The Carob Tree

Biographical Note

The writer was born in Ammohostos (Famagusta) in 1968 to a family of long agronomic and agrarian tradition. Following the eviction from the paternal land during the Turkish invasion of 1974 he migrated to the citrus farmlands west of Limassol. In the orchards he received his fundamental education and identified books as his most substantial niche. Nevertheless he pursued a formal education in the city's public schools.

He is a Horticulture (BSc) graduate of Iowa State University in the US where he also received a graduate (MSc) degree in Plant Physiology. Since his final repatriation he has been employed in the productive, commercial and research domains of the island's agricultural sector. As his concomitant pursuits remain the study of the Hellenic language, the study of the physical world, landscaping and the writing of scientific, technical, literary (philological) and critical treatises.

Forward

This little book does not claim to be a treatise, but a brief review of the history of the carob tree in Cyprus. The objective of the book is to inform the reader in a simple and easy to read manner about this humble yet important tree of Cyprus.

I believe that our dear friend Marios Kyriacou has succeeded in this objective and our decision to publish this book shall be proved correct.

Our thanks to
Photo Edwards & Sons

Edited
Elli Constantinidou

Publisher
Carob Mill Restaurants Ltd

CONTENTS

THE CAROB TREE

INTRODUCTION

In the Mediterranean landscape where long, dry summers under intense, incessant sunlight deplete the earth of its water reservoir, the vegetation patiently anticipates the return of the rainy winter. On parched valleys and on thinly soiled, often barren, rocky hillsides, one will almost unmistakably encounter among the sparse trees a species bearing a broad deep-green, umbrella-shaped canopy and a rough dark brown trunk, at times solitary but more often in groves, sheltering under its thick shade shepherds and their herds. That is the carob tree, which, rivaled only by the olive tree, has been of the greatest blessings for the Mediterranean lands and the Middle East.

Carob tree - Limassol district

It is not easy to fathom how valuable this tree has been for mankind over the past twenty-five centuries at least. In fact, its withered value, as opposed to the unquenched glory of the olive tree, has led to the present, faster than ever shrinkage of its populations through the act of man, as it often is the case with what has served but is no longer of apparent usefulness to him. Hence these trees that have survived over decades and centuries under frugal precipitation, offering man and beast cherished food and shelter, they are today subjected to unhesitant and often illegal lumbering only to end up as firewood. The Mediterranean landscape is thus impoverished, as ecosystems with marginal precipitation, were other trees could hardly subsist, are being stripped of this valuable species capable of self-seeding under such poor conditions.

Perhaps in order to conceive the elder value of the carob tree one should be aware that such it was that a single tree was often regarded more valuable than the plot of land on which it grew. Therefore the proprietor of the tree could be lawfully distinct from that of the plot. Of course, this was the case for one more reason; carob trees just like olive trees would self seed and grow as a wild stock where ever birds or rodents would discard the seed after having nourished on the fruit. These trees in order to become productive they would have to be grafted. Whoever grafted a tree instantly became its proprietor and thus enjoyed the fruits of the tree without any objection by the owner of the land.

No other tree of the Mediterranean meadow may offer so much while asking for so little. The thrifty carob tree may survive and fruit where for other trees precipitation would be inadequate and the soil too poor. At present day when the population of the earth has multiplied and continues to grow at a fast rate, water that is the support for the earth's life mantle is becoming all the more scarce. Trees like the carob sustain it while being sustained by it, thus setting a paradigm for our relation with our environment.

DESCENT AND NOMENCLATURE

The carob tree is a very old species that has survived the ice ages. It is a quite unique species bearing no close relatives and in fact a sole survivor of the genus Ceratonia. We often encounter it self-propagated among bushes of the chaparral, such as the lentisk (Pistacia lentiscus) and the rock-rose (Cistus salviifolius) and next to the olive tree. Seldom do we encounter the carob tree cultivated in large-scale planted groves.

It is assumed to have originated in Syria and probably also in the North African coast. In Syria and Palestine it was a rather common and proliferated species since antiquity. As it becomes apparent from the parable of the prodigal son, carobs were widely used as a fodder for livestock and particularly for hogs while they were deemed a humble food for man:

> *"And he would gladly have fed on the pods that the swine ate; and no one gave him anything."*
>
> Luke 15,16

From there it was disseminated to and naturalized in Asia Minor (present day Turkey), Crete, Cyprus, Rhodes, Chios, Samos, Sicily, south Italy, Spain and Portugal. The Spaniards carried it into Mexico and South America from where it has spread and established its presence under systematic cultivation to North and South America and even Australia.

Theophrastus referred to the carob tree as “keronea” and also as “Egyptian fig tree”. Dioscorides referred to it as “keratea” and to the fruit itself as “keration”, derived from the Greek word “keras” which stands for horn. All of these names characterize the fruit of the carob, which is a curved, oblong, compressed pod reminiscent of a goat horn. Another name for carob encountered in antiquity is “kyamos of Pythagoras”, kyamos meaning bean. From the Greek keratea, the Latin binomial (botanical name designating genus and specific epithet) for carob was derived, that is Ceratonia siliqua, siliqua meaning pod bearing. The Greeks must have imported the carob tree into Italy, as besides Ceratonia the Romans referred it to as Siliqua graeca, meaning “the Greek pod”. During the Hellenistic era the carob must have not been a widespread tree in the Greek isles, as Theophrastus makes no mention of its presence in Cyprus or Crete where today it is common and self-propagated. During the same period carobs from the lands of Palestine, Syria and the Northern African coast were carried by camel caravans to Egypt, where Greek merchants would buy and trade in them. Thus carobs’ alternative name as “Egyptian figs” was coined.

The name carob is derived from the Arabic “kharrub”. The spreading of the tree to the western Mediterranean lands by the Arabs during the middle ages explains the adoption of this name in most European languages: in English as carob, in French as caroubier, in Italian as caroba, in German as caruba and in Spanish as algaroba. Equally common was the naming of the carob by the Europeans as Bread Tree of St. John, encountered in French as abre ‘a pain de St.Jean and in German as Johannis brot Baum. According to the Greek botanist Gennadios, the latter name was derived from a misinterpretation of the reference of evangelists Mathew (3,4) and Mark (1,6) to the nourishment of St. John in the desert, according to which the locust referred to by the evangelists were not the actual insects but the carob pods. That also explains the alternative naming of carobs by the Europeans as Locust Beans. Finally, many are the various local names given to the tree and its fruit in the Greek world, among which the most common Cypriot “teratsia” that is obviously a corruption of the ancient Greek “keratia”.

BOTANICAL DESCRIPTION

The carob tree, Ceratonia siliqua, is the sole species in its genus. It belongs to the family of legumes (Leguminosae) that comprises all the pod-bearing plants. It can be encountered as a large bush but most often as a tree capable of reaching a height of up to 12m. It is a long-lived species that may survive for up to 300 years. Its canopy is usually neatly hemispherical and up to 5 meters wide. The trunk of the carob tree is rough and the bark bears a dark brown colour while the wood itself is distinctly reddish. Its leaves are 12-30cm long and 3-15cm wide. They are oblong and compound, that is, each one is made up of 4-8 small oblong or obviate leaflets. The leaflets are curvaceous, dark shining green above, dull and rather ashy-gray below. It is a polygamous, dioeciously or hermaphrodite tree, meaning that some individuals bear male flowers, others bear female flowers and others bear perfect besides male or female flowers (hermaphroditic). The flowers, particularly the male ones produce a very characteristic and for some rather unpleasant, opulent odor. The fruit of the carob is a compressed, horn shaped pod. When it ripens, about mid August, it assumes a very dark brown, almost blackish colour. The flesh of the pod has a spongy, glutinous texture rich in carbohydrates. It contains 10-18 very hard, compressed, lens-shaped, shining dark brown seeds in individual cavities.

CULTIVATION

The exploitation and perhaps the cultivation of the carob in Cyprus must date back to the first centuries A.D. This entailed the care taking and exploitation of self propagated trees, either solitary or in thickets, which in many cases were grafted to produce selected types of pod.

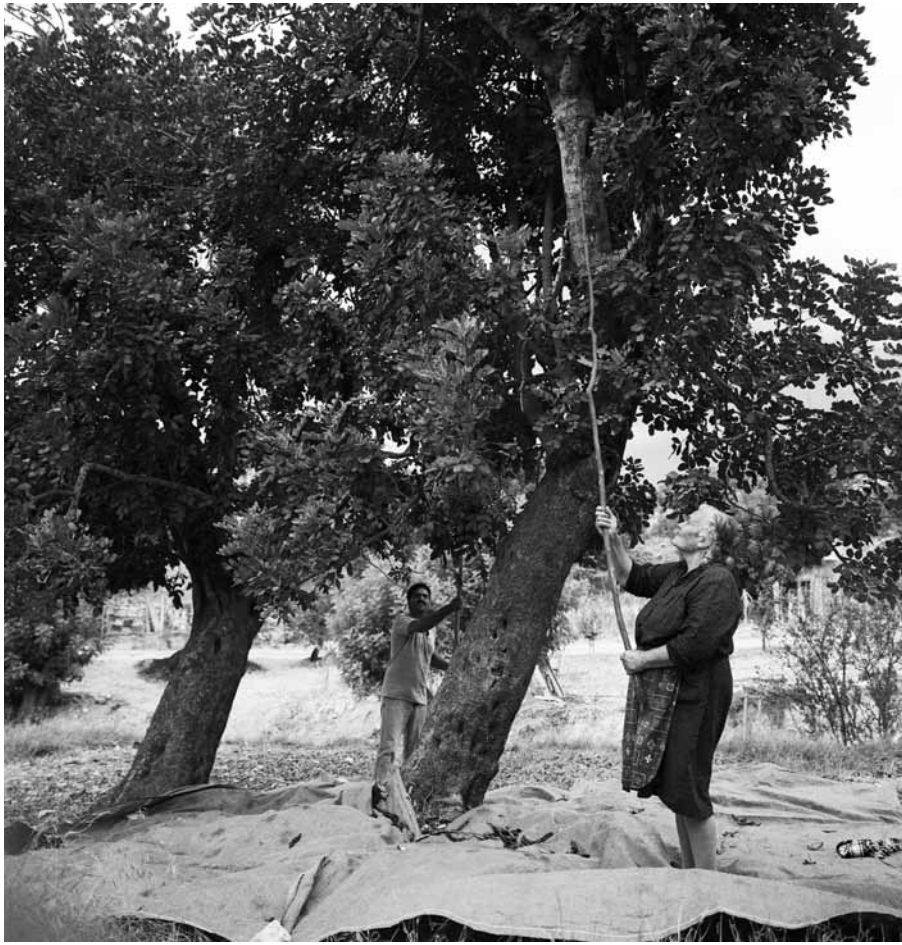
Thus three types of trees were eventually categorized: The wild stock, which comprises trees typically short and slender, sometimes of bushy habit and usually bearing small, slender pods. The so-called “apostolika”, meaning “of the apostles”, which were wild, non-grafted stock yet large fruited enough to receive commercial interest. The name most likely stems from the apostolic journeys of Saints Paul and Barnabas along with the evangelist Mark to Cyprus and their possible nourishment on selected, wild carobs. Finally trees produced by the grafting of selected, large fruited and productive types onto wild seedlings. Compact, systematic orchards of carobs are seldom found on Cyprus. As a rule, the cultivation of the carob tree on the island concerns either solitary trees or thickets in companion with agronomic crops such as barley and wheat.

Among the Cypriot varieties, most important is the variety known as “Tylliria”, named after the locality of its supposed origin. This is the most widespread variety and it has established the name of excellent quality for Cypriot carobs internationally. For that reason it has been imported and cultivated as a major variety in the USA, Israel and Australia. Other Cypriot varieties are “Kountourka” and “Koumbota”, both originating in the Karpasia peninsula. Varieties differ among them with regards to the size and morphology of the tree, of the fruit and the seed and with regards to the colour and composition of the fruit. A multitude of other local names is used to characterize types that most often fall under one of the three main varieties already mentioned.

The carob tree comes to fruit bearing around the eighth year from planting and reaches full production at 25-30 years of age. Under the conditions of low precipitation prevailing in Cyprus, average production is about 25 kilos per tree depending largely on the previous season's precipitation. Given adequate rainfall or irrigation, production may reach up to 200 kilos per tree. The carob tree is characterized by alternate bearing, that is, it produces a significant volume of fruit every other year.

The carob is a tree of minimal demands for care. It is very resistant to drought and therefore as a rule it is a rain fed crop, although it could benefit substantially in terms of productivity if partially irrigated during the summer season. The tree is also very frugal in its nutrient demands and its requirements are largely satisfied by the fertilization of companion agronomic crops. Its hardy character makes the carob a blessing for the productive forestation of marginally fertile soils and of regions receiving very low rainfall. It also offers itself as a highly suitable crop for organic farming as besides its minimal requirements it faces very few pests. Perhaps the major one is none other than the field rat (Rattus rattus var.frugivorus), which is attracted by the sweetness of the pods and the fresh sap under the bark. Rats are commonly controlled by use of baits and the placement of trunk rings made of spiny shoots of bushes, in order to impede the pest's climbing on the trees.

The pruning of the carob tree follows no particular system only it aims at improving sunlight penetration of the canopy and removal of the dead branches. Moreover, basal, adventitious shoots (suckers) are also removed as they deplete foodstuffs from the productive part of the tree. The continuous suckering is a characteristic of the carob as well as the olive, which allows them to reestablish infinitely owing to their resilient root system. This is a very valuable characteristic of particular ecological significance for it ensures the quick reestablishment of vegetation following fire and consequently the control of soil erosion, both of which are common phenomena around the Mediterranean.



Harvesting the carobs

The harvesting of carobs commences around mid August, at which time they reach maturity, and lasts up to November. The process basically entails knocking the pods off the tree by use of long sticks, commonly known in Cyprus as “vakles”, and picking them off the ground, onto which nets are often laid to ease gathering. Carobs are then placed into large woven jute bags and are transferred to the carob mills or to the local cooperatives. While this is often preceded by a curing period during which the pods are laid onto the ground in open air.

PROCESSING AND USES OF CAROBS
COMPOSITION AND NUTRITIONAL VALUE

The cultivation and increasing commercial importance led to a growing number of uses to which carobs were put but also to innumerate byproducts of their industrial processing. Most important use by volume remains until today the enrichment of livestock feed. For this purpose carobs are consumed whole or cracked (cubed) after they are kibbled, that is after the seed is removed. The seed itself is shelled and the embryo is separated from the endosperm. A natural gum, also known as tragasol, is extracted from the latter. This valuable substance is used in the food industry, in cosmetics, in paper manufacture, in the making of photographic film and the dying of precious fabrics. During World War II it was used in the manufacturing of parachutes, which as a matter of fact led the demand for Cypriot carobs to a climax and initiated the first attempt for local processing of the carob seed aiming at extracting the gum. Finally the seed embryos produced in the process are used as a valuable dietary supplement for cattle but also in the food industry, particularly as a thickener and stabilizer in the preparation of canned soups.

Carob flour is produced by the grinding of the rest of the pod and is used in the confectionery industry in place of cocoa. In the older days the aim of this substitution was the adulteration of cocoa since carob flour was far cheaper and considered largely as an inferior substance. Nowadays the nutritive advantages of carob flour have been acknowledged and the substitution of cocoa for carob flour aims in the production of wholesome and healthier confectionery products. These advantages mainly consist of a low fat content, a high natural sugar content, an abundance of minerals and vitamins, protein, and a rich pectin and lignin content which accounts for carob's beneficial properties for the peptic (digestive) system. Of course beyond its nutritive value, the very flavor and taste of carob flour can hardly be distinguished from that of cocoa. Owing to its high pectin content carob flour has been used in medicine for the treatment of infant diarrhea and stomach pain.

The therapeutic properties and medicinal use of carobs was known in antiquity and recorded by Dioscorides who makes mention of their digestive and diuretic value. Also known was their use in the preparation of soothing potions for pneumonic (i.e. of the lungs) ailments.

The main constituent of carobs is carbohydrates, sugars in particular. Therefore their role in human diet has been mainly as a sweetener. The Arabs and the Ottomans used carobs along with licorice root in the preparation of the very popular refreshment drinks known as “sherbets” [Ar. sharbah, Turk. sharbat]. Carob flour was widely used by the same people for making popular and affordable desserts. Carob flour was also considered as a cheap substitute for coffee and was resorted to for the adulteration of the latter. Contemporary demand for healthy alternatives in nutrition is leading to a resurgence in demand for both carob flour and carob syrup in the confectionery industry of Europe and America in replacement of cocoa, coffee and sugar for chocolates, biscuits, coated raisins, drinks and a multitude of other products.

Composition of carob flour on dry matter basis	
Calorie per 100g	177
Total Fat	0.7%
Natural Sugars	46%
Fiber	7%
Other Carbohydrates	35,4%
Protein	4,5%
Ash	3,4%
Moisture	3,0%
Iron (mg/100g)	50

In Cyprus there survives a long tradition in the preparation of a natural sweetener known as “teratsomelo”, meaning “carob honey” and of a natural a caramel known as “pastelli”. Their preparation is quite simple. Carobs are coarsely ground, placed in large straw baskets and impregnated in cold water. The sugar water solution draining underneath is collected in a large kettle and simmered. Evaporation of the water thickens the solution to produce a dark brown, viscous syrup with the characteristic intense aroma of carobs. In this form it can be used as a sweetener in confectionery and in the preparation of refreshment drinks. Prolonged simmering of the syrup leads to the formation of the caramel known as “pastelli”. This natural caramel is still a ubiquitous and highly prized delight in traditional village fairs around Cyprus. Finally, the distillation of the carob sugar solution may yield 18-20% alcohol.

The wood of the carob tree has long been considered as an excellent fuel and a source of fine quality coals. The decline in the commercial cultivation of carobs in Cyprus and elsewhere has turned interest toward lumbering, which during the last decades seems uncontrolled and threatens long-lived populations of the species.

The leaves, the bark and the young, immature fruit contain adequate quantities of tannin to be used in the treatment of hides. In many parts of the Mediterranean this tannin was also used for the dying of sails.

Finally, the seeds of the carob, owing to their roughly consistent individual weight were employed initially in ancient Egypt as a measure of weight for gold, precious stones and spices. In time the term carat was coined, most likely derived from the Greek word “keration”, meaning carob. The weight of the carob seed ranges between 190 and 205 milligrams while a carat has been defined as 200 milligram

THE CAROB TRADE - CYPRUS' "BLACK GOLD"

The importance of carob trading for the Cypriot economy had undoubtedly been paramount until the early 1960's. Until the end of the colonial era and before the advent of modern agriculture with large scale irrigated crops like potatoes and citrus, carobs were among the main agricultural exported products of the island and a substantial source of exchange income. The unrivalled quality of Cypriot carobs became renowned internationally. The popular naming of carobs as the black gold of Cyprus therefore came by.

The total annual carob production of Cyprus while following the fluctuations in the previous year's precipitation it more or less averaged around 50,000 tons. The number of trees on the other hand was estimated at around two million, thus yielding an average production of 25 kilograms per tree. In 1960 Cyprus held the third position worldwide in carob production after Spain and Italy.

Renowned centers of carob production were the villages of Ypsonas, Pyrgos, Anogyra, Peyia and Eptakomi. About thirty per cent of the total production originated from the provinces of Ammohostos (Famagusta) and Kerynia (Kyrenia), now under the control of the Turkish army. In every carob-producing region, one may still encounter robust warehouses where production was collectively delivered to and in cases of coastal areas small loading docks and marine shelters for the shipment of carobs.

Large-scale carob trading in Cyprus began before the First World War through private entrepreneurship. Of course the potential revenue from carob exports did not evade the interest of the British colonial administration. From the book of Magda Ohnefalsh-Richter "Greek Ethics and Customs in Cyprus" written between 1894 and 1912, we learn that the British administration of the island received 157,452 pounds from the carob exports in the year 1906/7, a noteworthy amount given that the total revenues of the administration from the collective exports of all other agricultural products was only 142,383 pounds. These numbers provide ample evidence to the great significance of carob exports for the island's economy. The latter is also exemplified by the formation in 1907 of the "Committee for the Protection and Proliferation of the Carob Tree" under

the aegis of the political envoy in Larnaca. The main objective of the committee was the control of field rats, the most widespread pest of the carob tree to this day.

From the very first years after its establishment in 1896, NP Lanitis Ltd, one of the island's major trading companies, devoted a substantial share of its activity to the carob trade. Major markets for Cypriot carobs at the time were Britain, Russia, Egypt and Romania. The latter two imported mainly selected, whole carobs established by NP Lanitis Ltd as type "Extra". Following First World War, carob exports from Cyprus soar along with wine exports. Private industrial mills that buy directly from farmers their annual production for processing and exporting come to the forefront. Carob delivery to the mills would begin in August and the long wagonload processions would fade off sometime in November. The sorting and processing of the loads could last up to six months.

Transporting the carobs to the Carob-Mill

The first and southernmost compartment of the Lanitis carob mill was founded more than a hundred years ago, in the latter days of the Ottoman period while two more legs were added later on. Carobs were received in the first compartment and weighed on an industrial, large-scale weight balance. In this same space carobs underwent their first selection. Foreign bodies such as pieces of wood or stones that all but accidentally had sneaked into the farmers' delivery bags were discarded amidst commonplace quarrelling and practical joking. Selected, large-size carobs were set aside for export in intact form destined for domestic consumption. The rest of the carob bulk passed through three different mesh sizes, was kibbled and crushed. This process took place in the central compartment of the warehouse were the actual mill machinery was and still is housed.

The final products were three: Small carob cubes, carob flour and the seed. These products were stacked in the northern compartment pending shipment. Carob cubes were exported solely for livestock feed to countries such as Britain, Germany, France, and Russia. Carob flour on the other hand was often exported as a substitute for chocolate in the continental confectionery industry. The seed was most always in high demand and rewarding prices, as it would yield the valuable byproduct known as carob gum or tragasol upon processing of the cotyledons. Gum was used in the manufacture of photographic films and elastic membranes. With the advent of the oil industry and its plastic byproducts this use gradually dwindled.

Beyond the actual export of carobs, either whole, kibbled or ground, attempts were at times made to further process carobs locally. Most notable among them were the production of gum by the Schizas factory in Limassol and its export to Britain during the Second World War were it was used in the manufacturing of parachutes. Equally ambitious was the operation of a chocolate factory in Alassa, which utilized carob flour instead of cocoa. A carob gum factory for industrial grade gum and a roasted carob powder factory were also later established and operated by the Cooperative Carob Marketing Federation.

The first collective attempt to market carobs took place in 1945 in the district of Limassol with the participation of roughly ten local cooperatives. In 1946

Loading of carobs on barges - Old Limassol Port

five district Carob Marketing Unions were assembled, with the exception of the Nicosia district were carobs are not cultivated. Each union operates its own kibbling plant for carobs and other processing machinery for other products. Initially the five district unions functioned independently of each other in marketing their carobs locally and abroad. Members of these unions were the cooperatives of carob-producing villages. Carob farmers delivered their annual harvest to the village cooperatives and were down paid for about 70-75% of the value according to current market price.

The village cooperatives would then deliver their produce to the district Union. The district Unions were responsible for the storage, the kibbling and bagging of carobs and finally the loading onboard commercial ship. The collective trading of carobs was eventually assigned to the Cooperative Carob Marketing Federation in 1953. The Federation exported kibbled carobs almost entirely to Britain while the seed was exported to various continental countries. The proceeds less expenses were distributed by the Federation to the district Unions and village cooperatives, which in turn completed the payment of their member farmers. All transactions were carried out through the Central Cooperative Bank. Remarkably the total annual carob production in Cyprus for the year 1963 reached a record high of 67,000 tons, about 60 per cent of which was marketed through the cooperative network and the rest through private traders.

The total annual production of carobs in Cyprus today does not exceed 10,000-14,000 tons. About 1,000-1,500 tons of these productions are consumed on the island mainly as livestock feed. The rest is exported to Britain, USA, Italy and Sweden also as livestock feed. Selected, whole carobs for domestic consumption are currently exported only to Egypt.

Export Statistics for Carob-producing countries (1950's-1960's)

Country	Annual average production (tons)	Comments
Spain	408.000	1950-52
Italy	61.000	1950-56
Cyprus	53.000	1959-68
Greece	35.000	1960-66
Portugal	28.000	1950-52
Algeria	20.000	
Morocco	7.000	(exports only)
Turkey	5.000	(exports only)
Malta	3.000	

Orphanos, P.I., and Papaconstantinou, J., Agric. Res. Inst., Tech. Bull. No.5, 1969. Nicosia, Cyprus.

Unfortunately the cultivation and trading of carobs in Cyprus today is following a path of steady decline. Despite the prospect for support of the crop by the European Union and the particular applicability of the crop's shifting to a commercially more promising organic status, farmers seem disinterested in pursuing an expansion of the crop owing to the unrewarding prices for carobs over the last three decades and the low productivity under the prevailing drought conditions. Contrary to countries such as Spain, Portugal, Italy, USA and Israel, the systematic cultivation of carobs, as opposed to grafting and cropping of wild stock, was practically never pursued in Cyprus. Furthermore, despite the declaration of the carob tree by the state as a protected species, the rampant felling of carob trees in the countryside is a stark reality. Hence, added onto the seemingly irreversible decline of agricultural interest in carob culture is the endangerment of the species' population and the potential ecological impoverishment of arid, infertile landscapes enriched for eons by the carob tree's presence.

BIBLIOGRAPHY

1. Γενναδίου Π.Γ. (Διευθυντού της Γεωργίας), «Περί Κερατέας». 1902. Report on the Carob-Tree. Government of Cyprus. Department of Agriculture.

2. Γενναδίου Π.Γ., "Λεξικόν Φυτολογικόν". 1914. Εκδόσεις Τροχαλία (Ανατύπωση 1997), Αθήνα.

3. Magda Ohnefalsch -Richter, Ελληνικά Ήθη και Έθιμα στην Κύπρο. 1913. Μετάφραση Άννα Γ. Μαραγκού. 1994. Πολιτιστικό Κέντρο Λαϊκής Τράπεζας, Λευκωσία.

4. Meikle R.D., «Flora of Cyprus». 1977. The Bentham-Moxton Trust, Royal Botanic Gardens, Kew.

5. Heywood V.H., Flowering Plants of the World. 1993. Oxford University Press, New York.

6. Theophrastus Enquiry into Plants, «Περί Φυτών Ιστορίας». Harvard University
Press, 1990.

7. Γεωργακοπούλου Α.Ν., "Ο Πλούτος από τα Δέντρα". Παράρτημα "Γεωργικού Δελτίου". 1931. Έκδοσις Ελληνικής Γεωργικής Εταιρείας, Κοινοφελούς Ιδρύματος Δημοσίου Δικαίου.

8. Λαμπράκη Μ., "Τα Χόρτα". 1997. Εκδόσεις Τροχαλία, Αθήνα.

9. Κουμεντάκη Π., "Σύγχρονη Υγιεινή Οικολογική Μαγειρική. 1996. Αθαν. Χριστάκης, Αθήνα.

10. Bailey C., «Chocolite». Healthy Eating. April 2000. The Magazine Printing Company. Brimsdown, Enfield, Middlesex.

11. Ροδοσθένους Χ., “Η Χαρουπιά”. 1997. Υπουργείο Γεωργίας Φυσικών Πόρων και Περιβάλλοντος, Τμήμα Γεωργίας, Λευκωσία

12. Orphanos P.I., Practical Aspects of Carob Cultivation in Cyprus. Portug. Acta Biol. (A) XVI (1-4): 221-228, 1980.

13. Davies W.N.L. et al., Chemical Composition of Developing Carob Pods. J.Sci.Fd Agric., 1971, Vol. 22, February.

14. Κέστας Α., Διευθυντής Συνεργατικής Ομοσπονδίας Διαθέσεως Χαρουπιών Λτδ. 2000. Προσωπική συνομιλία.

15. Ζαχαριάδης Χρ., Μηχανικός Χαρουπόμυλου Λανίτη (1943-1983). 2000. Προσωπική συνομιλία.

16. Orphanos, P.I., and Papaconstantinou, J., Agric. Res. Inst., Tech. Bull. No.5, 1969. Nicosia, Cyprus.

17. Carob Agro forestry in Portugal and Spain. In The Australian New Crops Newsletter. Issue No 7, January 1997.

18. The New Oxford Annotated Bible with the Apocrypha. New York Oxford University Press, 1977.

19. Charalambous J., et al. 1966. The Composition and Uses of Carob Bean. Cyprus Agricultural Research Institute.

20. Katzen M., Moosewood Cookbook. 1977. Ten Speed Press, Berkeley, California.