INTRUSIVE FLORA OF ECONOMIC IMPORTANCE
IN ANCIENT ITALY

by

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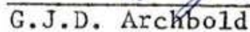

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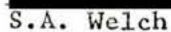

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Abstract

The aim of this thesis is to determine which plants were imported into ancient Italy, the circumstances permitting the introductions to take place and become established, and the subsequent effects of the intrusive plants upon the native flora and peoples of the peninsula.

The introduction provides a brief preface to the mechanics of plant introduction and defines the category of plants and the chronological period examined. This chapter contains a short discussion of the problems encountered in determining the geographical origins of a plant and the methods used to solve them. A brief account of the most important ancient and modern sources of information concludes the chapter.

Chapter II is a catalogue of the plants which are known to be foreign to Italy. Entries are arranged in botanical order and where possible, common and ancient Latin names are given. A short description of the functions, importance, date and agent of introduction accompanies each entry. A summary of the pattern of introduction with regard to chronology and economic importance is provided by Table I and its interpretation in chapter III.

In chapter IV the factors which resulted in plant importation and establishment in Italy are examined. Contact with new lands and peoples provided the greatest stimulus for importation. At first, alien plants were introduced by foreign peoples coming to Italy, but as Roman military and political power grew, the Romans penetrated other lands and imported plants into the peninsula themselves.

Chapter V reviews the consequences of alien flora upon the country-

side and people. Except for relatively small areas, it would appear that native crops were not severely affected by intrusive plants until the first century A.D. In fact, the importation of certain plants probably helped to maintain the fertility of Italian soil and agricultural production. The effect upon the people of the peninsula was direct and important almost from the beginning. The staples of the Italian diet were largely formed from the products of introduced plants and variations in the diet were the result of importations. The change from subsistence to profit farming was made possible by alien flora and created a special problem for Rome--the need to import grain.

The summary offers a terse survey of the patterns of plant introduction in the general light of changing Italian culture. It also places the investigated period within the larger chronological framework of the major waves of plant introduction into Italy in order to illustrate the great importance of this period to the peninsula.

Examiners:

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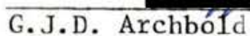

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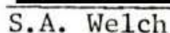

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Finally, I acknowledge with deepest gratitude the excellent work and friendly conversation of Mrs. A. Nasser, who has typed the text of my thesis.

A.N. Sherwood
Victoria, 1980.

Abbreviations

Abbreviations follow those listed in the following works:

i) Latin authors: Oxford Latin Dictionary. fascicle i (Oxford, 1968) ix-xx.

ii) Greek authors: Liddell and Scott, Greek-English Lexicon, 9th ed., revised by H.S. Jones (Oxford, 1940, repr. Oxford, 1968) xvi-xxxviii.

iii) Periodical titles: "Notes for contributors and Abbreviations" American Journal of Archaeology, vol. 28, No. 1 (Winter, 1978) 1-8.

iv) Reference works and collections: Hammond, N.G.L. and Scullard, H.H. (Eds.) The Oxford Classical Dictionary, 2nd ed. (Oxford, 1970) ix-xxii.

Translations

Unless otherwise noted, the translations of Latin and Greek passages are taken from the Loeb Classical Library.

Dedication

This work is dedicated to my family for their unfailing support of me during my studies.

Dedicatur quoque omnibus magistris meis qui conati sunt mentem meam tollere.

Fig. 1 The regions of Italy. Note the position of ancient Calabria; the area which now bears that name was Lucania and Bruttium to the Romans

I. Introduction

Farming, the fundamental craft of all civilizations, began with plants as nature had made them. It is obvious, but rarely acknowledged, that man shaped wild plants, just as he shaped inanimate objects into better tools to improve their usefulness to himself. For example, the wild grape vine of Eurasia, Vitis vinifera sylvestris, is dioecious and has one-or-two ounce bunches of fruit the size of peas. But from this, man has produced approximately 3000 different cultivars, some of which have fifteen pound bunches of grapes the size of plums and all of which are hermaphrodite.[1]

In primitive plant breeding systems there are at least three ways that generic variability can be increased.[2] The first method is through crop-weed complexes. Most cultivated plants have weed races which evolve side by side with the cultivated form. Although there is some exchange between them, the integrity of the plants is largely retained. The Italians had little, if any, control over this method of generic variation. The second method favoring variability lies in the agronomic practices of primitive cultures. Subsistence farmers could not afford a crop failure since such a disaster could result in famine or death. Therefore a dependable crop was much more desired than a crop of maximum yield. As a result, subsistence farmers tended to grow crops of mixed populations rather than crops of pure varieties to enhance the survival of the crop. Subsequent hybridization of the intermingled plants increased the genetic variance of the crop. Primitive farmers were able to regulate this method through seed selection and the weeding of the crop. The third system of producing plant variants is through

plant introduction. Although farmers by nature are a sedentary breed who establish those crops and plants most suitable to their needs by means of plant selection and experimentation, it sometimes becomes necessary for them to move, and when they do, the farmers take their valuable plants with them. In the new location of settlement, the introduced plants may come into contact with other varieties of the same plant resulting in hybridization between the races which may produce varieties with higher potentials. Intermittent trading and exchange of plant materials from one region to another could, of course, have similar genetic effects. Of the three manners of increasing the genetic variability of plants, the Romans had most control over this last method, plant introduction.[3] The reasons and factors leading to plant introduction and the subsequent effect of these plants in Italy are the topic of this paper.

The immigration of cultivated plants in many cases began before human history was recorded. As a result it has not always been easy to determine the origin of individual cultivated plants, especially since the wild species from which they came were unknown for a long time. The deliberate assemblage of plant materials is recorded as early as the Assyrian king Tiglath-Pileser I (c. 1130 B.C.) who recorded "that he had brought cedars and other trees as well as rare vines from countries that he had conquered and had planted them in the gardens of his own land."[4] And Darius (521-486 B.C.) praised Gadatas, the satrap of the Ionian province, for cultivating in western Asia Minor the fruit trees of Syria.[5] Later, Aristotle established a botanical garden in Greece and trained both Alexander the Great and Theophrastus in natural history

and philosophy. Alexander took botanists along with his armies when he marched to India, and Theophrastus described the differential response of plants grown in different environments and locations. Plant introductions have continued to take place to the present day, and some have spawned famous historical incidents such as the mutiny of the 'Bounty' in 1787.[6] New and interesting plants have always attracted the attention of agricultural peoples.

In order to discuss introduced plants in Italy, it is necessary first to determine which plants are indigenous and which are intrusive. To consider all the flora of Italy would be a task far beyond the scope of this study. Therefore the topic of discussion is limited to a study of those plants which served a utilitarian purpose and fall within the following categories of use: (1) consumed by man, (2) shelter (shade trees, hedges), (3) ornamental, (4) industrial, (5) animal fodder, (6) medicinal, (7) fertilizer, (8) semantic, whose importance resides in some religious, magical or superstitious significance. Although plants such as the apple, pear, olive, vine and fig are native to various parts of Europe, we have no evidence of their scientific cultivation west of Greece until the first millenium B.C. and particularly in Roman times.[7] Only with the introduction of superior cultivars and techniques do these plants become socially and economically significant. Therefore, such plants are included in this paper.

By definition, if a plant is intrusive it must be of foreign origin and, although this paper is not primarily concerned with discovering the place of origin of the various plants, knowledge in this area is valuable when tracing the growth of communication and trade among the peoples

with which the Romans had dealings. In the case of certain plants such as the peach and apricot, knowledge of the native land may also help to explain why some introductions occurred at such a late date.[8] Unfortunately it is often a difficult task to trace the land of origin of a plant.

Five or six methods of inquiry exist for discovering the geographical origin of a cultivated plant. One of the most direct means is to seek the country in which it grows spontaneously without the help of man. Besides difficulties of observation there are other obvious problems such as whether a plant growing wild, with all the appearance of an indigenous species, has existed in that country from a very early period, or has been introduced at a more or less ancient date. Plants which fit this description are termed naturalized species, that is, those plants that have been introduced among a country's native flora and which, although of a foreign origin, persist in such a manner that observation alone cannot distinguish them. Through the work of N.I. Vavilov[9] the theory has evolved that those areas which contain the greatest number of cultivars of a species represent a possible centre of original domestication.

Historical records give indications of a plant's geographical origin when the plant has been transplanted by migrations, military expeditions, traders or adventurers. However, the information obtained from the ancient authors is not without error and must be examined carefully. A common mistake is the belief that a plant originates in that country from which it has been obtained. For example, the peach was called the *Persicum malum*, the Persian apple, by the Romans because they had obtained

it from Persia. We now know that it originated in China. Similarly the Romans, having received the pomegranate from Carthage, called it <u>malum Punicum</u>, the Punic apple, but we know it was first domesticated in Persia.

The principal difficulty which commonly occurs in the case of ancient historians is to find the exact translation of the names of plants, which in their works always bear common names. Attempts to identify the plants of the poets are extremely difficult since descriptions are almost always lacking, determination often being made by means of the few adjectives given. Some assistance is provided by the short descriptions provided by writers such as Pliny, Dioscorides and Columella, but once again vernacular nomenclature was probably as arbitrary and capricious as it is today; often the same name is given to different plants. However, in some cases the common names of cultivated plants are well-known and may give indications of the origin of a species. If a community uses a foreign name for a commodity, that commodity can be regarded as of foreign origin, coming from that country where the language of its name is spoken. For example, the word "tea" comes from "te", which is used in one of the Chinese dialects in place of the more universal "cha"[10] and "chocolate" from the Mexican "chocolatl".

Archaeology and palaeontology provide the most direct proof[11] of a plant's existence in a country and also provide a date of service. Evidence from archaeological investigation includes the remains of equipment for processing products, aerial photographs which reveal patterns of agricultural settlement and activity, inscriptions, reliefs and paintings of plants and finally the actual remains of plants, pollen analysis and casts made from root and grain cavities. Unfortunately

most of these 'proofs' have drawbacks. For example, the paintings of the Villae Rusticae around Pompeii depict the date,[12] but the date did not mature around Pompeii.[13] Scullard[14] also points out that the floral decoration of Etruscan paintings and works of art illustrate many non-indigenous plants, but he advises us not to place total reliance upon these depictions as proof that these plants were grown in Italy, since "Etruscan art borrowed much from oriental sources." Even the most direct evidence we have, the actual remains of parts of plants, can often be only of limited value in determining the flora of a given area. Identifications of plant remains are often very difficult and sometimes must be left at the generic or even the family level. Jarman[15] states that precise identification "often is impossible .... For the botanist attempting to reconstruct a botanical prehistory, this state will cause him some difficulty." Dimbleby[16] states that the identification of pollen grains also can usually be ascribed only to family and perhaps genus and Jashemski[17] points out that historic sites have not yielded significant results in pollen analysis owing to the ease of contamination and the fact that pollen is easily destroyed once it is exposed to air. However, this remains the most valuable source of information and new results are continually being published as techniques of analysis are improved.

The period to be examined encompasses the interval from the beginning of the first millenium B.C. to A.D. 500. Since this predates the major wave of plant introductions during the Greek colonization period by several centuries, we are able to evaluate the impact that introduced species had upon Italian agriculture as it developed from a primitive,

subsistence livelihood to a level unattained by western man until relatively modern times. Thus we are able to determine changing patterns in the needs and desires of the peoples of Italy as reflected by their importation of various types of plants. By following the development of agriculture within the peninsula we also can examine the factors which led to the introductions and those which led to their establishment or failure as a plant in Italy.

Attempts to date plant introductions must remain vague, especially for the early period. Many plants cannot be accurately dated to within 500 years, others to within a few hundred years. Only after 500 B.C. can we begin to be more specific. However, since we are dealing with patterns of change determined by waves of introductions, which may last several centuries, specific dates are not of major importance. Later, near the end of the Republic and the beginning of the Empire, historical sources become valuable as guides for determining intrusive flora, their dates of importation, and the motivations and historical contexts surrounding the introductions.

The peninsula of Italy is characterized by great variations in climate, geological structure and soil types. Agricultural practice consequently varies from region to region, and even within some regions. The location of Italy west and north of the lands of the Eastern Mediterranean Basin along with the survival of its forests ensured the peninsula of a heavier rainfall and predominance of particular patterns of crop and animal husbandry. The fertility of Italian soil has been well known since antiquity, but the ancient writers were not unaware that poor soils and terrains were unsuitable for particular crops.

Traditionally Italy has been divided into three divisions--northern, central and southern--according to climate. The northern region, with its severe winters and hot, dry summers belongs climatically to Central Europe. The central and southern regions, with most of their rain falling in the winter, belong to the true Mediterranean climate. As one travels from the northwest to the southeast of the peninsula, the amount of precipation decreases sharply resulting in significant change of land use.

Landscape features further determine the patterns of land use in the peninsula. Relatively extensive coastal lowlands and river plains (especially the Po Valley) combine with the Alps in the north and the Apennine range to provide excellent conditions for pastoral husbandry on a large-scale, with transhumance from winter to summer pastures. Cultivation also extends well up the mountain slopes in many regions of Italy, which makes possible the cultivation of temperate and sub-tropical plants within the same region.

"Under such varied conditions of climate and relief, farmers were able to acclimatize a great variety of sown and planted crops. The restricted areas of level ground were used for grain crops, the hillslopes for vineyards and orchards, the mountains for timber and summer pasture (Var. R. 1.6.2-6; 1.23.1-4; Col. 1.2.3). The coastal flats were put down to meadow and used for cattle. In the valleys the richer lands were set aside for wheat, flax and vegetables, the poorer soils for legumes, which require less nourishment, and which themselves enrich the soil by the process of nitrogen-fixation."[18]

Ideally, detailed studies of individual regions of antiquity should

be made but the evidence does not permit a fully-documented account of the various types of development for different regions at different periods. Nevertheless, we should remember that many of the references of classical writers to the peninsula can be seriously misinterpreted if it is not appreciated that Italy has a great variation in her land, with gross differences in agricultural and economic potential.

In no department of Roman life are we better informed than in the exploitation of the soil. Even though for the first six centuries of Roman history we have no contemporary records on which to construct an account of agricultural development, from the Elder Cato to the Younger Pliny we are much better informed.[19] "We have not only contemporary witness for much of the time in the form of references and allusions in literature, but the works of the great writers on agriculture, Cato, Varro and Columella, not to mention the encyclopedist Pliny, fall within it, and give us on the whole a picture exceptionally complete."[20] These four represent the most important ancient authors for this study.

Marcus Porcius Cato (234-149 B.C.) wrote his De Agri Cultura, the oldest continuous prose work in the Latin language, about 160 B.C. To a large extent it deals with the development of orchards, vine, olive and grazing for profit in Latium and Campania during the second century B.C. It is basically a manual concerned with the technique of farming for profit but since Cato mentions about 120 plants, many scholars argue a silentio that plants of later importance in Italy that are not mentioned by Cato must have been introduced after Cato wrote. For example, since lucerne is mentioned by Varro, but not by Cato, scholars assume that it was introduced into Italy during the interval between their two

books. Brehaut[21] points out that the purpose of the manual should be considered and suggests that the revolution in Roman agriculture, that is, the transition from cereal to cash crops and management by absentee owners, necessitated a manual on operations which Cato supplied. Thus Cato provides valuable information at a critical turning point in Roman agriculture.

Marcus Terentius Varro (116-27 B.C.) wrote his Res Rusticae in his eightieth year,[22] 37 B.C. Its three books are devoted respectively to agriculture proper, domestic cattle, and the smaller stock of the farm. Although the latter two books are not as important for this essay as the first, they occasionally mention plants of interest. The work, almost encyclopedic in scope at some points, contains a wealth of information with valuable introductory chapters. In spite of its many shortcomings it was prized from Varro's time onwards and was consulted by most later authors including Vergil, Columella and Pliny.

Lucius Iunius Moderatus Columella was probably born about the beginning of the Christian Era. He wrote his De Re Rustica in twelve books and his De Arboribus in two. We are missing only the first book of the De Arboribus. Books I to V, X and XII of the De Re Rustica are extremely valuable when discussing the flora of Italy. The other books are useful to a lesser extent since they are concerned with animal husbandry, poultry, fish, bee-keeping, the duties of the bailiff and his wife, and a calendar of operations. The De Arboribus deals with the cultivation and propagation of the vine, olive and other trees, but most of its material is more fully treated in the De Re Rustica. Columella[23] indicates in the De Re Rustica that agriculture was losing ground to

meadows, pastures and stands of timber which were given preference by owners. White[24] says "Columella's aim seems to be to restore confidence in traditional forms of farming, especially in the combination of sown with planted crops ... wasteful methods must be abandoned, carelessness eliminated, and a determined effort be sustained to restore and preserve the fertility of the soil of Italy." As with the earlier writers, profit is a major concern of Columella and his books are aimed at wealthy owners, rather than small holders.

Gaius Plinius Secundus, Pliny the Elder (23 A.D.-79 A.D.) was an encyclopedist who has often been criticized as a mere compiler. However, his work contains much information not to be found elsewhere. Plants occupy the attention of seventeen (Books XII-XXVIII) of his thirty-seven surviving books. Although he seems to have had little interest in the classification of plants on the basis of their resemblances, he did group plants together. For example, he classified trees as forest trees, exotic trees and fruit trees. His moralizing attitude toward the condition of contemporary agriculture gives us valuable information when he compares it with earlier agricultural practice, but one must be critical of the information which Pliny supplies because of his own uncritical method. That he treats at length agricultural details, not only concerning grain crops, but also fruits, vegetables and other plants is of great value for this type of study, as are his short descriptions of the various plants.

These four authors represent the most important ancient literary sources for the introduction of plants to Italy. Of course valuable information can be found in many other writers as well. Strabo for

example provides many facts upon which one can make judgements as to the profusion and distribution of various plants; Vergil's Georgics are useful, although it is generally agreed that he draws heavily upon Varro; Horace and the Younger Pliny provide evidence of agricultural practice on estates of different periods; Palladius (fourth century A.D.) wrote a monthly agricultural calendar which provides some information on the state of crops and of agriculture in the Late Empire, but "since it is a calendar of operations one must be careful not to draw the conclusion that agriculture was necessarily in decline because of the declining references to plant varieties."[25]

Of the many modern works on plant biology, there are very few which might be regarded as standard reference books for a topic on ancient plant introductions. Alphonse de Candolle's L'Origine des plantes cultivées printed in 1886 remains the basic reference for determining the age and place of origin for plants. Although his dates for plants are of little value, his conclusions regarding geographical distribution remain, for the most part, unchanged.

Shortly before the appearance of de Candolle's book, H. Nissen published his Italische Landeskunde (1883) which has also become very dated in many respects. However, since it treats Italy specifically, the work remains a fundamental source of much information not available elsewhere.

In 1926, N.I. Vavilov[26] produced a massive work in Russian which added greatly to the knowledge of plant origins. In 1949 K. Starr Chester translated many of the more important sections of the work under the title The Origin, Variation, Immunity and Breeding of Cultivated

Plants. As with de Candolle, this work is concerned with the flora of the world and has become seriously dated.

Standard reference works of the flora of Italy are A. Fiori's *Nuova flora analitica d'Italia* (1923-1929), E. Baroni's *Guida botanica d'Italia* (1955) and V. Giacomini's and L. Fenaroli's *Conosci l'Italia: II la flora* (1958).

The most up-to-date reference books concerned with the flora of our region are O. Polunin's and A. Huxley's *Flowers of the Mediterranean* (1967), O. Polunin's *Flowers of Europe* (1969) and T.G. Tutin's (ed.) *et al*. *Flora Europaea* (1968-1976). These books are especially valuable since they attempt to indicate which plants are native and which plants are introduced to Italy. Unfortunately their usefulness is limited since they offer no attempt to date the introductions.

More general, but fundamental works on Roman agriculture and its development within the ancient economy are W.E. Heitland's *Agricola: A Study of Agriculture and Rustic Life in the Graeco-Roman World* (1921), T. Frank's (ed.) *An Economic Survey of Ancient Rome* (1933-1940) and K.D. White's *Roman Farming* (1970). These three works are basic to an understanding of Roman farming practice and contain much information on the external and internal influences which shaped Italian agriculture.

K.D. White also produced *A Bibliography of Roman Agriculture* (1970) which provides a quick and convenient guide to all aspects of the profession.

Finally, J. André published his invaluable *Lexique des termes de botanique en Latin* in 1956. The problems concerning plant identification have already been referred to, and it is largely due to this work

that the flora in the works of the ancient Latin writers is more properly identified by scholars today. André's collection of references for each type of plant has provided an indispensable aid for a study of this type.

Through the examination and comparison of the information found in the ancient authors and in modern authorities, this thesis will attempt to illustrate the impact of intrusive flora upon the agricultural practice of Italy by determining the reasons and the effects of plant introductions into the peninsula between 1000 B.C. and A.D. 500.

II. CATALOGUE OF PLANTS

The following catalogue constitutes a list both of the plants not native to Italy and of plants which were not utilized to full potential until superior cultivars were introduced into Italy,[27] both categories relating to the period 1000 B.C.-A.D. 500. The information included in the catalogue is arranged in the following order:

a) Botanical family name in upper case letters followed by the common name of the family: JUGLANDACEAE: Walnut Family. This name is only given at the beginning of each group of plants which are members of that family.

b) Genus name with an initial upper case letter: Juglans.

c) Species name in lower case letters: regia. This is followed by the author's name which is often abbreviated: L. (Linnaeus).

d) The common name(s): Walnut, French Nut, Italian Nut.

e) The Latin name(s) used by Roman authors:[28] _juglans_, _Jovis glans_.

f) Information concerning the plant:[29]

  i) the place of origin, since this is sometimes a factor in determining the date of introduction;

  ii) the country from which the plant was brought to Italy;

  iii) the agent by which the plant was introduced;

  iv) the date or period of introduction;

  v) the uses of the plant: food, herbal, ornamental, industrial etc.;

  vi) the extent of cultivation in Ancient and Modern Italy;[30]

  vii) references in Latin authors.[31]

Unfortunately for many plants only some of this information is available.

Furthermore not all the plants and cultivars which must have been introduced into Italy can be included in the catalogue. Factors such as a very early period of introduction, widespread dispersion and naturalization, and the lack of archaeologically-dated remains have obscured the history of many plants. Identification of plants described by the ancient authors often in only the briefest or vaguest of terms has also caused much difficulty.

The arrangement of the plants in their botanical order follows the order set out in the volumes of *Flora Europaea* and of *Flowers of the Mediterranean*.

PINACEAE: Pine Family

1. Pinus pinea L.: Stone Pine, Umbrella Pine: pinus, picea.

Probably a native of Asia Minor introduced into Italy after the eighth century B.C. Pliny writes:

> Peregrinae tum videbantur, quoniam non erant suburbanae, pinus atque abies omnesque quae picem gignunt (Nat. 16.38).
>
> The pine and the fir and all the trees that produce pitch were in those days (sc. 287 B.C.) considered exotics, because there were none in the neighborhood of the capital.

Although no fruit was borne until the fifteenth year and the greatest yield occurs only after fifty years of growth, it was extensively cultivated for its nuts which resembled the almond in taste. The timber was used for carpentry and furniture-making, and the resin of the pitch-pine produced the pitch most highly esteemed in Italy for vessels intended for storing wine (Plin. Nat. 14.127). It has been widely planted since Roman times and became well-established everywhere.

Plin. Nat. 16.38, 123; 17.64; 14.127; Pallad. 12.15.3; Col. 5.10.14; Col. Arb. 22.3.

CUPRESSACEAE: Cypress Family

2. Cupressus sempervirens L.: Funeral Cypress, Italian Cypress, Common Cypress: cupressus.

A native of the mountains of Busih, west of Herat, it was introduced to Phoenicia and then carried by the Phoenicians elsewhere in the Eastern Mediterranean, especially to Greece and Cyprus about 1000 B.C.[32] It was introduced to southern Italy either by the Phoenicians or the Greeks.

> Cupressus advena et difficillime nascentium fuit, ut de qua verbosius saepiusque quam de omnibus aliis prodiderit Cato ... huic patria insula Creta, quamquam Cato Tarentinam eam appellat, credo, quod primum eo venerit (Plin. Nat. 16.139ff.)
>
> The cypress is an exotic, and has been one of the most difficult trees to rear, seeing that Cato has written about it at greater length and more often than about all the other trees ... The native country of this tree is the island of Crete, although Cato calls it Taranto cypress, no doubt because that place was where it was first imported.

Cypress wood is very hard and durable and was much used in antiquity for making sacred images (Plin. Nat. 16.216) as well as in shipbuilding, temples and housebuilding. It was a religious symbol largely used in cemeteries (Hor. Epod. 5.16) and enjoyed great reputation as an ornamental, especially the columnar form var. pyramidalis:

> diu metae demum aspectu non repudiata distinguendis tantum vinearum ordinibus, nunc vero tonsilis facta in densitatem parietum coercitaque gracilitate perpetuo teres trahitur etiam in picturas operis topiarii, venatus classeve et imagines rerum tenui folio brevique et virente semper vestiens (Plin. Nat. 14.140).
>
> For a long time past merely owing to its pyramidal appearance it was not rejected just for the purpose of marking the rows in vineyards, but nowadays it is clipped and made into thick walls or evenly rounded off with trim slenderness, and it is even made to provide the representations of the landscape gardener's work, arraying hunting scenes or fleets of ships and imitations of real objects with its narrow, short, evergreen leaf.

The particular popularity of the pyramidal variety still provides a familiar sight in the Italian landscape today. Decoctions of the leaves were also used medicinally.

Plin. Nat. 16.139-142, 212, 216; 24.102; Cato Agr. 48; 151.1; Hor. Epod. 5.16; Ov. Met. 10.106; Pallad. 12.15.3.

SALICACEAE: Willow Family

3. Salix viminalis L.: Common Osier, Osier: salix.

A native of Central Europe which was introduced both into northern Europe and southward into Italy at an early date. It was widely cultivated for basket-making but its primary cultivation was to provide withes and poles for vineyards.

> Atticus putat singula iugera sufficere posse quinis et vicenis iugeribus legandae vineae (Col. 4.30.2; cf. Plin. Nat. 17.143).
>
> Atticus thinks that one iugerum of osier-willows may suffice for binding twenty-five iugera of vineyard.

Cato placed it third in his list of most profitable agricultural pursuits (Agr. 1.7) and Pliny named nine varieties (Nat. 16.177) but, as long as it was pliant, the variety used made no difference (Col. 4.30.3).

Col. 4.30.2f.; Plin. Nat. 16.173-77; 17.143; Cato Agr. 1.7; 6.4; 40.2, 4; Var. R. 1.24.4; Vitr. 8.1.3.

JUGLANDACEAE: Walnut Family

4. Juglans regia L.: Walnut, French Nut, Italian Nut: juglans, Jovis glans.

Although indigenous to Western Asia as far east as Afghanistan and as far west as Eastern Europe, it does not appear in Greek literature until the fourth century B.C. nor is it identifiable in Cato's list of nuts worth planting. However Varro mentions it (R. 1.16.16; L.L. 5.102) which leads Hyams[33] to suggest that it was introduced during Varro's lifetime (116 B.C.-27 B.C.). Bianchini,[34] while admitting the date of introduction is unknown, suggests an early date. Pliny says it came to Italy via Persia (Nat. 15.87). The walnut contains a large amount of

fatty oil (50% in fresh walnuts, 65% in dried nuts) which was sometimes preferred to olive oil, but it turned rancid if not used quickly. The fleshy outer portion of the fruit, which is rich in vitamin C, was eaten, and the nut gives a good yellow dye (Plin. Nat. 15.87). The nuts were also thrown by married couples at their wedding ceremonies:

> nec non et honori is naturae peculiaris gemino protectis operimento, pulvinati primum calycis, mox lignei putaminis. quae causa eas nuptiis fecit religiosas, tot modius fetu munito quod est verisimilius quam quia cadendo tripudium sonivium faciant (Plin. Nat. 15.86).
>
> Moreover the walnut has a distinction of structure that is peculiar to it, in that it is protected by a double covering consisting first of a cushion-shaped cup and then of a woody shell. This is the reason why walnuts have become emblems consecrated to weddings, because their progeny is protected in so many ways--a more likely explanation of the custom than that it is due to the rattling rebound which it makes when it falls on the floor.
>
> sparge, marite, nuces (Verg. Ecl. 8.31).
>
> Scatter, bridegroom, the nuts!

The wood of the tree is hard and homogeneous, and was valued, as it is today, by cabinet-makers.

Col. 12.5.1, 59.2; Arb. 22.3; Var. R. 1.16.16; L.L. 5.102; Plin. Nat. 15.86; 17.89; Cic. Tusc. 5.20.58; Pallad. 2.15.14.

BETULACEAE: Birch Family

5. Corylus avellana L.: Hazelnut, Filbert, Cobnut: nux Abellana, nux Avellana.

Although fossilized remains indicate that the Italians were using this nut at an early date, this was a wild variety which was only collected and not cultivated. The variety introduced from the Pontic region

(Plin. Nat. 15.88) was recommended for planting by Cato (Agr. 8.2) who represents the *terminus prius quem* for their introduction to Italy. The fruit is a nut and seed containing 65% fatty oil which is used for perfumery as well as eating. Servius (A. 7.740) tells us that the name of the nut, abellana, was derived from the name of the town Abella in Campania,[35] which was for centuries the largest centre of hazelnut production in Italy. It is still grown extensively in parts of Italy and Sicily.

Cato Agr. 8.2; 51.1; Col. 7.9.6; 5.10.14; Plin. Nat. 15.88; 12.100; 16.74; 17.96; Serv. A. 7.740.

FAGACEAE: Beech Family

6. Castanea sativa Miller: Sweet or Spanish Chestnut: *castanea*.

Probably native to Asia Minor coming to Italy from the area around Sardis (Plin. Nat. 15.93). It was introduced between the time of Cato and Varro[36] and its cultivation spread rapidly thanks to its high food value; it contains 40-50% starch, 4% oil, and sugars which make it just slightly poorer than bread in food value. It was eaten boiled and as a porridge but

> torrere has in cibis gratius, modo molantur, et praestant ieiunio feminarum quandam imaginem panis (Plin. Nat. 15.92).
>
> It is more agreeable as a food when roasted, provided it is ground up, and it supplies a sort of imitation bread for women when they are keeping a fast.

It was especially used in times of famine and even today in some of the poorer areas of Italy and other European countries its high food value is recognized and it forms a staple of the peasants. The nuts were also

used to fatten livestock (Plin. Nat. 15.93) and along with walnuts and acorns, to fatten table delicacies such as dormice (V. R. 3.15.1-2). Pliny distinguished eight varieties, the best coming from Sardis and the neighborhoods about Naples and Taranto (Plin. Nat. 15.93f.). Today the largest producers in the world are France and Italy.

V. R. 3.15.1-2; Col. 4.30.2; Plin. Nat. 15.28.92f.

MORACEAE: Mulberry Family

7. Morus nigra L.: Black Mulberry: morus.

A native of Persia and the mountains of Nepal introduced to Greece and then to Italy. Since neither Cato nor Varro mention it, the mulberry was probably not introduced into Italy until late in the first century B.C. or perhaps even the early first century A.D. Pliny knew several varieties by his time, but he says

> minimum in hac arbore ingenia profecerunt: nec nominibus nec insitione nec alio modo quam pomi magnitudine differunt mora Ostiensia et Tusculana Romanae (Nat. 15.97).

> In the case of this tree the devices of the growers have made the least improvement of any, and the mulberry of Ostia and that of Tivoli do not differ from that of Rome by named varieties or by grafting or in any other way except in the size of the fruit.

It became widely cultivated in Italy for its edible fruit and for ornamental value. When the superiority of the white mulberry (Morus alba) for rearing silkworms was recognized in the twelfth century A.D., the black mulberry lost much of its importance, but it had become naturalized and consequently is common in Italy today.

Col. 5.20; Arb. 25.1; Plin. Nat. 15.97; 24.120; Palad. 3.25.30; Ov. Met. 4.90.

8. Ficus carica L.: Fig: ficus.

Probably first cultivated in Asia Minor and transplanted to Greece and North Africa from there. The fig tree and its culture perhaps came to Italy with the Greek colonists who settled Sicily and Calabria between the eighth and sixth centuries B.C., but it is also possible that they may have found the fig already in the area, introduced by the Phoenicians. Condit[37] believes that the fig was transplanted directly from Syria: "The principal difference in fig culture in Greece and Italy is the prevailing practice of caprification (the pollen is transferred by the fig wasp) in Greece and the general lack of knowledge concerning this practice in both ancient and modern Italy. This would seem to be a strange and marked contrast if Italy obtained the fig from Greece." Many varieties were imported throughout the Roman period, which greatly extended the possible orchard sites (V. R. 1.41.6; Plin. Nat. 15.68; 21.92). The fig could be eaten fresh but was usually sun-dried and provided a valuable winter food, along with dried apples (Col. 12.14.1). The ease of drying, storing and the high sugar content (over 50% in dried figs) made it a very attractive fruit. It was cited as one of the attractions which led the Gauls to invade Italy.

> produnt Alpibus coercitas ut tum in exuperabili munimento Gallias hanc primum habuisse causam superfundendi se Italiae, quod Helico ex Helvetiis civis earum fabrilem ob artem Romae commoratus ficum siccam et uvam oleique ac vini praemissa remeans secum tulisset; qua propter haec vel bello quaesisse venia sit (Plin. Nat. 12.5).
>
> It is stated that the Gauls, imprisoned as they were by the Alps as by a then insuperable bulwark, first found a motive for overflowing into Italy from the circumstance that a Gallic citizen from Switzerland named Helico, who had sojourned at Rome on account

> of his skill as an artificer, had brought with him when he came back some dried figs and grapes and some samples of oil and wine; and consequently we may pardon them for having sought to obtain these things even by means of war.

The value of these products to the Romans is revealed by Pliny's willingness to forgive the invasion. The fig also had medicinal values as a laxative and when roasted, as a poultice for wounds and sores. In 1947, practically all Italian fig culture was carried on south of Naples, and today Italy vies with Spain as the world's leading producer.

Cato *Agr*. 8.1; 40.1; Var. *R*. 1.41.4, 6; Col. 12.14.1; Plin. *Nat*. 15.68-83; 12.5; 15.60; Hor. *Epod*. 16.46.

CANNABACEAE: Hemp Family

9. Cannabis sativa L.: Hemp: *cannabis*.

Probably a native of the north shore of the Black Sea and the south shore of the Caspian Sea. Although known in Egypt before 2000 B.C. it seems to have reached Italy at a relatively late date; Lucilius (120 B.C.) was the first Latin author to mention it (Lucil. 111). As a yarn derived from plants its use was second only to flax and the fibre was used for sailcloth, string, etc. It was *utilissima funibus* (Plin. *Nat*. 19.173) and it must have largely replaced esparto grass which had to be imported (Plin. *Nat*. 19.26f.) and leather (Cato *Agr*. 135.3) in the rope-making industry. The seeds also yielded an oil used in paints and the plant was cultivated as an ornamental. Its uses as an intoxicant (Hdt. 4.75.1) and medicinal (Plin. *Nat*. 20.259) were known in antiquity as well. Although only Rosea in the Sabine territory is mentioned as a centre of hemp production (Plin. *Nat*. 19.174), its cultivation was likely quite widespread if Varro's advice was followed:

> quae nasci in fundo ac fieri a domesticis poterunt, eorum nequid ematur, ut fere sunt ... quae fiunt de cannabi ... ut funes, restes, tegetes (Var. R. 1.22.1; cf. 1.23.6).
>
> nothing should be bought which can be raised on the place or made by the men on the farm, in general articles ... which are made of hemp ... such as ropes, cordage, and mats.

Its taxation by Aurelian indicates that it probably continued to be cultivated on a large scale.[38] Today, Italy, Poland and the USSR furnish 75% of the world's output.

Lucil. 111; Var. R. 1.22.1, 23.6; Plin. Nat. 19.173-74; 20.259; 2.10.21; 11.2.75; Gel. 17.3.4; Hdt. 4.73.1, 75.1.

ARISTOLOCHIACEAE: Birthwort Family

10. Aristolochia clematitis L.: Birthwort: aristolochia.

A native of southeast Europe now naturalized throughout most of Europe. It served a medicinal function as an aid for women in childbirth and as a cure for snake bite (Plin. Nat. 25.95f.). Four varieties were known to Pliny, one of which was used by the fishermen of Campania to poison fish that could be collected when they floated to the surface (Plin. Nat. 25.98). At present it is a weed found in vineyards and gardens.

Plin. Nat. 25.95-98; Cic. Div. 1.16.

PORTULACACEAE: Purslane Family

11. Portulaca oleraceae L.: Purslane: portulaca.

A native of Africa and Asia introduced at an early date. It was used as a vegetable, herb, medicinal and fodder. Today it is a noxious weed although P. oleraceae sativa is cultivated as a vegetable.

Co. 12.13.2; Cels. 2.33.

CARYOPHYLLACEAE: Pink Family

12. Agrostemma githago L.: Corn Cockle, Cockle:

Probably a native of the Eastern Mediterranean but now a weed of crops throughout Europe. The seeds are somewhat poisonous and contamination of flour by it may be dangerous to livestock and humans. Date of introduction unknown.

RANUNCULACEAE: Buttercup Family

13. Aconitum lycoctonum/vulparia Reichenb.: Monkshood, Wolfsbane:

aconitum, lycoctonon.

There is doubt whether this plant is native or an introduction.[39] Pliny tells us that the name is derived from the Black Sea port of Aconis and that

> constat omnium venenorum ocissimum esse aconitum et tactis quoque genitalibus feminini sexus animalium eodem die inferre mortem (Nat. 27.4).
>
> It is established that of all poisons the quickest to act is aconite, and that death occurs on the same day if the genitals of a female creature are but touched by it.

As a poison it was employed to such an extent that Trajan forbade its cultivation, the offense punishable by death.[40] It was also employed in a solution of warm wine to neutralize bites and stings of harmful creatures.

Plin. Nat. 27.4-10; 20.50; Ov. Met. 7.407; Verg. G. 2.152.

LAURACEAE: Laurel Family

14. Laurus nobilis L.: Bay, Sweet Bay, True Laurel: laurus, daphne.

Perhaps a native of Asia Minor introduced at an early date into the Mediterranean region.[41] It was the sacred tree of Apollo, was used in religious ceremony, and became extensively cultivated as an ornamental in both sacred and secular gardens (Plin. Nat. 15.127). It was also the symbol of victory for generals, emperors and victors of the Delphic Games. The wood is hard, durable timber and the ancients appreciated the medicinal properties of the fruits, oil and leaves which were used as a spice for flavoring. The plant was believed to fend off lightning and consequently the emperor Tiberius was said to wear a laurel wreath when there was a thunderstorm (Plin. Nat. 15.135). Several varieties were known to the Romans (Cato Agr. 8.2; Plin. Nat. 15.127-32).

Cato Agr. 8.2; 133.2; Plin. Nat. 12.1; 13.139; 15.126-38; 23.158.

15. Cinnamomum zeylanicum: Cinnamon: cinnamomum, cinnamum.

A native of Sri Lanka which was introduced more as a curiosity than as a plant to be seriously cultivated, at the beginning of the Imperial period.

> radicem eius (sc. cinnamomi) magni ponderis vidimus in Palatii templo quod fecerat divo Augusto coniux Augusta, aureae paterae impositam, ex qua guttae editae annis omnibus in grana durabantur (Plin. Nat. 12.94).

> We once saw in the Temple of the Palatine erected in honor of his late Majesty Augustus by his consort Augusta, a very heavy cinnamon-root placed in a golden bowl, out of which drops used to distil every year which hardened into grains.

The spice was extremely expensive (Plin. Nat. 12.93) and Italy's entire

supply was imported except for a few isolated cases since the plant could not be successfully acclimatized.

Plin. Nat. 12.85-94; Cels. 3.21.

PAPAVERACEAE: Poppy Family

16. Papaver somniferum L.: Opium Poppy: papaver.

Probably a native of Central Europe or perhaps Asia Minor. From the Eastern Mediterranean it was introduced at a very early date into Italy. Prehistoric remains have been found in Northern Italy but this may not indicate cultivation since the finds were rather sparse.[42] The Italians were cultivating the plant during the Tarquinian monarchy in pre-Republican Rome if the anecdote of Tarquin and the poppy-heads is true:

> fuisse autem in honore apud Romanos semper indicio est Tarquinius Superbus, qui legatis a filio missis decutiendo papavera in horto altissima sanguinarium illud responsum hac facti ambage reddidit (Plin. Nat. 19.169).

> That the poppy has always been in favor at Rome is indicated by the story of Tarquinius the Proud, who knocked off the heads of the tallest poppies in his garden and by means of this unspoken rebus conveyed to the envoys sent to him by his son that sanguinary answer of his.

One of the most valuable of all medicinal plants (it is the source of opium, morphine and codeine), it has been used as a narcotic and soporific since antiquity but not without criticism.

> ... non vi (sc. papaveris) soporifera modo, verum, si copiosior hauriatur, etiam mortifera per somnos ... qua de causa magna concertatio extitit. Diagoras et Erasistratus in totum damnavere ut mortiferum, infundi vetantes praeterea, quoniam visui noceret (Plin. Nat. 20.199).

> ... it is not only a soporific, but if too large a dose be swallowed the sleep even ends in death ... For this reason a great controversy has arisen. Diagoras and Erasistratus have utterly condemned it as a fatal drug, forbidding its use moreover in injections[43] on the ground that it is injurious to the eyesight.

In Roman times opium was taken as a lozenge or as a solution mixed with wine. It was also cultivated for its fine, non-narcotic oil which was used in cooking and painting, and the seeds were used to add a bit of spice to bread.

Plin. Nat. 13.108; 18.229; 19.168f.; 20.198f.; Col. 10.314.

CRUCIFERAE: Mustard Family

17. Cardaria draba L.: Hoary Pepperwort, Hoary Cress :

A native of S.E. Europe, the Soviet Union and Poland, Austria and Hungary. Often a troublesome weed which spreads by root buds. The seeds have been used as a substitute for pepper. Date of introduction unknown.

18. Malcolima maritima L.: Virginia Stock:

A native of Albania and Greece introduced into Italy as an ornamental. Date of introduction unknown.

19. Cheiranthus cheiri L.: Wallflower:

A native of Greece introduced to most of Europe as an ornamental and for medicinal purposes. Date of introduction unknown.

20. Armoracia rusticana P. Gaertner, B. Meyer and Scherb: Horse

Radish: armoracia.

A native of Eastern Europe and the Soviet Union, this plant was introduced into Italy at an early date; Pliny believed that it was a native wild plant (Nat. 19.82). It was prized for its medicinal properties as a strong diuretic, diaphoretic and stimulant (Plin. Nat. 20.22) and was used in solutions to cure eye problems (Col. 6.17.8). The plant will tolerate frost and can be harvested during the winter. It cannot be used as a fodder owing to the presence of a strongly irritant, volatile oil.

Plin. Nat. 19.82; 20.22; Col. 6.17.8; Pallad. 4.9.5.

21. Lepidum sativum L.: Garden Cress: nasturtium.

A native of North Africa which may have been distributed as a weed before being cultivated by the Greeks, Romans and Egyptians. It was usually eaten as a seedling in salads and the seeds were of some value since they produce a mustard oil. Pliny says of it

> nasturtium venerem inhibet, animum exacuit (Plin. Nat. 20.127).
>
> Cress is an antaphrodisiac, but sharpens the senses.

It also had medicinal qualities as a cough suppressant and for various other bodily pains.

Plin. Nat. 19.155; 20.127.

22. Brassica oleracea L.: Cabbage: brassica, corambe.

Due to ancient cultivation and widespread distribution it has been

very difficult to discover the plant's origin. Opinion is still divided whether it is indigenous to Western and Southern Europe[44] or whether it is native to the littoral of Western Europe. Hyams,[45] basing his argument on philological factors and the number of cultivars which exist in Western Europe, favors the latter theory, concluding that it moved eastward sometime shortly after 1000 B.C. Cabbage, containing large amounts of Vitamin A and C, is one of the most nutritious of vegetables. Cato had nothing but praise for the cabbage, especially for its medicinal value of which he says

> Brassica est quae omnibus holeribus antistat (Cato _Agr_. 156.1).
>
> It is the cabbage which surpasses all other vegetables.

Medicinal uses included everything from a laxative to a cure and preventive for drunkenness. Pliny (_Nat_. 19.137) states that it was sown and harvested the year round, and also used as a fodder plant. Kale, kohl-rabi, cauliflower and types of broccoli are all derivatives of the cabbage which have been identified, at one time or another, as a variety used by the Romans.

Cato. _Agr_. 156-58; Col. 11.3.14, 23f.; Plin. _Nat_. 19.136f.; 20.78ff.

23. Crambe maritima L.: Seakale: _batis marina_.

A cabbage-like plant native to the coasts of non-Mediterranean Europe. Probably an early introduction since Pliny (_Nat_. 21.86) thought it was native to Italy. It was cultivated as a vegetable for its young shoots and for its laxative qualities (Plin. _Nat_. 21.174).

Plin. _Nat_. 21.86, 174.

24. Raphanus sativus L.: Radish: radix.

Of uncertain origin. Brouk[46] believes it to be a native of the Eastern Mediterranean and Western Asia, de Wit[47] merely says that it is native to the Mediterranean. The plant, which has relatively little nutritive value, was not popular among the Romans.

> et vis mira colligendi spiritum laxandique ructum; ob id inliberalis (Plin. Nat. 19.79).
>
> They have a remarkable power of causing flatulence and eructation; consequently they are a vulgar article of diet.

However, Pliny goes on to say, the radish was held in high esteem by the Egyptians because they had no plant which yielded a greater supply of oil.

Col. 11.3.18; Pliny Nat. 19.78-87, 121; Var. L.L. 5.103; Pallad. 1.35.5.

RESEDACEAE: Mignonette Family

25. Reseda luteola L.: Dyer's Rocket, Weld, Dyer's Greenwood: lutum.

Indigenous to Central Europe, R. luteola was probably brought to Italy by the Romans in the latter half of the first millenium B.C. This is one of the oldest dyer's plants known, yielding a yellow dye.

Plin. Nat. 33.87, 91; Verg. Ecl. 4.44; Vitr. 7.14.2.

CRASSULACEAE: Stonecrop Family

26. Aeonium arboreum L.: House-leek Tree :

A native of North Africa introduced into Italy at an unknown date.

SAXIFRAGACEAE: Saxifrage Family

27. Saxifraga umbrosa L.: Wood Saxifrage:

A native of Spain and France introduced into Italy as an ornamental. Although the date of introduction is unknown, it is likely that it was known to the Romans owing to their familiarity with its native habitat.

PITTOSPORACEAE: Pittosporum Family

28. Pittosporum tobira Thunb.: Japanese Pittosporum:

An aromatic, resinous shrub native to China and Japan frequently grown as an ornament in the Mediterranean. Date unknown.

PLATANACEAE: Plane-tree Family

29. Platanus orientalis L.: Oriental Plane: _platanus_.

Probably a native of Turkey introduced as a shade tree in the Mediterranean. That this was its main function is made clear by Pliny.

> Sed quis non iure miretur arborem umbrae gratia tantum ex alieno petitam orbe? platanus haec est ... atque inter primas donata Italiae (_Nat_. 12.6).
>
> But who would not be justifiably surprised to hear that a tree has been procured from another clime merely for the sake of shade? This tree is the plane ... and was one of the first trees bestowed on Italy.

Different varieties were imported later during the Empire and new ones were devised in Italy (Plin. _Nat_. 12.12). The wood takes a fine polish and was much prized by cabinet makers. Pliny dates the first importation to the period around the Gallic invasion of 390 B.C.

Plin. _Nat_. 12.6f.; Hor. _Carm_. 2.15.4; 2.11.13.

ROSACEAE: Rose Family

30. Rosa gallica L.: French Rose, Red Rose: rosa.

A native of Asia Minor and perhaps of the other countries of the Eastern Mediterranean which was under cultivation by the Greeks in the fourth century B.C. It appears to have been imported by the Romans as an ornamental in the first century A.D. Other purposes for cultivation were its medicinal properties and use in the perfume industry. Many varieties of roses were known in the Roman world, some native, some imported; unfortunately most were merely grouped under the encompassing term rosa.[48] For this reason it is difficult to distinguish the varieties in the Latin sources. Botanists have, however, been able to determine several introduced varieties by other methods.

31. Rosa damascena Blackw.: Damascus Rose: rosa.

From Asia Minor.

32. Rosa binifera Poiret: Autumn Damask Rose: rosa.

From Asia Minor. Verg. G. 1.119.

33. Spiraea salicifolia L.: Willow Spiraea:

A suckering shrub native to Central Europe, Bulgaria, Romania and the Soviet Union. Introduced as an ornamental at an unknown date.

34. Mesipilus germanica L.: Medlar: mespilum.

A native of southeast Europe and southwest Asia not introduced into Italy until the Roman period:

non fuit haec arbor in Italia Catonis aevo
(Plin. Nat. 15.84).

In Cato's time this tree did not exist in Italy.

The fruit can only be eaten when over-ripe or used for making medlar jelly and cheese. The plant has astringent qualities which gave it a medicinal value (Plin. Nat. 23.141) and the hard, flexible wood was used for handles. At one time very popular, it is almost unknown today.

Plin. Nat. 15.84; 17.59; 23.141; Pallad. 4.10.22; 4.10.19

35. Crataegus azarolus L.: Azarole, Mediterranean Medlar:

A native of Crete introduced into Italy at an unknown date for its apple-flavored fruit.

36. Cydonia oblonga Miller: Quince: cotoneum, cydoneum.

Perhaps cultivated as early as the fourth millenium B.C. in Anatolia, the quince spread to Crete and then to Greece about 1000 B.C. It found its way to Sicily by the sixth century and to Italy by at least the second century since Cato (Agr. 7.2) speaks of it. Pliny says that it came to Italy from Crete (Nat. 15.37). From Italy it was introduced to the rest of Western Europe in the following two or three centuries and reached its gastronomic zenith in the Middle Ages. Pliny (Nat. 15.38) tells us that only one type, the Mulvian quince, can be eaten raw, the rest are acidic when raw and were used for flavoring and marmalades. The seeds contain much mucilage and were used medicinally.

Cato Agr. 7.2; Var. R. 1.59.1; Col. 12.47.1; Plin. Nat. 15.37-38.

37. Pyrus communis L.: Pear: pirum.

A native of temperate Europe, Anatolia, the country to the south of the Caucasus, parts of Iran and possibly the hill-country of northwest India, which was probably first cultivated in Anatolia. These eastern pears were introduced into European horticulture by the Romans during historical times and contributed some of their superior attributes to the breeding of still better cultivars by combining the qualities of eastern and western pears. Cato (*Agr*. 7.4) names five types and says there are many others. Columella (5.10.18) believes they are too numerous to enumerate. Besides being eaten fresh, the fruit was also dried and used in marmalades. The wood of old trees was used for fine wood-work.

Cato *Agr*. 7.4; Var. *R*. 1.59.3; Col. 5.10.18; 12.10.4; Plin. *Nat*. 15.53-58; 23.115.

38. Malus domestica Borkh: Apple: malum.

As with the pear, the apple is a native of temperate Europe, Anatolia, the area south of the Caucasus, parts of Iran and the hill country of northwest India and was probably first cultivated in the Anatolian region. Five to six thousand years of cultivation in the case of the apple have produced about 10,000 cultivars (or names at least). The rapid increase in varieties during the Roman period is easily seen when we note that while Cato only mentions four varieties, Pliny lists thirty-six types. Apples are a fruit of good nutritive value, ripe ones containing 7%-9% sugar, vitamin C and a source of pectin. The fruit can be eaten raw, dried, as a preserve or in jams. The wood is also valued for carving and cabinet-making.

Cato *Agr.* 7.3; Col. 5.10.19; *Arb.* 25.1; Verg. *G.* 2.88; Plin. *Nat.* 15.39, 42, 57-65, 109-11, 116; 16.74, 77, 84, 90, 92, 98; 23.100.

39. Prunus domestica L.: Plum: *prunum*, *prunus*.

Probably a native of Western Asia, introduced at a relatively late date into Roman horticulture. Cato (*Agr.* 133.2) mentions only one variety and Pliny says:

> sed pruna quoque omnia post Catonem coepisse manifestum erit (*Nat.* 15.46).
>
> But it will be obvious that all our plums have also been introduced since the time of Cato.

However, as often happens when a cultivated plant is brought to the attention of a people, native wild varieties which had perhaps only been gathered in the woods previously are brought into cultivation. This would appear to be the case with the plum. The Greeks, receiving P. domestica from Asia Minor, introduced it into Magna Graecia and by Vergil's time it appears to be commonplace in Italy. Columella mentions only four types but Pliny mentions a huge number of varieties and says:

> nec aliud pomum ingeniosius geminatum est (*Nat.* 15.42).
>
> And indeed no other fruit has been more ingeniously crossed.

The fruits were eaten fresh or dried and were recognized as a laxative (Plin. *Nat.* 23.132). The hard, compact wood was used by turners and cabinet-makers.

Cato *Agr.* 133.2; Col. 10.404; 12.10.2; Plin. *Nat.* 13.51; 15.41-44, 46; 23.132; Pallad. 1.5.2.

40. Prunus persica L.: Peach: persica.

A native of China, the peach was probably introduced into Iran by the Han Dynasty[49] (second century B.C.) and then taken by the Romans to Italy during the reign of Augustus and introduced with difficulty (Plin. Nat. 15.45). From Italy, the Romans spread the peach throughout Western Europe and to Great Britain. It was the most costly of all fruits, no doubt because of the necessity of cultivating it near a market and the fact that it was difficult to grow the peach in the vicinity of Rome.

> pomum innocuum expeditur aegris, pretiumque iam singulis triceni nummi fuere, nullius maiore, quod miremur, quia non aliud fugacius: longissima namque decerpto bidui mora est cogitque se venumdari (Plin. Nat. 15.40).
>
> It is a harmless fruit, in demand for invalids, and peaches have before now fetched thirty sesterces each, a price exceeded by no other fruit--which may surprise us, because there is none which keeps worse: the longest time that it will last after being plucked is two days, and it compels you to put it on the market.
>
> iuxta Romam ipsam castaneae cerasique aegre proveniunt, persica in Tusculano, nuces Graecae cum taedio inseruntur Tarracina silvis scatente earum (Plin. Nat. 16.138).
>
> In the actual neighborhood of Rome chestnuts and cherries only grow with reluctance, and the peach-tree round Tusculum, and almonds are laboriously grown from graft, although Tarracina teems with them.

The fruit was both popular fresh and in preserves, and the kernels were processed for their oil for use in perfumery. At the present, Italy and the United States are the largest producers of peaches.

Col. 10.405, 410; Plin. Nat. 13.60, 63; 15.39-40, 44-46; 16.138; 17.151.

41. Prunus armeniaca L.: Apricot: armeniaca, praecoquum.

Although the apricot is recorded as being introduced to Italy from Spain in the twelfth century A.D., the Romans knew and cultivated this plant. A native of China, the plant was probably brought to Armenia during the Han Dynasty along with the peach. It was then introduced to Italy by the Romans in the reign of Augustus. Apparently the tree was not widely cultivated and was not imported into the northwest areas of the empire. As a result, when the empire collapsed the apricot fell out of cultivation and had to be reintroduced from Spain in the twelfth century. The fruit was eaten fresh, dried or made into conserves and the kernels produce a sweet, edible oil which could be used in the place of almond oil.

Col. 5.10.19; 10.404; 11.2.96; Plin. Nat. 15.41; 16.103; Pallad. 2.15.20; 12.7.4.

42. Prunus dulcis (Miller) D.A. Webb, Prunus amygdalus Batsch: Almond-tree: amygdala, nux graeca.

A native of Central Asia which gradually moved westward into the Near East. Almonds were familiar to the Greeks and Romans long before the tree itself was introduced owing to the ease of transporting the hard-shelled nuts. The Romans probably received it from Greece in the latter half of the second century B.C.

> haec arbor an fuerit in Italia Catonis aetate dubitatur, quoniam Graecas nominat ... (Plin. Nat. 15.90).

> It is doubtful whether this tree existed in Italy in the time of Cato, as he called almonds 'Greek Nuts'...

The kernels are eaten fresh or used as a flour for culinary purposes

such as biscuits and bread. The seeds also yield an oil used in perfumery and medicine. The Romans introduced it into Spain, France and Germany.

> Cato *Agr*. 8.2; 133.3; Var. *R*. 1.6.4; 3.16.22; Col. 12.57.2; 5.10.12; Plin. *Nat*. 15.89f.; 16.138; 17.252.

43. Prunus cerasus L.: Sour Cherry: *cerasus*.

The generally accepted history is that about 73 B.C. Lucullus introduced P. cerasus into Italy for cultivation from Cerasus in West Asia. The Romans subsequently introduced the plant into Northern Italy, Gaul and Britain in the latter part of the first century A.D.

> Cerasi ante victoriam Mithridaticam L. Luculli non fuere in Italia, ad urbis annum DCLXXX is primum invexit e Ponto, annisque CXX trans oceanum in Britanniam usque pervenere (Plin. *Nat*. 15.102).

> Before the victory of Lucius Lucullus in the war against Mithridates, that is down to 74 B.C., there were no cherry-trees in Italy. Lucullus first imported them from Pontus, and in 120 years they have crossed the ocean and got as far as Britain.

However, it must be pointed out that P. avium, the sweet cherry, is a native of Europe and was almost certainly gathered by the Romans. But the cultivation of cherries does not occur until the introduction of the more luscious variety from the east. In the process of segregation and selection, more and more varieties emerged locally as new cultivars and were distributed all over the empire (Plin. *Nat*. 15.103-104). Besides the fruit, the wood of the cherry-tree was also prized (Plin. *Nat*. 16. 154, 218). Today, Italy is one of the world's largest producers of cherries.

Var. R. 1.39.2; Col. 11.2.11; Plin. Nat. 15.102; 16.125, 218; 18.232; Serv. G. 2.18.

LEGUMINOSAE: Pea Family

44. Ceratonia siliqua L.: Carob, Locust Tree: siliqua.

The native habitat of C. siliqua is difficult to determine since it is now naturalized throughout the Mediterranean, nevertheless many authorities consider it to be a native of the Eastern Mediterranean, perhaps the Levant. If this is the case, the Greeks probably introduced it into Italy at a relatively early date. Columella believed it was a wild tree (7.9.6). The seeds and pods of the carob are still highly prized in the hotter parts of the Mediterranean Basin as food for animals and the sugary, unripe pods (50% sugar in the pulp) were eaten by the Italians (Plin. Nat. 15.95). Fresh pods have a laxative quality, dried ones astringent qualities that were recognized in antiquity (Plin. Nat. 23.151). The hard, lustrous wood is used for marquetry, walking-sticks and cabinet-making today and the plant is recovering some of its former importance in a new role as a chocolate substitute. The regular seeds were the original 'carat' weight of jewellers.

Col. 5.10.20; 7.9.6; Arb. 25.1; Plin. Nat. 15.95, 117; 33.151; Pallad. 3.25.27.

45. Lupinus luteus L.: Yellow Lupin: lupinus (?).

A native of Poland and Spain, introduced to most of Europe. It is grown as a food, fodder and green manure. Fresh seeds are poisonous. Unfortunately the Latin name lupinus is a general name for the entire genus Lupinus which makes identification of this species difficult, if

not impossible, in the Roman writers (*cf*. Plin. *Nat*. 18.133).

46. Lupinus albus L.: White Lupin: *lupinus*.

This is generally regarded as the species most often referred to by the term *lupinus*. It was a native of southeast Europe that was introduced to much of Europe at an early date. Its great importance was due to its farinaceous seeds which were a favorite pulse in Greece and Italy. As well, it had widespread use as a green manure and fodder, although the fresh seeds are poisonous. Upon the collapse of the empire, the plant was lost to Italy and had to be reintroduced by the Arabs after the seventh century A.D. Today, the yellow lupin, L. luteus, has largely replaced L. albus.

Cato. *Agr*. 34.2; 37.2; 54.2; 60.1; Plin. *Nat*. 18.133.

47. Vigna unguiculata L.: Black Pea, Cowpea: *phaseolus* (?).

A native of central Africa which travelled to India before reaching Greece in the fourth century B.C. The Latin term is again a general one and reference to this plant does not occur in Latin literature until the first century A.D. By the end of the Roman era it had been established in southern Europe as a minor food legume. The seed is the edible plant which is also cultivated for fodder. Today, it is chiefly cultivated in the Mediterranean region, the Tropics and the United States.

Col. 2.12.3; 11.2.75; Plin. *Nat*. 12.26; 18.58; 24.65.

48. Cicer arietinum L.: Chickpea: *cicer*, *cicer arietium*.

A native of West Asia which spread to the Mediterranean at an early

date. It has been widely cultivated since classical times for its edible seeds and as a forage plant. It was also attributed minor medicinal properties such as a cure for warts, gout, jaundice, etc. (Plin. Nat. 22.148). As with peas it has a very high calorific value. During the Middle Ages it was widely cultivated throughout Europe, but at the present has lost its popularity in the north and is widely cultivated only in the Mediterranean region and Asia.

Col. 2.10.20; 9.1.8; Plin. Nat. 18.124; 22.148-50.

49. Vicia faba L.: Pulse, Horsebean, Broad Bean: faba.

Probably a native of Asia Minor (North Africa and Southern Europe are also suggested as its place of origin), now naturalized in most of Europe. It has been cultivated since prehistoric times but apparently was not introduced into Italy until the Iron Age.[50] The pulse was valued for its seeds which contain a high percentage of protein and for its usefulness as a green manure. Pliny tells us that it was used in sacrifices to the gods, as a manure and fodder crop and that it held the highest place of honor among the leguminous plants because it could be used to make bread (Nat. 18.117f.). It also had a reputation as a cure for colic and coughs, and was thought to cause sleeplessness and to have a dulling effect on the senses. Today it is still used as a food and green manure crop, but it no longer enjoys its former predominance because of the introduction of the French Bean from America.

Cato Agr. 70.1; Plin. Nat. 18.177-22; 22.140-41.

50. Lens culinaris Medicus, Ervum lens L.: Lentil: lens.

A native of southwest Asia introduced into Europe with some of the cereals. However, there are not any remains in Italy before the Iron Age,[51] even though some finds were discovered at the Bronze Age lakeside villages in Switzerland. The seeds are very nutritious and have been important both as a food and forage plant. It also had many uses as a medicinal plant: a cure for abscesses, burns, cholera and dysentery to mention only a few (Plin. Nat. 22.142f.).

Plin. Nat. 18.123; 22.142-146.

51. Lathyrus sativus L.: Grass Pea, Chickling Pea: cicercula, lathyros.

The origin of this plant is uncertain and it is not known whether it is an exotic or not. Remains have been found in the late Iron Age level of pre-urban Rome mixed with V. faba.[52] Presumably this plant was used in the same way as other pulses, in soups and as a vegetable supplementing the protein supply in the diet and as a cure for various ailments.

Var. R. 1.32.2; Col. 2.10.19; Plin. Nat. 18.124; 22.148

52. Pisum sativum L.: Pea: pisum, pisa.

Probably a native of western Asia which came to Europe with the cereals. There has been some debate whether this plant was known to the Romans, but de Candolle[53] insists that it must be the plant described by Pliny

> pisum in apricis seri debet frigorum inpatientissimum; ideo in Italia et in austeriore caelo non nisi verno tempore terra facili, soluta (Nat. 18.123).

> Peas must be sown in sunny places, as they stand cold very badly; consequently in Italy and in severer climates they are only sown in spring, in yielding soil that has been well loosened.

It is a very nutritious plant and has been cultivated elsewhere since prehistoric times for its seeds which are rich in protein, vitamin B and C. It can be eaten green, dried or preserved.

Plin. Nat. 18.123, 125; 20.53.

53. Trigonella foenum-graecum L.: Fenugreek: fenum (faenum) graecum, silicia.

A native of Asia introduced into much of Europe. The seeds are edible and contain coumarin, a substance used in making perfumes. It has been used as a fodder but its primary use, if Pliny is any guide, was for veterinary treatments and as a medicinal plant, especially for female ailments (Nat. 24.184f.).

Col. 2.10.33; Plin. Nat. 18.140; 20.123; 24.184-88.

54. Medicago sativa L.: Alfalfa, Lucerne: Medica.

A native of Asia which travelled to Greece in the fifth century B.C. (Plin. Nat. 18.144) and then to Italy probably between the second and first centuries B.C.; it is mentioned by Varro but not by Cato which gives us its approximate date of introduction. Alfalfa continued to spread wherever the Roman army and its horses went. However, considerable attention was required or the invalida Medica was killed off by weeds (Col. 2.10.27; Plin. Nat. 18.145f.). Consequently, with the fall of the Roman Empire, alfalfa more or less disappears from Europe and had to be re-introduced by the Arabs in the eighth century

A.D. It was one of the most valuable of all forage crops and was extensively used as a green manure.

> Sed ex iis (sc. generibus surculorum), quae placent, eximia est herba Medica, quod semel seritur, decem annis omnibus deinde recte quater, interdum etiam sexiens demetitur, quod agrum stercorat, quod omne emaciatum armentum ex ea pinguescit, quod aegrotanti pecori remedium est, quod iugerum eius toto anno tribus equis abunde sufficit (Col. 2.10.25).

> But of those (sc. young shoots) which find favor the Medic plant is outstanding for several[54] reasons: one seeding affords, for all of ten years thereafter, four harvestings regularly and sometimes six; it improves the soil; lean cattle of every kind grow fat on it; it has medicinal value for an ailing beast; and one iugerum of it provides abundant fodder for three horses for an entire year.

We have no idea how extensively it was cultivated, though it is possible that with legumes, alfalfa helped to keep Italian soil from serious impoverishment. Later, in the fourth century A.D., Servius (G. 1.215) notes that Venetia was covered with it.

Var. R. 1.23.1, 42.1; Col. 2.10.24-28; Plin. Nat. 28.144-48; Verg. G. 1.214-16; Serv. G. 1.215.

55. Medicago arborea L.: Tree Medic: cytisus.

A native of Africa which came to Italy via Greece (Plin. Nat. 13. 134) as a fodder crop, which gave a good return for a minimal amount of work. However, it was not widely cultivated in Italy.

> praeterea, quo maxime miror rarum esse in Italia, non aestuum, non frigorum, non grandinum aut nivis iniuriam expavescit (Plin. Nat. 13.134).

> Moreover--a fact that makes me very much surprised that it is rare in Italy--it is not afraid of damage from heat and cold and hail and snow.

For such a hardy and cheap fodder, nec aliud minoris impendi est (Plin.

Nat. 13.132), we also should be surprised that it was not more extensively cultivated, especially considering the difficulties encountered when growing other fodder crops such as alfalfa.

Var. *R*. 1.23.1; Col. 9.4.2; Plin. *Nat*. 13.130-34; 18.148.

56. Onobrychis viciifolia Scop.: Saifoin:

A native of Hungary, Yugoslavia and Romania. Introduced to Italy as a fodder crop. Unknown date of introduction.

EUPHORBIACEAE: Spurge Family

57. Ricinus communis L.: Castor Oil Plant: *ricinus*, *cici*.

A native of tropical Africa introduced into Mediterranean Europe as an ornamental and for its seeds which produce the important industrial and medicinal oil, castor oil. The seeds are poisonous, but after pressing the oil is pure since the ricin, an acute poison, remains in the residue. The laxative property of the oil was known in antiquity and although it was also used as a source of illumination it was not highly regarded (Plin. *Nat*. 23.83-84). Its food value was also recognized in antiquity: *cibis foedum* was Pliny's verdict (*Nat*. 15.25).

Plin. *Nat*. 15.25; 16.85; 23.83-84, 89.

RUTACEAE: Rue Family

58. Citrus medica L.: Citron: *malum citreum*, *malum Medicum*.

A native of southwest Asia which owed its distribution in the Roman Mediterranean to the Jews. The citron had become 'the fruit of a goodly tree', an object essential for the ritual celebration of the holiday of

the Feast of Booths and consequently was introduced into areas of Jewish settlement. Pliny regarded the citron as inedible and he seems to indicate that it was little known and unsuccessfully introduced, but at the same time he tells us that it had become naturalized and had great medicinal values (Nat. 15.14f.). However, with the increasing Jewish dispersal it appears to have become better known, but it did not become common since Diocletian's edict of A.D. 301 fixed its price at twenty-four denarii, an expensive fruit. By the fifth century A.D. there were citrus groves in Sicily and around Naples (Pallad. 2.24.14). Besides its medicinal qualities, the citron was used as a breath-sweetener, in perfumery and as the ancient equivalent of our mothballs to keep insects away from stored clothing and fabrics (Plin. Nat. 15.15f.). Its wood was also highly valued (Hor. Carm. 4.1.20). At present, the citron is cultivated on a commercial scale in Italy, especially in Calabria and around Florence, but the lemon has largely replaced it in importance.

Plin. Nat. 15.14f., 47; 17.64; 23.105; Hor. Carm. 4.1.20; Mart. 13.37; Vitr. 8.3.8.

BURSERACEAE: Balsam Family

59. Boswellia: Incense Tree: tus.

Tus, frankincense, is the resin extracted from several species of the genus Boswellia. These trees and shrubs, indigenous to Somalia and Arabia, are very difficult to acclimatize and although Columella (3.8.4) says that tus grows in Rome, this could be Ajuga chamaepitys, ground-pine, which is indigenous to Italy. Pliny does say

virgis etiam turis ad nos commeantibus (Nat. 12.57)

even some sprigs of the incense-tree find their way

to Rome.

but he gives the definite impression that it was not well-known. It was probably introduced at the beginning of the Imperial period but quickly failed.

Col. 3.8.4; Plin. Nat. 12.51-57; 30.51.

60. Commiphora schimperi Engl.: Myrrh: myrr(h)a.

Myrrha is the resin from the small trees and shrubs of the genus commiphora which are indigenous to Somalia and Arabia. As in the case of frankincense, if plants were introduced as Columella suggests (3.8.4), it was on a very small scale and the introduction was short-lived.

Col. 3.8.4; 10.173; Plin. Nat. 12.66-71; 19.162, 188; 24.154.

ANACARDIACEAE: Cashew Family

61. Pistacia vera L.: Pistachio Nut: pistacia.

A native of western Asia and Asia Minor introduced by Vitellius in the first century A.D. (Plin. Nat. 15.91) to Italy. From Italy it was exported to Spain and other European countries where it also became established. The plant will grow in very dry conditions, poor soil and at high altitudes and is able to withstand great variation in temperature. The nut was eaten roasted or incorporated into other foods such as pastries. It was also used as a cure for snake bite (Plin. Nat. 13.51). Italy is one of Europe's major producers of P. vera today.

Plin. Nat. 13.51; 15.91; Pallad. 3.25.23; 11.12.3.

HIPPOCASTANACEAE: Horse-Chestnut Family

62. Aesculus hippocastanum L.: Horse-Chestnut:

Originally thought to be a native of Asia Minor. A. hippocastanum is now regarded as indigenous to the Balkans. It was extensively planted for ornament and as a shade tree in most of Europe. The wood is quite light and is thus used for turnery and kitchen utensils. The large seeds are not edible, although they have sometimes been used to feed livestock. They contain 5% of oil, and starch which has been used for stiffening. Date of introduction unknown.

BALSAMINACEAE: Balsam Family

63. Impatiens parviflora DC: Small Balsam:

Native of Central Asia which was originally cultivated but is now wild. Unknown date.

64. I. glandulifera Royle: Policeman's Helmet:

A native of the Himalayas introduced as an ornamental. Unknown date.

65. I. balfourii Hooker:

A native of the Himalayas introduced to Southern Europe. Unknown date.

RHAMNACEAE: Buckthorn Family

66. Ziziphus jujuba Miller: Common Jujube: <u>zizyphus</u>, <u>zizyphum</u>.

A native of Asia which came to the Mediterranean region via Persia and Asia Minor. It probably reached the Mediterranean area a few cen-

turies before the Christian Era, but according to Pliny it did not reach Rome until late in Augustus' reign.

> aeque peregrina sunt zizipha ... quae et ipsa non pridem venere in Italiam ... ex Syria. Sex. Papinius, quem consulem vidimus primus utraque attulit divi Augusti novissimis temporibus in castra sata (Nat. 15.47).
>
> Equally foreign is the jujube-tree ... which itself also has only recently come into Italy ... from Syria. Sextus Papinius, who was consul in our own day, introduced it in the last years of the principate of his late Majesty Augustus, having grown it in his camps from slips.

The plant was cultivated as an ornamental in gardens and was valued for its fruit which could be eaten fresh, dried or as a preserve. The juice had medicinal uses as a cough syrup and the timber was of some value.

Plin. Nat. 15.47; 17.75; 21.51; Col. 9.4.3, 6; Pallad. 5.4.1f.

VITACEAE: Grape Family

67. Vitis vinifera L.: Vine: vitis, vinea.

Although V. vinifera is generally agreed to be a native of Western Asia, its introduction into Italy is a matter of great debate. It is generally believed that the Greek colonists introduced viticulture and some superior cultivars into southern Italy during their migration in the eighth and seventh centuries B.C. However, some scholars still believe that the Mycenaeans had introduced it much earlier and Hyams,[55] who does not agree with the theory that the Etruscans were an indigenous people, says the first theory "does not account for the sophisticated viticulture which the Etruscans also possessed at a date too early to be accounted for by the spread of the vine northward from southern Italy." Therefore he supports the third theory that previous to the

Greek introduction, the Etruscans made an introduction in the north. The wild vine is native to Italy, but geneticists have been able to distinguish between cultivated and wild species remains, proving that there was no viticulture west of Greece until the seventh century B.C.[56] The vine in Italy and ultimately under Roman discipline is central to the whole history of the diffusion of the plants and its cultivation since it was the Romans who introduced it to Western and Central Europe. Of course the vine was most important for the wine industry, but the grape was also eaten and raisins, currants and sultanas date from antiquity. Vine leaves had medicinal properties and were used in cooking as well. In 1973, Italy had the most acreage in vine, followed by Spain and France.

Plin. *Nat*. 14.8-148; 17.152-216; Cato *Agr*. 23.1-26.1; Var. *R*. 1.8.1-7; Col. 3.1.1ff.

MALVACEAE: Mallow Family

68. Malva verticillata L.: Mallow: *malva*.

A native of Asia introduced into Italy and used as a salad plant and ingredient of cough medicines. Many other native varieties of mallow were also simply called *malva* which prevents identification of species in the sources.

69. Hibiscus syriacus L.: Syrian Ketmia, Rose of Sharon:

An introduction from Asia grown as an ornamental. Unknown date.

70. Hibiscus trionum L.: Bladder Ketmia, Flower-of-an-Hour:

A native of Southeast Europe or Central Africa cultivated as an

ornamental. The petals soon wilt after opening which gives it the second popular name. Unknown date.

ELAEAGNACEAE: Oleaster Family

71. Elaeagnus augustifolia L.: Oleaster:

A native of Asia introduced to much of southern Europe and cultivated as an ornamental. It has an edible, oily fruit which when dried is now known as 'Trebizond grapes'. Date unknown.

CUCURBITACEAE: Gourd Family

72. Citrullus vulgaris Schrader, Colocynthis citrullus L.: Watermelon: melopepo.

A native of Asia and North Africa which does not seem to have been known to the ancient Greeks but was probably introduced into the Mediterranean via Egypt just before the Christian Era. It was used, as it is today, as a source of refreshment. The term melopepo causes some confusion since it also refers to Cucumis melo, the melon or cantaloupe.

Plin. Nat. 19.67; Ed. Diocl. 6.30, 31.

73. Cucurbita lagenaria L.: Gourd or Calabash: cucurbita.

A native of Africa introduced into the gardens of tropical countries and those temperate ones which have a sufficiently high summer temperature to maintain it. Since it is not mentioned by Roman sources until the early Empire, it is assumed that this represents its date of introduction into Italy. Having reached its peak of cultivation in Europe in the sixteenth century, its use is declining. The stalk was eaten and

the gourd was used as containers for water and wine (Plin. Nat. 19.71). Pliny also tells us that it was also forced to grow into specific shapes by binding it (Nat. 19.70) and Columella adds a few other details:

> Una neque est illis (sc. cucurbitis) facies. Nam si tibi cordi
> Longior est, gracili capitis quae vertice pendet,
> E tenui collo semen lege: sive globosi
> Corporis, atque utero nimium quae vasta tumescit,
> Ventre leges medio; sobolem dabit illa capacem
> Naryciae picis, aut Actaei mellis Hymetti,
> Aut habilem lymphis hamulam, Bacchove lagoenam.
> Tum pueros eadem fluviis innare docebit (Col. 10.381-88).
>
> Nor have they all one form: now, if you desire
> The longer shape which hangs from slender top
> Then from the narrow neck select your seed;
> But if a gourd of globelike form you seek,
> Which vastly swells with ample maw, then choose
> A seed from the mid-belly, bearing fruit
> Which makes a vessel for Narycian pitch
> Or Attic honey from Hymettus' mount.
> Or hand water-pail or flask for wine;
> 'Twill also teach the boys in pools to swim.

The last line seems to refer to the use of gourds as supports for lads learning to swim, a primitive form of water-wings.

Plin. Nat. 19.69-74; Col. 10.380-88; 11.3.49.

74. Cucumis sativus L.: Cucumber: cucumis, cucumer.

A native of India which had reached Greece by the fourth century B.C. via the Levant and Egypt. It probably arrived in Italy about the same time, but it is not mentioned in Latin literature until the first century B.C. (Var. R. 1.2.25). It was then spread by the Romans into Central Europe. The plant has little nutritive value and was mainly used in salads and as a medicinal (Plin. Nat. 20.10; Col. 7.10.5). It was a favorite of Tiberius who had specially prepared cucumber beds mounted on wheels, so that the plants could be moved indoors on wintry

days (Plin. Nat. 19.64; Col. 11.3.52).

Var. R. 1.2.25; Col. 2.9.10; 7.10.5, 13.2; Plin. Nat. 19.64-68; 20.7, 10.

75. Cucumis melo L.: Melon, Cantaloupe: melo, melopepo, pepon.

A native of Asia and Africa probably introduced into the Graeco-Roman world in the beginning of the Christian Era. Representations of the fruit have been found at Herculaneum and Pompeii. They were cultivated for their fruit, and medicinal qualities.

> Qui pepones vocantur refrigerant maxime cibo et emolliunt alvum (Plin. Nat. 20.11).

> The gourds called pepones make a very refreshing food, and are also laxative.

The lack of references to this excellent fruit seems to indicate very limited cultivation and perhaps a poor quality of fruit.

Plin. Nat. 19.65-67; 20.11; Pallad. 4.9.6.

MYRTACEAE: Myrtle Family

76. Myrtus communis L.: Myrtle: myrtus, murtus.

The native range is very uncertain since it has been widely cultivated since ancient times. Pliny says

> Arbor ipsa in Europae citeriore caelo, quod a Cerauniis montibus incipit, primum Cerceis in Elpenoris tumulo visa traditur, Graecumque ei nomen remanet, quo peregrinam esse apparet. fuit ubi nunc Roma est iam conderetur ... (Nat. 15.119).

> The actual tree is recorded to have been seen for the first time on the hither side of Europe, beginning from the Ceraunian Mountains, on the grave of Elpenor at Circello, and it still keeps its Greek name, showing it to be an exotic. At the time of the foundation of Rome myrtles grew on the

present site of the city ...

It was grown for its very aromatic flowers, leaves and bark which have a variety of uses: oil for perfumery, condiment, medicinal uses (Plin. Nat. 23.159-63) and for its wine-making properties (Cato Agr. 133.2; Col. 12.38.1-8). It was also cultivated as an ornamental both for religious functions and for secular functions such as wreaths for victors.

Cato Agr. 133.2; 125.1; 8.2; Plin. Nat. 15.188-26; 17.62; 23.159-63; Col. 12.38.1-8; Pallad. 11.14.5.

PUNICACEAE: Pomegranate Family

77. Punica granatum L.: Pomegranate: malum granatum, malum punicum.

A native of the area from Asia Minor to the Himalayas which came to Italy via Carthage probably in the third century B.C. The rind of the unripened fruit and flower gives a red dye used for tanning leather (Plin. Nat. 13.113) and the bark of the root was used in medicinal concoctions to relieve nausea, to fight tapeworm and to heal sores (Plin. Nat. 23.106f.). The plant was also popular as an ornamental and the fruit, which is very juicy with a sour and refreshing taste, was eaten fresh. As well, the plant had an important religious significance as a symbol of fertility.

Cato. Agr. 7.3; 133.2; Col. 12.42.1; Plin. Nat. 13.9, 112; 15.60; 24.57; 23.106-09, 114; Pallad. 3.25.7.

UMBELLIFERAE: Carrot Family

78. Anthriscus cerefolium (L.) Hoffman: Salad Chervil: enthryscum.

A native of the region from the Soviet Union to southeast Europe.

It was cultivated as a herb and has become naturalized. Identification as the <u>enthryscum</u> of Imperial writers is not certain for the plant, but if it is, the plant was probably introduced sometime during the three centuries preceding the Christian Era.

Plin. <u>Nat</u>. 21.89; 22.81; Pallad. 3.24.9; 10.13.3.

79. Coriandrum sativum L.: Coriander: <u>coriandrum</u>.

A native of Western Asia and North Africa which was introduced for its seeds which are a very strong aromatic used for flavoring. It also had considerable medicinal qualities and was used for complaints as diverse as severe nose bleeds (Col. 6.33.2) to ridding the body of internal parasites (Plin. <u>Nat</u>. 20.218). Pliny does say that coriander was not found as a wild plant (<u>Nat</u>. 20.216).

Cato <u>Agr</u>. 147.6; Col. 6.33.2; 11.3.29; Plin. <u>Nat</u>. 19.117, 123; 20.216.

80. Pimpinella anisum L.: Anise: <u>anesum</u>, <u>anisum</u>.

Of Asiatic origin, P. anisum was widely cultivated for its aromatic fruits which are similar to caraway (Plin. <u>Nat</u>. 20.185). It also had many medicinal values.

> praecipuum autem est ad ructus; ideo stomachi inflationibus et intestinorum torminibus et coeliacis medetur (Plin. <u>Nat</u>. 20.189).
>
> Its chief value, however, is to cause belching, and so it cures flatulence of the stomach, griping of the intestines and coeliac trouble.

Today, Italy is one of the four main producers of anise in Europe.

Plin. <u>Nat</u>. 20.185-95; Col. 12.15.3.

81. Anethum graveolens L.: Dill, False Fennel: anethum.

A native of southwest Asia introduced and widely naturalized in the Mediterranean region. It was widely employed as a herb and was used as a cure for hiccups, flatulence, and eye problems (Plin. Nat. 20.96).

Plin. Nat. 19.123, 167; 20.96; Verg. Ecl. 2.48.

82. Petroselinum crispum (Miller) A.W. Hill: Parsley: petroselinum, apium.

Perhaps a native of southeast Europe or Western Asia which has now become naturalized in much of Europe. It has been used as a garnish and cultivated as a herb whose functions ranged from curing sick fish to increasing human fertility to warding off drunkenness.

Plin. Nat. 19.158; 20.112-18; Col. 11.3.33.

83. Carum carvi L.: Caraway: careum.

An introduction from Caria in Asia Minor. Andrews suggests that it was introduced as a well-developed cultivated plant at a relatively late date.[57] Pliny says:

> Peregrinum et careum gentis suae nomine appellatum, culinis principale. in quacumque terra seri vult ratione eadem qua olusatrum, laudatissimum tamen in Caria, proximum Phrygia (Nat. 19.164).

> The caraway is also an exotic, and bears a name from the country it belonged to; it is chiefly for the kitchen. It will grow in any country if cultivated in the same manner as black-herb, though the kind most highly spoken of grows in Caria, and the next best in Phrygia.

It was valued chiefly for its seeds which were used as flavoring in breads, cakes, etc. and had some medicinal properties as well. The

plant is naturalized in most of Europe today thanks to the Romans who introduced it to various countries, but it is not extensively cultivated in Italy.

Col. 12.51.2; Plin. *Nat*. 19.164.

84. Levisticum officinale Koch: Lovage: *ligusticum*.

A doubtful native of Europe;de Wit suggests Persia as its place of origin, Pliny says Liguria (*Nat*. 19.165). It was cultivated as a herb for flavoring and use in salads.

Plin. *Nat*. 19.165; 20.168.

85. Daucus carota L.: Carrot: *pastinaca*, *carota*.

As in the case of several other plants, a wild species of carrot existed in Italy, but it was not until classical times that D. carota was cultivated when a superior cultivar with a thick root was introduced from Afghanistan. It was first cultivated by the Romans in the late Republican or early Imperial period[58] but was not highly regarded. Consequently it failed to establish itself and was lost within a few centuries until it was reintroduced via Spain in the twelfth or thirteenth century. At this time it spread throughout Europe. Today there is no large-scale commercial production of carrots in Italy, although there are substantial crops for local use.

Plin. *Nat*. 19.90; 20.30; Apicius. 3.113-15; 3.21.1.

OLEACEAE: Olive Family

86. Jasminum officinale L.: Common Jasmine:

A native of Asia grown in Southern Europe as an ornament. The flower is also used in perfumery. Unknown date.

87. Olea europaea L.: Olive: _olea_, _oliva_.

Probably a native of Asia Minor which came to Italy in the seventh or sixth century B.C. via Greece.

> ... Fenestella vero omnino non fuisse in Italia Hispaniaque aut Africa Tarquinio Prisco regnante, ab annis populi Romani CLXXIII (Plin. _Nat._ 15.1).

> Fenestella says that in 581 B.C. during the reign of Tarquinius Priscus, it was not found at all in Italy and Spain or in Africa.

By Cato's time the olive had become commonplace and by the first century A.D. Italy had probably become the greatest oil-producing country in the world. The fruit yields up to 50% of its weight in valuable oil used for cooking, cleansing, illumination, unguents etc. The other major product of the olive was _amurca_, the watery portion that flows out upon pressing:

> Ex olea fructus duplex: oleum, quod omnibus notum et amurca, cuius utilitatem quod ignorant plerique ... (Var. _R._ 1.55.7).

> The olive yields two products: oil, well known to all, and amurca. As most people are ignorant of the value of the latter ...

The substance had properties which led to its use as a weed-killer, insect repellant and for many other valuable functions (_cf_. Cato _Agr_. 91f.; Var. _R_. 1.55.7f.; Plin. _Nat_. 15.33). The wood is also valuable for use in turnery and cabinet-making. Today the olive is grown in almost every region of Italy and only Spain can vie with Italy as the world's leading producer.

Plin. *Nat.* 15.1-35; Cato *Agr.* 64.1ff.; Var. *R.* 1.55.1-7; Col. 2.71.1ff.

ASCLEPIADACEAE: Milkweed Family

88. Gomphocarpus fruticosus (L.) R.Br.: Bristly-Fruited Silkweed:

A native of Africa grown as an ornamental with emetic and purgative functions. Unknown date.

RUBIACEAE: Madder Family

89. Rubia tinctorum L.: Dyer's Madder: *rubia*, *rubea*.

Forbes[59] describes this plant as a native of Syria which made its way to the Mediterranean via Palestine and Egypt, but this is not certain. The ancients cultivated it for the roots which yield red dye and minor medicinal qualities.

> Sunt etiamque duo genera non nisi sordido nota volgo, cum quaestu multum polleant. in primis rubia tinguendis lanis et coriis necessaria: laudatissima Italica et maxime suburbana ... (Plin. *Nat.* 19.47).

> There are two kinds that are known only to the avaricious herd, as they are very profitable articles of trade. First comes madder, which is indispensable for dyeing woollens and leather; the most highly esteemed is the Italian, and especially that grown in the neighborhood of Rome ...

Today its loss of economic importance is due to the development of synthetic dyes.

Vitr. 7.14.1; Plin. *Nat.* 19.47-48; 24.94.

BORAGINACEAE: Borage Family

90. Omphalodes linifolia (L.) Moench: Venus' Navel Wort:

Introduced to Italy from Poland, Spain or France. Date unknown.

91. Borago officinalis L.: Borage:

There is a great amount of uncertainty concerning this plant. Brouk[60] believes it was introduced from Syria, Polunin and Huxley[61] believe it is a native of the Mediterranean, and de Wit[62] thinks it was unknown in antiquity. It is now cultivated mainly in the central and southern regions of Italy. Date unknown.

92. Trachystemon orientalis (L.) G. Don: Eastern Borage:

A native of the Eastern Mediterranean naturalized in Italy. Date unknown.

LABIATAE: Mint Family

93. Ocimum basilicum L.: Sweet Basil: ocimum.

A native of South Asia or Africa introduced to Italy via the Middle East. It is an aromatic shrub that has been cultivated as a culinary herb and medicinal plant since antiquity. The leaves are used as flavoring for salads, soups and sauces. Even though it had many medical uses, it did not receive total acceptance by the Romans (Plin. Nat. 20.119). At present it is particularly popular among the French and Italians.

Plin. Nat. 20.119-24.

94. Melissa officinalis L.: Balm: apiastrum, melissophyllum.

A native of the Eastern Mediterranean and West Asia which was introduced to Italy and Central Europe. The herb was used for infusions against stomach ailments and used externally to cure bites, stings and wounds. It was also one of the plants widely cultivated for apiculture.

Var. R. 3.16.10; Col. 9.9.8; Plin. Nat. 20.116; 21.53, 70.

95. Majorana hortensis Moench, Origanum majorana L.: Sweet Marjoram: amaracus.

A native of Africa cultivated for its aromatic leaves which served both culinary and medicinal purposes. The ancients did not make a distinction between this plant and several other varieties which has made identification very difficult. Date unknown.

Plin. Nat. 21.37, 61.

SOLANACEAE: Nightshade Family

96. Lycium barbarum L.: Duke of Argyll's Tea Plant, Box Thorn:

Possibly a native of Southeast Europe but now widespread in Europe. Date unknown.

97. Solanum melongena L.: Aubergine, Egg-Plant:

A native of the Old World Tropics now cultivated in Central and Southern Europe. The fruit grows up to 2-1/4 pounds in weight and can be eaten fried or raw as a salad vegetable. Date unknown.

SCROPHULARIACEAE: Figwort Family

98. Veronica persica Poiret: Buxbaum's Speedwell, Persian Speedwell:

A native of Western Asia, now widely naturalized throughout Europe. Date unknown.

99. V. filiformis Sm.: Creeping Speedwell, Round-leaved Speedwell:

A native of Asia Minor, now widely naturalized throughout Europe. Date unknown.

COMPOSITAE: Composite Family

100. Chamaemelum nobile (L.) All.: Chamomile: chamaemelon.

A native of Western Europe introduced into Italy and cultivated for its use as a valuable tonic and stimulant. The Latin term chamaemelon encompasses a variety of plants making identification uncertain.

Plin. Nat. 22.53.

101. Chrysanthemum parthenium (L.) Bernh.: Feverfew: parthenium.

A native of Southeast Europe introduced and cultivated in Italy as a medicinal plant. It was used to break fevers, as a vermifuge, stimulant and even as an insecticide (Plin. Nat. 21.176).

Plin. Nat. 21.89, 176; 22.43.

102. Cichorium endiva L.: Endive: intubus.

A native of India which appears to have been unknown to the Greeks until the Roman period. It probably came to Italy not much earlier than the first century B.C. The plant was used as a vegetable or salad

plant, as a medicinal plant (Plin. Nat. 20.73) and to feed geese (Var. R. 3.10.5). It disappeared from Italy following the collapse of the Empire and was reintroduced via France in the fourteenth century. At present several species are widely cultivated in southern Italy often in association with woody crops such as the olive.

Var. R. 3.10.5; Col. 8.14.2; 11.3.27; Plin. Nat. 19.129; 20.73.

103. Lactuca sativa L.: Garden Lettuce: lactuca.

Probably a native of Asia (Col. 10.179f.) now found in many forms in Europe. The plant has little nutritive value but became a popular salad plant thanks to its cooling and pleasant taste (Plin. Nat. 19.27), and was also believed good for the stomach since it promoted one's appetite.

Col. 10.179f.; 11.3.26; Plin. Nat. 19.125f.

LILIACEAE: Lily Family

104. Aloe vera L.:

A native of Africa and Asia now naturalized along the southern littoral of Europe. The juice was used as a tonic, astringent and for chronic constipation. Unknown date.

105. Allium cepa L.: Onion: cepa.

A native of Western Asia which has probably been under cultivation since about 3000 B.C. The Greeks and Romans are believed to have obtained it by at least 800 B.C. and the Romans spread it throughout Europe. It was widely used as a vegetable and condiment and had many

medicinal uses, especially as an antiseptic for sores and eye problems (Plin. *Nat.* 20.39f.). In 1970, Italy was one of the world's top six producers.

Plin. *Nat.* 19.101-07; 20.39-43; Col. 12.10.1-2.

106. Allium sativum L.: Garlic: *alium*.

A native of Asia which was introduced into the Mediterranean Basin at approximately the same date as the onion. Garlic is one of the most nutritious of all vegetables: it has more protein than green peas and a content of 586 calories per pound. In antiquity it was commonly cultivated as a food, condiment and medicinal plant. The juice is a mild antiseptic, stimulant and cure for tapeworm (Plin. *Nat.* 20.50f.). Italy is presently one of the world's top producers.

Plin. *Nat.* 19.111-16; 20.50-57; Col. 11.3.15, 20: Hor. *Epod.* 3.

107. Lilium canidum L.: Madonna Lily: *lilium*.

A native of Greece imported to Italy as a garden ornamental. It was also used as a medicinal for wounds and sores, and as a diaphoretic (Plin. *Nat.* 21.126f.). It was used in perfumes as well:

> Lilium rosae nobilitate proximum est et quadam cognatione unguenti oleique, quod lilinum appellatur (Plin. *Nat.* 21.22).
>
> The lily comes nearest the rose in fame, and there is a certain relationship shown in the ointment and oil, which they call lilinum (oil of lilies).

Since a large number of varieties are all called *lilium* identification is difficult.

Plin. *Nat.* 21.22, 126.

108. Tulipa oculus-solis St.: Amans Flowers:

A native of Asia Minor often cultivated and now sometimes naturalized in Mediterranean Europe. Date unknown.

109. Tulipa clusiana Vent.:

Probably a native of Western Asia introduced as an ornamental. Date unknown.

110. Endymion non-scriptus (L.) Garcke: Bluebell, Wild Hyacinth:

A native of West Europe introduced into Italy. Date unknown.

111. Hyacinthus orientalis L.: Hyacinth: hyacinthus.

A native of Yugoslavia introduced as an ornamental. The plant was also cultivated for its purple dye. Identification is difficult since the common name hyacinthus applied to several varieties.

Col. 9.4.4; 9.10.99; Plin. Nat. 21.65f.

112. Asparagus officinalis L.: Asparagus: asparagus.

The native habitat of this plant is unknown. Perhaps a wild variety was indigenous to Italy and cultivars were introduced from Asia Minor or Egypt, or perhaps the Romans domesticated their own wild variety. The asparagus was not cultivated for food by the Greeks, but it was used for medicinal purposes. However it was highly valued by the Italians well before the Imperial period and was cultivated in the gardens of Cato's day (Cato Agr. 161.1-4).

> nihil diligentius comprehendit Cato, novissimumque libri est, ut appareat rem irrepentem ac noviciam

> fuisse (Plin. _Nat_. 19.147).
>
> No subject included by Cato is treated more carefully, and it is the last topic of his book, showing that it was a novelty just creeping in.

By Pliny's time the plant had become the object of a luxury trade, Ravenna and Campania producing the most favored plants (Plin. _Nat_. 19. 54). Although it was a most beneficial plant for stomach ailments (Plin. _Nat_. 20.108) it also required attention:

> Omnium in hortis rerum lautissima cura asparagis (Plin. _Nat_. 19.145).
>
> Of all cultivated vegetables asparagus needs the most delicate attention.

Plin. _Nat_. 16.173; 19.145-51; 20.108; 23.27; Pallad. 4.9.10; Cato _Agr_. 6.4; 161.1-4; Mart. 13.21.

IRIDACEAE: Iris Family

113. Crocus sativa L.: Crocus, Saffron Crocus: _crocus_.

Probably a native of the Eastern Mediterranean which was introduced into Italy for the production of its famous yellow saffron dye. To produce an ounce of dye requires approximately 4000 stigmas which accounts for the cost of the product and Pliny's statement (_Nat_. 21.32) _adulteratur nihil aeque_. The plant also had medicinal functions and was used in food preparation. Although grown in Italy, foreign varieties were preferred especially Cilicia's partially because

> serere in Italia minime expedit, ad scripula usque singula areis decoquentibus (Plin. _Nat_. 21.31).
>
> to grow it in Italy is most unprofitable, as a whole bed of saffron yields only a scruple of the essence.

At present, Italy is one of Europe's leading producers, ranking below only France and Spain.

Col. 3.8.4; 9.4.4; Plin, _Nat_. 21.31-34.

PALMAE: Palm Family

114. Phoenix canariensis Chaub.: Canary Palm: _palma_.

A native of the Canary Islands commonly planted for ornament in the Mediterranean region.

Plin. _Nat_. 6.205.

115. Phoenix dactylifera L.: Date Palm: _palma_.

A native of the Middle East planted for ornament, since they did not bear fruit when introduced into ancient Italy.

> sunt quidem et in Europa volgoque Italia, sed steriles... nulla est in Italia sponte genita (Plin. _Nat_. 13.26).
>
> It is true that there are also palms in Europe, and they are common in Italy, but these are barren.... there are none in Italy not grown under cultivation.

Although the fruit was by far the most important product of the tree, its parts such as leaves (for ropes) and wood were useful.

Plin. _Nat_. 13.26f.; 12.103; 16.223; Col. 12.53.2; Pallad. 11. 12.1.

GRAMINEAE: Grass Family

116. Triticum[63] durum Desf.: Durum Wheat, Hard Wheat: _triticum_.

The first evidence of durum wheat in Italy is post 300 B.C., but in a few centuries it had displaced T. dicoccum, emmer, as the principal wheat cultivated in Italy. Emmer had previously provided the base for the staple food of the Italians, a type of porridge, _puls_, but the use of durum permitted a significant change of diet from porridge to

bread. It is generally believed that contact with the Greeks in the south precipitated this change in the rest of the peninsula. At present, Italians claim that T. durum is the best source of semolina flour, which is used for making pastas or paste products, and as a result it is still grown in Latium. The term triticum is applied to several of the naked wheats in the Latin sources, making identifications difficult.

Cato Agr. 34.2; Plin. Nat. 18.63ff., 119ff.

117. Triticum aestivum L.: Wheat, Bread Wheat: triticum.

Although this species was established quite early in Europe and was fairly common in Spain during the second millenium B.C., it was not until the first century A.D. that it became firmly established in the lowlands of Europe.[64] This type of wheat is superior to all others as a bread wheat and is the most important cereal crop of the Western World. Italy is one of Europe's largest producers of T. aestivum today.

Plin. Nat. 18.7, 16, 98.

118. Secale cereale L.: Rye: asia, secale.

Probably a native of Asia Minor and Transcaucasia which was introduced at a very early date into Europe as a contaminant in other cereals. There have been no significant finds of rye in Europe which date to pre-Roman times and Pliny is the first author to mention it.

> Secale Taurine sub Alpibus asiam vocant, deterrimum et tantum ad arcendam famen ... (Nat. 18.141).

> The name for secale in the subalpine district of Turin is asia; it is a very poor food and only serves to avert starvation.

In the same passage Pliny says that it grows in any sort of soil with a

hundred-fold yield which perhaps helps to explain why it became a major crop after the fall of the Roman Empire[65] since it appears to have had such a poor reputation in the first century A.D.

Plin. Nat. 18.141; Ed. Diocl. 1.3.

119. Hordeum distichon L.: Two-Rowed Barley: hordeum.

A type of wild two-rowed barley was one of the very first cultivated cereals. H. spontaneum was being cultivated in Asia Minor during the eighth or seventh millenium B.C., but at an early date was replaced by a six-rowed barley, H. vulgare, which became the principal barley grown in Italy. Issac[66] states that two-rowed barley is not found in Europe until classical times and that although there is evidence for it in Greece in the third century B.C., there is no evidence in Italy until 300 years later. H. distichon gives a superior yield to six-rowed barley and although it is now chiefly used as a fodder and for malting beer, it was part of the diet in antiquity.

> Alterum quoque genus hordei est, quod alii distichum ... ponderis et candoris eximii, adeo ut tritico mixtum egregia cibaria familiae praebeat (Col. 2.9.16).
>
> There is also a second variety of barley which some call distichum ... of extraordinary weight and whiteness, so much so that when mixed with wheat it makes excellent food for the household.

It is a very hardy cereal as well, and will survive in conditions unfavorable to wheat.

Col. 2.9.8, 16; Plin. Nat. 18.71f.; Pallad. 2.4; 3.8.

120. Arundo donax L.: Giant Reed, Cane: donax.

An ornamental which probably originated in the Orient, but has long been cultivated in the Mediterranean region where it is now fully naturalized. It is widely used for basket-making, walking-sticks and for making wind-breaks and shelters. It is the largest grass in Europe.

Plin. *Nat.* 16.165; 24.86; 32.141.

121. Avena sativa L.: Oat: *avena.*

A plant which arrived in Europe as a contaminant of the early cereals. The Romans knew it as a weed of cultivation, a fodder (Col. 2.10.24, 32) and, Pliny indicates, a cereal for human consumption.

> ... ipsa (*sc*. avena) frumenti sit instar, quippe cum Germaniae populi serant eam neque alia pulte vivant (*Nat*. 18.149).

> ... the oat itself counts as a kind of corn, inasmuch as the races of Germany grow crops of it and live entirely on oatmeal porridge.

However it would appear that it was not extensively cultivated in ancient Italy.

Plin. *Nat*. 18.141; Col. 2.10.24, 32; Hor. *S*. 2.6.84.

122. Phalaris canariensis L.: Canary Grass: *phaleris.*

A native of Africa and the Canary Islands introduced into most of Europe. Today it is used as a grain to feed cage-birds. It may be the *phaleris* Pliny describes (*Nat*. 27.126) as one of the remedies that break up stone in the bladder, but this is not certain.

Plin. *Nat*. 27.126.

123. Coix lacryma-jobi L.: Job's Tears:

A native of India often grown as an ornamental in Southern Europe. The fruits are used for necklaces, chaplets etc. and although they probably contain more protein than any other cereal, they are generally consumed only by some Far Eastern peoples. Unknown date.

124. Colocasia esculenta Schott: Taro, Colocasia: aros, aron.

A native of the Pacific Islands and South East Asia which probably travelled to Egypt and then to Africa and Italy. It is a starchy plant that can take the place of our potato or the shoots can be eaten like asparagus. The term aros may refer to other plants as well, so we are not sure if C. esculenta is the plant the ancients were speaking about.

Col. 10.244; Plin. Nat. 19.96; 24.142.

CYPERACEAE: Sedge Family

125. Cyperus papyrus L.: Papyrus: papyrum, scirpus.

A native of tropical Africa which spread to Egypt and later to Syria and Asia Minor. In the Middle Ages it was cultivated in southern Italy, Sicily and Malta. Especially in light of this later acclimatization of the plant, the possibility that papyrus did grow at some time in the marshes of southern Italy cannot be summarily ruled out. Although we have no archaeological remains of the plant, we do have inscriptional evidence (IG 14.654; IG 14.1047) from Italy as well as some references in ancient authors which say the plant was grown in Etruria and south Italy (Str. 5.2.9). However, it is argued that the terms used to describe the papyrus plant are also used as generic terms for rushes and aquatic plants. If C. papyrus was introduced into Italy,

it was a short-lived introduction of very little, if any, importance.

Plin. _Nat._ 13.71-89; 16.157, 178; 24.88; Str. 5.29; _IG_ 14.654; 14.1047.

III. Interpretation of Catalogue: General Patterns of Introduction

The information regarding the chronology and the economic importance of the catalogue's plants has been condensed into tabular form (Table I, p.81) in order to illustrate more clearly general patterns of change in the agricultural life of the ancient Italian peoples. Although many of the plants have been located in the table somewhat arbitrarily, and subsequent research may alter the details of the table, the general patterns of significant change seem to be valid.

Economic Importance: Summary

Plants of significant importance were continually introduced from the earliest period until the first century A.D. The very small number of plants of crucial importance introduced after 300 B.C. is not surprising since, in the preceding three and a half centuries, the Greek colonists had probably imported their available supply of suitable plants--plants of greatest importance tend to be introduced first. The later exceptions, hemp, durum wheat and alfalfa, either were not available until their introduction or their importation was a direct result of the demand of Rome's increasing military role.

After the first century A.D. our sources become less informative and no plants can be clearly isolated as introductions of this period. Some previous introductions such as rye and oats gained in importance, but the period is more notable for the plants, such as alfalfa, carrot and apricot, which fell out of cultivation and disappeared from the peninsula because of the disruption of agricultural practice.

Plants of significant importance were, for the most part, introduced

after the period of Greek colonization and before the end of the first century A.D. The imported flora of this class is much more diverse in its functions than the plants of the crucial category. Although many plants are valuable for their food qualities, they tend to be less nutritious than the food plants of crucial importance and were instead cultivated for their flavoring characteristics, sweetness or, in the case of the plants imported after 160 B.C., to supply the growing demand of the Roman upper class for luxuries such as fruits and nuts. Others such as the laurel, pomegranate and cypress had important religious overtones as well as food values. The introduction of fodder plants parallels the gradual growth of grazing, especially under the direction of the Greeks in the south. The importance of other plants rested in the developing perfume and dye industries. Osier, one of the early introductions, was probably introduced initially for basket-weaving, but it gained in importance along with the cypress as a source of stakes, props and withes for the vine industry. Generally, the plants of this category represent items of peripheral social importance which were cultivated on a smaller scale than the plants of crucial importance.

Plants of minor importance were imported throughout all the periods except the last, but the largest number of introductions dates from 300 B.C. Most of these plants were valued for their flavoring qualities or, in the case of the fruits, for their enticing oddity. A few others such as feverfew, citron and purslane were cultivated for their medicinal properties.

Unsuccessful introductions fall almost entirely within the period

37 B.C. to A.D. 100. This was a period of great wealth and curiosity on the part of Rome and attempts were made to introduce plants that were previously known only as imported products--attempts which failed because the plants could not be acclimatized. The date palm, although it did become an ornamental and provided a few products, should be considered a failure since it was almost certainly introduced for its fruit, which could not be produced in Italy.

Chronological Patterns: Summary

The table reveals five major chronological periods of plant introduction which reflect significant changes in the agricultural life of the ancient Italian peoples.

During the earliest period the native inhabitants of Italy were parochial subsistence farmers who had little control over the type of introductions available to them. It is easy to see at a glance that, except for the osier, all of the plants were food plants. The group of large importance were all annual plants of high nutritional value requiring little cultivation or special care. As a result they became staples, along with the cereals, of the Italian diet. Although most of these plants were natives of Asia and Asia Minor they were probably carried by migrating peoples into Central Europe before arriving in Italy. Since the cabbage, seakale and osier are natives of western and central Europe, this route of introduction may help to explain their importation into Italy at this early date.

The second major period of introduction began about 750 B.C. when the Greeks began to colonize southern Italy. Economically this is cer-

tainly the most important period of plant introduction into Italy owing to the importation of three plants: the olive, fig and vine. Once again food plants dominate the list, but they are no longer only annual plants. The introductions reflect a superior culture with more refined tastes than those of the previous period. Many of the plants required patient care and served other than the fundamental function of sustenance. Religious, ornamental and dietary considerations illustrate introductions by an advanced culture which refused to go without those materials that had proven useful and pleasurable. Although the Greeks were the major agent of introduction, the Phoenicians were operating in the area and may be responsible for some of the importations.

The third period extends from the beginning of the fourth century to the middle of the second century B.C. Whereas the previous period was the most important period of plant introductions, this is undeniably the period of most striking agricultural change in the Roman Republic. Not only were introduced plants spread throughout the peninsula, but for the first time, farming for profit was practiced on a large scale by native peoples. Growing contact between the Greeks in Magna Graecia and the Italians to the north probably initiated the change which became prominent after the Punic Wars. The plants introduced during this period are generally of less economic importance and, in the case of food plants, of less nutritive value. Besides the less important plants, an increasing refinement of taste led to the widespread cultivation of durum wheat, at the expense of emmer, for bread-making purposes. A growing demand for brightly colored textiles accounts for the introduction of dyer's madder and, to a less extent, the pomegranate. The Greeks probably continued in their role as the agent of the introductions, but as

the Romans began to come into contact with foreign lands, they began to import plants such as the pomegranate themselves.

During the fourth chronological period, from the middle of the second century B.C. until 37 B.C., the Romans began to come into direct contact with foreign lands and peoples both through military expeditions and commerce. Consequently they discovered different plants which had been improved by centuries of cultivation. Now for the first time the Romans themselves act as the importers of exotic plants on a large scale. By the end of the period Rome had almost total control of the Mediterranean Basin and was able to draw upon the flora of other countries to supply the luxury trade in Italy. Fruit and nut trees dominate the list and almost all the plants of the period were intended for use by the wealthy class only. Even alfalfa, which later became a green manure of widespread cultivation, was probably introduced as a fodder for horse-breeders and ranchers--the wealthy class.

The fifth, and final, major period of introduction took place between 37 B.C. and the end of the first century A.D. For many Romans this was a period of great wealth and extravagance. Fruits and nuts continued to excite the appetite of the Romans and were eagerly brought to Italy, probably as much for their oddity as for their food value. New cultivars of ornamental plants, such as the rose and lily (which also had important industrial uses) were introduced to grace the pleasure gardens of villas and palaces. The Romans had set about to acquire any plants that pleased them. As a result, several introductions were almost immediate failures because they could not be acclimatized to the peninsula, cinnamon, papyrus and myrrh for example.

After the first century A.D. we know of no plants that were introduced into Italy before A.D. 500. As has been mentioned, during this period some previously unimportant plants, such as rye and oats, gain importance because of their hardiness. However, several other plants fall out of cultivation and disappear from the peninsula thanks to agricultural disruption caused by barbarian incursions, economic problems, manpower shortages, and other factors. Italy had to wait until the Arabs came to Spain before she received any more exotic plants.

TABLE I: Introductions Categorized According to Chronology and Economic Importance

Degree of	Period of Introduction*				37 B.C.-		
Importance	Pre-750	750-300	300-160	160-37	A.D. 100	100-500	Unknown
Crucial	Cabbage Chickpea Onion Garlic	Fig Pear Apple Horsebean Lentil Vine Olive	Durum Wheat Hemp	Alfalfa			
Significant	Osier Myrtle Poppy	Stone Pine Cypress Laurel Plane Tree Quince Carob Lupin	Hazelnut Fenugreek Pomegranate Coriander Dyer's Madder Asparagus Crocus Gingelly	Walnut Dyer's Rocket Medlar Plum Almond Cherry Sweet Chestnut	Bread Wheat 2 Row Barley Jujube Madonna Lily Rose Peach Pistachio Mulberry		Azarole Ainse Sweet Basil Balm Giant Reed
Minor	Garden Cress Sea kale Radish Oat	Purslane Horse Radish	Feverfew Cucumber Salad Chervil	Tree Medic Caraway Endive Lettuce Citron Smilax	Apricot Cowpea Watermelon Gourd Melon Rye	Job's Tears(?)	Birthwort Wolfsbane Hoary Cress Wallflower Castor Oil Dill Parsley Lovage

(cont.)

TABLE I (cont.)

Degree of Importance	Period of Introduction* Pre-750	750-300	300-160	160-37	37 B.C.-A.D. 100	100-500	Unknown
Unsuccessful Introductions				Date Palm Mecca Balsam	Carrot Papyrus Frankincense Myrrh Cinnamon		
Unknown	pea			Wood Saxifrage			Virginia Stock House-leek Tree Pittosporum Willow Spiraea Sainfoin Horse Chestnut Cockle Oleaster Ketmia Mallow

*These periods represent the terminus ad quem for each plant. Research may provide even earlier dates for the importation of some plants.

IV. Factors Governing the Introduction and Establishment of Plants

Obviously the most important factor governing the success of an introduction was the desire of the inhabitants to possess that particular plant, otherwise the cultivation of the plant would not spread and the introduction would be a failure. However, many other factors influenced not only the success and longevity of introductions, but also their dates of arrival. Population migrations, the introduction of new agricultural tools and techniques, the growth of commerce, climatic changes, population pressures and alterations of diet are only a few examples of conditions which affect plant introductions.

Centres of plant origin and the development of agriculture.

Vavilov[67] proposed eight independent centres of origin of the world's most important cultivated plants. Two, being New World centres, have no bearing on this topic. The other six are: (1) the Chinese centre, (2) the Indian centre, (3) the Central Asiatic centre, (4) the Near Eastern centre, (5) the Mediterranean centre and (6) the Abyssinian centre. Although the lists of indigenous plants for each centre have undergone revision and other primary and secondary centres have been added, Vavilov's work remains a foundation for studying the origin of plants.

The Mediterranean region, although notable for its distinct cultivated plants of more limited value than the other centres, ranks with the Chinese centre as a major area of origin for vegetables. This helps to explain the smaller number of vegetables introduced, but it must be

remembered that plants indigenous to the Mediterranean centre are not necessarily native to Italy. This paucity of cultivated plants in the Mediterranean region meant that in order for Italy to become a country of diverse crop production, as it is today, many plants had to be introduced from the other centres.

It is generally accepted that the first deliberate cultivation of plants by man occurred in the Near Eastern area, more specifically in southwest Asia, nine or ten thousand years ago.[68] The earliest agriculturalists concentrated on the cultivation of annual crops, such as cereals and pulses, relying on local wild trees to provide fruits and nuts to supplement their diet. Varieties of wheat and barley were probably two of the first plants to be domesticated, owing to their importance as basic staples for both man and his animals, but gradually other annual crops were domesticated according to their importance to man. Within a millennium and a half, the Near East had developed its food-growing potential to such an extent that commerce, transport and urban society could begin. However, it was not until this type of agriculture was well established that orchard husbandry could be practiced. Orchard plants require a growth period of five to ten years before they begin to produce. Only a mature economic system and relative social security could provide, or even stimulate, such cultivation which would be beneficial so much later--even to subsequent generations.[69] It is not a coincidence that the vine and olive did not come into cultivation before the end of the fourth millennium B.C. in the Near East.

For this same reason it is not surprising that the earliest plant introductions into Italy are annual, staple crops, such as wheat and

barley. The inhabitants were simply not advanced enough to undertake the more complex cultivation of orchard crops. Later on, orchard husbandry was introduced and established in Italy by colonists of a higher cultural level who had experience in the cultivation of such plants.

Plant introduction prior to the period of Greek colonization.

Plant selection is implicit in primitive agriculture, as is plant introduction. Farmers by definition must be a sedentary people who tend to occupy a given area for extended periods of time during which, by the process of selection, they develop varieties of crops adapted to their region and to their special needs. But occasionally the farmers moved, taking their favorite plants with them. Upon reaching a new area they introduced their varieties of plants among native varieties which may have resulted in superior hybrids that were then propagated by selection.[70]

It seems clear that in southwestern Asia, about the beginning of the seventh millennium B.C., man had already begun to domesticate the two wild wheats, T. boeoticum and T. dicoccoides, and was growing variants of the latter that were similar to T. dicoccum, emmer. It seems equally clear that emmer became the main wheat crop and spread with human migrations, sometime before 5000 B.C., into much of Asia, Africa and Europe accompanied by T. monococcum, einkorn, perhaps originally as a contaminant although it soon became established as a crop in its own right. Without question other plants were also transported in these early migrations, but the lack of paleobotanical material makes it very difficult to determine the periods when more perishable plants

were introduced into new regions. For this reason, a few plants such as garlic, onions and pea, which may well have been introduced into Italy before 1000 B.C. have been included in the catalogue.

The geographical isolation of Italy from the rest of the Mediterranean lands may have delayed plant introductions into the peninsula since the early migrations and plant introductions followed a land route from Western Asia to Europe. Indeed, archaeological evidence often indicates the earlier use of cultivated crops in other areas of Europe and the Mediterranean Basin.[71] Not until maritime activity began in the Eastern Mediterranean and points of contact were established in the western region is there archaeological evidence which would indicate that Italy had received new plants before or at the same time as the other Western Mediterranean lands.

With the growth of commerce in the Eastern Mediterranean, explorers, adventurers and traders began to look westward for new areas to exploit. Contact between the Aegean and the West began in the seventeenth century B.C. and Mycenaean trade with Italy seems to have increased until it reached a peak about 1400 B.C. Most of the Mycenaean finds in Italy occur in the south, especially in the area of Taranto, a fact which led some scholars to suggest a Mycenaean colony in the area.[72] However, the important fact to be considered is that contact between the inhabitants of Italy and the more culturally and agriculturally advanced peoples of the Eastern Mediterranean had finally been established by sea.

After the collapse of the Mycenaean civilisation, a few centuries elapsed before trade routes were again established between Italy and the Eastern Mediterranean. In the fifteenth or fourteenth century,

Phoenicia had begun to establish itself as a trading power, at first operating in the Eastern Mediterranean with Cyprus, Rhodes and other islands. These islands became useful staging-posts for Phoenician vessels going farther afield and gradually they extended their lines of commerce westward.

As far as we know, the Phoenicians did not establish any colonies on the Italian mainland, but their trading contacts there were strong and they did establish a colony at Gades in Spain perhaps as early as 1100 B.C., although some would place the date one to three hundred years later. It is apparent that the Phoenicians had established firm trade routes around the western Mediterranean, and contact with native peoples must have grown steadily.[73]

The exploration of new territory and contact with new peoples represented the first steps toward plant exchanges but it is impossible to determine the importance of such exchanges in these early commercial ventures. However, we do know that agricultural exchanges were a part of maritime commerce from earliest times and we have historical records attesting to the antiquity of plant collection. As noted above, the Assyrian king, Tiglath-Pileser I (c. 1130 B.C.) recorded that he had brought cedars and other trees as well as rare vines from countries that he had conquered and had planted them in gardens of his own land,[74] and the Phoenicians are believed to be the party responsible for the introduction of the cypress tree into Cyprus and other areas of the Eastern Mediterranean about 1000 B.C.[75] Thus, culturally advanced peoples were transplanting vegetation since they realized the value and importance of improved varieties of plants or of varieties which had to be imported

from distant areas.

It is unlikely that introductions on a large scale occurred during this early period of commerce with the West, since native farming methods were probably at such a primitive level that they deterred much experimentation with crops. However, it is not improbable that small scale introductions of annual plants such as the pea, garlic and onion were made by these early traders into their trading areas so that they might have fresh supplies of familiar foods.

The period of Greek colonization.

When, in the course of the eighth century B.C., the Greeks from Euboea sailed out to found their first colonies in the western Mediterranean they were not venturing into the unknown. When they went they must have drawn upon geographical knowledge already acquired by traders whose ships had begun to find profitable harbors in the West. These earlier voyagers themselves were only following a route already established by Mycenaean trade and perhaps by settlement.

The reasons suggested to account for the Greek colonizing movement include population pressures at home and the desire either to create markets for the products of the mother cities or to become areas of primary production for the founding cities. Whatever the reason, even if these colonies had been founded for commercial benefit, the new inhabitants had to be able to support themselves within a short time. As a result, sites were chosen which had their own large, fertile plain for cereal production, and preferably a good harbor as well.[76]

The new inhabitants, while cultivating the land for their sustenance, were not about to give up the foods, beverages and other plea-

sures that they had enjoyed in their homeland. For such reasons, according to Nissen,[77] the richest of the waves of new plants into Italy began. Not only were new plants and superior cultivars introduced by the colonists into Italy, but equally important, a highly developed culture, several stages beyond the hand-to-mouth economy of the natives, was introduced. This last fact gains considerable importance when one considers that until the third century B.C. native Italian agriculture was rarely practiced above the level of subsistence.[78] Famine often hovered just above the populace and no one dared to risk experimentation with crops since failure could mean famine or even death.[79]

At this time, the knowledge of iron working appeared in Italy, probably a result of Greek influence. The Villanovan culture in the north was particularly skilled in this technology. The introduction of iron into agriculture had results which ought not to be underestimated. Most scholars agree that deforestation of the countryside increased, but how much is a matter of debate. It is quite certain that this action set the process of erosion[80] into motion while simultaneously opening up new and large tracts of land for cultivation, of which iron-shared ploughs made better use through deeper and better cultivation of the soil. Bennett's[81] statement that "when man became a settled cultivator he became responsible for the widespread disturbance of the ecological habitat" certainly applies to Italy from this period forward.

The diffusion of iron use in Italy seems to have advanced much more quickly than the practice of arboriculture. For example, the extension of land put under cultivation and the accompanying population explosion in central Italy during the first half of the first millennium B.C.[82]

may have been a partial result of iron-tool use. However, at Narce, which had a domestic occupation into the seventh century B.C., there were no traces in the plant record of either vines or olives and at Rome, vine pips do not appear until Period IV (625-575 B.C.). It would be surprising if the vine and olive had not been cultivated before this date, but it may be that their introduction into Campania did not take place on a large scale until mid-Etruscan times.[83] Pliny provides an erroneous statement of the antiquity of the olive's introduction into Italy in a quote from Fenestella, but had he redefined the geographical region to central Italy the statement would have been nearer the truth:

> ...Fenestella vero omnino non fuisse in Italia Hispaniaque aut Africa Tarquinio Prisco regnante, ab annis populi Romani CLXXIII ... (Plin. Nat. 15.3).
>
> ... Fenestella says that in 581 B.C., during the reign of Tarquinius Priscus, the olive was not found at all in Italy and Spain or in Africa ...

Such a statement however, may indicate the traditional belief that plants of this nature were not widely cultivated in Italy until after the middle of the first millennium B.C.

The settlement of Greek colonists in Italy aided plant introductions in two major respects. First,it resulted in the importation of a large number of plant varieties which were to become very important economically to the population of the peninsula. Second, the presence of the colonists ensured the establishment of these plants in Italy until such time as the natives who ultimately controlled the distribution of the plants had advanced far enough culturally to reap the benefits that widespread cultivation could provide.

The Roman agricultural revolution: the change from subsistence to profit farming.

During the period following the intensive Greek colonization of the eighth and seventh centuries, commerce spread new ideas and new plants throughout the peninsula. Plants such as the vine, fig and olive gradually began to spread northward taking advantage of areas unsuitable to cereal and pulse crops, but only on a very small scale. After the consolidation of central Italy under Roman rule in the late fourth century, small holdings increased in size, but the economy continued at a level of subsistence, without much interest in cash crops.

Roman contact with the Greeks in Magna Graecia subsequently increased, and this event is usually regarded as the reason for the noticeable change of Roman diet about 300 B.C.[84] At this time the Romans became familiar with T. durum, durum wheat, which rapidly replaced emmer as the principal cereal crop of Italy. The standard dish of the peasants previously had been <u>puls</u>, a porridge of pounded emmer, barley or even bean-flour. The only bread was a flat, hard, tough, unleavened substance which was dipped in milk to soften it before eating. With the cultivation of durum wheat, leavened breads and pastries became possible and caught the fancy of the Italian people. This change of preference in wheats was to have far-reaching consequences not only in Italy, but also in other Mediterranean areas, such as Egypt,[85] North Africa and Sicily.

The major revolution in Roman agriculture began in the third century B.C., a direct result of the Punic Wars, especially of the war with Hannibal. In continental Italy there was a great difference in

the degree of suffering and devastation to the different regions. Except for the first few weeks of the war with Hannibal, the northwest section of the peninsula suffered very little. In contrast, the southeast region was terribly devastated by both the Carthaginians and the Romans themselves.[86] Appian[87] says Hannibal destroyed 400 towns which for the most part must have been located in southern Italy. The scorched-earth policy adopted by Q. Fabius Maximus Verrucosus, later named Cunctator, completed the task of Hannibal.

> Edictoque proposito ut quibus oppida castellaque immunita essent, uti commigrarent in loca tuta, ex agris quoque demigrarent omnes regionis eius qua iturus Hannibal esset, tectis prius incensis ac frugibus corruptis, ne cuius rei copia esset ... (Liv. 22.11.4-5).
>
> He also issued an edict that those who dwelt in unfortified towns and hamlets should remove to places of safety; and that all the inhabitants of that district where Hannibal was likely to be marching should abandon their farms, first burning the buildings and destroying the crops, that there might be no supplies for him of any kind.

Toynbee makes it clear that southeast Italy never made a complete recovery in antiquity. "It did increase its agricultural produce a bit in the second century A.D., but it was not until after the Second World War that southeast Italy as a whole attained the populousness and prosperity which had been attained there in the sixth century B.C."[88] Brunt[89] agrees that no area of Italy suffered more than Campania and Bruttium, but points out that Campania recovered, Bruttium did not. To explain the divergency, other causes than the ravages of war must be sought. Three centuries of almost continual war, land confiscations later imposed by the Romans, the importation of slaves and the profitability of pasturage compounded by a great decline in population surely

help to explain the economic decline in the south.

The grain supply.

During the wars with the Carthaginians, Italy, so far as it was not being devastated by the enemy or by the inhabitants' own hand, must have gone heavily into cereal culture in order to supply the army with portable foodstuff.[90] After the war, when the supplies stored for the army were thrown onto the market at a reduced price in order to please the populace, the price fell so low that some merchants actually gave their supplies to the shippers to pay the freight charges.

> Per eos dies (c. 202 B.C.) commeatus Sicilia Sardiniaque tantam vilitatem annonae affecerunt ut pro vectura frumentum nautis mercator relinqueret (Liv. 30.38.5).
>
> About that time supplies from Sicily and Sardinia lowered the price of grain so much that the merchant would leave his grain to the mariners to cover the freight.

This depressed market lasted only a short time, but the situation probably reappeared whenever wars were concluded and stockpiled grains were released onto the open market. Perhaps this was not a major factor in the change from cereal to cash crops, but it must have influenced profit-oriented producers who might end up giving a year's labor away for virtually nothing.

During the third century B.C. the Romans had begun to import large amounts of grain from Sicily, and then later from Africa and Egypt. The discovery and subsequent reliance upon these regions as a cheap source of grain for Rome and a few other coastal cities had far-reaching effects upon the agriculture of these receiving areas. It is important to under-

stand that the grain supply from foreign lands affected only Rome and a few other regions, not the entire peninsula. In fact, in areas where harbor facilities were not available for grain imports, cereal production suffered no diminishment and the surplus was regularly employed as an animal fodder in some of the northern districts.

In 200 B.C. the government in Rome had decided to pay off in land, in lieu of money, the third and last installment of the repayment of the Roman state's Hannibalic war-debt to its private creditors. The public land with which this repayment was made all lay within a radius of fifty (Roman) miles from the city of Rome, land that came to be called the Trientabula.[91] This was the most valuable non-urban real estate in Italy since Rome now had access to foreign grain sources[92] and more valuable cash crops such as the vine, olive, fruits and vegetables could be raised close to the urban market. Pliny confirms the value of the area in his day.

> Nec minus miraculum in pomo est multarum circa suburbana fructu annuo addicto binis milibus nummum, maiore singularum reditu quam erat apud antiquos praediorum (Nat. 17.8).

> And in the matter of fruit-trees no less marvellous are many of those in the districts surrounding the city, the produce of which is every year knocked down to bids of 2000 sesterces per tree, a single tree yielding a larger return than farms used to do in old days.

> Itaque sub urbe colere hortos late expedit, sic violaria ac rosaria, item multa quae urps recipit, cum eadem in longinquo praedio, ubi non sit quo deferri possit venale, non expediat colere. Item si ea oppida aut vici in vicinia aut etiam divitum copiosi agri ac villae, unde non care emere possis quae opus sunt in fundum, quibus quae supersint venire possint, ut quibusdam pedamenta aut perticae aut harundo, fructuosior fit fundus, quam si longe

> sint importanda, non numquam etiam, quam si colendo in tuo ea parare possis (Var. R. 1.16.3).

> And so it is profitable near a city to have gardens on a large scale; for instance, of violets and roses and many other products for which there is a demand in the city; while it would not be profitable to raise the same products on a distant farm where there is no market to which its products can be carried. Again, if there are towns or villages in the neighborhood, or even well-furnished lands and farmsteads of rich owners, from which you can purchase at a reasonable price what you need for the farm, and to which you can sell your surplus, such as props, or poles, or reeds, the farm will be more profitable than if they must be fetched from a distance, sometimes, in fact, more so than if you can supply them yourself by raising them on your own place.

Rome's success at producing orchard crops was due in part to the destruction of the southern garden during the Hannibalic war, part to the proximity of this area to the major market of the peninsula, Rome.

Italian farmers did not fear the competition of imported grain, in fact they may have welcomed it. Once the burden of grain supply was removed from an area, exotics could be cultivated. The excavation of the villae rusticae[93] and the contemporary excavations being done at Pompeii[94] show that although specialization in the production of oil and wine was common, a good deal of mixed farming was evident. Great fortunes could be made by catering to the luxury trade at Rome and other urban areas whether the demand be for fowl, fruit, nuts or other products as the books of Varro illustrate. And yet, Varro does not recommend that only cash crops should be cultivated:

> Quae nasci in fundo ac fieri a domesticis poterunt, eorum nequid ematur, ut fere sunt quae ex viminibus et materia rustica fiunt, ut corbes, fiscinae, tribula, valli, rastelli; sic quae fiunt de cannabi, lino, iunco, palma, scirpo, ut funes, restes, tegetes (R. 1.22.1).

> Nothing should be bought which can be raised on the place or made by the men on the farm, in general articles which are made of withes and of woods, such as hampers, baskets, threshing-sledges, fans, and rakes; so too articles which are made of hemp, flax, rush, palm fibre, and bulrush, such as ropes, cordage and mats.

The industrial cities along the coast of Campania benefitted from the cheap supply of grain imported by maritime transport, cultivating plants for scents, unguents, perfumes and ornament.

> Cetero terrarum omnium Aegyptus accommodatissima unguentis, ab ea Campania est copia rosae. (Plin. Nat. 13.26.
>
> In other respects Egypt is of all the countries in the world the best adapted for the production of unguents, but Campania with its abundance of roses runs it close.
>
> genera (sc. rosa) eius nostri fecere celeberrima Praenestinam et Campanam (Plin. Nat. 21.16).
>
> The most famous kinds of roses recognized by our countrymen are those of Praeneste and those of Campania.

Grain cultivation was profitable in Italy only in the interior of the country or areas which did not have near access to a harbor. It was limited to supplying the needs of nearby cities and towns, and to feeding slaves and livestock of the villas and farms. Vineyards, olive plantations, orchards and stock farms became the dominant forms of agriculture in Latium, Campania and other parts of Italy.[95] Thus, it is not surprising when Cato places grain land in sixth place in his list of the best kinds of farm:

> Praedium quod primum siet, si me rogabis, sic dicam: de omnibus agris optimoque loco iugera agri centum, vinea est prima, si vino bono et multo est, secundo loco hortus inriguus, tertio salictum, quarto oletum, quinto pratum. sexto

> campus frumentarius, septimo silva caedua, octavo arbustum, nono glandaria silva (Agr. 1.7).
>
> If you ask me what is the best kind of farm, I should say: a hundred iugera of land, compromising all sorts of soils, and in a good situation; a vineyard comes first if it produces bountifully wine of good quality, second, a watered garden; third, an osier-bed; fourth, an oliveyard; fifth, a meadow; sixth, grain land; seventh, a wood lot; eighth, an arbustum; ninth, a mast grove.

Cato's book applies to the territory of Campania and adjacent parts of Latium and Samnium,[96] areas which were able to import their grain. Farming for profit had arrived and the revolution in Roman agriculture was underway.

Transportation costs in antiquity.

The importance of commerce and transport within Italy is difficult to over-emphasize when one is concerned with large-scale production and the need to get surplus to a market. C.A. Yeo[97] has calculated from a passage in Cato (Agr. 23.3) that the price of a heavy commodity was more than doubled after it was hauled a distance of one hundred miles, and this may not even include the cost of oxen and wagon. That the cost of transportation for even shorter distances must have been prohibitive has been shown by Rostovtzeff[98] who calls our attention to the prevalence of famines even in such rich, grain-producing regions as the Po Valley, Central Italy and North Africa.

Transportation costs were a major factor not only in the determination of Rome's sources of grain, but also in the determination of crops in areas such as North Italy. High costs made it impractical to produce wheat in the north for consumption by Rome and the army. As a

result, large tracts of land were turned over to fodder crops such as barley: it was much cheaper, and easier, to drive pigs, geese and other animals to markets than to use wagons and pack animals[99] to transport cereal crops. Nor was it an accident that cattle ranching was extensively carried on in the grain-producing areas of both North and South Italy.

The decline of grain cultivation in Italy was, at one time, attributed to the competition from the grain tribute from Sicily, Africa and Egypt. However, since the Romans were also buying grain from the provinces and selling it at less than half the purchase price, surely, had the Italian farmers wished and been able to compete with Egyptian and provincial farmers, the Roman government would have bought their grain from them.[100] But cheaper maritime transport of grain favored the policy of turning from native wheat production destined for markets other than local ones in Italy. The disparity between the costs of land and maritime trade can be easily illustrated by pointing out that Ostia, not nearly as good nor as safe a port as Puteoli, ultimately became the major port of Rome since it rid the importers of 150 miles of very expensive land haulage.

The high costs of land transport had a revolutionary effect upon Italian agriculture, turning farmers to fodder grains or to less bulky and more expensive crops than emmer. It has even been suggested that the difference in volume between hulled wheat, such as emmer, and naked wheat, such as durum, may have been a factor in the conversion to naked wheat cultivation.[101] Cato, when he declares his list of the best types of farms, does not mention, and perhaps does not take into account,

the effect of distance from a market. Pliny, quoting Cato almost two centuries later, indicates that transportation to market had to be considered:

> ille (sc. Cato) in agro quaestuosissimam iudicat vitem ... proxime hortos irriguos. nec id falso, si sub oppido sint ... (Nat. 18.29).
>
> In Cato's opinion the most profitable part of a farm is a vineyard ... and next he puts kitchen-gardens well supplied with water; and this is true, if they are near a town.

Land transportation and commerce must have been a major concern of farmers who were producing surplus for market. Columella points out the importance of a road to a farm:

> Multum conferre agris iter commodum: primum quod est maximum, ipsam praesentiam domini, qui libentius commeaturus sit, si vexationem viae non reformidet; deinde ad invehenda et exportanda utensilia, quae res frugibus conditis auget pretium et minuit impensas rerum invectarum, quia minoris adportentur eo, quo facili nisu perveniatur; nec non nihil esse etiam parvo vehi, si conductis iumentis iter facias, quod magis expedit quam tueri propria (Col. 1.3.3-4).
>
> A handy road contributes much to the worth of the land: first and most important, the actual presence of the owner, who will come and go more cheerfully if he does not have to dread discomfort on the journey; and secondly its convenience for bringing in and carrying out the necessaries--a factor which increases the value of stored crops and lessens the expense of bringing things in, as they are transported at lower cost to a place which may be reached without great effort; and it means a great deal, too, to get transportation at low cost if you make the trip with hired draught animals, which is more expedient than looking after your own.

Columella attributes this statement to Cato, but clearly transportation remained a concern of landowners well into the Empire. Potter[102] even suggests that the more influential landowners were prepared to invest resources in the improvement of local communications by building roads.

"Their objective was to facilitate the passage of goods to and from towns, especially Rome, and in this respect it is interesting to note that the few minor roads to which we can assign approximate dates, do correspond chronologically with the period of maximum rural prosperity: the first and early second centuries A.D." It is also interesting to note some regional differences between the areas lying close to Rome and those in more remote districts: marginal land in the remote districts were not brought into cultivation until the second century A.D. whereas similar land near Rome was being cultivated by the mid-to-late first century A.D. Clearly the main cause of this situation was the cost of transportation which rapidly increased the further the farm was from market (Col. 3.2.1).[103]

Demographic shifts and their results.

After the Punic Wars there were few farmers to work the abandoned and ruined land of central and south Italy. Large numbers of men had been killed and there appears to have been a significant increase of the urban population at the expense of the rural population in the southern areas such as Apulia, Lucania and Calabria; a great contrast to the well-populated rural regions in the North, the Po Valley, Picenium and Umbria for example.[104] The edict of Fabius' depredations,[105] if it was obeyed, may have initiated the movement toward urban centres and the rise of Rome as an industrial power, because of the restrictions placed upon Capua by siege and by later penalties, that probably stimulated the flow of manpower to the city.[106] It has also been suggested that the lack of fertility of the land thanks to erosion and overcropping, and the encroachment of weed and bush once the land had been abandoned,

served to deter the return of workers to the land.[107] Whatever the reason, some of the formerly cultivated land of central and south Italy was not farmed again until relatively modern times. Of course there was some vine, olive, cereal and other crop cultivation which helped to counter the devastation suffered in the third century, but it was pasturage which experienced the greatest growth in the south.

Pasturage was almost certainly unaffected by the later Gracchan legislation since it would have been an almost insurmountable task to reconvert to arable farming that land given up to pasturage after the third century B.C.[108] Even before the end of the war with Hannibal it had been a difficult task for farmers to re-establish themselves on their land:

> sed res haudquaquam erat populo facilis, et liberis cultoribus bello absumptis et inopia servitiorum et pecore direpta villisque dirutis aut incensis (Liv. 28.11.9).
>
> But it was no easy matter for the people, since free farmers had been wiped out by the war, and there was a scarcity of slaves, while cattle had been stolen and farmhouses demolished or burned.

Livy was describing a situation in 206 B.C. when the Senate and Consuls were attempting to restore the farmers to their land in Latium after Hannibal had withdrawn. The situation in south Italy was far worse by the time Hannibal finally left the peninsula and resettlement of much of the land was out of the question.

During the last centuries of the Republic references to the growth of pasturage are sufficiently numerous to indicate that it had gained a position of importance. An anecdote about Cato reveals his high opinion of grazing: when asked the three best ways in agriculture of get-

ting rich quickly, Cato is said to have replied 'being a competent grazier, a moderately good grazier and a bad grazier'. Columella,[109] who related the story, went on to agree with Cato's first two answers, but to disagree with the third.

Besides the profitability of stock-raising, the fact that this branch of the agrarian economy required fewer workers than farming undoubtedly contributed to its growth in the south which was severely depopulated after the third century. Once pasturage became established, it was not likely to be replaced as a result of population pressure. According to White,[110] the shift to pasturage contributed to the further abandonment of land by the local populace, since the change in pattern of land use (farming to ranching) caused the market towns of a region devoted to arable or mixed plantation farming to lose their *raison d'être*.

In central Italy the situation was different, although a similar change to profitable agriculture did occur. Until 266 B.C. Italian agriculture had been basically at a subsistence level. However, contact with Sicily and North Africa subsequently introduced a large-scale or plantation-type farming aimed at producing a profit. Since all the surviving writers on Roman agriculture date after this period, they are all, from Cato to Palladius, concerned with making agriculture pay--to reshape the pattern of land utilization in Italy.

> agricolae ad duas metas dirigere debent, ad utilitatem et voluptatem. Utilitas quaerit fructum, voluptas delectationem; priores partes agit quod utile est, quam quod delectat. Nec non ea, quae faciunt cultura honestiorem agrum, pleraque non solum fructuosiorem eadem faciunt, ut cum in ordinem sunt consita arbusta atque oliveta, sed etiam vendibiliorem atque adiciunt ad fundi pretium (Var. *R.* 1.4.1)

> The farmer should aim at two goals, profit and pleasure; the object of the first is material return, and of the second enjoyment. The profitable plays a more important role than the pleasurable; and yet for the most part the methods of cultivation which improve the aspect of the land, such as the planting of fruit and olive trees in rows, make it not only more profitable but also more saleable, and add to the value of the estate.

The wealthy class were gripped by a desire for financial gain that required larger estates and changed their outlook on agriculture.

The small-holder's advantage had rested in his minute care and freely bestowed labor, without stopping to inquire whether the percentage of profit was or was not an adequate return for his toil. With the introduction of plantation-type farming for economic profit, this attitude towards agriculture quickly disappeared. The profit-minded investor could not but help compare the returns and different kinds of investment, recognizing that exotic plants produced a much better return than most native crops. Moreover, as Varro's passage indicates, the cultivation of orchard crops increased the value of the land by as much as four times in the case of vine and olive groves.[111]

However, small-holders could not take advantage of the growing demand for luxuries. Fussel[112] illustrates that a peasant with a holding of fifteen acres could not produce a grain surplus of any size beyond his own family's requirements. Nor could he work much more than fifteen acres by himself. This explains, in part at least, why a growing Rome became dependent upon foreign grain. It also helps to explain the inability of the peasant farmer to change to orchard cultivation: he simply could not survive without his full yearly harvest of grain, never mind the five to ten years required before fruit trees began to

yield produce.

Not even the translation into Latin of numerous books by foreign writers such as Mago and Theophrastus and subsequent improvements in technique and theory could re-establish the small-farmer in his previous status. Moreover, technical improvements often required the command of considerable capital. Without such capital the small farmer could do little.

> Nam is demum cultissimum rus habebit, ut ait Tremelius, qui et colere sciet et poterit et volet. Neque enim scire aut velle cuiquam satis fuerit sine sumptibus, quos exigunt opera (Col. 1.1.1).
>
> For in the end, as Tremelius remarks, he will have the best-tilled lands who has the knowledge, the wherewithal, and the will to cultivate them. For the knowledge and willingness will not suffice anyone without the means which the tasks require.

The wealthy man had both the time and the means to invest in cash crops, so long as the demand from urban markets created the need for the cultivation of large crops.

The growth of large, profitable estates owned by the wealthier classes of Italy had been initiated in part by the loss of manpower during the Punic Wars. Military affairs continued to encourage the growth of such estates. Rome's increasing military involvement in the eastern Mediterranean after 201 B.C. for example, steadily drained potential farmers from the land in order to equip a standing army. As a result, land was abandoned or fell into the hands of the wealthier classes. One such class was the Senators who gained great benefits from Rome's foreign wars. Not only did they amass fortunes from the spoils of war which, being forbidden by law to invest in commerce, they inves-

ted in land, but they were also able to make profitable use of the great number of slaves that were pouring into Italy following Roman victories.

> Augebant eorum (sc. servorum) numerum, ut ab recenti Africo bello, et ab ipsis Setinis captiva aliquot nationis eius empta ex praeda mancipia (Liv. 32.26.6.).
>
> Their number was increased, as was natural after the recent African war, by numerous prisoners of war of that nation, bought up out of the booty of the people of Setia themselves.

Livy describes only one local example in 198 B.C. in this passage, but similar situations existed in various areas of the peninsula following most military victories.

Slave labor was most profitably used in the care of vineyards, olive plantations, orchards and livestock. Cereal cultivation required intensive activity only at seeding and harvesting time, but these other crops required attention throughout the year. Later, during the empire, the dwindling and expensive slave force was used for the production of wine, oil and perfumes almost to the exclusion of grain production. However, even during the earlier period in Italy, the margins of profit in agriculture were not ordinarily very generous. Estates run as businesses could not afford a crowd of idle hands, so landlords kept their work force to the minimum, recruiting free labor casually as needed. Cato devotes several chapters to terms for the letting of contracts, and references in the other writers give evidence that major seasonal migrations brought laborers into the richer agricultural areas, especially at harvest time, from urban areas.[113] Thus slave labor not only replaced the serious vacuum created by the loss of Italian manpower, and allowed the cultivation or grazing of land that might have otherwise

remained abandoned, but it also helped to determine the crops to be cultivated. Landowners were aware of the cost of slaves' upkeep and wished to ensure a return on their investment As a result, crops were cultivated which required year-round care and yielded the largest economic gains possible: introduced plants and cultivars for the most part.

Erosion, soil exhaustion and plant adaptability.

The question whether ancient Italy suffered seriously from erosion and soil exhaustion is slowly being answered as archaeology continues to indicate earlier dates for the use of green manures.[114] However, the great concern of the agricultural writers regarding the availability and use of fertilizer provides clear proof that soil depletion was a question of importance, at least from the second century B.C. T. Frank states "there is abundant evidence that the thin soil of Latium had suffered both from erosion and overcropping as early as the fifth century B.C. and that the process was continuing through the centuries."[115] Deforestation of the land probably increased between 800-700 B.C. when iron was introduced, and although deforestation probably was not extensive in the early period, by the end of the third century and the beginning of the second century B.C. it may have been serious enough in the regions north of Rome to cause an unusual number of inundations of the Tiber.[116] Perhaps Carter and Dale[117] exaggerate the situation when they state that "by 200 B.C. the Romans and those preceding them in Italy and Sicily had reduced the productivity of the land to an alarming extent. At this point the land of central and south Italy could be re-

deemed only by a vigorous and widespread conservation program to bring it back to anything approaching its former productivity," but it is almost certain that grainland had declined in virility which caused shifts to pasturage or other crops and increases in the size of land allotments because of the dismal yields, as low as a gain of one or two bushels to a bushel of seed.[118] Columella did not agree with many of his contemporaries who thought decreasing yields were caused by soil exhaustion:

> Saepenumero civitatis nostrae principes audio culpantes modo agrorum infecunditatem, modo caeli per multa iam tempora noxiam frugibus intemperiem; quosdam etiam praedictas querimonias velut ratione certa mitigantes, quod existiment ubertate nimia prioris aevi defatigatum et effetum solum nequire pristina benignitate praebere mortalibus alimenta. Quas ego causas, P. Silvine, procul a veritate abesse certum habeo ... Nec post haec reor violentia caeli nobis ista, sed nostro potius accidere vitio (Col. 1. prae. 1-3).
>
> Again and again I hear leading men of our state condemning now the unfruitfulness of the soil, now the inclemency of the climate for some seasons past, as harmful to the crops; and some I hear reconciling the aforesaid complaints, as if on well-founded reasoning, on the ground that, in their opinion, the soil was worn out and exhausted by the over-production of earlier days and can no longer furnish sustenance to mortals with its old-time benevolence. Such reasons, Publius Silvinus, I am convinced are far from the truth ... I do not believe that such misfortunes come upon us as a result of the fury of the elements, but rather because of our own fault.

But he advises going over from grain to vine production:

> Nam frumenta maiore quidem parte Italiae quando cum quarto responderint, vix meminisse possumus (Col. 3.3.4).
>
> For we can hardly recall a time when grain crops, throughout at least the greater part of Italy, returned a yield of four for one.

Careless cultivation on the part of the farmer cannot account fully for

this state of affairs since Columella recommends planting the vine, a plant which can flourish in soils exhausted by cereal crops--soil exhaustion must have occurred.

The vine, olive, fig and other fruit trees have deep, spreading root systems which can tap subsoil moisture enabling them to withstand droughts and to reach the essential nutrients which winter rains tend to wash out of light soil once it has been cleared for cereal crops. When soil exhaustion and erosion first became problems in Etruria and the Alban Hills during the third and second centuries B.C., rich individuals began to invest in the cultivation of the vine and olive in the areas which were no longer of use to the small holder.[119] As cereal crops continued to become less profitable, land which may have been abandoned or turned to ranching was instead turned to the vine, olive and orchards.

During the Roman Period when population pressure brought about the cultivation of marginal land,[120] the rougher regions favored the cultivation of plants with deep root systems. The Tavoliere di Puglia, the Daunian Plain, provides a useful example of this type of cultivation in a rough area. Drawing upon the work of J. Bradford and G.D.B. Jones and their interpretation of air-photographs taken between 1943 and 1945, Toynbee[121] supplies the following information: On the level plain a film of humus overlies a crust of hard limestone, and this overlies, in turn, a subsoil of decomposed limestone. The pattern of any trenches or holes cut into, or through, the crust is registered in differences in the height and color of crops which is revealed in the air-photographs.

Olives and vines can grow on the Tavoliere if pits or trenches are

cut right through the hard limestone crust so as to enable the roots to reach down into the soft, limestone subsoil. Where the nature of the crop is revealed, it appears that at least 70% of the land was devoted to the cultivation of olives and vines. These plots of land average ten iugera and date to about 120 B.C., therefore representing Gracchan allotments.

The chief problem in an ancient Mediterranean orchard was to get the root system developed. Young trees could be grown, but it was necessary to provide irrigation for their shallow root systems which caused a loss of quality in the fruit of the tree once it had matured. Therefore grafting became a natural and early alternative. Cato[122] seems to have known only two methods of grafting, but Columella knew four and he stresses the superiority of grafting over using seedlings or cuttings.[123] New cultivars could also be easily propagated and acclimatized within Italy by grafting them to wild trees already growing in Italy, but Varro indicates that grafting was not the method used to introduce some new plants into Italy: Speaking of figs he says:

> ... ut siquando quis trans mare semina mittere aut inde petere vult. Tum enim resticulam per ficos, quas edimus, maturas perserunt et eas, cum inaruerunt, complicant ac quo volunt mittunt, ubi obrutae in seminario pariant. Sic genera ficorum, Chiae ac Chalcidicae et Lydiae et Africanae; item cetera transmarina in Italiam perlata (Var. R. 1.41.5-6).

> ... as when you wish to ship seeds overseas or import them thence. In this case we pass a string through the figs when they are ripe for eating, and after they have dried they are tied in bundles and may be sent where we will; and there they are planted in a nursery and reproduce. It was in this manner that the Chian, Chalcidian, Lydian, African, and other varieties of over-sea figs were imported into Italy.

Pliny, writing later, describes another method of transporting plants

> temptavere gentes transferre ad sese propter remedii (sc. Medicae) praestantiam fictilibus in vasis, dato per cavernas radicibus spiramento (qualiter omnia transitura longius seri artissime transferrique meminisse conveniet, ut semel quaeque dicantur); sed nisi apud Medos et in Perside nasci noluit (Nat. 12.16).
>
> Because of its great medicinal value various nations have tried to acclimatize the citron in their own countries, importing it in earthenware pots provided with breathing holes for the roots (and similarly, as it will be convenient to record here so that each of my points may be mentioned only once, all plants that are to travel a specially long distance are planted as tightly as possible for transport); but it has refused to grow except in Media and Persia.

Obviously this second method would allow the grafting of the exotic plant to native varieties as soon as it reached Italy; Varro's method obviously would not. As a result of grafting, native varieties experienced great improvement[124] and great numbers of hybrids[125] were created as Rome developed her contacts in the Eastern Mediterranean and Asia.

The increase in the number of hybrids of these plants meant that different soil conditions could be utilized[126] and that, as a result, agriculture could be extended even further afield. However, certain soil conditions continued to restrict some of these cash crops. For example, the olive tends to run to wood in over-rich soil and therefore the hillside was preferred to the rich plain for groves; nor would many of these crops flourish in areas of poor drainage, and areas such as Venetia were turned over to pasturage as a result.[127] Nevertheless, vine and olive culture increased greatly in the last centuries of the Republic and were in a healthy condition in the first century A.D., using in general, limestone ridges somewhat too rough for cereals and

small crops.[128]

The advantages of arboriculture over annual crops such as cereals were considerable once the initial outlay of time and capital had been made. Besides being able to take advantage of soil impoverished by cereal cultivation, the profit from arboriculture was much greater in a good year and an occasional crop failure or inferior yield did not result in cutting down the plants and starting all over again, or even shifting to other products. However, only gradually did arboriculture increase its hold in the peninsula.

The Italians were well aware of the problem of soil exhaustion and combatted it as best they could, using manures and fertilizers. Unfortunately stock-raising land is relatively scarce in much of Italy preventing the restoration of fertility to the land by means of animal manure. What little there was, they used as efficiently as possible, but green manures were more important.

Although the Greeks followed a crop and fallow method, some Romans recognized the advantage of a three-course rotation method (of a type) allowing two years of cropping and the third year the land was left fallow or put to green manure.[129] It is generally accepted that lucerne did not reach Italy until after the Roman armies returned from their long sojourn in Greece (146 B.C.), but in fact other green manures were used in Italy prior to its introduction. Jarman[130] in her analysis of the plant remains at Narce had identified substantial leguminous crops which would have been used as fodder and green manure. Such discoveries are changing the view that green manures were not used until quite late in Italy. Once alfalfa was introduced it probably became the

most important of the green manures since it was also an important fodder crop. A single sowing lasted ten years and allowed four to five crops to be taken each year.

Thus, crops which began as intrusive flora came to serve a vital role in the preservation and nourishment of the soil of Italy. Or, if marginal land had to be taken under cultivation, many of the introduced species provided excellent yields under conditions which may have returned only mediocre produce had native crops been planted.

Climatic change.

The change of climate in Italy is a factor which necessitated changes in cultivation, but it is often overlooked by scholars because there are few direct historical references to it. That it was recognized as such a factor by the ancients is attested by Columella:

> Multos enim iam memorabiles auctores comperi persuasum habere longo aevi situ qualitatem caeli statumque mutare .... Nam eo libro, quem de agri cultura scriptum (*sc.* Hipparchus) reliquit, mutatum caeli situm sic colligit, quod quae regiones antea propter hiemis adsiduam violentiam nullam stirpem vitis aut oleae depositam custodire potuerint, nunc mitigato iam et intepescente pristino frigore largissimis olivitatibus Liberique vindemiis exuberent (Col. 1.1.4-5).
>
> For I have found that many authorities now worthy of remembrance were convinced that with the long wasting of ages, weather and climate undergo a change; .... For in that book on agriculture which Hipparchus has left behind he concludes that the position of the heavens has changed from this evidence: that regions which formerly, because of the unremitting severity of winter, could not safeguard any shoot of the vine or the olive planted in them, now that the earlier coldness has abated and the weather is becoming more clement, produce olive harvests and the vintages of Bacchus in the greatest abundance.

Columella passed no judgement upon this theory, he merely left the decision of its validity in the hands of astronomers.

Huntington[131] developed the following table to illustrate his hypothesis that the level of civilization in Rome fluctuated in accordance with the average rainfall:

Year	450-250 B.C.	250-200 B.C.	200-100 B.C.	100 B.C.-A.D. 50	A.D. 80-200	A.D. 200 Onward
Level of Civilization	Very High	Falling	Low	High	Mainly Low	Very Low
Rainfall	Heavy until 300	Decreasing	Light until 150 then increasing	Heavy at first then decreasing	Light	Light and generally decreasing

He observed that the vigorous life of the early Republic, based on intensive agriculture, was maintained during the period from 450-250 B.C. during the period of heavy rainfall. Towards 250 B.C., during a period of decreasing rainfall, the spirit of discipline and rural simplicity began to decay. From 225-200 B.C. was a period of economic stress, and the second century B.C. witnessed a great decline of agriculture. After the land law of Spurius Thorius in 111 B.C. agricultural disturbances declined and the price of land rose rapidly, when the vine and olive replaced grain as the main agricultural product. By 90 B.C. there was a marked increase in general luxury and comfort which reached a high level between 75 B.C. and A.D. 50. From A.D. 80 the peninsula experienced a gradual decline and A.D. 180-90 were years of famine and pestilence. A.D. 193-210 were years of a slight increase in prosperity but then began in full force the long 'decline and fall of the Roman

Empire'.

Although Huntington's hypothesis seems far-fetched, his theory that the climate was not stable but changed would appear to have a solid foundation. Jarman and Webley[132] state that Tavoliere had suffered abandonment of sites in the Eneolithic, Bronze and Iron Ages. Of three proffered explanations: (1) impoverishment of soil, (2) mobility due to trade, textile industry, livestock or the like which necessitated movement, or (3) a change to a drier continental climate, Jarman and Webley consider the third the only reasonable explanation; a mild climatic change resulting in less rain would destroy the cereal-based economy and force abandonment of the land. That climatic change continued is most probable since by the early historic period, arable agriculture had again become the mainstay of the economy.

Thus gradual but continual climatic change influenced the selection and cultivation of crops. Plants such as the vine, olive, fruit and nut trees which could withstand these changes benefitted and their cultivation spread. Unfortunately, at present, it is not known how greatly Roman agriculture was affected by these changes of climate.

Change of diet.

The Italian diet had been changing since the first plants were introduced to the peninsula, but after the Greek colonization period their diet had become more or less stabilized. Wine replaced milk diluted with water as the major beverage and with emmer, olive oil and vegetables formed the staples of the Italian diet. Of course the Italians had access to and used other plants but only upon a relatively small

scale when compared to the use of the staples.

About 300 B.C. the Romans began to change their diet considerably. At this time naked wheat came to the forefront of cereal production in Italy and replaced the older, hulled emmer and einkorn. Roman preference for this type of wheat affected other lands as well once large amounts were imported. For example, in Egypt emmer had been the preferred type of wheat and it was considered a disgrace to eat naked wheat. However, under Greek rule they changed to the cultivation of naked wheat after the big export market opened up in Rome.[133]

As Rome began to expand her contacts, more and more pleasurable plants came to be noticed and consequently were introduced into Italy. The use of 'ordinary' crops such as pulses, beans and other vegetables may have declined slightly among the wealthy class, but Apicius and Petronius illustrate that epicures had concocted a large number of salads and dishes from delicate varieties of these plants that were developed in the early empire, and of course these crops remained as valuable as ever for the masses.

The impression one gains from Varro is that although farmers specialized in the products most suited to their own situation (climate, soil and market) there was a growing diversification of production between farms owing to the large demand for luxuries from rich consumers. As a result of this demand, the first centuries B.C. and A.D. saw a great growth in those items of demand, especially fruit culture, viticulture, olive groves, nut production and figs.

Hyams[134] overstates the situation: "men will always pay more for their pleasures, especially the pleasure of intoxication and oblivion,

than for their necessities, and throughout the history of the Roman Republic and Empire the government had repeatedly to check the spread of vineyards into land needed for wheat, for there was no cultivation so profitable as viticulture". However, there is no doubt that the growth of cities and increase of wealth excited the demand for table delicacies. Columella speaks the truth when he says:

> His tamen exemplis nimirum admonemur, curae mortalium obsequentissimam esse Italiam, quae paene totius orbis fruges adhibito studio colonorum ferre didicerit (Col. 3.8.5).
>
> Surely these examples remind us that Italy is most responsive to care bestowed by mankind, in that she has learned to produce the fruits of almost the entire world when her husbandmen have applied themselves to the task.

This chapter has been devoted to an examination of the factors which allowed plant introductions to take place and to become established in Italy. Reed[135] in a memorable passage has misrepresented these factors: "The ancient Romans, who were noted for their predatory conduct toward other tribes and peoples, as well as for an absence of scientific ability, pilfered, extorted, plundered or despoiled other lands of fruits, grains and vegetables which through centuries of toil, had been tamed and bred ... The craze for novelties and out-of-season viands for the sated appetites of the Roman overlords compelled gardeners to invent methods for forcing, and ingenious tricks in cultivating exotic plants." Pliny, on the other hand, while leaning in the opposite direction has come closer to the truth: for without communication and contact between lands, there would be no exchanges of plants:

> quis enim non communicato orbe terrarum maiestate Romani imperii profecisse vitam putet commercio rerum ac societate festae pacis, omniaque etiam

quae ante occulta fuerant in promiscuo usu facta?
(*Nat*. 14.2).

For who would not admit that now that intercommunication has been established throughout the world by the majesty of the Roman Empire, life has been advanced by the interchange of commodities and by partnership in the blessings of peace, and that even things that had previously lain concealed have all now been established in general use?

V. Social, Economic and Ecological Effects of Introductions

The results of plant introductions upon Italian society were seldom produced solely by the importation of foreign flora. Rome, through her military and commercial expansion, especially after the Punic Wars was undergoing a rapid and radical exchange of ideas and cultures. Economic, political, cultural and moral values were altered in remarkable fashion. Most changes probably would have occurred even without the cultivation of new plants, but they would have been neither as swift nor as great. As with the factors involving plant introductions, the results were complex and varied. Often, in fact, the consequences were an extension of the same factors which allowed exotic plants to be imported in the first place.

The most obvious and direct result of intrusive flora was its effect upon the Italian countryside and the native plants. Columella's comments imply an increase of vineyards and orchards at the expense of grain cultivation and Domitian's decree[136] further indicates that throughout Italy there was a slow but steady yielding of cereal culture to vines and orchards from the second century B.C. Pliny states the opposite situation regarding Africa:

> Cereri id (sc. solum Africae) totum natura concessit, ōleum ac vinum tantum non invidit, satisque gloriae in messibus fecit (Nat. 15.8).

> This territory (sc. Africa) Nature has yielded entirely to the Corn-goddess, having all but entirely grudged it oil and wine, and having given it a sufficiency of glory in its harvests.

This is obviously an exaggeration[137] but it indicates indirectly the importance African wheat had for Rome; cereal cultivation around the city

had been superseded by other crops which left only two alternatives: importation or famine.

> Itaque in "hoc Latio et Saturnia terra," ubi di fructus agrorum progeniem suam docuerant, ibi nunc ad hastam locamus, ut nobis ex transmarinis provinciis advehatur frumentum, ne fame laboremus (Col. I. prae.20).
>
> So, then, in "this Latium and Saturnian land," where the gods had taught their offspring of the fruits of the fields, we let contracts at auction for the importation of grain from our provinces beyond the sea, that we may not suffer hunger.

Although cereals are not often mentioned in the works of the ancient authors, their cultivation can be taken for granted. They must have been planted throughout most of Italy in order to support the growing population. Several areas are, in fact, noted by the ancient writers as being the best grain lands: the Po Valley (Tac. Hist. 2.17.1; Plin. Nat. 18.127; Str. 5.1.12), Umbria (Str. 5.2.10), Etruria in the first century B.C. (Var. R. 1.44.4), Campania (Str. 5.4.3; Plin. Nat. 18.111; Col. 3.8.4), Clusium (Plin. Nat. 18.66), and Apulia (Var. R. 1.3.6; Sen. Ep. 87.7) which, by Seneca's time, was in decline. But these are all casual references and can hardly be said to give a reliable picture of the entire situation. For when the capital city was supplied by the provinces, there was little concern about the supply of the rest of the country. Of course, the major cereals that were cultivated on the peninsula, two-rowed barley and durum and bread wheats, were not native plants.

The whole attitude of cultivation for profit and pleasure altered the landscape of areas owned by the wealthier class. Columella indicates that some of the less economically crucial imported plants were widespread:

> Leguminum genera cum sint complura, maxime grata et in usu hominum videntur faba, lenticula, pisum, phaselus, cicer, cannabis ....Item pabulorum optima sunt Medica et faenum Graecum ....(Col. 2.7.1).
>
> Though there are very many kinds of pulse or legumes, those observed to be most pleasing and useful to man are the bean, the lentil, the pea, the cow-pea, the chick-pea, hemp .... Likewise of the fodder crops the best are Medic clover and fenugreek ....

Pliny protests the growth of ornamental gardens:

> bina tunc iugera p.R. satis erant, nullique maiorem modum adtribuit, quo servorum paulo ante principis Neronis contento huius spatii viridiariis? (Nat. 18.7).
>
> In those days two acres of land each was enough for the Roman people, who assigned to no one a larger amount--which of the persons who but a little time before were the slaves of the Emperor Nero would have been satisfied with an ornamental garden of that extent?

Perhaps Varro best describes the effect of exotic plant cultivation upon Italy's landscape, although for the sake of impact he obviously overstates the condition of the peninsula:

> Non arboribus consita Italia, ut tota pomarium videatur? (Var. R. 1.2.6).
>
> Is not Italy so covered with trees that the whole land seems to be an orchard?

However, by the end of the first century A.D. this statement may well have been true for large areas of Italy as Domitian's edict would imply.

Although an early introduction, the cultivation of the vine did not greatly increase until the second century B.C. In Cato's day Italian wine was little known outside of Italy,[138] and even in the late Republic Lucullus and Caesar imported Greek wines as a special favor to the people at festivals.[139] One of the most famous vintages of Italian wines was produced as early as 121 B.C., the year of the consulship of Opimius, yet in 89 B.C. the censors introduced a maximum price on im-

ported wines in an attempt to curb Italian preference for foreign wines and to stimulate the consumption of native brands.[140] However, imported wines were probably more desirable until the Augustan period, at which time the reputation of the native wines substantially increased as a result of the extensive expansion of viticulture in Italy. Pliny states:

> Verum inter haec subit mentem, cum sint genera nobilia quae proprie vini intellegi possint LXXX fere in toto orbe, duas partes ex hoc numero Italiae esse, longe propterea ante cunctas terras (Nat. 14.87).
>
> Among these topics, however, it occurs to me that while there are in the whole world about eighty notable kinds of liquor that can properly be understood as coming under the term 'wine', two thirds of this number belong to Italy, which stands far in front of all the countries in the world on that account.

The chief centres of viticulture in Italy included much of the Po Valley, the region around Genoa in Liguria, a large part of Etruria, Umbria and Picenum, parts of Latium, south Latium and the whole of Campania (Plin. Nat. 14.21ff.; Col. 3.2.10-23; Mart. 13.108ff.) as well as a few other areas in south Italy such as Thurii, Tarentum and a few towns of Calabria and Lucania. These areas represent the regions of superior viticulture as seen by the Roman writers. Archaeological evidence indicates that the lower slopes of Mount Vesuvius were largely given over to viticulture and that, although southern Italy was not well-known for its wines according to the ancient writers, wine production was carried out on a least a small scale. For example, Strabo (6.1.14) only mentions the wine of Thurii in the south, but we are reasonably certain that Rhegium also exported wine to Rome since a wine jar from that site was found at Rome (CIL 15.4590).

Olive culture was closely associated with viticulture and followed much the same pattern of growth. Hatzfeld[141] has proved that Pliny's statement (Nat. 15.3) that olive oil was not exported until 52 B.C. is incorrect. Archaeological finds at Delos prove its sale there at least as early as the Sullan period. This earlier exportation of oil serves to enhance the belief that Italy was producing huge amounts of oil during the last century of the Republic. It has been estimated that the Italy of the late Republic-early Empire was producing 30-36,000,000 gallons of olive oil for food alone.[142]

The construction and addition of oil vats to the villas of Central Campania in the middle of the first century A.D. supports the view that during this period there was substantial growth of the olive industry.[143] Pliny writing about this time says:

> principatum in hoc quoque bono optinuit Italia e toto orbe, maxime agro Venafrano eiusque parte quae Licinianum fundit oleum, unde et Liciniae gloria praecipua olivae (Nat. 15.8).
>
> In the matter of this blessing also Italy has won the highest rank of all the world, particularly in the district of Venafro and the part of it which produces the Licinian oil, which causes the Licinian olive to be exceptionally famous.

This may have been true when Pliny wrote, but if Columella (5.8.1) is any guide, the Romans bestowed relatively little care upon the olive. This may have led to the production of a poorer quality of oil which would help to explain why Spanish oil captured the Roman market in the second century A.D.[144]

Italian wine and oil had steadily gained in reputation and distribution throughout the Republic and early Empire. Not only did Italian viticulturalists and horticulturalists import and develop the most re-

nowned stocks, but they thoroughly learned what soils to select for them, how to fertilize them and how to nurture them.

> Scrofa, Quoniam fructum, inquit, arbitror esse fundi eum qui ex eo satus nascitur utilis ad aliquam rem, duo consideranda, quae et quo quidque loco maxime expediat serere. Alia enim loca apposita sunt ad faenum, alia ad frumentum, alia ad vinum, alia ad oleum.... (Var. R. 1.23.1).

> "Since I hold", continued Scrofa, "that the profit of the farm is that which arises from it as the result of planting for a useful purpose, two items are to be considered: what it is most expedient to plant and in what place. For some spots are suited to hay, some to grain, others to vines, others to olives...."

The ancient farmer had learned by experience that climate and soil were the major factors in the determination of fruit and grain cultivation,[145] that a vinestock from Lebanon, for instance, gave a different grape on the slopes of Vesuvius or in the plain of the Rhone Valley.

> usus et experientia dominantur in artibus, neque est ulla disciplina, in qua non peccando discatur (Col. 1.1.16).

> It is practice and experience that hold supremacy in the crafts, and there is no branch of learning in which one is not taught by his own mistakes.

He became an experimental farmer, observing the results of his agricultural ventures and drawing his conclusions accordingly. He was weak in theory but strong in practice; his methods were warranted to produce the best possible yield for a particular soil and climate. Hence he watched his neighbors' crops and was guided by their experience as well.

> Bivium nobis enim ad culturam dedit natura, experientiam et imitationem. Antiquissimi agricolae temptando pleraque constituerunt, liberi eorum magnam partem imitando. Nos utrumque facere debemus, et imitari alios et aliter ut faciamus experientia temptare quaedam, sequentes non aleam, sed rationem

aliquam (Var. R. 1.18.7-8).

For nature has given us two routes to agriculture, experiment and imitation. The most ancient farmers determined many of the practices by experiment, their descendants for the most part by imitation. We ought to do both--imitate others and attempt by experiment to do some things in a different way, following not chance but some system.[146]

Experimentation and the art of grafting resulted in a tremendous increase in the varieties of orchard plants. White[147] has produced a table (Table II, p.141) listing the number of separate varieties of fruit trees mentioned in six Latin authors which clearly illustrates the result of introduction and grafting.

In the first century B.C., Varro had already written his famous lines:

contra quid in Italia utensile non modo non nascitur, sed etiam non egregium fit? ....Non arboribus consita Italia, ut tota pomarium videatur? (Var. R. 1.2.6).

On the other hand, what useful product is there which only does not grow in Italy, but even grow to perfection? .... Is not Italy so covered with trees that the whole seems to be an orchard?

According to White's table, Varro's words might be more aptly applied to conditions in the first century A.D., but nevertheless there is some truth in his words. For example, the Romans had gradually acclimatized many imported fig trees, planting one kind in a light chalky soil, and another in a rich or well-manured soil (Cato Agr. 8.1; 40.1; Var. R. 1.41.4) which greatly extended the possible orchard sites. However, later writers provide documentation that introductions were not always easy and that they did not always succeed:

quod (sc. semen) ex longinquo petitur, parum familiariter nostro solo venit, propter quod

> difficilius convalescit alienum exterae regionis (Col. Arb. 1.3).
>
> a plant which is brought from a distance arrives not properly acclimatized to our soil, and, therefore, being an alien from a foreign land, thrives only with difficulty.
>
> namque non omnia in omnibus locis nasci docuimus, nec tralata vivere; hoc alias fastidio, alias contumacia, saepius inbecillitate eorum quae transferantur evenit, alias caelo invidente, alias solo repugnante (Plin. Nat. 16.134).[148]
>
> In fact, we have shown that not all trees will grow in all places, or live if removed from one place to another; this is due in some cases to antipathy, in others to obstinacy, more frequently to the weakness of the specimens transplanted, because in some cases the climate is unfavorable and in others the soil is incompatible.

But once new varieties were available, hybridization proceeded to produce even more cultivars. Pliny (Nat. 15.42) states that no other fruit has been more ingeniously crossed than the plum and after speaking of the olive he says:

> Reliqui arborum fructus vix specie figurave, non modo saporibus sucisque, totiens permixtis atque insitis, enumerari queunt (Nat. 15.35).
>
> The rest of the fruits produced by trees can scarcely be enumerated by their appearance or shape, let alone by their flavors and juices, which have been so frequently modified by crossing and grafting.

The significant increase of varieties in the first century A.D. should indicate a growing production of fruit and the extension of its cultivation throughout the peninsula. Areas especially noted for fruit production were the Po Valley, Picenum, Latium and Capua (Plin. Nat. 14. 37; 15.15, 55; Str. 5.1.4, 12; 5.4.2, 3; 5.3.5).

The extent of cultivation for most plants is not known. However, local varieties often became famous throughout Italy and certain towns

and regions were well known for their special products.[149] Praeneste and Tarento were noted for their walnuts (Plin. Nat. 15.86), Tarento and Naples for their chestnuts (Plin. Nat. 15.92-94). Garden flowers were of course grown in private gardens throughout the peninsula, but an important flower industry also developed near the larger cities to provide flowers for private homes especially for festivals. In the region below Praeneste and about Capua a great flower industry developed in order to supply material for perfume and unguent production (Plin. Nat. 13.26; 21.16). Other areas were noted for particular vegetables. Campania for the cucumber (Plin. Nat. 19.67) and Ravenna for its asparagus (Plin. Nat. 19.54) are examples of areas known for the odd shape and size of their vegetable. But since the poorer peoples of Italy must have lived on vegetables to a large extent, their cultivation is generally assumed to have been quite extensive.

The writings of authors such as Petronius and Apicius illustrate that the wealthy class continued to enjoy vegetables[150] prepared in exotic dishes. However, as more enticing food became available, the vegetarian aspect of their diet may have declined. Ancient Italy did suffer from diseases caused by vitamin deficiences: night blindness from a lack of vitamin A, scurvy from a lack of vitamin C, and rickets from a lack of vitamin D, are a few examples. Unfortunately, the information provided by the ancient authors and the present evidence from skeletal and coprolite analysis does not permit us, at this time, to determine whether the wealthier classes in Italy suffered or benefitted from their change of diet.[151]

Although new plants did not generally cause wholesale changes in

agricultural practice there were exceptions. The most notable was the replacement of cereal culture in the immediate vicinity of Rome with vine, olive, fruit and vegetable culture. Of course this involved the annona, the grain supply of Rome which created consequences of great importance for the whole Empire.

The physical problems involved with shipping large amounts of grain to Rome had several results. Numerous docks and lighthouses were installed primarily for the benefit of government grain ships sailing between Egypt and Rome. The large natural harbor at Puteoli was bypassed and Ostia was used instead since this rid the government of 150 miles of expensive land transport. However Ostia was a poor port even after Claudius' renovations. Seen in this light, Nero's plan to connect Ostia and Puteoli by a canal navigable by barges was economically sound, but it was not until Trajan built the inner harbor that Ostia became a safe port. As the port of Rome, Ostia had the additional disadvantage of being a consumer's port. It received imports but produced very little for export forcing ships to go elsewhere for return cargos. Claudius even granted special privileges to shipowners in order to ensure a steady grain supply (Suet. *Cl.* 18-19). The Romans were well aware of their weakness as Tacitus' paraphrase of a letter from Tiberius to the Senate in A.D. 22 illustrates:

> Quantulum istud est de quo aediles admonent! Quam, si cetera respicias, in levi habendum! At hercule nemo refert quod Italia externae opis indiget, quod vita populi Romani per incerta maris et tempestatum cotidie volvitur. Ac nisi provinciarum copiae et dominis et servitiis et agris subvenerint, nostra nos scilicet nemora nostraeque villae tuebuntur. Hanc, patres conscripti, curam sustinet princeps; haec omissa funditus rem publicam trahet (Tac. *Ann.* 3.54).

> How little a thing it is to which the aediles call attention! How trivial, if you cast your eyes around! But, Heaven knows, not a man points out in a motion that Italy depends on external supplies, and that the life of the Roman nation is tossed day after day at the uncertain mercy of wave and wind. And if the harvests of the provinces ever fail to come to the rescue of master and slave and farm, our parks and villas will presumably have to support us! That, Conscript Fathers, is a charge which rests upon the shoulders of the prince; that charge neglected will involve the state in utter ruin.

Rome's growing dependence upon foreign grain had had serious consequences in the first century B.C., when owing to the threat of famine[152] caused by pirates, Pompey was given extraordinary powers under the Gabinian Law of 67 B.C. (App. *Mith.* 14.93-94). Later, when Sextus Pompey had blocked navigation and the famine of 41 B.C. resulted, Appian (*BC* 5.18) says Italian agriculture was ruined. At one point, after recovery from the threat of a famine, Augustus had even thought of terminating the grain supply:

> ... ut tandem annona convaluit, impetum se cepisse scribit frumentationes publicas in perpetuum abolendi, quod earum fiducia cultura agrorum cessaret (Suet. *Aug.* 42).
>
> and when grain at last became more plentiful, he writes: "I was strongly inclined to do away forever with distributions of grain, because through dependence on them agriculture was neglected."

But since the *annona* had become a source of gaining public favor Augustus did not dare to discontinue it and the grain supply endured as a major concern of the emperors until the end of the empire.

Latifundia provided an opportunity for introduced plants to propagate themselves in Italy as illustrated in the previous chapter. It also might be said that these intrusive, expensive and now indispensable plants provided the basic stock by which latifundia were able to

propagate themselves. The profitability of various crops was often a major factor in the growth of latifundia but it was not essential. "Since Italian land was not normally subject to tax, whereas provincial holdings were subject to tributum, the primary motivation, that of acquiring as large estates as possible in the pursuit of power and prestige, was not seriously affected by considerations of profitability, so that unproductive use of land, in the form of pleasure-grounds and game-preserves did become common in Italy."[153]

After the Punic Wars, farming for subsistence by small holders continued increasingly to yield to commercial farming on large estates operated by absentee owners with slave labour supplemented by seasonal contract labour. The separation of the ruling classes from the ancestral tradition of farm work owing to the growth of wealth and large estates in the second century B.C. created new problems in farm technique and management for the Romans.[154] However, since the peninsula is characterized by great variations in climate, geological structure and soil types, with consequent variations in the pattern of land use in different regions, generalizations must be carefully scrutinized.

For example, there was a very high density of small farms, farms and villas in the area north of Rome with a greater concentration in the immediate environs of Rome. However, "it would be a mistake to envisage the growth of rich estates as a rapid process. The great majority of the prosperous villa sites had, to judge from surface remains, a very long history. Some started as pre-Roman farms, others as part of resettlement schemes .... There is little in the archaeological record to show the existence of the great slave-run latifundia seen by Tiberius

Gracchus (Plu. T.G. 8) ... and the broken, dissected terrain of South Etruria probably was much better suited to small holdings than to large agricultural units."[155] But there is little doubt that there was a persistent trend towards the absorption of smaller holdings into larger estates. Near Rome and in veteran settlement schemes the process seems to have been particularly noticeable (Cic. Agr. 2.28.78). The proximity of Rome probably accentuated the disadvantage of the small producer[156] in a wine and orchard country and veteran settlements failed to arrest the depopulation of areas in which they were established:

> Veterani Tarentum et Antium adscripti non tamen infrequentiae locorum subvenere, dilapsis pluribus in provincias (Tac. Ann. 14.27).
>
> Veterans were drafted into Tarentum and Antium, but failed to arrest the depopulation of the districts, the majority slipping away into the provinces.

The process of building large estates must have continued during the time of Columella unless he was indulging in empty rhetoric when he advised his readers to take up only the amount of land they really needed and not to copy the extravagance of the great land lords

> ...qui possident fines gentium, quos ne circumire quoque valent sed proculcandos pecudibus et vastandos ac populandos feris derelinquunt aut occupatos nexu civium et ergastulis tenent (Col. 1.3.12).
>
> ...who, possessing entire countries of which they cannot even make the rounds, either leave them to be trampled by cattle and wasted and ravaged by wild beasts, or keep them occupied by citizens enslaved for debt and by chain gangs.

Latifundia fall into two distinct categories: the ranch, devoted to stock-raising on a large scale, and the large-scale mixed farm. The ranch became most common in southern Italy, especially in Calabria where

the terrain and the ecology were favorable to its development. Apart from the dangers of overstocking it was probably the most efficient use of the area after the Hannibalic War. Its effect upon the population of a region could be considerable.

Mixed farming of cash crops was common on the latifundia of central Italy. Pliny the Younger offers a fine example: his Tuscan estate was equipped with pleasure and hunting-grounds, arable and planted crops. The work by Jashemski[157] at Pompeii also indicates that mixed farming was practised by even humbler citizens on a small scale in their gardens. The cultivation of a few vines, fruit trees, nut trees and vegetables would have enabled a family to harvest enough produce for its own use with perhaps a small surplus to sell. The latifundia devoted to mixed farming probably relied upon major cash crops such as the vine and olive.[158] However, "the ratio between the cultivation of cereal crops and other sown crops as opposed to vines and olives remains unclear. Indeed, the whole question of the origins of arboriculture in the Roman region is still virtually unstudied."[159]

Cereal cultivation was superseded in certain areas simply because the production of wine, olive oil and animal products was more profitable. Cato (<u>Agr</u>. 1.7), Varro (<u>R</u>. 3.2.1ff.) and Columella (3.3.1ff.) all indicate that other investments provided greater returns. However, these pursuits often required considerable initial outlay of capital as well as special care. Most notable were the <u>vivaria</u>, special enclosures such as <u>leporaria</u>, <u>piscinae</u> and <u>gliraria</u> constructed for animals, but plants sometimes required site adaptations as well. For example, some important crops required irrigation: trenches were dug for lucerne,[160] cisterns

were sometimes placed in gardens for vegetables.[161] Columella divided trees into two classes:

> Placet igitur, sicuti Vergilio, nobis quoque duo esse genera surculorum: quorum alterum sua sponte gignitur, alterum cura mortalium procedit. Illud, quod non ope humana provenit, materiae est magis aptum: hoc cui labor adhibetur, idoneum fructibus (Col. Arb. 1.1).
>
> We too, like Vergil, think proper, then, to divide growing trees into two classes, those which come into being of their own accord and those which are the result of human care. The former class, which does not come up by the help of man, is better suited for timber, the latter, on which labor is expended, is adapted to the production of fruit.

Consequently it is not surprising that the Latin authors gave special attention to the care of fruit trees: nurseries, both for new seedlings and for the acclimatization of imported plants, were constructed with deep ditches to prevent access by cattle (Col. 5.9.1ff.), special manured pits were dug well in advance of the transplantation from the nursery (Plin. Nat. 17.79ff.); and great consideration was given to ensure the proper spacing when laying out orchards (Col. 5.3.6ff.; Arb. 4.2). Props, frames and withes necessary for vineyards made the cultivation of osier-willows, reeds, chestnut trees and cypress a profitable business in its own right (Col. 4.30.2). Care of the trees continued as they grew: weeding, pruning and manuring to mention only a few areas of concern. Finally, as is the case today, the attractiveness of fruits and nuts to children required humbler gardeners to protect their trees by walls topped with glass or sharp shards.[162] This last point is of minor import but it does illustrate that orchard trees, even cultivated on a small scale, had expenditures. Large estates run as businesses for profit could ill afford to discount the expense of such duties and Cato's

book makes this quite clear.

Central Italy, however, does not seem to have suffered as much from the growth of latifundia as is normally assumed. Rural settlement reached a peak in almost all parts of Campagna in the first century A.D. with an increasingly large amount of marginal land brought under cultivation. At first glance, the population turnover in the late Republic and early empire is surprising. Near Rome, once founded, a farm tended to stay in occupation, even though the owner may have changed. However, further north a different situation existed. For example, in the Sutri area, no less than 67% of the Republican sites appear to have gone out of use at the end of the first century B.C., while an even greater proportion, 76%, of the early imperial farms represent new foundations. It is not until later in the imperial period that the Campagna begins to suffer from latifundia and it should be remembered that small farms, although they often tended to be absorbed by more successful landowners, continued to exist throughout the empire. In fact, archaeological evidence proves that new smallholdings were being founded between A.D. 300 and A.D. 500.[163]

However, after the second century A.D. the political upheaval in Italy seriously affected agricultural practice. "The system of imperial latifundia made for unproductive agriculture since it resulted in the loss of initiative and intelligent interest on the part of agriculturalists when the estates were given over to one lord at Rome. The procurators were under constant pressure to bring in immediate returns. There was no incentive to rotate crops, to try new agricultural experiments, to fertilize the soil, or to improve the land for the future."[164] A bit overstated perhaps, but the abandonment of many sites in the second

and third centuries A.D., as suggested by archaeological evidence, proves the collapse of agriculture in Italy at this time.[165] Since plants such as lucerne and the carrot required human attention, this helps to explain why they fell out of cultivation and had to be reintroduced later.

Criticism of landowners attempting to consolidate their holdings into a single, enormous, economic entity was not lacking. Pliny's _latifundia perdidere Italiam_ (_Nat_. 18.35) was perhaps the strongest expression of dismay, but White[166] suggests that this may only apply to those parts of the south where the latifundia were so large they could not be properly cultivated and had been allowed to lapse into vast tracts of _agri deserti_. Yet Horace, writing more than half a century earlier than Pliny, expressed concern that luxury estates were ruining Italian agriculture:

> Iam pauca aratro iugera regiae
> moles relinquent, undique latius
> extenta visentur Lucrino
> stagna lacu, platanusque caelebs
>
> evincet ulmos; tum violaria et
> myrtus et omnis copia narium
> spargent olivetis odorem
> fertilibus domino priori.
>
> tum spissa ramis laurea fervidos
> excludet ictus; non ita Romuli
> praescriptum et intonsi Catonis
> auspiciis veterumque norma.
>
> privatus illis census erat brevis,
> commune magnum: nulla decempedis
> metata privatis opacam
> porticus excipiebat Arcton,
>
> nec fortuitum spernere caespitem
> leges sinebant, oppida publico
> sumptu iubentes et deorum
> templa novo decorare saxo. (Hor. _Carm_. 2.15)

> A short time and our princely piles will leave but few acres to the plough; on all sides will be seen our fish-ponds spreading wider than the Lucrine Lake, and the lonely plane-tree will drive out the elm; then will beds of violets and copses of myrtle and the whole company of sweet perfumes scatter their fragrance amid olive groves that once bore increase to their former owner; then will laurel thickets shut out the sun's hot rays. Not so was it prescribed under the rule of Romulus and unshorn Cato or by the standard of our sires. With them private estates were small, and great was the common weal. No private citizen had a portico measuring its tens of feet, lying open to the shady north; nor did the laws permit our fathers to scorn the chance turf, but bade them at common cost adorn their towns and the temples of the gods with marbles rare.

Pliny himself frowned upon the large size of ornamental gardens (Nat. 18. 7) and criticized the change of horti from a place of simple production to gardens where delicacies for the tables of the rich were grown (Nat. 19.51-55). The ruin of agriculture and the ruthless drive toward consolidation of land were censured so often that one suspects a cliché.[167]

The growth of latifundia and the shift from subsistence to profit farming resulted in surplus that was sold not only within the peninsula but throughout the empire and as far away as the Red Sea.[168] Etruscan wines were known in Greece from the days of Alexander[169] but Pliny says:

> et hinc deinde altius cura (sc. de generibus nobilibus vini Italiae) serpit, non a primordio hanc gratiam fuisse, auctoritatem post DC urbis annum coepisse (Nat. 14.87).

> and further investigation going into this subject more deeply indicates that this popularity does not date back from the earliest times, but that the importance of the Italian wines only began from the city's six hundredth year (i.e. 154 B.C.).

As noted above[170] it took another century and a half until it had established its reputation among the wealthy class at Rome, but it was certainly consumed in large quantities by the poorer peoples of Italy.

Singer[171] estimates that at one point over 660 million gallons were consumed yearly in Italy and more was exported. Olive oil (and other crops to a much lesser degree) followed much the same pattern of growth as the vine and was exported at least as early as the Sullan period.[172] However, during the earlier period Italian products had suffered serious competition from the older regions of cultivation in the Eastern Mediterranean. It was not until the late Republican-early Imperial period that the quality of native products had improved enough to discourage the importation of foreign wines and oils. On the other hand, since areas such as Spain, Africa and Asia were producing their own crops, Italian surplus was not much exported except to the Alpine areas which were unable to produce their own wine and oil.

In the first century A.D., western Mediterranean lands which had received their 'cash' crops via Roman agency began to find a growing market for their produce in Italy. We hear of Spanish plums, oil and wine, Gallic peaches, cherries from Lusitania and many other products. Unfortunately for Roman producers, during the second century A.D., Spanish products began to capture the Roman market eventually forcing native olive culture to give way.[173] The shards of Monte Testaccio indicate that the native wine industry must have suffered as well. Consequently, it is not surprising that the Roman government passed legislation to assist Italian producers.

> Parsimonia apud veteres Romanos et victus atque cenarum tenuitas non domestica solum observatione ac disciplina, sed publica quoque animadversione legumque complurium sanctionibus custodita est (Gel. 2.24.1).
>
> Frugality among the early Romans, and moderation in food and entertainments were secured not only

> by observance and training at home, but also by public penalties and the inviolable provisions of numerous laws.

Gellius proceeds to give examples of the laws and he makes it clear that they affected foreign products since leading citizens were required to swear under oath that "they would not serve foreign, but only native wine." Pliny (Nat. 13.24) records that in 189 B.C. the censors issued a proclamation forbidding the sale of imported perfumes. Although both of the examples represent sumptuary laws which were not directly intended to protect native interests but to curb extravagances, they indirectly assisted native production. The first aided the food industry, the second the Capuans[174] who were in charge of the perfume industry. Pliny records another edict, this time concerning the wine industry:

> P. Licinius Crassus L. Iulius Caesar censores anno urbis conditae DCLXV edixerunt, 'ne quis vinum Graecum Aminniumque pluris octonis aeris singula quadrantalia venderet': haec enim verba sunt (Nat. 14.95).

> In the year 665 from the foundation of the city (i.e. 89 B.C.) the censors Publius Licinius Crassus and Lucius Julius Caesar promulgated an edict prohibiting 'the sale of Greek and Aminnian wine at a higher price than 8 asses for 6 gallons'--those being the actual words of the edict.

Although this is generally regarded as only another sumptuary law, Pliny may have considered it a direct aid to Roman[175] production since he discusses it in the context of the continuing poor reputation of Italian wine during the first century B.C. This seems even more likely since about 129 B.C. the Romans had passed punitive legislation in favor of Italian farm products.

> nos vero iustissimi homines, qui Transalpinas gentis oleam et vitem serere non sinimus, quo pluris sint nostra oliveta nostraeque vineae; quod cum faciamus,

> prudenter facere dicimur, iuste non dicimur
> (Cic. Rep. 3.9.16).
>
> We ourselves, indeed, the most just of men, who forbid the races beyond the Alps to plant the olive and vine, so that our own olive groves and vineyards may be the more valuable, are said to act with prudence in doing so, but not with justice.

This is the only undisputed evidence we have that during the Republican period the Romans did legislate in favor of Italian farm products.[176]

Later, in the Imperial period, Domitian passed an edict which was even more direct and severe than the Republican law:

> Ad summam quondam ubertatem vini, frumenti vero inopiam existimans nimio vinearum studio neglegi arva, edixit, ne quis in Italia novellaret utque in provinciis vineta succiderentur, relicta ubi plurimum dimidia parte; nec exsequi rem perseveravit (Suet. Dom. 7.2).[177]
>
> Once upon the occasion of a plentiful wine crop, attended with a scarcity of grain, thinking that the fields were neglected through too much attention to the vineyards, he made an edict forbidding anyone to plant more vines in Italy and ordering that the vineyards in the provinces be cut down, or but half of them at most be left standing; but he did not persist in carrying out the measure.

That the edict affected the provinces is proved by Philostratus who reports an embassy to Rome to ask for a repeal of the edict (VA 6.42) and the success of the mission (VS 1.520). There is little doubt that Domitian's decree was caused by a shortage of wheat (rather than the threat of revolution suggested in Phil. VS 1.520) and an over-abundance of olive groves and vineyards. It is generally believed that Latium at least gave up cereal culture soon after the importation of tribute grains, and that throughout much of Italy during the first century A.D. there was a slow but steady yielding of cereal culture to vines and orchards. Frank[178] dismisses the theory that Domitian's edict was intended

to win a provincial market for Italian surplus as implausible "since encouragement of the vine and olive would defeat the purpose of the decree, which was to increase cereal production at home". But it must have also been issued to help Italian producers! Why else should the Italian orchards be left intact while those of Spain and France, countries which produced little if any grain for Italy, were to be halved, if not totally destroyed?

Rome had become a consumers' city which acquired products from Italy, from the Empire and from beyond, giving little in return. Growing competition from provinces such as Spain and Gaul captured both the agricultural and industrial export markets of Italy. "The importance of trade was seldom clearly understood during the empire. The directors of state had no need or desire to balance trade: they were not interested in who carried the goods; they did not concern themselves greatly when Gaul and Spain captured the markets that had formerly belonged to the producers of Italy; and the expensive importations from the East were to them not so much a question of danger to Italian production as of the depletion of precious metals that flowed beyond reach. The emperors did not depart from the ancient custom of laissez-faire: 'mercantilism' and 'protection' were never seriously tried."[179] Diocletian attempted to solve some of the problems, but he merely gained a brief respite before the empire collapsed.

The importance of agriculture in the Roman world was not merely economic. Its moral value as a nursery of steady citizens and, at need, of hardy soldiers was recognized by the Roman authors. The growth of latifundia permitted a drastic increase of absentee ownership of land

and drove much of the peasantry from the land to other pursuits: life in the city or perhaps life in the army. The ancient writers provide numerous examples of occasions when farmers were summoned from the field to deliver the state from some military threat, only to return to the plough once victory had been gained. Columella, having just related several such examples, continues:

> cum tot alios Romani generis intuear memorabiles duces hoc semper duplici studio floruisse vel defendendi vel colendi patrios quaesitosve fines, intellego luxuriae et deliciis nostris pristinum morem virilemque vitam displicuisse. Omnes enim, sicut M. Varro iam temporibus avorum conquestus est, patres familiae falce et aratro relictis intra murum correpsimus et in circis potius ac theatris quam in segetibus ac vinetis manus movemus (Col. 1. prae. 14-15).[180]
>
> When I observe that so many other renowned captains of Roman stock were invariably distinguished in this twofold pursuit of either defending or tilling their ancestral or acquired estates, I understand that yesterday's morals and strenuous manner of living are out of tune with our present extravagance and devotion to pleasure. For, even as Marcus Varro complained in the days of our grandfathers, all of us who are heads of families have quit the sickle and the plough and have crept within the city-walls; and we ply our hands in the circuses and theatres rather than in the grainfields and vineyards.

"That the conditions of agriculture were not only important in connexion with food supply, but had an extensive moral and political bearing, is surely beyond dispute."[181]

TABLE II: Varieties of Vines, Olives and Fruit Trees

Century	2 B.C.	1 B.C.	1 A.D.	1 A.D.	4 A.D.	4-5 A.D.
Author	Cato	Varro	Columella	Pliny	Palladius[1]	Macrobius[2]
Species:						
Vine	7	5	63	71		23
Olive	10	9	12	15	6	16
Pear	5		18[3]	39		32
Apple	4	5[4]	8	23		22
Fig	6	4	17	29		26
Plum			4	9	1	
Quince			3	4		

1. Not evidence of decline: lists of varieties are not appropriate in Palladius' Calendar of operations.

2. Macrobius' lists are stated by him to have been compiled by a certain Cloelius, who may be much earlier in date.

3. Represents only a selection, according to the author.

4. Varro notices only foreign varieties.

VI. Conclusion

Present day Italy is one of the richest of the agricultural countries in the Mediterranean, not only in the quantity and the quality of its produce but also in the diversity of its crops. It ranks as one of the world's major producers for many products: olive, grape, fig, chestnut, walnut, hazelnut, almond, peach, apricot, cherry, hemp, etc. Other crops such as bread wheat, anise, crocus and pistachio are produced in quantities large enough to place Italy among the major producers of Europe. The pine, willow and cypress have become commonplace throughout the peninsula, so common that it is easy to lose sight of the fact that these too are intrusive flora like the plants mentioned above.

The native flora of Italy has been revolutionized by six major human upheavals which have occurred over several millennia. The first, the immigration of peoples which occurred in the fifth or sixth millennium B.C. was in several respects the most important since it introduced the basic cereal crops and vegetables upon which agriculture developed. The next major event which led to great alterations in the flora of Italy was the Greek colonization movement which began in the eighth century B.C. Nissen[182] regards this as the richest of the waves which brought new plants into Italy by human agency. The third human upheaval was the economic and social revolution precipitated in the third century B.C. by the Punic Wars. This agricultural revolution which continued through the second and first centuries B.C. not only propagated the intrusive flora of the previous wave from the south to the north end of the peninsula, but it also brought in a new wave of plants,

notably fruit and nut trees. The next upsurge occurred in the seventh century A.D. when Islam erupted out of Arabia, resulting in new introductions as well as some reintroductions via Spain of plants that had fallen out of cultivation near the end of the Roman Empire. The fifth period was the great exchange of plants between the Old and New Worlds following the discovery of the Americas at the end of the fifteenth century A.D. The final period of importation followed the discovery of Australia in the seventeenth century A.D. and the subsequent large-scale introduction of the eucalyptus tree into the Old World. Of course plant introduction did not occur only at these moments but was a gradual process taking place over a period of centuries, even millennia.

It also should be remembered that once one type of plant was introduced this did not prevent other varieties of the same plant from being imported in later periods. To the contrary, it probably stimulated the search and importation of new and superior cultivars to improve the known stock.

This study has been concerned with the plants introduced during the Greek colonization period and the following period of agricultural revolution which began in the third century B.C., touching upon the preceding and subsequent periods. Although the dating of flora introduced before the last century B.C. is very vague and in some cases open to significant change, trends in the pattern of plant types as they were successively introduced can be discerned.

As might be expected food plants for consumption by man dominate the list. Common sense also leads us to expect the most important of these plants to be introduced before the less important plants. For the

most part this is true, but the term 'important' must be placed in proper perspective. For a populace who eked out an existence from the soil, or for pastoralists,[183] the most important plants were those, recognized through experience, which provided the most nutrition. They contained significant amounts of vitamins, minerals, calories and protein, but more importantly they were crops with a low failure rate and could be harvested several times a year in certain areas. Nor did they require intensive care and nurturing.

During the period of Greek colonization, plants began to be introduced which represented not only the more refined needs of a superior culture but also a more highly developed level of agricultural ability. As previously explained[184] the cultivation of the fig, olive and vine required an agricultural society which was not solely concerned with farming for subsistence. Plants of this period also represented the influence of a foreign people's preference upon the peninsula, an influence which continued to grow until well into the Republic. As a result, plants not of great economic importance either to the natives nor to the importers were introduced for religious reasons or perhaps even for the mere pleasure they gave. The laurel, plane and cypress trees may be assigned economic values, but their importance in other areas must not be under-estimated or disregarded because economic and 'usefulness' factors are regarded as the sole motivations governing introductions at this time.

After the Punic Wars, Roman agriculture was not completely given over to large plantation cultivation and ranching. In fact, "as in modern times, the small farm far outnumbered the large estates in clas-

sical times".[185] However, very few scholars would attempt to argue that plant cultivation in Italy did not undergo drastic change during this period. The increasing involvement of the peasant in military affairs (military expeditions, conscriptions and loss of life), demographic shifts from rural to urban areas (caused by soil exhaustion, increased industrialization and later the bread and circuses at Rome), and the spoils of war (resulting in land investments run by slave labor) had several consequences. The number of small farmers decreased while estates increased in both size and number. In some areas the acreage planted in cereals was gradually reduced while that of the vine, olive and fruit tree was increased. A considerable amount of land was turned to pasturage for grazing or abandoned since it could no longer be farmed. These circumstances provided the opportunity for the wealthy class to indulge their growing interest in the new varieties of plants that they came into contact with as Roman vigor penetrated further afield.

De Candolle[186] states, "The species first cultivated during Graeco-Roman civilization and later nearly all answer to more varied or more refined needs. A great dispersion of ancient species from one country to another took place, and at the same time a selection of the best varieties developed in each species". The Romans were rapidly becoming aware of the pleasures that foreign cultures offered, their plants were one method of experiencing them. As a result more exotic vegetables were cultivated,[187] plants with edible fruits were introduced and those with nutritious or aromatic seeds were cultivated in the gardens of the rich and even of some humbler citizens.[188]

Plants other than those used primarily for food were generally

later in their introduction, being imported as required. The growth of luxury in the peninsula was accompanied by a demand for visual pleasure which resulted in the importation and production of large numbers of ornamental plants. The growth of industrial products such as perfumes, unguents and dyes made use of many of these same plants and a growing rope industry may have influenced the introduction and cultivation of hemp. Fodder plants and green manures became important after the Punic Wars when ranching dominated large parts of southern and northern Italy and other areas such as Etruria were beginning to suffer from soil exhaustion. But the demand of luxury items dominated the plants which were introduced in the late Republic and the Empire. Charlesworth[189] points out the importance with which trade routes were regarded, routes that carried not only the grain supply but also routes that conducted expensive imports from the East, imports which could not be grown, at least not profitably, in Italy.

Once plants had been introduced and begun to be cultivated, several different situations could result. Cultivation might produce subspontaneous (i.e. plants seeding and establishing themselves in the wild, although originally being imported) and naturalized plants; plants may become casuals (i.e. introduced plants which cannot maintain themselves for long); or plants may be improved by hybridization, possibly losing their qualities of self-survival which are no longer required as long as man tends them.

Plants which became naturalized in antiquity have presented a problem for modern botanists attempting to determine their place of origin, but for ancient farmers these plants caused little if any dif-

ficulty. The most obvious exceptions were those plants which were introduced, perhaps by accident in some cases, and became a weed problem. Contaminants in fodder crops were a threat and human food could become dangerous if weed plants, such as cockle, were accidentally eaten with the plants they infested.

The situation involving casual plants and the plants 'improved' by cultivation is more serious. In the troubled times of the third and fourth centuries A.D., cultivation of crops was greatly disturbed and when plants unable to propagate themselves were left to survive on their own, they disappeared from the peninsula.[190] This too has caused difficulties for modern botanists who, at one time, believed some of these plants to belong to a later wave of introduction. For the Romans of the Republic and early Empire this effect went unnoticed. For the later population of Italy it must have had some consequence but perhaps not too much since the plants were allowed to fall out of cultivation in the first place.

That introduced plants had an effect upon Italian agriculture is beyond dispute. How great the effect was can only be gleaned from historical sources for a very small number of the most important plants. However,the ongoing research of botanists and archaeologists and the improved methods of floral analysis should greatly increase our knowledge of ancient Italy's flora: when plants were first cultivated, the extent of their cultivation and whether they displaced other plants. More knowledge of these matters will certainly help us better to understand land usage, demographic changes and socio-economic conditions in the regions examined.

This monograph has illustrated the desire of the Romans to possess plants which were useful to them. The Romans attempted introductions of many types of plants, some of which failed. How many endeavors failed will probably never be known since failure almost certainly precludes the discovery of archaeological remains. But it is not rash to suggest that Italy had been introduced, if only for a moment, to many more foreign plants[191] than the historical and archaeological record indicates.

> ... nec nostram civitatem praedictis egere stirpibus, quippe compluribus locis urbis iam casiam frondentem conspicimus, iam turеam plantam, florentisque hortos myrrha et croco. His tamen exemplis nimirum admonemur, curae mortalium obsequentissimam esse Italiam, quae paene totius orbis fruges adhibito studio colonorum ferre didicerit (Col. 3.8.4-5).

> ... our own community is not destitute of the aforesaid plants, for in many sections of the city we see at one time cassia putting forth its leaves, again the frankincense plant, and gardens blooming with myrrh and saffron. Surely these examples remind us that Italy is most responsive to care bestowed by mankind, in that she has learned to produce the fruits of almost the entire world when her husbandmen have applied themselves to the task.

Notes

1. Hyams (1971) p.x.

2. Harlan (1966) p.56.

3. The introduction of a cultivar often prompted the cultivation of previously neglected native species which then became part of the increasing gene pool of possible hybridizations.

4. Reed (1942) p.8.

5. Meiggs and Lewis (1969) no. 12 p.20; cf. Plin. Nat. 12.57.

6. Captain Bligh's voyage had been commissioned by the British Government to introduce breadfruit plants, Autocarpus communis, from Tahiti to the West Indies.

7. Helbaek (1959) p.371.

8. For example, the peach was a native of China and was not introduced into Asia Minor until the second century B.C. The Romans imported it in the first century A.D. or perhaps slightly earlier from Asia Minor. Unless the Romans had had strong contacts with China it would have been impossible to import the peach much earlier--it simply was not available to the Romans until it reached Asia Minor.

9. Vavilov, N.I. The Scientific Bases of Plant Breeding (1935) (in Russian). Selected writings have been translated by K. Starr Chester under the title The Origin, Variation, Immunity and Breeding of Cultivated Plants. Waltham, Mass., 1949-50.

10. Hill (1952) p.473.

11. However there is a problem owing to the disparities in the quantity of such evidence from different areas and periods.

12. Day (1932) p.176.

13. Plin. Nat. 13.26.

14. Scullard (1967) p.66.

15. Potter (1976) p.308.

16. Dimbleby (1967) p.177.

17. Jashemski (1974) p.402. Some pollen was found on this excavation which has amazed many people who thought such finds impossible.

18. White (1970) p.36.

19. Ibid. p.14.

20. Heitland (1921) p.131.

21. Brehaut (1966) p.xiii.

22. Var. R. 1.1.1.

23. Col. 3.3.1.

24. White (1970) p.27.

25. Ibid. p.262, n.4.

26. supra n.9.

27. No attempt has been made to note all cultivars of a plant.

28. Only one or two of the most common Latin names are listed; see André (1956) for synonyms.

29. This information has largely been derived from the reference works cited in the introduction and from the books marked with an asterisk (*) in the bibliography. Where a difference of opinion exists, footnotes will be provided.

30. Although this monograph is not concerned with modern Italy, a few statistics regarding agricultural production in Italy today will be noted in order to illustrate the importance of ancient introductions to modern Italy.

31. Only the ancient testimonia I have used are listed here. More may be found in André (1956) and in the useful indices of the Loeb Classical Library for Pliny, Columella, Varro and Cato.

32. Sir Arthur Evans, The Palace of Minos (London, 1964) vol. I, p.344 implies that the cypress was grown on Crete before the middle of the second millenium B.C. However he does not state it as a fact until a much later date. His other references to the cypress on the island at this early date also express uncertainty: vol. II, 7, 145, 298; III, 321, 523; IV, 1, 18, 970.

33. Hyams (1971) p.211.

34. Bianchini and Corbetta (1976) p.193.

35. cf. Plin. Nat. 15.88.

36. White (1970) p.498, n.88.

37. Condit (1947) p.11.

38. Forbes (1965) vol. iv, p.59.

39. de Wit (1966) vol. i, p.120 says it is a native of the Alps and high central European mountains; Polunin (1969) p.98 merely says it is a native of Europe.

40. le Strange (1977) p.6.

41. Brouk (1975) p.282.

42. Renfrew (1973) p.161.

43. 'Injections' is a mis-translation of *infundi*, render it as 'ointments'.

44. de Wit (1966) vol. i, p.143.

45. Hyams (1971) p.34f.

46. Brouk (1975) p.135.

47. de Wit (1966) vol. i, p.143.

48. A few references which apply to the genus Rosa are Plin. *Nat.* 13.26; 21.14, 121.

49. Bianchine and Corbetta (1976) p.150 suggest the peach and apricot were brought back by Alexander.

50. Renfrew (1973) p.107.

51. *Ibid.* p.113.

52. *Ibid.* p.117.

53. de Candolle (1959) p.329.

54. *cf.* Plin. *Nat.* 18.144 who says 30 years.

55. Hyams (1971) p.17.

56. *Ibid.* p.17.

57. Andrews (1949) p.53.

58. Hyams (1971) p.45.

59. Forbes (1965) vol. iv, p.108.

60. Brouk (1975) p.283.

61. Polunin and Huxley (1967) p.150.

62. de Wit (1966) vol. ii, p.145.

63. See the appendix (p.169) for an explanation of the wheats used in ancient Italy.

64. Helbaek (1960) p.105.

65. Forbes (1965) vol. iii, p.145 says that at the end of the empire rye penetrated as far south as Campania.

66. Issac (1970) p.58.

67. Vavilov (1949-50) p.14-54.

68. Harlan (1976) p.95 states that although evidence is meagre, there are hints that the inhabitants of Southeast Asia were manipulating plants as early as the people of the Near East.

69. Pliny (Nat. 15.3) says: "Also Hesiod, who thought that instruction in agriculture was a prime necessity of life, declared that no one had ever gathered fruit from an olive-tree of his own planting--so slow a business it was in those days."

70. Harlan (1966) p.56.

71. supra. notes 46, 47, 48.

72. Woodhead (1962) p.21.

73. Harden (1963) p.62.

74. Reed (1942) p.8.

75. Lehner (1960) p.57.

76. Dunbabin (1948) p.211.

77. Nissen (1883) vol. i, p.439f.

78. An obvious exception would be during times of war when the armies required supplies.

79. infra note 112.

80. infra p.106.

81. Bennett (1971) p.171.

82. Potter (1979) p.62.

83. Ibid. p.126.

84. Singer (ed.) (1956) vol. ii, p.120.

85. *infra* p.115.

86. Toynbee (1965) vol. ii, p.10.

87. App. *Libyca* 20.134.

88. Toynbee (1965) vol. ii, p.35. Of course wars waged on the peninsula affected Roman agriculture throughout history.

89. Brunt (1971) p.277.

90. Frank (ed.) (1933-40) vol. i, p.198.

91. Liv. 31.13.

92. Toynbee (1965) vol. ii, p.248.

93. Carrington (1931) pp.110-130; Day (1932) pp.162ff.

94. See the articles of W.F. Jashemski in the bibliography.

95. Yeo (1946) p.241.

96. Brehaut (1966) p.xiv.

97. Yeo (1946) pp.221-24.

98. *Ibid*. p.225.

99. Var. *R*. 2.6.5.

100. Carter and Dale (1974) p.134.

101. Jasny (1942) p.761.

102. Potter (1979) p.108.

103. Columella notes that the grape cannot be grown profitably as a fruit unless the orchard is near a market. His major concern is probably spoilage, but transportation difficulties must also be considered.

104. White (1967) p.77.

105. *supra*. p.92.

106. Toynbee (1965) vol. ii, p.13.

107. Carter and Dale (1974) p.130.

108. White (1967) p.75.

109. Col. 6. prae. 4.

110. White (1967) p.75.

111. Forbes (1965) vol. iii, p.121.

112. Fussel (1972) p.14.

113. Cato Agr. 144-45; Var. R. 1.17.2; Col. 3.21.10; Plin. Nat. 14.10. Pliny's comment includes the fact that funeral costs for workers were also considered if the work was dangerous.

114. Jarman (1976) p.308.

115. Frank (ed.) (1933-40) vol. i, p.366.

116. Ibid. p.174. The timber was used for ship-building and construction at Rome.

117. Carter and Dale (1974) p.131.

118. Lord (1963) p.151.

119. Hyams (1952) p.125.

120. Potter (1979) p.120. "One of the features that has emerged with extraordinary consistency from surface surveys in various regions of Italy is the very high density of rural settlement in the Roman period. The countryside, whether in the river valleys of Apulia and the Abruzzi, the coastal flats bordering the Tyrrhenian Sea or the hilly terrain of Etruria, seems to have supported a very large farming population, which brought all but the most marginal land into cultivation."

121. Toynbee (1965) vol. ii, pp.563-65.

122. Cato Agr. 40; 41.

123. Col. 5.10.6.

124. Grafted stock also gave a yield true to type whereas seedlings tended to be of poor quality or to revert to wild type.

125. See Table II, p.141.

126. Col. Arb. 3.1.

127. Stevens (1966) p.100.

128. Frank (ed.) (1933-40) vol. v, p.183.

129. Fussel (1972) p.12.

130. *supra*. note 114.

131. Brooks (1949) p.314. Semple (1932) p.90, believes that the climate in classical times was more or less the same as it is today. The question has been reopened in an important book by C. Vita-Finzi, based on detailed field investigations of geological changes (*The Mediterranean Valleys* (Cambridge, 1969), esp. 112ff).

132. Jarman and Webley (1975) p.195ff.

133. Harlan (1975) p.188.

134. Hyams (1971) p.151.

135. Reed (1942) p.113.

136. *infra* p.138.

137. Frank (ed.) (1933-40) vol. iv, p.46f. for a description of the oil producing areas of Africa.

138. Plin. *Nat*. 14.87.

139. Plin. *Nat*. 14.95.

140. *infra* p.137.

141. Hatzfeld (1932) p.140f.

142. Frank (ed.) (1933-40) vol. v, p.152, note 2.

143. Blackenhagen *et al*. (1965) pp.55-69.

144. Frank (ed.) (1933-40) vol. v, p.153.

145. Cato *Agr*. 6.1f.; Var. *R*. 1.23.1f.; Plin. *Nat*. 14.10f.; 17.1f.

146. *cf*. Verg. *G*. 1.51-53.

147. White (1970) p.262. See Table number II, p.141.

148. Pliny continues to describe failures; *cf*. Plin. *Nat*. 14.1.

149. Scullard (1967) p.65 notes that Etruscan cities are not mentioned as famous for any fruit or vegetable. This may indicate agricultural decline.

150. Pliny (*Nat*. 19.59) speaks highly of vegetables.

151. Brothwell (1969) p.176f.

152. Of course there were other reasons as well, but threat of famine appears to be one of the major concerns.

153. White (1967) p.76.

154. The complaint that absentee owners were the cause of declining agricultural profit became a common one: Var. R. 1. prae. 15; Col. 1. prae. 5; Plin. Nat. 18.21.

155. Potter (1979) p.123.

156. Ibid. p.133 contradicts this view for the early period.

157. Jashemski (1977) pp.217-227.

158. Frank (ed.) (1933-40) vol. i, p.126 estimates that the land around Rome doubled, tripled and even quadrupled in value from 200-150 B.C. when it was planted in vines and olives.

159. Potter (1979) p.126.

160. Stevens (1966) p.102.

161. Jashemski (1977) p.223.

162. Ibid. p.227.

163. Potter (1979) p.126.

164. Frank (ed.) (1933-40) vol. v, p.301.

165. Jones (1963) p.146.

166. White (1967) p.77.

167. MacMullen (1974) p.6. Other passages he cites are Cic. Agr. 3.4. 14; Hor. S. 2.6.8f.; Sen. Ep. 90.39; Petr. 48.3; Plin. Ep. 3.19.

168. Day (1932) p.176.

169. Scullard (1967) p.65.

170. supra p.120.

171. Singer (ed.) (1956) vol. i, p.134.

172. supra p.122.

173. H.A. Severus 23.2 indicates that olive culture had suffered in Italy.

174. Since the Capuans were not Roman citizens at this time, the law was probably intended as a sumptuary decree only.

175. The area around Rome since Aminnian wine came from Picenum.

176. Frank (ed.) (1933-40) vol. i, p.173.

177. cf. Suet. Dom. 14.2.

178. Frank (ed.) (1933-40) vol. v, p.183.

179. Ibid. p.295.

180. cf. Var. R. 2. prae. 3.

181. Heitland (1921) p.5.

182. Nissen (1888) p.430-32.

183. White (1970) p.47. "The evidence indicates that the early settlers of Latium were pastoralists."

184. supra p.84.

185. Potter (1979) p.134.

186. de Candolle (1886) p.451.

187. Plin. Nat. 19.54.

188. supra. note 152.

189. Charlesworth (1926) p.232ff.

190. Alfalfa, carrot, and apricot are examples of plants which fell out of cultivation and had to be reintroduced.

191. For example, rice, Oryza sativa, was cultivated by the Seleucids in Syria when the Romans conquered it and was used in Italy as a medicine (Hor. S. 2.3.155). However, although Italy is presently Europe's only large producer, rice was not introduced, as far as we know, until 1468. Only lack of desire prevented its introduction into the peninsula in antiquity.

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Appendix I: A Note on the Types of Wheat Used in Italy

Botanical Name	Common Name	Hulled(Glume) or Naked
Diploid (14 chromosomes-2x7)		
T. boeoticum Boissiem. Schiem.	Wild Einkorn	Hulled
T. monococcum L.	Einkorn	Hulled
Tetraploid (28 chromosomes-4x7)		
T. dicoccoides Körn.	Wild Emmer	Hulled
T. dicoccum Schübl.	Emmer	Hulled
T. durum Desf.	Durum Wheat	Naked
Hexaploid (42 chromosomes-6x7)		
T. spelta L.	Spelt Wheat	Hulled
T. aestivum L.	Common or Bread Wheat	Naked

All wheats belong to the genus Triticum of the family Gramineae.

The above table lists those species of wheat most important to ancient Italy. They have been divided into three groups according to the number of chromosomes contained in their cells. Chromosomes in wheat occur in blocks of seven, and artificial and accidental breeding have produced the diploid (2 sets of 7), the tetraploid (4 sets of 7) and the hexaploid (6 sets of 7) groups.

The terms hulled and naked refer to the condition of the grain at the time of threshing. Those which have hard close glumes and lemmas (types of modified leaf that protect the grain) which are difficult to remove from the grain are called hulled or glume wheats since their hulls, or glumes, remain attached to the grain through the threshing process. The wheats whose loose hulls are more easily removed are called

naked wheats since the threshing removes all covers from the grain.

The rachis, the axis to which the seeds cling, represents another major difference between the types of wheat. In the wild wheats the rachis is very brittle and drops the seeds very easily and quickly. In the less developed cultivated wheats (einkorn, emmer, spelt) the rachis, while less fragile, still drops the grain easily and consequently large amounts of it are lost during harvesting. In the well-domesticated wheats (durum, bread) the rachis is tough, so very little grain is lost.

Einkorn, emmer and spelt, although they are domesticated wheats, have retained some wild wheat characteristics such as the fragile rachis and stiff, close-fitting glumes that do not release the kernels during the threshing.[1]

Einkorn, or One-Grained wheat, is so named because although each spikelet normally has two flowers, usually only one of these is fertile with the result that a single seed is formed in each spikelet. This species is almost certainly descended from wild einkorn which shows the changes in rachis, glumes and yield (cultivated varieties usually have a much greater yield) which illustrate the conscious selection by man of a superior cereal. It has a considerable resistance to temperature variation and drought, and grows surprisingly well in poor soil.

Emmer, or Two-Grained wheat, is a descendant of wild emmer and again shows the improvement between the wild and domestic types. This, at one time, was the most widely cultivated of all wheats but it is now grown only in very limited amounts.

Durum wheat is believed to be a descendant of emmer wheat even though it has a tough rachis and soft, loose glumes which give an increased yield when harvested and provide a naked wheat upon threshing. It is by far the most important of the tetraploid group today and is only second to bread wheat in world production. This is regarded as the best wheat for pasta or macaroni making.

Spelt is a hexaploid wheat which falls into an intermediate area between wild wheats and the bread and durum wheats since it retains a fairly fragile rachis and close, tough glumes. Even though its yield cannot compete with bread wheat, its hardy nature enables it to compete with other wheats on a small scale.

Common or Bread wheat is the most highly developed and most widely grown variety of wheat. The rachis is tough and the glumes small and loose. However it is not a particularly hardy cereal and can only be grown under much more limited conditions than the other wheats. The wheat is best for bread-making and use in cakes, biscuits and pastries. Its production is only second to rice of all the cereals in the world.

Although einkorn and emmer probably arrived in Europe and Italy together, emmer rapidly became the dominant wheat crop. This situation lasted well into the first millennium B.C. in Italy until durum, a naked wheat, was introduced.

Pliny (_Nat_. 18.29.109ff) tells us that _alica_ was prepared from emmer by a process of pounding and that three grades of groats (hulled

grains crushed but not milled) were obtained by sifting. Cato (*Agr.* 85.1) tells us that *alica* was used for making *puls*, a type of porridge which was, for a long time, the staple food of Latium. Types of bread could be made from emmer and other cereals, such as barley, but the bread was of poor quality (Plin. *Nat.* 18.74) and not often produced, as far as we know.

Moritz[2] explains that husked grains were often roasted as part of the hulling process, which largely destroyed the gluten content (the substance which retains the CO_2 for leavened bread) of the grain making it unsuitable for leavened bread. Emmer can be made into reasonable bread if it can be freed from its husks without roasting, but this was not possible in early Italy. Thus, when durum was discovered about 300 B.C. it rapidly gained the dominant position among the wheats in Italy, owing to its bread-making quality, and remained the major wheat of Italy until recent times. T. aestivum, bread wheat, became very popular in the first century A.D. but production conditions prevented it from gaining the dominant position in ancient Italy even though it is vastly superior to durum for making bread.

Bread as a type of food is superior to porridge in several respects: it is a solid, not a liquid, it lasts longer without spoiling and the higher temperature of baking (450°F vs. 140°F) kills bacilli in the bread. The change in diet from *puls* to *panis* is generally regarded as a significant cultural achievement by the Italians.

Note on Translations.

Often the term 'spelt' is used by translators to describe the

wheats of Italy which include emmer, einkorn and true spelt. This general term is inaccurate and can be misleading especially since T. spelta was not popular in ancient Italy. In fact, some scholars believe that it never penetrated further south than the Po Valley although others believe that attempts were made to grow it in the area around Rome, but that these attempts failed.

Notes to Appendix I

1. The shape of the seed also changes as the wheat becomes more advanced. Wild wheats have a thin, pointed grain which is difficult to mill. The grain of einkorn, emmer and spelt becomes thicker and rounder, that of durum and the bread wheats even more so which greatly aids reduction during milling.

2. Moritz (1958) pp.xxi-xxii.

Appendix II: Addendum to the Catalogue of Plants

BURSERACEAE: Balsam Family

124. Commiphora opobalsamum Engl.: Mecca Balsam: balsamum, opobalsamum.

A small shrub from Somalia and Arabia which was used as a medicant and scent. Several other balsam trees also produce a similar resin which makes identification in the Latin sources difficult. The plant was known in Rome, but not widely cultivated.

> Sed omnibus odoribus praefertur balsamum uni terrarum Iudaeae concessum, quondam in duobus tantum hortis, utroque regio ... ostendere arborum hanc urbi imperatores Vespasiani, clarumque dictu, a Pompeio Magno in triumpho arbores quoque duximus (Plin. Nat. 12.111).

> But every other scent ranks below balsam. The only country to which this plant has been vouchsafed is Judaea, where formerly it grew in only two gardens, both belonging to the king .... This variety of shrub was exhibited to the capital by the emperors Vespasian and Titus; and it is a remarkable fact that ever since the time of Pompey the Great even trees have figured among the captives in our triumphal processions.

Plin. Nat. 12.111-123; 13.15; 15.30; 16.135; Col. 10.301.

PEDALIACEAE: Pedalium Family

125. Sesamum indicum L.: Gingelly, Til: sesamum.

Probably a native of tropical Africa which the Romans received from India (Plin. Nat. 18.96) during the Republic. The oil of the sesame seed had properties similar to olive oil which permitted its use on a small-scale as a lubricant and lamp oil. It was also sprinkled on breads and pastries. Columella (2.7.1) describes it as one of the kinds of pulses maxime grata et in usu hominum.

Col. 2.7.1; 2.10.18; Var. R. 1.45.1; Plin. Nat. 13.11, 12; 15.28; 18.49, 58, 60, 96-99; 22.132; 23.95.

LILIACEAE: Lily Family

126. Smilax aspera L.: Smilax: smilax, milax.

Although the plant is now naturalized around the Mediterranean, Pliny (Nat. 16.153) says that it first came from Cilicia. In antiquity it was often mistaken as ivy and used in wreaths at sacred rites. The young shoots could be eaten like asparagus and the juice of its berries were used as an antidote for many poisons (Plin. Nat. 24.83). The terms smilax and milax were also used to describe a type of yew and holm oak by the Romans which has caused some problems in identification of S. aspera.

Plin. Nat. 16.153-155; 24.82-83.

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IN ANCIENT ITALY

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