocene as rivers and wadis entered the Konya Plain, most of their sediment load was deposited as fan-shaped masses of alluvium, the largest fan being deposited by the Çarşamba River covering 474 km^2. Although broadly fan-shaped, its hydro-geomorphological characteristics are today more akin to an alluvial floodplain than an alluvial-fan environment. Overbank deposition of silts and clays over very low slopes have pushed these alluvial features towards the center of the plain, on top of the lacustrine beds of paleo-lake Konya (Roberts *et al.* 1996: 19).

Between c.10800-c.9700 cal BP Konya Basin was primarily dry, however running and spring water was discharged from the Toros range while vegetation slowly increased (Kuzucuoğlu 2002). In this period, Pınarbaşı by the freshwater and Can Hasan III on an alluvial fan were inhabited by the south of Konya in the Konya Basin; according to Kuzucuoğlu (2002), with the reason of settlement choice related to springs and river mouths along the edges of the mountain ranges. It was stated by de Meester (1970) that Can Hasan III lay in the Karaman plain on the alluvial fan of the Selereki River near Pleistocene lake marls which were subject to winter flooding. Pollen results (Bottema and Woldring 1984) show that the maximum arboreal pollen curves happened during the early Holocene and not at its onset. This delay in woodland expansion is usually explained by differences in the migration of trees or by differences in the composition of tree species (Eastwood 1999). There are also some controversial ideas about the reconstructing the past environments depending on the pollen analyses, because some species such as Prunus and Malus have very poor preservation due to the fact that they do not need to spread the pollen because of their pollinating system. None of these species reflects in the pollen records in many samples. On the other hand, for the Pınarbaşı A Neolithic hunting camp, today situated near Süleymanhacı modern village which was a wetland zone until ten years ago, charcoal remains (Asouti 2002) were dominated by tree and shrub taxa that can be attributed to a vegetation type very much akin to woodland-steppe comprising widely-spaced, drought-resistant trees, such as *Amydalus, Prunus, Celtis, Rhamnus* and *Pistacia*, including shrubs such as *Asteraceae* and *Lamiaceae,* alternating with stretches of grassland. They also include a smaller hygrophilous component of *Fraxinus, Tamarix, Vitex* and *Phragmites*, that can be identified with submerged marshes and riparian forests growing around the freshwater spring-fed pool and the shallow saline lake depressions receiving seasonal runoff from the volcanic uplands of Karadağ (Asouti 2002). From the ostracods, diatoms, and stable isotope analyses on the multiple core samples taken around Pınarbaşı, Adabağ and Acıgöl by the Süleymanhacı village it was concluded that Pınarbaşı was a freshwater site, freshwater being the part of a shallow lake between 50,000 and 25,000 BP (Reed *et al.* 1999). A lithostratigraphic sequence from the alluvial fan of Ibrala located near

Karaman provided evidence of changing sedimentary regimes during the Holocene and in the Late Pleistocene, pointing to major climatic changes including extensive seasonal floodings at the end of the last glaciation (Roberts *et al.* 1996).

After 10,500 BP, forest cover spread over the Toros Mountains bordering the Konya Basin, *Betula* dominated, but was eventually replaced by Quercus at about 9,000 BP (Bottema 1987: 300). After 10,000 BP, *Gramineae* pollen increased and at the same time *Chenopodiaceae* pollen decreased.

From c.9700 to 8600-8500 cal BP in the Konya Basin there was not much climatic difference from the previous period, except that the growth of endogenic resources too was triggered by the humidity rise in this period (Kuzucuoğlu 2002).

Between 8600-8500 and 7900 cal BP the new sites flourishing in the north and south of the Aladağ volcano, between Beyşehir and Konya and in the south of the Konya Plain between the Çarşamba and the Kılbasan fans were interpreted by Kuzucuoğlu (2002) as the opening of new territories in the highlands and lowlands taking the advantage of increasing water availability. As the climatic conditions became more and more advantageous, the societies were also able to take advantage of them, also meaning that together with the increase in resources a population increase and a human mobility expansion seem to have occurred (Kuzucuoğlu 2002).

As the sedimentological research in the Çarşamba alluvial fan at locations close to Çatalhöyük indicated (Roberts 1983; Bottema and Woldring 1984; Karabıyıkoğlu and Kuzucuoğlu 1998; Kuzucuoğlu *et al.* 1999; Fontugne *et al.* 1999), inspite of the fact that the onset of the Holocene (between 10,800 and 8000 cal BP) showed no marsh and lake appearance and soil formation, the first settlements in 7400 cal BC in the early Holocene took advantage of a previous start of alluvial deposition by the river (Roberts *et al.* 1999). Today, the hydrologically controlled modern environment resemble little to that of Neolithic Çatalhöyük in which natural flooding and sedimentation was still a feature (Fairbairn *et al.* 2002). There are contraversial ideas in reconstructing the paleoenvironment of the area. While archaeobotanical data revealed a range of dryland and wetland plant species with connections to several possible uses by people lived in the area during the early phases of the settlement, geomorphological and palynological research supplied the result that given the paleoenvironmental factors that Konya Plain was in a closed hydrological system the closest dry areas to the site may have been local hammocks as the raised patches of the Pleistocene marl (Roberts *et al.* 1999). Geomorphological and palynological researches showed that the environment of Konya Basin was of steep environmental gradients including permanent wetland areas and drier ridges and hills; thus the Catalhoyuk Neolithic site was surrounded by a mosaic of marsh, pool, river channel and swamp environments (Roberts *et al.* 1996, 1999; Fairbairn *et al.* 2002). However, there are uncertainities concerning the pollen data of the local environment. Charcoal data suggest (Asouti 2003) there were raised alluvial surfaces near the site supporting riparian vegetation. The floodplain probably supported open, herbaceous marshes, dominated by *Bolboschoenus maritimus* and *Phragmites australis* (Asouti and Hather 2001). Remains of wetland species of birds were also dominant in the archaeozoologic data (catal animal bones). Although the location of Çatalhöyük was similar with that of Suberde, Can Hasan III and Pınarbaşı Neolithic sites by the springs or river mouths, having founded on the alluvial fan, as in the same case of Can Hasan III, and spring flooding covered the area surrounding the settlement with backswamp clay (Hodder 2005).

According to archaeobotanical data, after c.7000 cal BC as the juniper increases there is a gradual decline in precipitation (Asouti 2003). In the later levels the plant diversity also increased with the increase of juniper, including *Acer, Pinus, Tamarix, Ficus, Rosa, Prunus* and Caprifoliaceae (Asouti and Hather 2001). In the lowest levels of the site there are more riverine taxa (willow/poplar, elm), originating in the local alluvial plain where the site was located, and used primarily as firewood; and more hackberry, a dry land fruit tree having grown on the hills to the south and was exploited for forage and firewood (Asouti 2003; Fairbairn *et al.* 2002).

Quercus and *Juniperus*, exploited primarily as timber, might have grown along with other wild dry land fruit trees and shrubs in a form of park-woodland the closest to Catalhoyuk about 10-12 km to the south (the foothills of today's Toros Mountains bordering Konya Basin steppe), which was also considered to be the closest dry land area to the settlement suitable for agriculture (Fairbairn *et al.* 2002). On the other hand, according to Asouti's interpretations using charcoal data (Fairbairn *et al.* 2002), dry land fruit trees and shrubs exploited for forage and firewood (*Celtis, Amygdalus, Pistacia,* Maloideae-it included probably *Crataegus* sp.) may also have grown in a less denser woodland form stretching through steppe or actually as stands between the alluvial plain and the steppe. All these interpretations were supported by the evidence of park-woodland and woodland steppe plant taxa recovered from the charcoal remains (Asouti 2001; 2003) and the forms of the Neogene terraces where wetland zone was supposed to end bordering the north-facing foothills of the Taurus range studied by the geomorphologists (Roberts *et al*. 1996;1999;2003).

Despite the charcoal analysis results (especially from the earliest levels) revealing abundant riverine taxa (willow/poplar, elm) considered to have grown by the rivers near the Catalhoyuk Neolithic settlement, were not preferred as timber and instead, oak and juniper species, that grew 10-12 km far according to charcoal and geomorphological data, were used for timber (Fairbairn *et al.* 2002).
In result, the closest wild fruit tree resource seems to be 10-12 km away from the settlement.

The drying period in the area overlaps with the abandonement of the settlement in the East and of a rather different nature, it shifts to the West side of the Çarşamba River (Hodder 2005).

Eastwood *et al.* (2003), using the pollen data gathered from the analysis of several cores taken from the surroundings of Çatalhöyük, suggest an interpretation of the landscape in the early stages of Çatalhöyük settlement as a largely treeless *Artemisia*-chenopod-grass steppe on the drier Anatolian plateau, giving way to open oak-grass parkland with some juniper, pistachio/terebinth and birch on the foothills, and to oak-pine-cedar woodland in the better-watered Toros Mountains. As a result, when Çatalhöyük started, the area was relatively dry, although fans had started to form (Hodder 2005). Oak and other park-woodland charcoal is considered to have been brought to the site from at least 10 km away (Asouti 2005; Hodder 2005). According to archaeobotanical research at Çatalhöyük, people used various locations for cereal farming including today's Toros Mountain skirts 10 km to the south, now steppe as well due to heavy grazing and plundering (Fairbairn *et al.* 2002). Analysis of wheat phytolith indicated dry farming (Rosen 2005). Overall data suggest at least some cereal farming took place at some distance from the site (Fairbairn *et al.* 2002; Asouti 2005; Rosen 2005; Hodder 2005), which, according to Hodder (2005), suggested a major investment of labor. Hodder concludes that (2003), the importance of domestic plants and animals to subsistence might have been over-estimated.

When compared, Çatalhöyük seems to have had a greater dependence on cultivated plants than did Aşıklıhöyük (Asouti&Fairbairn 2002; Hodder 2003).

From 7900 to 7400 cal BP humidity still increased in the Konya Plain, favoring vegetation growth on forested slopes. Whether regional or local, climatic conditions are approaching the mid-Holocene climatic optimum. Although settlement distribution remains regular, it is more scattered than in the previous period. Possible causes of such a change in pattern are most probably not mainly due to climatic and environmental constraints, but to changes in socio-economic practices. Isolation of communities together with abandonment of routes may be related to more autarkic agricultural practices in a context of limited exchange. Territories controlled by a single site may have grown larger and more complex possibly concentrically controlled and managed around a center-site, leaving wide open spaces in-between site-territories (Kuzucuoğlu 2002).

The marshlands and lakes forming after the increase in humidity in the region can be evaluated as environment's slow reaction to this increase. River fans were started to be shaped at the northern foot of the Toros range due to increase in runoff and spring water discharges allowed by the early Holocene increasing precipitation (Kuzucuoğlu 2002).

The period between 7400 and 6900 cal BP corresponds to the Holocene climatic optimum in Anatolia. Central Anatolia is being 'abandoned' in this period (Kuzucuoğlu 2002). A few remaining sites are located on alluvial fans at the mouth of Tauric rivers with high (spring?) discharge (2 sites), and at the northern edge of the central plateaus (3 sites). According to paleoenvironmental records, such newly occurring site decrease is not a response to climatic stress since the period corresponds to the Holocene climatic optimum. The end of this period even occurs before the beginning of the mid-Holocene climatic deterioration (dessication). In this context, human societies have reacted to triggering factors other than the rarity of resources (Kuzucuoğlu 2002). Extensive spring floods between c.7400-c.3000 BC were also indicated by the early Holocene sediments on these fans. Although there were no changes in total rainfall, changes occurred in the seasonality of the rainfall (Kuzucuoğlu 2002). Arboreal Pollen ratio reached its maximum at 6200 cal BP (Bottema and Woldring). Some marshes and small shallow lakes occurred in the Konya Plain around 6000 cal BP (Kuzucuoğlu *et al.* 1998; Fontugne *et al*. 1999).

According to Çetik (1985), during Pluvial, Neolithic and even Historic Ages, in the Southern border of Konya Basin, in areas probably between South of Ulukışla-Karaman and West of Çay, Akşehir area of slopes of Toros Mountains facing Central Anatolia, *Cedrus* and *Pine* forests were in abundance. According to an assumpion, Akyokuş in West of Konya was covered with *Pine* forests 250-300 years ago. Today, there are Black Pines 20 km. south of this area. The research done by Çetik (1985) in the Southwest forest steppes surrounding Konya Basin showed that, the border of *Cedrus* forests started 1000 years ago very close to the Basin and possibly were mixed with today's *Juniperus* forests.

6.2.2. Central Highland

At 12,000 BP the humidity began to increase, and alongside the 'steppe' ground cover on the mountainsides of Hasandağ as well as those of Karacadağ and Karadağ, *Betula* (birch), *Cuppressaceae* (cypress) and eventually *Quercus* (oak) began to flourish (Bottema and Woldring 1984). A subsequent recovery of the *Artemisia* (wormwood), which had begun to die out in this period, indicates another cool dry spell (ibid). Between c.10800-c.9700 cal BP humidity increased once more; grasses spread over broader expanses, and *Betula* (birch) became denser. In the surroundings of the volcanic cones of Karacadağ, Karadağ and Hasandağ significant changes were occurring at the beginning of the Holocene period (ibid). Regional vegetation was an oak-terebinth-juniper-grass land indicating heavier rainfall in the Central Highland; *Corylus* (hazelnut), *Carpinus orientalis* (oriental hornbeam tree), *Alnus* (alder), *Ostrya* (hophornbeam) and *Ulmus* (elm) also appeared on the scene (Kuzucuoğlu 2002; Bottema and Woldring 1984). Van Zeist and de Roller (1995) states that in the Aşıklı area in addition to possible arboreal vegetation in suitable habitats of Melendiz River, the steppe may have borne scattered tree growth. At this period, Aşıklıhöyük Aceramic Neolithic site was inhabited at a local widening in the narrow fertile intermontane valley of the Melendiz River (Payne 1972); and Neolithic findings were also discovered in Hacıbeyli and Toparın Pınar by Sultansazlığı during this period (Kuzucuoğlu 2002). Environmental factors must have been favored in settling in

Aşıklıhöyük, as it offered the water source of Melendiz surrounded by meadows and land suitable for agriculture (limited in extent), a scattering of mixed forest and at higher altitudes steppe vegetation on the treeless volcanic slopes (Esin 1995). The analyses of the plant remains recovered from the Early Neolithic levels of Aşıklıhöyük showed that large quantities of *Celtis tournefortii* (hackberry) fruits and almost exclusive numbers of *Pistacia* cf. *atlantica* (pistachio) were probably consumed; small numbers of fragmented fruit-stones of wild *Amygdalus* were also recovered (van Zeist and de Roller 1995). There was a great variety of wildlife and availability for agriculture and animal husbandry found in these habitats (woods, steppes, meadow and riverside), as well as sources of raw materials for construction needs, tools, implements, vessels and weapons (Esin 1995).

Between c.9700 and c.8600-8500 cal BP, regional humidity rose in continuity with the previous period in Central Highland, and obsidian workshop numbers decreased in this area (Kuzucuoğlu 2002). Site locations at the edges of the Central Highland plateaus, possibly related to 'routes' towards neighboring areas: three sites on the route northwards from the Melendiz to Tuz Gölü; one remaining site northwards to Kızılırmak valley (Kuzucuoğlu 2002).

From 8600-8500 to 7900 cal BP forests expanded. Pollen diagrams prepared from the Akgöl sediment core, some 100 km SSW of Aşıklı, suggests at least by 8000 BP humidity had reached modern levels (Bottema and Woldring 1984).
In this period, obsidian workshops were the only sites abondoned. The location of the Tepecik and Çiftlik sites may be interpreted as related to the development of agriculture more than to the proximity to the obsidian sources. New sites between the Bor corridor and Central Highland; over the Obruk Plateau; and between the Sultansazlığı Plain and the Kızılırmak valley can be interpreted either as new 'route'-type locations, possibly showing human activities expansion in the highlands as well as the growth of exchanges between territories or as expansion of exploited land due to climatic long-term trends towards amelioration.

From 7900 to 7400 cal BP the landscape has evolved to form a mosaic of woodland with mesic trees and shrubs and more open grassland. Climatic conditions are approaching the mid-Holocene climatic optimum.

The period between 7400 and 6900 cal BP corresponds to the Holocene climatic optimum in Anatolia. It precedes the start of the mid-Holocene climatic change (desiccation), which starts in paleoenvironmental records at 6500 cal BP in Central Highland (Kuzucuoğlu 2002).

6.2.3. Lake District

Today, in Central Anatolia plain steppes, *Artemisia santonicum* and Chenopodiaceae and in soil accumulated parts in skirts of mountains and hills as result of water erosion Gramineae are dominant. Because most of Chenopodiaceae are dry land plants, their existence through time shows drought periods and changes in dry land sizes. Increase in the pollens of aralik bitkileri such as *Centaurea solstitialis* also shows an increase in drought and expansion of dry lands. The abundance of Umbelliferae, *Matricaria* and *Thymus sipyleus* pollens indicates the existence of low mountain steppes and water erosion around the region; and the existence of *Sanguisorba minor* and *Quercus* pollens show the existence of forest steppes between 20,800 and 16,600. According to the same research (van Zeist *et al.* 1975), the frequency of *Cedrus libani* and *Pinus nigra* pollens, and the scarcity of *Abies* pollens may indicate a drier climate than that of today in mountains. *Coryllus* and *Tilia* pollens were also observed by the researchers. Today, these species still grow, though scarcely, in the same region (Çetik 1985). In 1991 by van Zeist and Bottema, the late quaternary vegetation of the Pisidian Lake District was constructed for a section of SW Anatolia for the periods between 12,000 and 8000 BP considering various pollen cores on the Late Glacial-Early Holocene vegetation in perennial Beyşehir Gölü, Karamuk Bataklığı, Pınarbaşı and Söğüt. This research showed that, in 12,000 BP a more open and more drought resistant vegetation under drier climatic conditions than today favored evergreens, such as *Quercus, Cedrus libani, Pinus* cf. *nigra* and *Juniperus* cf. *excelsa* forming an open and cold-deciduous montane woodland with patches of subalpine dwarf-shrub vegetation approx. 500-1700 m above sea level in the Toros Mountains including the areas around Beyşehir Lake. Further inland, *Artemisia*-dominated steppe vegetation border started, although in this research the border has been laid very arbitrarily. At higher elevations with more precipitation in the steppe area, forest-steppe with *Quercus* and *Juniperus* is thought to have been present (van Zeist and Bottema 1991). From c. 10800 BP to c. 8600-8500 cal BP local environments around Gölhisar, Söğüt, Karamık and Beyşehir were probably dominated by a low herb cover (grass) with arboreal taxa most likely confined to restricted locations (Bottema and Woldring 1984; Eastwood 1999; Kuzucuoğlu 2002). Due to the fact that between c.10800-c.9700 cal BP Suberde was settled by the Suğla Lake and Aceramic Hacılar was settled near Beyşehir Lake on the 'flat terrain on the river bank some 500 metres from the point where it breaks out in the open' (Helbaek 1970), Kuzucuoğlu (2002) classifies this settlement according to the choices of locality by the springs and river mouths along the edges of the mountain ranges. In Central Anatolia during the drought period from 14,000 BP to 5,850 BP some Pluvial lakes dried (Erol 1969; 1971). Neolithic people settled on the extended lake beaches. Mounds, situated by Suğla and Beyşehir shoreline beaches, of which skirts were worn out by the lake waves are also evidences of the expanding and drying stages of the lakes during the Holocene (Erol 1980). 5 m of shoreline beaches, now ridges and wave-cut cliffs from Holocene, and 10 m of them from Würm Pluvial by Suğla Lake point to changing climate conditions in these periods (*ibid*). So far, among these mounds by the shorelines of Suğla Lake 8 Neolithic and many others from later periods were found (Güldalı 1981). And maybe because of the numerous shiftings of the lake people finally abandoned this area (Erol 1980). Paleological studies around the Suğla Lake showed the area had a steppic climate with hot and dry summers and cold and rainy winters during the Neolithic. The results of Suberde excavations and pollen analyses showed that arboreal vegetation was dense around the lake, which included evergreens still growing in the area today such as *Cedrus*, *Pinus nigra*, *Abies*, possibly *Juniperus* trees, and also *Juglans, Betula,* and water-loving trees such as *Salix* and *Tilia* existed in the Neolithic period of the settlement (Aytuğ 1967).

According to van Zeist *et al.* (1975), who undertook a pollen research in the south of Beyşehir, Söğüt and Köyceğiz, between 11,630 and 8,230 BP in and around Karamuk Marshland there were grasses. During the final phase of Last Glacial equal to Younger Dryas period and the beginning of the Holocene, precipitation increased allowing denser arboreal cover (van Zeist and Bottema 1991). Two pollen diagrams made as results of sediment cores from Beyşehir Lake area showed that, between 10,900 BP and 9,000 BP pine and cedar began to spread in the mountains and up to about 6000 BP coniferous forest as well as deciduous forest must have been present in the Beyşehir area (*ibid*). Between c.9700 and c.8600-8500 cal BP, there was an expansion of river and spring-related settlements in the Konya-Beyşehir region (Kuzucuoğlu 2002). New sites were located at the main outputs of underground water (springs); such as Erbaba

on the shorelines of Beyşehir and other Neolithic settlements by Suğla; and people also inhabited close to the mouth of rivers in the southern plains (Kuzucuoğlu 2002). However, after 8,230 BP forests expanded; especially *Artemisia santonicum, Chenopodiaceae*, *Gramineae* and other grasses' dominating the area implies that, due to the drought, the area was a vast steppe and marshland zone (van Zeist *et al.* 1975).
This can be interpreted as the regeneration of the forests at the time when the area was finally abandoned due to possible extensive floods and the climate changes as well as the shortage of resources in the area due to dense population. Area overgrazed and resources exploited → Meadow type grasses dominated the vegetation. The typical steppe grasses show that the area was overgrazed (the species growing after overgrazing of the area) → Precipitation increased, lakes expanded, unexpected floods occurred → Area abandoned → Forests expanded. From 8500 cal BP on, arboreal pollen shows a true woodland, composed of mixed forest comprising oak, pine and juniper (Bottema and Woldring 1984; Eastwood 1999). Van Zeist and Bottema stated that (1991), in the 8000 BP around the Beyşehir Lake the vegetation cover did not change much. Deciduous trees such as *Quercus* and *Pistacia* cf. *atlantica* and conifers including *Juniperus excelsa* and *Pinus nigra* were the arboreal components. Further inland, the woodland merged into the steppe of the Central Anatolian plateau (van Zeist and Bottema 1991).

The analyses of the sediment core also revealed a result with high *Salix* pollen values representing the Late Glacial; another result of the analyses was an abrubt increase in *Pinus* percentages (van Zeist and Bottema 1991). The transition zone preceding *Quercus, Juniperus, Pinus* and *Cedrus* growth showed that pine was replaced by *Quercus* and *Juniperus* due to supposedly drier climatic conditions (van Zeist and Bottema 1991). Pollen analyses in the Söğüt Lake area by the same authors also showed similar results. According to these analyses, between c. 9000 BP and 3500 BP in the Söğüt Lake area, today situated in the south of Burdur Lake in the West Toros Mountains, there was a steady increase in *Pinus, Quercus* and *Juniperus* trees (van Zeist and Bottema 1991).

The period between 7400 and 6900 cal BP corresponds to the Holocene climatic optimum in Anatolia. It precedes the start of the mid-Holocene climatic change (desiccation). Central Anatolia is being 'abandoned' with the last 'colonised land' being abandoned first (Beyşehir, Suğla and Beyşehir-Suğla corridors) (Kuzucuoğlu 2002).

From 5,850 BP *Artemisia santonicum* decreased much, whereas trees increased. Owing to Anthropogenic effects *Centaurea solstitialis* increased. Around Karamuk Marshland from time to time dominance of *Cedrus* and *Quercus* shifted.

In the south of Beyşehir Lake a similar pollen research, undertook by van Zeist *et al.*?, showed that the area was covered with *Cedrus* forest, and *Pine* forest was lesser than today in 5,850 BP. *Abies* pollens were not observed, while *Quercus* were less and possibly bushes covered the ground in *Conifer* forests (referans?). From this date to 3,535 BP at the beginning, *Conifer* was dominant, *Pinus* incresed in comparison with *Cedrus. Abies* was present continually. *Quercus* amount was of no importance. *Coryllus* was abundant. Following the periods, *Quercus* and *Artemisia* increased. Human impact started in the region. Later that period, *Cedrus*, Compositae, *Centaurea* decreased. Only at 3500 cal BP does human occupation become visible in the spectra (Bottema and Woldring 1984; Eastwood 1999). Starting from 3,535 BP *Pinus* decreased dramatically, while *Artemisia, Chenopodiaceae, Gramineae, Plantago, Fraxinus, Quercus, Juniperus, Abies* and grasses increased and walnut and chestnut were observed. This zone shows human impact in the region clearly. The decrease in *Conifer* indicates the plundering trees started in this period. Increase in *Artemisia* points to grazing. *Lens culinaris, Pisum sativum, Vicia ervilia, Linum usitassimum* are rare. Rare amount of olive might show its cultivation. *Vitis* and *Fraxinus ornus* existed. The sweet rasin extracted from the latter's bark is consumed and has medicinal use. *Quercus* and trees yaprak doken increased, following the damage of *Cedrus* and *Pinus. Juniperus* decreased. *Findik and murver* pollens were observed in open areas. *Ostrya* and *Carpinus* increased after forest destruction and *Betula* was observed. Later this period, *Pinus* and *Cedrus* due to plundering decreased and *Juniperus* increased. Aralik otlari, *Salix* increased. Erosion started. Following the period *Pinus* increased, *Fraxinus,* walnut, chestnut still existed....

CHAPTER 7

DISCUSSION

7.1. Cultural Differences

When this research project started, the author presumed from the maps and from the first visit to the area that the Konya Basin was divided into forest, wetland and steppe zones. However, during further steps in the research this proved true only from a general environmental point of view. In real, its villagers separated their environments into four different zones. Wetlands by the Hotamış Lake; forests in the Karadağ and Toros Mountains; steppes in the central part concerning the heart of Türkmen ethnic affiliations of Türkmencamili, Dinlendik, İnliköy, Arıkören; and plains on the wetland parts without lakes. The latter two are considered lucky areas with rich agricultural products.

Although the first summer season spent in the field revealed many useful results, this time period was mainly used for familiarization with the different environmental zones, and cultural differences as well as building close connections with the local people. Using the Çatalhöyük dig-house as the base and making trips to villages during the day were only useful for gaining a general view. In spite of the useful insights gained from the discussions with the team members and the necessity of being involved in the archaeobotany team to better understand the archaeological evidence concerning the use of wild food plants, staying at a dig-house, trying to take every chance in finding a transportation and sometimes being joined by the other team members who demanded translation limited the time required to be spent with the local people. Also, summer was not a good season to study all the wild fruits, nuts and tubers focused on in this research. The second time the area was visited for a longer period when, by living with the villagers it was possible to refine the study. Between seasons and after the second summer season, other short visits were also made to the area. It proved the fact that, only when truely involved in the daily life of the local people was it possible to collect the data in multiple dimensions.

There were several obstacles to collecting the field data. Most of the time people were busy with daily tasks and answered a question by simply saying whatever came to their mind to go back to their work. The data collected in the beginnings of the first summer season therefore needed to be checked again by literally making the trip to the collecting spots in the harvesting times which differed for each plant genera, and making the trip back to the villages for processing, storing and consuming the plant together with the local people. In each step, plant samples were collected and labeled to be identified botanically back in Ankara.

As a result, it was observed that, local people living in the area did not want to talk about consuming wild food plants, especially the ones disquised for their bitter tastes by people with better economic conditions. The fear of being humiliated by other people and possibly by the researcher also prevented local people from telling the truth. Tannin removing processes, storage activities and real quantities of the collected and consumed plants were found out only after several trips required for building close relations were made. People felt more comfortable in answering questions concerning the consumption of *Quercus robur* (acorn) and *Crataegus orientalis* (hawthorn) fruits as they are also sold in their local market and they were delicious in their natural form. *Pyrus elaeagnifolia* (wild pear) fruits are ripe when they fall on the ground, or when they are buried in hay or acorn leaves for fermentation. The fruits are delicious when fermented. However, people did not want to talk about wild pear consumption as domesticated pear is commonly sold in markets. The most difficult plants to talk about were wild almonds and club rush tubers; the former for its bitter taste, and the latter for being gathered from the muddy water outside the domestic area. The consumption of a bitter tasting fruit (in spite of them being processed) was related with poverty. Although mud was good for constructing buildings and in the orchards, it meant dirt in the wild especially to the villagers who lived in the steppes. As a result, *Scirpus maritimus* (club rush) tubers said to be of no use by the Süleymanhacı villagers were found to be used in three different ways alongside their consumption and the trade network dating back to 1500's in the same village. Wild almond kernels again stated to

be of no use by the Adakale villagers, were actually consumed in four different ways in that village.
Cultural differences in the area require analysing the case in a broad sense. Chronological and spatial changes occuring all the time need to be understood to better evaluate the dietary changes concerning cultural and environmental differences.
Although harvesting, processing, storage and consumption activities concerning wild food plants still used in the area revealed important data for suggesting interpretations to the archaeological evidence, cultural differences between the Neolithic Period and today is too big to be compared. Today, there are cultural differences between the different ecological zones in the Konya Basin, and such differences reflect on the use of resources in various ways. Cultural differences reflected on the use of wild food plants also dates back to communities shifting in the area in the Ottoman Empire time and the enforcements brought to people's living styles by the empire.

Lack of some raw materials made it necessary to build a trade network within the region. These raw materials were mainly fuel, construction material and food; three elements required for people to stay alive. Many of them were parts of the plants or the plants themselves, and some of them were animal products. The life turned around them, and people made affiliations with some groups and made enemies with other groups. The groups made affiliations with were not in competition with each other, because each was from totally different environmental zones. Villages of the forest zones were either in affiliation with the wetland villages, or were neutral to each other. Villages of the forest zones were in conflict with their neighboring steppe zone villages, since the latter threatened the resources of the former and limited the mobility of the former. Villages of the steppe zones were in conflict with forest zone villages and despised the wetland villages as well. Villages in the plain were luckier than the other three with larger agricultural lands, and there was a desire to intermarry within the plain zone. Although the forest zone villagers allowed the wetland zone villagers to exploit their resources, they prohibited the steppe villages from doing so. Sometimes serious fights occurred between two groups.

Cultural differences reflected on preparing a meal in different ways. Through exchanges and shared resources, wetland and close forest villages cooked similar meals. Such meals sometimes differed a lot in the steppe zone. The differences between

the harvesting and processing techniques of the same plant species were related with cultural differences. Sometimes changes included tools and architectural context.
Changes are occurring all the time, and making a detailed analogy is not possible. None the less, these wild food plants recovered from the archaeological excavations are being used. It is very strong similarity to the Neolithic and harvesting, processing and storage may be similar.

7.2. Archaeological Implications

7.2.1. *Scirpus maritimus*

This plant has been an important resource as construction material and possibly in the diet as well since very early periods (charred club-rush tuber and seed remains in considerable numbers as well as their presence in human coprolite from 20,000 BP in Wadi Kubbaniya). Although its charred tuber and seed remains have been recovered from several Neolithic and Chalcolithic sites in the Near East, a detailed ethnobotanical study concerning the use of this plant has not been done in the area.

This study is the first to reveal the ethnographic accounts of the club rush (*Scirpus* maritimus) consumption in the Near East. Although the focus of this study has been the wild food plants, the attempt to model managing club rush resources along with other sedge and reed species by the wetland, steppe and forest zone villages were also made here. According to this model, a trade network concerning the exchange of club rush stems for other materials was discovered in the Konya Basin before the introduction of the mechanized agriculture to the country (before 1960's). Ethnobotanical data collected concerning the harvesting and processing of the plant for non-food uses made important contributions in understanding the taphonomy of the charred plant remains recovered from various excavations and debated for its different uses.

The villages located in previously wetland areas exploited the sedge and reed resources to build their houses. Future projects in these villages can explore the changes occuring in construction material use and the house types, as the environment is not the same any more due to severe drought in the area caused by the overuse of water resources. The marshlands and lakes started drying in early 1990's. When the first visit to the areas was undertaken by the present author in June 1998, only a small patch of marshland by Adakale village was left of the Hotamış Lake. Acıgöl (Süleymanhacı Gölü), which still existed in 1993, was already completely dry. Further south, the marshland by Hamidiye shown on the maps drawn in 1950's was totally gone. Arpa Çayırı marshland by Dedemoğlu village was replaced by an arid environment type as well.

When the villages were chosen according to their different environments, Adakale, Hamidiye and Süleymanhacı were chosen for study as wetland villages; however in the first visit to the area it was shocking to witness such a severe drought affecting all the natural water resources of the Konya Basin. Nevertheless, as stated by the geomorphologists (*cited in* Matthews *et al*. 1998) the drying of the lakes make a similar environmental condition to that of Neolithic Period in the region.

Different plant species were used for building different parts of the houses, ovens, watch towers, storage silos, storage parts and garden walls. The plant species used varied depending on the growing plants and their usable parts in different areas and in different environmental conditions and depending on the availability of the plant species. People in Harran town of Şanlıurfa in Southeastern Turkey have built their mudbrick houses with corbeled domes, since there is no plant species in the area to be used in constructing roofs.

Before the human manipulated severe drought, in wetland areas such as Dedemoğlu by Arpa Çayırı, and Adakale by Hotamış Gölü, where the main flora was composed of *Juncus*, *Scirpus*, *Phragmites* and *Typha*, saline and wet soil type did not permit villagers to adopt a productive agricultural economy. In these villages in 1998 this case was still apparent from the low population. Having suffered from the shortage of cereals, these villages used *Juncus* sp. stems in constructing roofs. They spread the stems parallel to each other on the roof. On the other hand, the villages on the plain with plenty of cereal products could use cereal straw for roofing and in the mudbrick. They owned larger agricultural lands to use by-products such as chaff both to use as building material and to have livestock grazing on. The wetland zone villages prioritized animal graze on the harvested fields.

There were reasons why *Juncus* sp. was not used on the floor under the carpets. First of all, this plant stems were hard even when they were fresh. Instead, in Dedemoğlu village the house floors were covered with *Scirpus* sp. (bafra) stems placed parallel to each other. Carpet was laid on the stem covered floor.

The villages such as Adakale with the availability to the abundant club rush resources used club rush stems in several ways including plaiting mats for roofs and floors. It was earlier argued by Hillman (2000) for the interpretation of club rush tubers and seeds as edible food resource that, club rush would only have been collected for its tubers and seeds, because its stems would have been too short to be worth using for thatching when reeds were clearly available. On the contrary, species of *Juncus* stems which are even shorter than club rush stems are used on the roofs, but in a rather different style than simply thatching or loose roof covering. The stems of *Juncus* dominant sedge species on the steppe zone were placed on the roofs and sealed with mudbrick. It was called karaörtü (black cover). In wetland areas, *Juncus* was replaced by other reed species such as *Phragmites* and *Typha* species in building karaörtü, because *Scirpus maritimus* was primarily appreciated for its higher quality in making beautiful mats for covering ceilings and floors. The sharp, barbed angles on the stems were flattened by stripping the stems. Dry ones were made flexible again by sprinkling water on them.

In the Konya Basin, cushions were filled with club rush stems as well. In the past, baskets used to be made from club rush stems. In the villages of wetland zones, club rush is called 'kovalık', meaning 'for making baskets'. In stem using activities, flowering parts were separated and left during the harvesting off site. Later on, livestock was allowed to graze on them. Tubers were not collected for consumption during these activities, because most of the tubers are starchy and hard in the club rush stem collecting season, that would be in late summer overlapping with cereal harvest. Club rush stems were piled as in the way of cereals. From far, they can be mistaken for wheat or barley piles. Metal sickles were used in harvesting club rush stems as in the case for wild grasses. All villages by the areas with club rush used the parts of the plant such as stems and tubers in constructing their houses, because the mudbrick they made from the soil in their area included club rush tubers and stems, and using club rush stems saved cereal straw which is valuable as animal fodder. Club rush grew in village surroundings without demanding a special care, unlike cereals. Mudbrick was cut from the damp soil in spring, the season when the club rush tubers developed. Villagers preferred cutting mudbricks from the soil rich in club rush tubers for building their garden walls. Many times club rush stems were used on top of garden walls and on roofs. Discarded tubers were thrown in oven fire alongside the fragments of deteriorated mudbrick, resulting in their accidental charring. Ovens were cleaned everyday regularly due to accumulated ash after each burning activity. Charred tubers alongside with ash including other accidentally charred plant parts would end up first in the house garbage in a corner of the gardens, and finally in the common garbage area of the village. Club rush stems were often used as fuel too. These longer stems, in comparison with that of *Juncus* species had other advantages too. When it snowed in winters, snow softened the earth surface allowing grass growth (*Agropyron* sp. (ayrık otu) detected by phytolith analysis in a basket material from Neolithic Çatalhöyük was included in these grasses too. This species was often mentioned by the villagers as a valuable animal fodder.). Snow covered club rush and reed communities high from the grasses allowed grasses to be grazed by the livestock. This speciality of the reeds and sedges covering a vast area in the Konya Basin made the lands very valuable pastures for livestock herders in winters. Livestock also fed on the flowering parts of the club rush. Seasonally piled dung of livestock made a good fuel resource since these wetland zones were relatively far away from the dense woodlands. In ovens inside and outside houses thousands of club rush seeds would get charred alongside with other wild grass seeds through dung burning. All these again ended up in the common garbage area. Garbage dumping in the reed and sedge communities occured most often. These plants helped to hide the dirt of the garbage and somehow covered it. It was useful to dump garbage in these areas also for later on these areas could be burnt for garbage cleaning. During this burning activity, again thousands of club rush seeds would get accidentally charred mixing in the garbage deposit.

At Neolithic levels of Çatalhöyük, club rush seeds were sometimes accompanied by chaff and cereal grains, *Astragalus/Trigonella* and Gramineae seeds, in a few cases seeds of *Rumex, Stachys,* and *Alyssum* too, and remains of dung. These seeds are mature in late summer. It might have been the case that, seed and chaff mixture ended up in dung following a late summer grazing. In Anatolia, livestock is often grazed on harvested fields as indicated above. As well as being nutritious, remains of harvested cereals also help to produce dung as fuel in good quality. Such mixtures of dry and wet land zones might point to dry patches of lands nearby the settlement area too. Neogene terraces 10-12 km far from the settlement area were already suggested as dry land zones used as agricultural lands (Fairbairn *et al*. 2005). Local people in Anatolia actually walk such long distances daily when they herd their animals. In the Black Sea

Region, male, female or 8 year-old shepherds walk around 20 km every day during herding activities.

The local names of club rush changed according to differences in the environmental zone as well as in the main uses of the plant. Club rush was called kovalık by the villages near Hotamış Lake. In these villages club rush stems were used for basketmaking. In mountain villages, the plant took the name of ‘kovalak’, because the villagers knew the stems of this plant through trade. All sedge species were called ‘kovalak’ (meaning: repellent) by the mountain villagers. During meat cooking activities in the open air, burnt sedges in the cooking fire produce a dark smoke that works as an insect repellent. In Madenşehir located in the forest of Karadağ, the club rush was also called ‘berde’ (berde cushions were made from club rush stems) meaning ‘from the flooded lands’. Suberde took its name from the same origin as well. In northern steppe villages still holding their availabiliy to reed and sedge resources, the club rush was called ‘bafra’, taking its name from the cushion made with club rush stems. In the central steppe villages such as Türkmencamili, the plant was called ‘kındıra’, meaning tinder, because sedge species such as *Juncus* growing in the now arid zone are used as tinder. The reflection of the changing environmental conditions on the language can be observed in Güneysınır (the village name means ‘south border’ pointing to the southern forest border to the Konya Plain). The village used to be surrounded by dense woodlands a few decades ago, but today due to deforestation the area is now being part of the expanding steppe zone. Before the deforestation, club rush was called ‘kovalak’ as in the mountaneous area villages. When the arboreal vegetation started to be replaced by steppic environmental type, the club rush changed the name from ‘kovalak’ to ‘kındıra’ as in the steppe zone villages.

As a result, *Scirpus* tubers were brought on site in mudbricks and were sometimes thrown away in the oven fire when the walls deteriorated and tubers fell off the walls.

Up to this point, the club rush tubers were brought on site within the construction material, club rush seeds were accidentally brought on site, and club rush stems were generally incidentally brought on site and all were charred as result of non-food activities. For this reason, the abundance of charred seeds and tubers of this plant present in the middens in no way indicates that they were eaten. During such activities, numbers of discarded and burnt tubers are not many, unless the whole garden wall is burnt in a fire.

However, there are villages still consuming club rush tubers. These villages would uproot the plant with its tubers and sometimes collect the tubers in early spring when the tubers were young and juicy. Tubers were separated from their stems, and their muddy outer layer was peeled off at the harvesting place. Often people of all ages, but mostly children, and young men and women, would casually collect club rush tubers during other activities. Tubers were also stored in storage pits in gardens. It is possible that decades ago the villagers preffered storing roasted tubers to storing fresh tubers to prevent them from germinating or being eaten by vermin. Club rush tubers were often roasted in low temperature in oven prior to their consumption. During roasting, some tubers would accidentally be burnt and thrown away in the oven fire.

Similar processes happen in the Aegean Region in Turkey. In the seaside villages of Aydın, poor families, who are often identified with the ethnic affiliation of gypsies by other people, exploit *Scirpus* species for consumption and for construction material. Club rush harvesting is done with the same metal sickles as are commonly used by the inhabitants to cut the wild grasses in their gardens and fields. In a similar way to Konya and Karaman villagers, they consume tubers of *Scirpus* species. This case study will be further recorded and published separately. The same tool was mentioned as standard harvesting tool by Hillman and was called 'reed hook' by him (Hillman 2000), as he observed reed harvesting in Adakale as well in 1970's. Hillman also notes that (2000), an almost identical tool was recovered from the Bronze Age reed-swamp settlement of Shinewater in southern England.

In the villages situated in wetland zones, all parts of club rush were used in several ways; hence the abundance of their charred form inside and outside houses. The use of this plant was very common because of its durability in a damp environment. Its long and flexible stems made the plant valuable for plaiting mats and baskets. The plant supplied building material and fuel resource in these environments lacking woodlands. The seeds supplied fodder for animals which grazed on them in late summer when the most wild grasses in the area turned yellow, and the plant preserved green reserves for livestock in winters. Club rush stems replaced the function of the cereal straw in wetland areas with saline soil.

Given all the ethnographic account, and given the archaeological evidence, the inhabitants lived in the Neolithic and Chalcolithic periods in the settlements within the scope of this research used club rush in various activities if the plant was locally abundant. According to geomorphological research, the marshlands of the Konya Plain where Çatalhöyük was located were probably dominated by the sedges and reeds including club rush, and grasslands. This case is apparent also from the construction of the mudbrick houses. Although reed and club rush stem fragments were found throughout the site, cereal straw is totally absent from the remains observed through macrobotanical and phytolith analyses (Hodder 2005), except for the few baskets suggested to be made from straw (Rosen 2005). According to the official papers from the Early Ottoman Period including the information on the environmental settings, Konya town had small patches of agricultural lands by the houses for immediate use. The Konya Basin had not owned wealthy lands for agricultural production until the area was introduced to the mechanized agriculture which was followed by human manipulated drying marshlands, and well irrigated agricultural lands through water drainage from lakes. Until recent decades, the villages between the center of Konya and Çumra had very limited access to cereal straw. The lack of straw from the archaeological context was interpreted by the archaeologists as off-site processing taken place (Hodder 2005). In addition, archaeological evidence tells that, cereal straw was not brought on site neither for the construction nor for fuel nor as storable animal fodder which typically occurred until very recently in Konya Basin marshland villages.

There were no tools concerning cereal or sedge\reed harvest recognized from the archaeological context of Çatalhöyük; however eight pairs of wild goat horncores placed on the lentil bin were recovered and interpreted as symbolic meaning (Hodder 2005). These horns might have been used as sickles for reaping reeds, sedges and cereals. The idea overlaps with the evidence from the SEM analysis of the obsidian bladelets recovered from the same levels. Traces of club rush were detected from these bladelets (Hodder 2005). Some wood and pieces of club rush tubers recovered in large quantities alongside with a cluster of obsidian debitage from the ashy spread related to oven indicate club rush harvesting using sickles (Fairbairn *et al.* 2005). The same tool type was recovered from the archaeological contexts of Erbaba, Hacılar, Kuruçay and Suberde in the Lake District (Esin states (1998) the finds of horn tools at Aşıklıhöyük, but she relates these tools with hunting activities and processing of skins and hides). The sickles made from horns as interpreted by Melaart and Helbaek as well (1970) and found at Hacılar and Kuruçay are almost identical with each other. At these settlements in the Lake District and at Çatalhöyük, stems of club rush might have been used in roof construction. A direct use of club rush stems was detected through pyhtolith analysis. Some baskets, possibly used in cooking wheat grains and maybe acorns, were made from club rush stems (Rosen 2005). Tubers of club rush were also recovered, though in low numbers, from Neolithic and Early Chalcolithic deposits of Erbaba, Aşıklıhöyük and Hacılar in Central Anatolia. Suberde with possible access to club rush and other sedge and reed species nearby the settlement could have made a good comparison to other sites located in marshlands, but it was not sampled at all.

Tubers recovered in large amounts from the archaeological contexts of Çatalhöyük were often addressed to their use as fuel. However, Konya and Karaman villagers do not collect tubers for fuel. Tuber collecting for the purpose of fuel is time wasting, and reaping the stems for fuel is more efficient. Although mud with tubers is collected from the ground to be used as building material, tubers are not picked from the soil. The deteriorated tubers thrown in the oven fire are limited to few. Only some portion of the tubers happened to be charred may have come from the discarded building material. Already, dumping some burnt fragments of building walls in the midden has been apparent in the floated samples of Çatalhöyük (present author's pers. observation 1999). Therefore, large amounts of tubers recovered archaeologically are possibly associated with their consumption. The abundant recovery of the charred remains of the small nutlets of club rush in every deposit including hearths of Epipaleolithic Abu Hureyra (11,150-10,450 BP) was interpreted by Hillman (2000) as a result of them having been growing locally and perhaps gathered as major food and roasted. *Scirpus maritimus* (club-rush) still grow in and around backswamps in the Euphrates Valley today.

Tubers are stored in storage pits in the gardens of the modern villages. It is possible that, in the early periods tubers of club rush were often roasted prior to their storage as well. Some tubers are accidentally charred during roasting activities and are dumped in the garbage inside the oven ash. Although *Scirpus maritimus* tubers were largely recovered from the midden deposits as well, the midden contexts were considered to be the unreliable resources for the assumption of food consumption. However, the abundant recovery of *Scirpus maritimus* tubers from fire installations including fire-pits and oven/hearth (Fairbairn *et al*. 2005) where roasting food plants takes place, and pits and bins (Helbaek 1970) where food plants are stored suggests tubers were roasted prior to their consumption, and they might have been roasted before stored as well. Hearths and rake-outs typically included pieces of *Scirpus maritimus* tuber alongside with the mixture of domesticated cereal and pulse, wood and wild seed (Fairbairn *et al*. 2005). The consumption of tubers as a side dish with the kavurga meal made from roasted or boiled wheat grain in wetland zones is a variety of the similar food prepared with kavurga and roasted or boiled acorns in the forest zones. It serves the same purpose that wild food plants were added in cereal meal both to make the meal nutritious and to increase the food amount.

In the 1999 summer season, experimental work was undertaken in collaboration with Michele Wollestonecroft to test the consumption possibilities of club rush tubers (see Çatalhöyük Archaeobotany Archive Reports 1999). Unfortunately, it was soon discovered that summer was the wrong season to test their harvesting, processing and edibility. The uprooting the plant with its tubers required time and energy, so three people could collect around half a kilo of tubers in one hour. Although pounding tubers into flour took a long time as well, flour-making from the tubers was possible. At Çatalhöyük in one of the contexts with bins, floors and midden deposits, grinding and abrading tools were found in association with plant remains that included cereals, acorns, lentils, club rush tubers and hackberries (Baysal and Wright 2005). Interestingly, in the Konya Basin kavurga meal is prepared from boiled and/or roasted cereals, acorns and tubers which are the main ingredients. In some villages pounded fresh hackberry fruits are added in the mixture as well (siliceous hackberry fruit stones do not decay even when not charred). Accidentally charred food remains after the oven-cleaning and useless parts such as fruit stones following the food processing are dumped in the garbage.

Phytolith analysis showed that at least one of the bins sampled contained matting made from *Scirpus* sp. It was interpreted by Rosen (2005) that, matting was used to extra-line the bin and the wheat grains, stored for the replantation, were preserved in a better quality from mildew and predation by rodents. Phytolith analysis undertaken on the floors also revealed that the floors included club rush remains, and the floors having been covered with mats made from club-rush is possible according to the results of these analysis (Rosen 2005).

7.2.2. *Crataegus* sp. (hawthorn)

Heat applied to fruits makes them sweeter in taste as result of the removal of tannin and thus more palatable. Wild fruits containing high tannin are often roasted, grilled or boiled. The possibility of them being charred is therefore likely. Hawthorn fruit does not fall into this group, since they are delicious and palatable even without any processes applied. Also, being a fleshy fruit, it cannot be preserved well in a storage pit. Storage pits preserve nuts and tubers, and dry grains the best. This ethnobotanical research also shows the fact that, except for one case (boiled hawthorn fruits are used in wine making in church remains), these fruits are not fire processed. They are mashed, pounded in wooden mortars, strained and consumed in their fresh form. The haws are not pit stored either. Instead, they are wrapped in clothes or put in jars and kept cool. Pickle is also made from the fruits. Fruit stones are dumped in the garbage later on. Although thousands of collected fruits are brought on site (one household brings at least 15-20 kg hawthorn fruits), these process types importantly decrease the chances of fruit stones being charred. Casual collecting and consuming off site often occurs too. As expected, the recovery of the *Crataegus* fruit stones from the archaeological excavations are few. And even fewer in the Neolithic and Chalcolithic deposits in sites located in Central Anatolia. Only pounding tools, if not made from wood as in the Konya Basin modern villages, are likely to be recovered as result of processing these fruits.

7.2.3. *Pyrus* sp. (wild pear)

Wild pear fruits are sour when they are not ripe, and still sour and harder than domesticated pears even when they are ripe. However, their sour taste is not due to tannin content and they are palatable especially when they fall on the ground. As indicated for hawthorns, wild pears with no tannin content also do not require any of the cooking applications. Villagers often prefer to bury wild pears for their fermentation in cereal straw, cereal grains or oak leaves. With or without fermentation, wild pears can be pounded or ground into flour which was a valuable dietary resource and an important material of the trade network in the Konya Basin until recently. The wild pear flour added to the wheat flour both extended the meal and increased its nutritional values. The fruits are also chopped and dried, and pickled fruits are very favourable too for their sour taste in some villages of the Konya Basin. Discarded fruit seeds are thrown away to the garbage. Casual collecting and consuming off site occurs as well. In modern villages, flour and fresh fruits are stored in sacks. Not being fire processed, pear fruit pips are not likely to be preserved either. In the archaeological record, charred pear pips are very rarely recovered. Still, such rare recoveries indicate the use of the plant and its existence in the natural environment surrounding the settlement (for the latter, excluding the chances of being exported). As the wild pear processing tool, only pestles, pounders, hand mortars and/or grinding stones are likely to be found. Baskets as storage utensils are also possible to have been used for especially fleshy fruit storage.

7.2.4. *Prunus* sp. (wild plum)

Wild plum fruits are used for its sour taste commonly by the local people of the Konya Basin. As well as abundant casual collecting and fresh consumption of the fruit off site, fruits are also brought on site to be used in meals. The fruit is generally cooked with meat meals and the fruit stones are thrown away in the rubbish.

Again, wild plum is one of the wild food plants whose remains are very rarely recovered from the archaeological context.

7.2.5. *Rhus* sp. (sumac)

In Konya Basin mountain villages, sumac fruit stones are used as animal fodder which ends up being charred inside dung. The fruit is pounded or ground, and fleshy part is separated from the fruit stones. It is a valuable spice used as seasoning in meals. However, its fruit stones were rarely recovered from the archaeological deposits, indicating that fruit stones possibly were not used as animal fodder in the past on the contrary of the case happens in the Konya Basin modern villages. Sumac trees grow adjacent to terebinth trees in the mountaneous areas of the Konya Basin. Bringing sumac fruits as well as terebinth fruitlets might be an expected case. It is possible that either this fruit was not used commonly by the inhabitants, or the fruit stones were discarded and thrown away in the rubbish.

7.2.6. *Pistacia* sp. (terebinth), *Quercus* sp. (acorn), *Celtis* sp. (hackberry), *Amygdalus* sp. (wild almond)

Terebinth is one of the most commonly recovered fruit species from the archaeological excavations of the Neolithic and Chalcolithic sites in the Central Anatolia and in the Near East as well. Although its domesticated form is classified as nut, terebinth is both nut and fruit. The fruit stone which is crusty and contains oil can be eaten with the outer fleshy part. The fruit does not have tannin and it is edible and delicious when fresh as well. Casual collecting and consuming the ripe fruitlets off site often happens with terebinth nuts too. Collecting this fruit in high amounts happens in the chance of the plant growing in an accessible distance. Off site processing happens in order to reduce the load by separating the unused branches and leaves by portable sieves hung on the neck. On site processing is required to separate the unripe and infected fruits from the ripe ones through floating all the collected fruits in plastic basins. In fact any pot which can keep the water inside would do. Such discarded fruits are used as animal fodder. Their possibility of getting charred is very likely through collected dung being used as fuel. Once dried on rooftops, they are preservable in storage rooms in sacks for the whole year. Collected fruits are brought on site for their valuable oil rich content makes an important nutritional and caloric contribution to the diet during the year. In modern villages, both fresh and roasted fruits are pounded in wooden hand mortars. Roasting terebinth fruitlets often happens as well, because this process both makes the fruit stone even crustier and reveals the oil rich content. Once roasted, it is also easier to pound the fruitlets. Some plants do not need to be cooked when mixed with pounded terebinth fruitlets, because the raw plants soaked in the oily fruit mash swell and become softer hence become edible. SEM studies of the chewing surfaces of the molar teeth from the Çatalhöyük burial context suggested that food was not often cooked, was large particle size, and was not abrasive (Hodder 2005). There is a considerable amount of wear probably resulting from regular consumption of hard things like tubers and uncooked grain (Hodder 2005). This picture fits well with the wild food plant consumption activities today happens in the Konya Basin modern villages. The traditional meal batırık is prepared from uncooked pounded or ground cereal grains mixed with roasted and pounded terebinth fruitlets. Also, roasted cereal grains are consumed with various roasted nuts and in one village with tubers as well. Wild almonds are generally roasted as well and such nuts are commonly buried in fire in ovens or in fire pits. Also, after their fresh consumption, broken nutshells with handstones are thrown away in the fire.

Dental microwear analysis from this site also implied from the lack of wears on teeth caused by abrasive material such as stone fragments and gritty sand that, the grains, nuts, berries and meat consumed by the inhabitants possibly did not include such abrasive material, therefore the food was not ground very often (Hodder 2005). However, there is a considerable amount of grinding slab, handstone and hand mortar fragments recovered from various contexts (Baysal and Wright 2005). By these researchers, they are reported to be light and portable which fits with the standard tools used in the Konya Basin for pounding or grinding nuts and fruits. New research undertaken on the Aşıklıhöyük ground stones reevaluated the interpretations earlier made on the uses of many stone tools and shed light on the possible nut processing uses of the 513 ground stones recovered from this settlement (Güldoğan 2003). In addition, the recovery of the wooden mortars reported by Mellaart (1968) indicates their use by the inhabitants and the possibility of more pounding tools made from wood. Wood is a fragile material, and if not charred its recovery is very limited to few cases especially from such early periods.

The cooking activity also can be derived from the charred remains of the plants, as well as other evidence such as clay balls abundantly recovered from lower levels of the site (Hodder 2005). The fact that some of the clay balls were found subject to fire, and some were left by the hearths/ovens, clay balls having been used in cooking plants was suggested (Atalay 2005). It is possible to find examples of cooking food mixed with sand and stone material in the Konya Basin. In some steppe villages, cereal grains and chickpeas are roasted in pans mixed with aktoprak which also have uses as building material for plastering walls. In other cases, ash or plant remains picked from dung are also used in roasting grains. The reason for using such materials during roasting is to prevent the plants from overroasting. Furthermore, rounded stones are used in acorn cooking in baskets by trasferring the heat from ovens/hearths by American Indian tribes in California. The parts of the Konya Plain far from the mountaneous areas lack such stone material. For this reason, clay abundant in the site surroundings is used for various purposes including making clay balls.

CHAPTER 8

CONCLUSION

The ethnobotanical study of the wild plant food use in the modern villages of the Konya Basin revealed many important results for the interpretation of the archaeobotanical recovery from the Neolithic and Chalcolithic sites. This type of ethnobotanical study in understanding the rolse of the wild food plants in early agricultural societies bu using ethnobotanical research is undertaken as the first time. In Turkey, although ethnobotanical research conducted by sociologists and ethnographers date back to 1960's, systematical research in ethnopharmacology and ethnobotany have developed in the last decade. In Turkey, an ethnobotanical research addressing archaeological recoveries has not been done except for Ertuğ's in depth study in a Central Highland village.

The main goal of this research was to understand the possible uses, processing techniques and social significance of wild food plants in the Neolithic Period in Central Anatolia through an in depth ethnobotanical research in modern villages. Most of the plants investigated in the ethnobotany of the area were present in the archaeological evidence from the Neolithic sites of the Konya Basin.This research aimed to help addressing various questions relating to the archaeobotany of these sites.

The study included cultural factors as well as environmental ones in exploring the differences and similarities in depth. By products, plant parts brought on site, possibilities of off site consumption are studied for each species.

One of the questions that this research addressed was how different processing techniques affected the survival of the various plant parts.

It was also important to stress that, as well as environmental circumstances cultural factors played role in the diet and the techniques used in processing plants.
During the study it was observed that, local people living in the area did not want to talk about consuming wild food plants especially the ones rejected for their bitter tastes by people with better economic conditions.

Other questions related to the role of the wild food plants in agricultural societies. To what degree the local people in modern villages situated in different environmental zones of the Konya Basin consume wild food plants was tested.

Finally, there was the question of how far it was possible to compare present day environments and sociocultural patterns, with the conditions predominating in the Neolithic. Paleoecological investigations and the vegetation surveys of the current environment could help estimating how far the wild fruit, nut and tuber resources were from the Neolithic settlements.

Changes are occurring all the time, and making a detailed analogy was not possible. None the less, these wild food plants recovered from the archaeological excavations are being used. It is very strong similarity to the Neolithic and harvesting, processing and storage may be similar. These techniques recorded from modern villages produced similar taphonomic results to those recovered from archaeological deposits.

It was also supported by the other analysis results on the archaeological remains that this ethnobotanical modelling can be used in interpresting the archaeological remains concerning wild food plants.

Researchers from other various disciplines, such as anthropologists, economists, sociologists, pharmacists and food engineers can also benefit from such ethnobotanical studies. This study also showed that, due to modernisation traditional living styles and natural environments which serve as open laboratories to archaeologists become extinct in a fast speed. For this reason, it is vital to record the data from these resources before they are lost from our world forever.

As well as scientific concerns, environmental worries are needed to be stressed in every possible chance. It is important that we pay attention to sudden changes in nature manipulated by human. Such changes are threat to us humans as well as habitats feeding and sheltering millions of animal and plant species.

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