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## Trees and shrubs of Rodhos — a monographic study\*

### Abstract

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From April 24th to May 24th 1983 floristic dendrological studies were conducted on Rodhos Is. In all 97 wild species of trees and shrubs were found. These were characterized as regards mode of occurrence and for the majority point maps of distribution were prepared. Besides there occur on Rodhos at least 74 species of introduced trees and shrubs, including 20 for fruit growing.

*Key words:* Chorology, trees, shrubs, Rodhos.

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### INTRODUCTION

Rodhos island, after Crete, Euboea and Lesbos is the fourth largest of the Greek islands, and at the same time it is the largest and most southerly located island of the Dodecanese. It extends between  $35^{\circ}52'$  and  $36^{\circ}37'$  Lat. N and between  $25^{\circ}23'$  and  $25^{\circ}56'$  Long. E. The area of the island is 1404 km<sup>2</sup>, the maximal length is 77 km and maximal width 37 km. The nearest distance from the shores of Anatolia is about 18 km. The island is mountainous, particularly in the western part. The highest mountain is Attaviros 1215 m elevation, which in its apical part is almost completely devoid of woody plants. Further peaks are Profitis Ilias near Salakos — 900 m and Akramitis, between Monolithos and Sianna — 825 m. The remaining peaks do not exceed 600 m. The island is built to its medium height from a tertiary flysch, while the upper parts as a rule constitute limestone rocks. In places, as for example in the Armenistis massif (northwest of Monolithos) and near Lindos, coastal

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rocks project directly from the sea forming sometimes narrow and deep, craggy gorges. The majority of the shores, however, particularly in the south and in the northwest are lowlands. Due to numerous streams and rivers, not all of which dry for the summer, Rodhos is a green island with a rich vegetation. The climate is Mediterranean with a mean January temperature of  $+13^{\circ}\text{C}$  and July temperature of  $+26-27^{\circ}\text{C}$ . From May to September rains are rare and when they come are of short duration and in the winter they are characterized by strong and frequent winds. The number of sunny days per annum is on the average 259.

The flora of Rodhos, in spite of numerous investigations conducted here, particularly by Italian botanists in the years 1912-1939, has not been sufficiently well recognized and described. It is estimated that it contains about 1100 species of vascular plants. Almost every floristic publication concerning this island provides new data and even descriptions of new species. The history of botanical investigations on Rodhos has been published by Cifferi (1944). The beginnings reach the second half of the XVIII c., when on Sept 21st 1761 Peter Forsskal landed here during his trip to "Arabia Felix" and collected 16 species, 2 of which were from cultivation. They were mentioned in his 1775 publication "Flora Aegyptiaco-Arabica". Several years later in 1787 the island was visited by Sibthorp who collected 3 species of plants. Next was Olivier in 1796. In the XIX c. a whole list of botanists and travelers appeared on Rodhos, and their herbarium collections have been utilized by De Candolle in his "Prodromus Systematis naturalis Regni vegetabilis" and by Boissier in his "Flora Orientalis". Of the better known botanists who have visited Rodhos one can mention Heldreich, Balansa, Orphanides, Haussknecht, Bourgeau, Post, Pichler, Barbey, Forsyth-Major and then numerous Italian botanists. Of the studies published by the latter of special interest is "La flora dell'isola di Rodi" of Fiori which appeared in 1924.

Rechinger summarized all these investigations and in his "Flora Aegaea" published in 1943 compiled data available to him on the flora of Rodhos presenting for each species its stands and sources of information (literature, herbarium specimens). Rechinger himself visited Rodhos in 1935 and collected very rich herbarium materials there that provided much completely new information. A year after publication of this flora a similar listing but only for the Dodecanese islands has been published by Cifferi (1944), however, stands are not cited there but only literature is quoted.

Since that time only very few other publications concerning the flora of Rodhos appeared, of which the most important ones though only of supplementary nature are two works of Finkl (1961-1962) who was on the island from December 1943 to October 1944 and one by Han-

sen and Snogerup (1966). The latter authors have compiled data about herbarium collections made on Rodhos by Danish and Swedish botanists (including their own) over the years 1959 - 1966. From the smaller floristic reports, concerning either descriptions of new species or critical evaluations of some groups of plants one can mention the following: Burt t (1951), Palmer and Meikle (1965), Phitos (1965), Snogerup (1967), Hansen (1969), Runemark (1980), Baumann and Dafni (1981). Further data on the stands of plant species on Rodhos can be found also in the "Flora of Turkey" edited by Davis (1965 - 1982) and in the beautifully illustrated book of Goulandris and Goulimis (1968) "Wild Flora of Greece".

During the last 10 years two extensive floristic lists have been published for plants collected or observed on Rodhos. The first one, compiled by Schouten (1976), presents the result of a visit by Dutch botanists on the island between 15th and 29th April 1976. The other, was made by Strasser (1981) who was on Rodhos between April 3rd and 31st in 1981. Finally one should also mention a popular article by Bechtel (1980) with information about the discovery on Rodhos of new orchid for the island — *Cephalanthera epipactoides*.

#### THE GENERAL CHARACTERISTIC OF THE VEGETATION

The vegetation of Rodhos island has not been a subject of detailed phytosociological study. The only exception is a study by Lavrentiades (1969) who describes in detail the plant communities in the region of Tsambica Bay, in the eastern part of the island, about 28 km southwest of Rodhos town. The whole island lies in the zone of evergreen, coriaceous leaved forests and Mediterranean thickets. The latter are included in the order *Oleo-Ceratonion* (more dry and thermophilous) or *Quercion ilicis* (less thermophilous and more moist). Within both zones they have developed, depending on the local site conditions and the means of utilizing the soil in the past and presently, into a forest, maquis or phrygana, which jointly occupy about 70% of the area of the island (about 25% is under cultivation). Apart from these basic plant formations, a small percentage of the area of Rodhos is occupied by specific sites, such as craggy limestone rocks with cliff flora, coastal dunes and stone beds of drying rivers.

#### FORESTS

Forests cover about 12 - 15% of the area of Rodhos, the main forest forming species being coniferous trees, pine and cypress. One can distinguish four basic forest types, of which only the first is of any importance.

a. Coniferous forests (*Pinus brutia*-*Cupressus sempervirens*)

Coniferous forest are distributed primarily in the central and western part of the island on hills and in mountain massifs such as Profitis Ilias, Attaviros, Akramitis and Filerimos. Above 500 - 600 m elevation the forest stands are formed by *Cupressus sempervirens* either pure or mixed with *Pinus brutia*. Dense cypress forests can presently be found in the apical parts of the Akramitis and Profitis Ilias (Fig. 1) and on the northern and western slopes of the Attaviros Mts. These are commonly the most shaded forests with very scanty herbaceous vegetation. In places where they have opened up somewhat and on a rocky, limestone substratum, where stands do not normally attain crown closure, single trees of the following admixed species can be found: *Quercus coccifera*, *Ceratonia siliqua*, *Olea europaea*, *Pyrus spinosa* and *Pistacia terebinthus*.

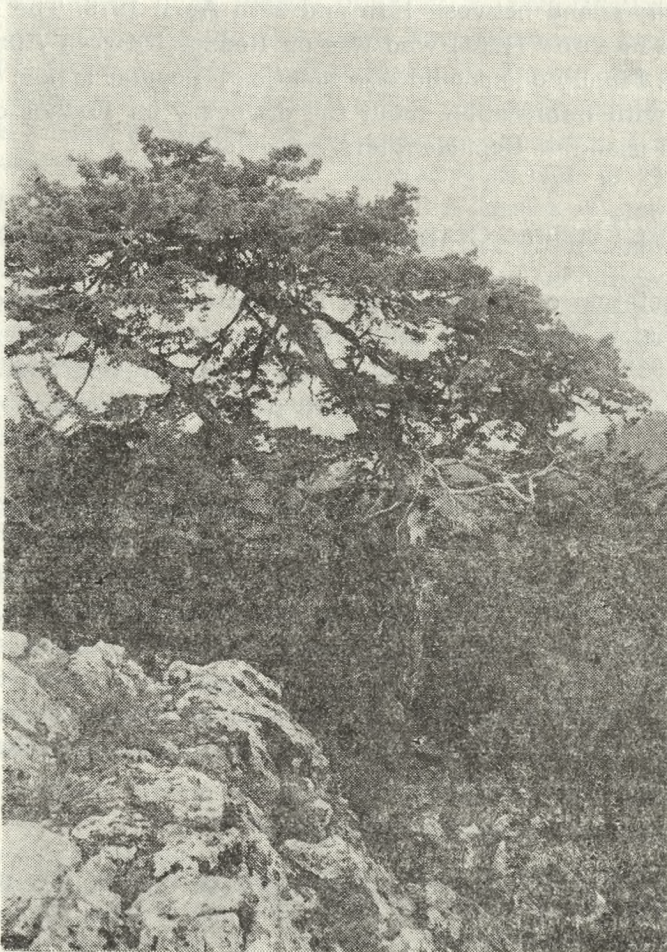


Fig. 1. *Cupressus sempervirens* f. *horizontalis* on calcareous rocks a little below the top of the Profitis Ilias Mts. near Salakos (Phot. A. Boratyński)

On the other hand in the understorey, in somewhat moister places one can find *Styrax officinalis* and *Anagyris foetida*. Low shrub species also appear here, particularly *Sarcopoterium spinosum*, *Cistus salvifolius*, *Genista acanthoclada*, *Salvia fruticosa* and on the edges *Lithodora hispidula*.

In the lower reaches of the mountains the participation of *Pinus brutia* increases substantially and on the regions located beyond the major mountain massifs it forms dense, usually monospecific forests. In these forests frequently the layer of thickets is often well developed. The specific composition of it is locally much differentiated with the dominance of one species or the other. These are *Arbutus unedo*, *Pistacia lentiscus*, *Cistus incanus*, *C. salvifolius*, *C. parviflorus*, *Salvia fruticosa*, *Lavandula stoechas*, *Erica manipuliflora*, *Hypericum empetrifolium*, *Calicotome villosa* and in moist places also *Phillyrea latifolia*, *Arbutus andrachne*, *Rhamnus alaternus*, *Styrax officinalis* and *Myrtus communis*. Of the climbers one can observe *Smilax aspera* and more rarely *Clematis cirrhosa* and *Lonicera etrusca*. In strongly opened and insolated forests one can find also *Anthyllis hermanniae* and *Colutea insularis*. Pine forests have been much damaged in the past and their place has been taken over by maquis or phrygana and also by cultivated fields.

#### b. Carr forests

Small fragments of carr forests have remained only along rivers that do not dry out in the summer. They are formed either by *Platanus orientalis* alone or with the participation of *Liquidambar orientalis* and single specimens of *Salix alba*, *Quercus coccifera*, *Phillyrea latifolia*, *Myrtus communis*, *Pistacia terebinthus* and sometimes even *Cercis siliquastrum*, *Laurus nobilis* and *Rhamnus alaternus*. Besides, in these forests, and more strictly on their edges one can frequently find such species as *Nerium oleander*, *Vitex agnus-castus*, *Styrax officinalis*, *Hypericum hircinum*, and *Smilax aspera*. The best preserved forest communities of the type of *Platanus orientalis*-*Liquidambar orientalis* are being protected in the nature reserve at Petaloudes (Valley of the Butterflies) on the rivulet Pelicano.

#### c. Oak woods

Most likely this type of forest has not been very widely spread on Rodhos. Presently it remains only in small fragments as for example on the northern slopes of the Profitis Ilias Mts. near Salakos where it is composed of *Quercus coccifera*. Old specimens of *Q. macrolepis* and *Q. pubescens* we have seen in the northern and eastern parts of the island, indicating that these species formed forests here earlier. This should be particularly true concerning *Q. macrolepis* numerous specimens of which occur between Rodhos town and Asgourou as well as in the vicinity of Lardos and Damatria.

#### d. *Phillyrea latifolia* forests

A remnant of such forest has been found in the central part of the Attaviros ridge at 1050 - 1150 m elevation. Trees of *Phillyrea latifolia* attain here a height of 6 - 8 m and usually have a crown that is only one sided, formed by winds. Also present are magnificent individuals of *Quercus coccifera* (Fig. 2) and one can suspect that earlier these two species have formed major forests here.

The *Phillyrea latifolia* wood represents a truly unique element in the vegetation of Rodhos, and in continental Greece such communities are not common. It would appear necessary to give it some special protection (such as a fence) and to place it under conservation as a nature reserve. Otherwise it is in danger of being destroyed. Almost the whole Attaviros region is one great pasture with very degraded vegetation.

#### MAQUIS

Typical maquis — thickets and low evergreen forests with coriaceous leaves remain on Rodhos only fragmentarily (eg. Profitis Ilias, Petaloudes). It is formed of evergreen species such as *Arbutus unedo* and *A. andrachne* (the latter is rare), *Ceratonia siliqua*, *Myrtus communis*, *Pistacia lentiscus*, *Quercus coccifera*, *Rhamnus alaternus*, *Phillyrea latifolia*, *Juniperus phoenicea*, *Smilax aspera* and *Erica manipuliflora* and of deciduous ones such as *Styrax officinalis*, *Calicotome villosa*, *Cistus incanus*, *C. salvifolius*, *Spartium junceum*, *Salvia fruticosa*, *Crataegus aronia*, *Prasium majus*, *Clematis cirrhosa* and *Lonicera etrusca*. Frequently *Pinus brutia* and *Cupressus sempervirens* represent within it a smaller or larger additional component.

However, on the island low maquis predominates, being impoverished and of the *Arbutus unedo*-*Erica manipuliflora*-*Calicotome villosa* type, with a major participation of species typical for the phrygana. It occupies regions at the feet of rocks and in local depressions on the northern slopes, usually within the range of occurrence of the phrygana or at the transition zone between phrygana and forest. Associated with it are juniper thickets on coastal dunes (discussed below).

#### PHRYGANA

For Rodhos this is a very characteristic plant formation with low, spiny, xeromorphic and thermophilous shrubs occupying about one half of the islands area (Fig. 3). These are primarily rocky regions located within forests and dry strongly eroded, denuded hill slopes as well as untended, abandoned agricultural lands. It represents a true mosaic of a dozen or so species of which the most common ones locally frequently dominating are *Cistus incanus*, *C. salvifolius*, *C. parviflorus*, *Genista acanthoclada* (Fig. 4) and *Lithodora hispidula*. Besides admixed with them to a greater or lesser extent are such species, as *Salvia fruti-*

*cosa*, *Anthyllis hermanniae*, *Erica manipuliflora* and *Calicotome villosa* as well as somewhat less commonly *Thymelaea tartonraira* and *Euphorbia acanthothamnus*.

Much poorer in terms of specific composition for this type of formation are the low thickets of *Sarcopoterium spinosum*-*Coridothymus capitatus*. They form either as a result of secondary succession on abandoned fields or as a result of considerable degradation of forest or thicket communities caused by goat grazing. Between these two extreme types of phrygana there is a whole series of intermediary forms differing from each other in specific composition and the luxuriance growth of various components.

#### CLIFFS

On Rhodos there is a small group of shrubs that occur exclusively on this type of sites. It includes species very rare for the island known from only single stands, such as *Dianthus fruticosus* (Fig. 5), *Linum arboreum* and *Scabiosa variifolia*. These three species similarly as a number of other representatives of the herbaceous flora are restricted in their occurrence only to the limestone cliffs and they are considered to be Pleistocene relicts (Runemark 1971). Besides in these specific conditions one can also most readily find such species as *Ephedra campylopoda*, *Euphorbia dendroides*, *Ptilostemon chamaepeuce*, *Pistacia terebinthus*, *Rhamnus oleoides* and to some extent also *Amygdalus graeca* (Fig. 6).

#### COASTAL DUNES

The coastal vegetation of Rodhos differs only slightly from that further inland. Almost everywhere, down to the sea-coast itself, one can find the phrygana and deformed pine forests. Only in the south of the island there remain fragments of specific juniper thickets extending along the coast, composed of *Juniperus phoenicea* and *J. oxyedrus* subsp. *macrocarpa* with a substantial participation of *Pistacia lentiscus*. In this type of communities there occurs on Rodhos the very rare species *Lycium schweinfurthii*.

#### BEDS OF DRY RIVERS

Stony beds of rivers that dry for the summer constitute a characteristic feature of the island's landscape. Sometimes beds of such rivers are very wide, particularly closer to the sea, at their mouths (eg. Kourkoutachi river near Appolakia, Makkaris river between Malona and Masari). A characteristic dendroflora develops there and it is of two kinds. The first includes strong shrubs which have settled in more fixed places (backwaters, deep stone beds) such as *Nerium oleander*, *Vitex agnus-castus*, *Pistacia lentiscus*, or species from the genus *Tamarix*. The second

type of plants are characteristically pioneers, occupying temporary stone beds, frequently destroyed by copious water flow in the winter. They include species occurring primarily in the phrygana, such as *Sarcopoterium spinosum*, *Coridothymus capitatus*, *Satureja thymbra*, *Thymbra spicata*, *Lavandula stoechas* and even *Anthyllis hermanniae* and also such species as *Ononis natrix*, *Putoria calabrica*, *Hypericum empetrifolium* and sometimes also *Ptilostemon chamaepeuce*.

#### OUR OWN INVESTIGATIONS

In the year 1983, from April 24th to May 24th, we have been conducting floristic observations on Rodhos island, however, we were concerned only with the woody flora. We have covered almost the whole of the island, penetrating the countryside from ten consecutive camp sites, both inland and along the coast, from the seashore to the peak of the tallest mountain, Attaviros. We were particularly interested in the southern part of the island, from where floristic data is rather scarce. The routes of our peregrinations have been shown on the enclosed map (Fig. 7). Our primary aim was to compile the full list of species of trees and shrubs occurring on the island, both wild and in cultivation, and on the other to determine their mode of occurrence and prepare point maps of their distribution.

It may seem that the first aim, the list of species for the island, would be easy to achieve. It appeared, however, that this was not so, and for several reasons.

a. In some instances it is difficult to decide whether we are dealing with the wild flora of Rodhos or with an introduced species that went wild. These doubts concerned such species as *Celtis australis* and *Medicago arborea* and for some species of the genus *Tamarix* (at least a part of the stands).

b. Species are also known which though mentioned for Rodhos in some publications (particularly older ones) and several times repeated by various authors, we were not able to find alive nor have we found any herbarium specimens of them anywhere, which could testify that these informations were true. Among these species one has to include *Clematis orientalis*, reported from Salakos. Its presence on Rhodos, however, is likely if one considers the whole range of the species. Other species in this category are *Paliurus spina-christi*, *Sorbus umbellata* and *Ulmus minor*.

Such "puzzles" can also be found in more recent publications. For example Schouten (1976) reports *Crataegus monogyna* subsp. *monogyna* from two localities — Epta Pigai and Elousa. It is not unlikely that a mistake took place here. That it was not *Crataegus monogyna* but *Crataegus aronia*, which hawthorn is known from several localities on



Rodhos. Also Strasser (1981) mentions *Berberis cretica* in one of the floristic lists prepared by him, from maquis near Lindos and Kalathos, at an elevation of 100 m. This species is a montane plant, usually occurring above 1000 m elevation. Also in this case there is not herbarium specimen to support the claim.

c. An opposite situation can also occur, namely that a herbarium specimen occurs, but on the attached label an exact localisation is lacking. This concerns *Atraphaxis billardieri* (Naturhistorisches Museum, Wien) and *Halimium umbellatum* (Davis, 1965 - 1982). We have not found these species anywhere on Rodhos.

d. There were considerable difficulties in differentiating between shrubs and shrublets or perennials with partially woody stems, particularly at their bases. In this case our opinion as to whether to classify the plant on our list or to exclude it was subjective though conditioned by numerous observations of specimens of various age. For example one can mention that we have excluded *Dittrichia viscosa* and *Origanum onites*, but we were not sure as regards *Ononis natrix* or *Achillea cretica*.

Thus basing on our own observations in the field and with the limitations referred to above, we have decided that the list of wild trees and shrubs on Rodhos includes 97 species, that is about 90% of the island's flora. Using our own herbarium collections and the field notes as well as herbarium collections in several major European Herbaria (ATH, BM, E, JE, K, LD, W) and literature quotations we have prepared 89 point maps of distribution of the various taxa. In this work we have not included a few species, namely *Atraphaxis billardieri*, *Halimium umbellatum* and *Clematis orientalis* for the reason mentioned above, *Olea europaea* in view of the difficulty in deciding the nature of individual stands (native or cultivated) and *Rubia tenuifolia*. In the latter case we suspect that our field observations may be erroneous due to inability to distinguish it from *Rubia peregrina*, which also grows on Rodhos. For three species of *Tamarix* we have prepared a common map, on which we have marked with dark spots all stands of these species and with differentiated signs for each species only for stands where we have ourselves collected flowering herbarium specimens. We have done this because the herbarium specimens of *Tamarix* devoid of flowers do not allow for indisputable identification, and literature quotation can therefore be erroneous (a difficult and critical genus).

In a similar manner we have prepared a map of distribution of the members of the genus *Capparis*, represented on Rodhos by two species, *Capparis ovata* and *C. spinosa*. The former on the basis of available data is more common and occurs primarily in the western part of the island while the latter (*C. spinosa*) has two definitely confirmed localities in the eastern part of the island.

Our investigations have led to the discovery of 3 new woody species for the flora of Rodhos, namely *Quercus aucheri*, *Rosa sempervirens* and *Tamarix tetrandra*, and several new stands of some rare species. We have also found a new almond hybrid, *Amygdalus* × *rhodia*, which originated as a result of natural hybridisation between the cultivated on the island *Amygdalus communis* and the wild *Amygdalus graeca* (Browicz in print). The herbarium collections accumulated during our stay on Rodhos comprising 214 herbarium sheets are being held in the Herbarium of the Institute of Dendrology of the Polish Academy of Sciences in Kórnik and their duplicates have been sent to the Goulandris Natural History Museum in Kifissia (Greece) and to the Royal Botanic Gardens, Kew (United Kingdom).

#### WILD TREES AND SHRUBS

Below is the list of trees and shrubs of the wild flora of Rodhos with a short characteristic of their occurrence, preceded by a key for the determination of the genera (separate for the *Gymnosperms* and for the *Angiosperms*) and within genera represented by two or more species also with a species key. We have tried to utilize in the keys primarily the vegetative traits to allow the use of the key in various parts of the season. Unfortunately this was not always possible and there was at times a need for the use of generative characters.

In the case of rare species or the more interesting ones, which have only a few localities on Rodhos we present a full list of these localities giving the source of our information. Our own herbarium collections are marked by the abbreviation B-D and the appropriate herbarium sheet number. The dimensions of trees and shrubs mentioned in the text concern the individuals growing on the island and do not always correspond to the maximal dimensions which the species can attain within its natural range.

#### KEYS TO GENERA

##### I. GYMNOSPERMAE

1. All leaves at the nodes, reduced to ca 2 mm long sheaths; twigs green with long internodes; equisetoid shrub . . . . . *Ephedra*
1. Leaves another form (not reduced); internodes short; not equisetoid trees or shrubs . . . . .

2. Fruit indehiscent, fleshy, berry-like, 1 - 2 cm in diameter . . . . . *Juniperus*  
 2. Fruit dehiscent woody cone, ellipsoide or ovoide 2.5 - 11 cm long . . . . . 3  
 3. Leaves acicular, in fascicles of two, up to 18 cm long . . . . . *Pinus*  
 3. Leaves scaly-like, opposite and decussate, ca 1 mm long . . . . . *Cupressus*

## II. ANGIOSPERMAE

1. Leaves (or cladodes) alternate or in clusters . . . . . 2  
 2. Leaves simple . . . . . 3  
 3. Stems with aërial rootlets. Evergreen climbing shrub . . . . . *Hedera*  
 3. Stems without rootlets . . . . . 4  
 4. Leaves pinnatifid or lobed . . . . . 5  
 5. Leaves pinnatifid, elongate and sessile. Dwarf shrub . . . . . *Achillea*  
 5. Leaves lobed, petiolate. Trees and tall shrubs . . . . . 6  
 6. Leaves palmately lobed . . . . . 7  
 7. Buds with a single closed scale concealed by petiole . . . . . *Platanus*  
 7. Buds not concealed; scale 5 - 6 . . . . . *Liquidambar*  
 6. Leaves pinnately lobed or with deeply dentate apex . . . . . 8  
 8. Leaves on sterile shoots with 3 - 7 forward pointing lobes, on fertile stems often with dentate apex. Small, more or less spiny tree . . . . . *Crataegus*  
 8. All leaves pinnately-lobed. Unarmed trees . . . . . *Quercus*  
 4. Leaves entire — integerrime, serrate or dentate . . . . . 9  
 9. Stems prickly or more or less spiny . . . . . 10  
 10. Stems with prickles; leaves evergreen, usually cordate at base . . . . . *Smilax*  
 10. Stems with spines; leaves never cordate . . . . . 11  
 11. Branches terminating in forked, subulate spines; plants with latex . . . . . *Euphorbia*  
 11. Spines another form; plants without latex . . . . . 12  
 12. Spines stipular, recurved, sometimes weakly developed . . . . . *Capparis*  
 12. Spines stout, straight, often leafy . . . . . 13  
 13. Fruit a drupe, with dry and splitting on one side pericarp . . . . . *Amygdalus*  
 13. Fruit fleshy or juicy, never splitting . . . . . 14  
 14. Fruit 1.5 - 3 cm in diameter; pedicels thick, as long as or slightly longer than fruit . . . . . *Pyrus*  
 14. Fruit 2 - 3 mm in diameter; pedicels thin, shorter than fruit . . . . . 15  
 15. Leaves petiolate; older shoots brown or almost black . . . . . *Rhamnus*  
 15. Leaves attenuate; older shoots light, almost white . . . . . *Lycium*  
 9. Unarmed plants . . . . . 16  
 16. Plants dichotomously branched, with latex . . . . . *Euphorbia*  
 16. Plants sympodialy branched, without latex . . . . . 17  
 17. Leaves with scattered, spreading tuberculate-bristles; corolla infudibuliform with very narrow c. 12 mm long tube . . . . . *Lithodora*  
 17. Leaves without bristles; corolla if infudibuliform then without long and narrow tube . . . . . 18  
 18. Leaves scaly, 1 - 5 mm long . . . . . 19  
 19. Leaves evergreen; flowers yellowish in small clusters . . . . . *Thymelaea*  
 19. Leaves deciduous; flowers white or pink in spike racems . . . . . *Tamarix*  
 18. Leaves another form . . . . . 20  
 20. Stems striate or angulate, green . . . . . 21  
 21. Leaves (cladodes) evergreen, ovate . . . . . *Ruscus*  
 21. Leaves deciduous, linear to lanceolate . . . . . 22  
 22. Stems terete, striate; flowers showy, papilionaceous; fruit a legume *Spartium*

22. Stems angulate; flowers small with 3-partite perianth; fruit a red drupe . . . . *Osyris*
20. Stems without grooves or angles . . . . . 23
23. Leaves assymetric at base . . . . . *Celtis*
23. Leaves symetric at base . . . . . 24
24. Leaves silvery sericeous at least beneath . . . . . 25
25. Leaves finely serrate . . . . . *Salix*
25. Leaves integerrime . . . . . 26
26. Flowers small, yellowish in clusters of 2 - 5; leaves evergreen . . . . . *Thymelaea*
26. Flowers big, pink, solitary; corolla broadly campanulate; leaves deciduous . . . . .  
 . . . . . *Convolvulus*
24. Leaves glabrous, if pubescent then not sericeous . . . . . 27
27. Leaves spatulate, often crowded in rosettes . . . . . *Linum*
27. Leaves another form; rosettes absent . . . . . 28
28. Leaves digitately veined, deeply cordate at base . . . . . *Cercis*
28. Leaves pinnately veined, usually cuneate or rounded at base, never deeply  
 cordate . . . . . 29
29. Leaves narrowly linear, up to 15 cm long and 4 mm broad . . . *Ptilostemon*
29. Leaves another form . . . . . 30
30. Plants with branched hairs (mainly bifurcate); fruit a siliqua . *Erysimum*
30. Plants glabrous, if pubescent then hairs simple; fruit another form . . 31
31. Stipules (ochreae) brownish, hyaline; fruit triquetrous nut . . . . . *Atraphaxis*
31. Hyaline stipules absent; fruit another form . . . . . 32
32. Leaves stellate-tomentose beneath . . . . . 33
33. Leaves evergreen; fruit a nut (acorn) . . . . . *Quercus*
33. Leaves deciduous; fruit a dry drupe . . . . . *Styrax*
32. Leaves glabrous or almost so, without stellate hairs . . . . . 34
34. Leaves sessile or attenuate; flowers blue, in capitula . . . . . *Globularia*
34. Leaves more, or less petiolate; flowers another colour, never in capitula . . . 35
35. Leaves aromatic; perianth 4-lobed . . . . . *Laurus*
35. Leaves without aromatic smell; perianth 6-lobed or flowers 5-merous . . . . 36
36. Fruit a nut (acorn) surrounded at base by cupshaped cupule; perianth  
 6-lobed . . . . . *Quercus*
36. Fruit a berry or drupe; flowers 5-merous . . . . . 37
37. Fruit a globose berry 1 - 2 cm in diameter; flowers with urceolate corolla,  
 greenish-white, in elongate panicles . . . . . *Arbutus*
37. Fruit a drupe ca 5 mm in diameter; flowers yellowish in condensed  
 panicles . . . . . *Rhamnus*
2. Leaves compound . . . . . 38
38. Leaves 3-5-foliolate (exceptionally part of leaves simple) . . . . . 39
39. Plants more or less prickly or spiny . . . . . 40
40. Stems angled, with prickles . . . . . *Rubus*
40. Stems not angled, more or less spiny . . . . . 41
41. Shrubs with stout lateral spines; all leaves 3-foliolate and petiolate . . . *Calicotome*
41. Shrubs with tortuose branches whose ends becoming spiny; leaves sessile;  
 part of leaves simple . . . . . *Anthyllis*
39. Plants unarmed . . . . . 42
42. Stems densely glandular-hairy . . . . . *Ononis*
42. Stems without glandular hairs . . . . . 43
43. Leaflets elliptical, 3 - 7 cm long, foetid; legume straight . . . . . *Anagyris*
43. Leaflets obovate, cuneate at base, not foetid; legume in spiral . . . *Medicago*
38. Leaves distinctly pinnate . . . . . 44
44. Leaflets integerrime . . . . . 45

45. Leaves evergreen . . . . . 46
46. Rhachis of leaves broadly winged; fruit a 1-seeded drupe . . . . . *Pistacia*
46. Rhachis not winged; fruit a linear-oblong, indehiscent, many seeded legume . . . . . *Ceratonia*
45. Leaves deciduous . . . . . 47
47. Leaflets ovate-oblong to oblong-lanceolate, 3 - 8 cm long . . . . . *Pistacia*
47. Leaflets broadly-obovate or almost orbicular up to 2(-3) cm in diameter . . . . . 48
48. Legume inflated, membranous, broad . . . . . *Colutea*
48. Legume very narrow, lomentaceous . . . . . *Coronilla*
44. Leaflets more or less serrate to toothed . . . . . 49
49. Unarmed plants . . . . . *Rhus*
49. Spiny or prickly plants . . . . . 50
50. Stems with prickles; leaves with 5 - 7 leaflets . . . . . *Rosa*
50. Small shrub with lateral branches forming leafless spines; leaflets 9 - 15 . . . . . *Sarcopoterium*
1. Leaves opposite or in whorls . . . . . 51
51. Leaves compound . . . . . 52
52. Leaves pinnate; woody climber . . . . . *Clematis*
52. Leaves digitate; upright shrub . . . . . *Vitex*
51. Leaves simple . . . . . 53
53. Leaves with twining petioles; woody climber . . . . . *Clematis*
53. If petioles present then not twining . . . . . 54
54. Leaves densely and silvery lepidote beneath . . . . . *Olea*
54. Leaves glabrous or pubescens but not lepidote . . . . . 55
55. Leaves acicular, channelled below; flowers urceolate . . . . . *Erica*
55. Leaves and flowers another form . . . . . 56
56. Leaves in whorls (3 - 8) . . . . . 57
57. Leaves linear-lanceolate up to 30 cm long with very numerous fine parallel veins . . . . . *Nerium*
57. Lateral veins not visible . . . . . 58
58. Leaves broadly-obovate or broadly-elliptic, 1 - 3 cm long . . . . . *Rubia*
58. Leaves more or less linear to 10 - 12 mm long . . . . . 59
59. Leaves rounded at the top; sepals and sometimes leaves with black glands . . . . . *Hypericum*
59. Leaves acute; plants without glands . . . . . *Asperula*
56. Leaves opposite . . . . . 60
60. Leaves glandular-punctate . . . . . 61
61. Leaves glabrous 2 - 7 cm long, ovate-lanceolate to broadly-ovate; flowers yellow or white . . . . . 62
62. Leaves coriaceous, evergreen, aromatic when crushed; flowers white . . . . . *Myrtus*
62. Leaves deciduous, often with goat-like smell when crushed; flowers yellow . . . . . *Hypericum*
61. Leaves scabrid, linear, 10 - 20 mm long; flowers mauve to purple . . . . . 63
63. Inflorescences (verticillasters) lateral, distant . . . . . *Satureja*
63. Inflorescences terminal . . . . . 64
64. Inflorescences capitate . . . . . *Coridothymus*
64. Inflorescences spicate, elongate . . . . . *Thymbra*
60. Leaves not glandular-punctate . . . . . 65
65. Lateral veins not visible . . . . . 66
66. Leaves more or less glabrous, foetid, blackening when dry . . . . . *Putoria*
66. Leaves more or less tomentose . . . . . 67
67. Inflorescences in crowded and broad, terminal spike; bracts differing distinctly from the leaves . . . . . *Lavandula*

67. Flowers singular in axils of upper leaves; bracts leaf-like . . . . . *Teucrium*
65. Lateral veins visible . . . . . 68
68. Twigs 4-angled . . . . . 69
69. Plants more or less glabrous . . . . . *Prasium*
69. Plants more or less tomentose . . . . . 70
70. Flowers yellow; verticillasters 14-30-flowered, crowded . . . . . *Phlomis*
70. Flowers mauve to white; verticillasters 2-6-flowered forming elongate spike . . . . . *Salvia*
68. Twigs terete . . . . . 71
71. Leaves grass-like connate at base forming short sheaths . . . . . *Dianthus*
71. Leaves free or only upper pairs of leaves completely connate . . . . . 72
72. Upper pairs of leaves connate, the next sessile or shortly petiolate; woody climber . . . . . *Lonicera*
72. All leaves free . . . . . 73
73. Leaves coriaceous, evergreen, glabrous . . . . . 74
74. Leaves linear-lanceolate up to 30 cm long with very numerous fine parallel veins, integerrime . . . . . *Nerium*
74. Leaves very variable in form, 4 (-7) cm long, dentate, serrate or integerrime; lateral veins only 7 - 11 pairs . . . . . *Phillyrea*
73. Leaves deciduous, more or less tomentose or sericeous, at least beneath or when young . . . . . 75
75. Leaves attenuate, borne in rosettes . . . . . *Scabiosa*
75. Leaves another form, more or less petiolate or subsessile, borne along stems . . . . . 76
76. Capsule with 5 valves; leaves with prominent net of veins beneath . . . . . *Cistus*
76. Capsule with 3 valves; leaves without net of veins . . . . . 77
77. Leaves up to 8 mm broad, not crowded . . . . . *Helianthemum*
77. Leaves up to 2 mm broad, crowded at the end of branches . . . . . *Halimium*

## GYMNOSPERMAE

### PINACEAE

#### *Pinus* L.

##### 1. *Pinus brutia* Ten.

Tree to 20 - 25 m high, very common and frequently planted. It forms pure forests at lower locations or mixed with *Cupressus sempervirens* in the mountain regions, to about 900 m. This pine has been found also in phrygana and maquis, singly or in groups (Fig. 8).

### CUPRESSACEAE

#### *Cupressus* L.

##### 2. *Cupressus sempervirens* L. f. *horizontalis* (Miller) Voss

Magnificent tree up to 25 - 30 m high, the trunk 3 - 4 m in girth, with broad crown (f. *sempervirens* with narrow conical crown is only culti-

vated). It is distributed throughout the whole island growing from about sea level up to 900 m altitude, eg. at the top of the Profitis Ilias Mts. and on the slopes of the Attaviros Mts. The most favourable conditions it finds at elevations of about 500 - 800 m and then it forms pure forests; in lower places this cypress grows together with *Pinus brutia* or solitary in maquis communities (Fig. 1 and 9).

#### *Juniperus* L.

1. Leaves acicular and jointed at the base; cones 10 - 20 mm in diameter ..... *J. oxycedrus*  
 1. Leaves scale-like, or if acicular then not jointed; cones ca 10 mm in diameter ..... *J. phoenicea*

#### 3. *Juniperus oxycedrus* L. subsp. *macrocarpa* (Sibth. et Sm.) Ball Syn.: *Juniperus macrocarpa* Sibth. et Sm.

A shrub or small tree of 5 - 6 m high, with a low-set head crown and usually twisted trunk. Littoral species. It occurs primarily on the seashores to 50 - 100 m, exceptionally up to 300 m altitude. This shrub grows on dunes, stony slopes and maritime cliffs around the whole island, the most rare in its north-eastern part. Sometimes it forms small woods, as for example near Prassonissi (Fig. 10 and 98b).

#### 4. *Juniperus phoenicea* L.

Shrub or sometimes small tree to 4 m high. This species is not to frequent and occurs first of all in southern part of the island and along seashores. Its the highest stands was found on the slopes of the Akramitis Mts. near Monolithos at about 600 - 650 m. This juniper grows primarily on dunes and maritime rocks, singly or in small groups and only exceptionally forming its own thickets, eg. near Monolithos and Prassonissi. Sometimes it can be found in the open *Pinus-Cupressus* forests (Fig. 11 and 98c).

### EPHEDRACEAE

#### *Ephedra* L.

#### 5. *Ephedra campylopoda* C. Meyer Syn.: *E. fragilis* Poir. subsp. *campylopoda* (C. Meyer) Aschers. et Graebn.

Pendent or climbing shrub with flexible, more or less fragile, green twigs, 2 - 3 m long. Very rare species occurring primarily on the calcareous cliffs, sometimes in maquis and in open *Pinus brutia* forests, between 300 and 700 m altitude (Fig. 12).

Localities: Sianna (Rechinger 1943); NW cliffs of the Akramitis Mts. near Monolithos, 600 - 650 m (B-D in observ.); Near road Embona-Agios Isidoros, only 1

specimen on *Arbutus unedo* in pine forest, 600-700 m (B-D in observ.); Calcareous cliffs of Messovouna Mt., between Archipolis and Archangelos, ca 300 m, 1 specimen (B-D in observ.); Calcareous cliffs of Profitis Ilias Mt. near Archangelos, 1 specimen (B-D 168).

## ANGIOSPERMAE

## SALICACEAE

*Salix* L.6. *Salix alba* L.

Tree about 10 m high, sometimes only a shrub. This is rather rare species scattered along streams and rivers chiefly on lowland and in lower parts of the mountains, to about 300 m altitude. It grows usually together with *Platanus orientalis*, *Liquidambar orientalis*, *Nerium oleander*, *Myrtus communis* and *Hypericum hircinum* (Fig. 13).

Notice: Finkl (1961-1962) mentions from Rodhos the second species, *Salix australior* Anderson — "Am Bachrand in der Schlucht hinter dem Schulgebäude im Calitea (Kalythies). Einzelenes Exemplar", but it must be confirmation.

## FAGACEAE

*Quercus* L.

- |  |                      |
|--|----------------------|
| 1. Leaves pinnately-lobed .....  | 2                    |
| 2. Lobes aristate; petioles 15-40 mm long; cupule with linearoblong, thick and flat, usually patent scales .....       | <i>Q. macrolepis</i> |
| 2. Lobes not aristate; petioles shorter, ca 10 mm; cupule with adpressed, never patent scales .....                    | <i>Q. pubescens</i>  |
| 1. Leaves not lobed .....  | 3                    |
| 3. Leaves glabrous at maturity .....   | 4                    |
| 4. Leaves 1.5-4(5) cm long, broadly ovate to oblong-lanceolate, sharply serrate-spiny, evergreen; petiole 1-5 mm ..... | <i>Q. coccifera</i>  |
| 4. Leaves 4-7 cm long, oblong to broadly obovate, semi-evergreen; petiole 1-2 cm long .....                            | <i>Q. infectoria</i> |
| 3. Mature leaves tomentose at least beneath .....  | 5                    |
| 5. Leaves oblong-elliptic to ovate-lanceolate, up to 7 cm long; veins 7-11 pairs .....                                 | <i>Q. ilex</i>       |
| 5. Leaves ovate to broadly oblong 1-3(4) cm long, rounded at apex or subapiculate; veins 5-9 pairs .....               | <i>Q. aucheri</i>    |

7. *Quercus ilex* L.

Evergreen tree. Very rare, mentioned only from three stands (Fig. 14)  
Localities: Kalkhang südlich von Archangelo (Hansen and Snogerup 1966); Rodini-valley and Petaloudes (Schouten 1976).



### 8. *Quercus aucheri* Jaub. et Spach

Evergreen, small tree ca 5-6 m tall. New species for the flora of Rodhos. It occurs only in the eastern part of the island, on the bare calcareous, rocky and stony slopes, usually scattered and singly, almost from sea level to 300 m altitude (Fig. 15 and 99b).

Localities: Messovouna Mt. between Archipolis and Archangelos, ca 300 m, single tree (B-D in observ.); 2-3 km NW of Malona, slopes of dried river valley, rare (B-D 147); single trees on the slopes of the mountain W of Lardos (B-D 127, 128 and 129); single trees by the road between Pefka and Lardos (B-D 137); at the base of the rocks near Pefka (B-D in observ.); Cape Mirtias E of Pefka, quite a frequent (B-D observ.).

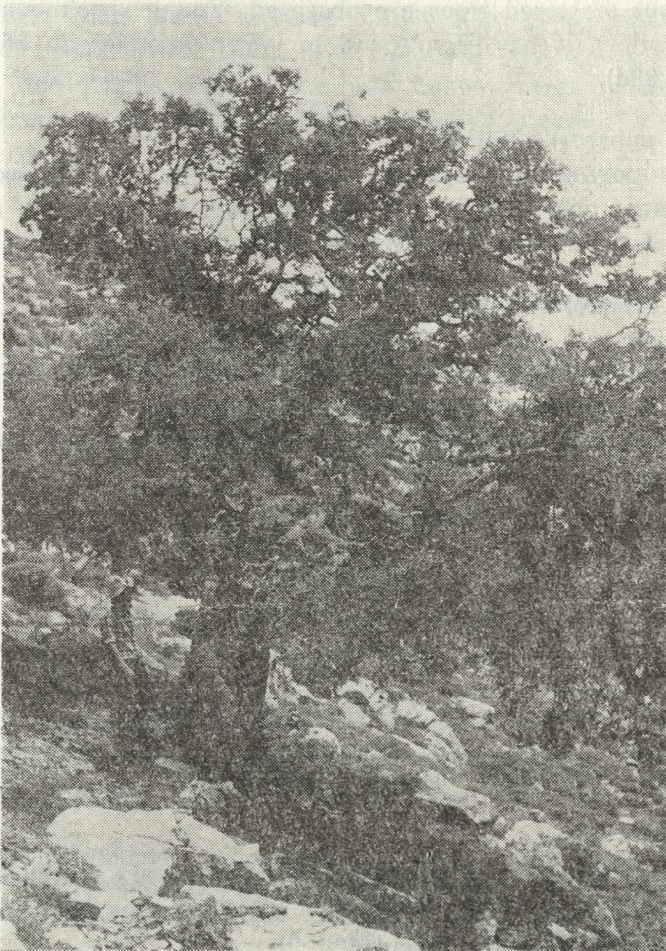


Fig. 2 *Quercus coccifera* — old tree on the southern slope of the Attaviros Mt. above Agios Isidoros, ca 950 m (Phot. A. Boratyński)

9. *Quercus coccifera* L.

Evergreen shrub or small tree, in extreme conditions growing up to 15 m high (New Monastery of Tsambica). Very common but not so gregarious as in continental Greece. It is important constituent of maquis and phrygana, especially on calcareous, sunny slopes. As understory it is also found in light pine forests. Altitudinally it grows right from sea level to 1100 - 1200 m (Fig. 2, 16 and 99a).

10. *Quercus macrolepis* Kotschy

Tree to 10 - 12 m tall with broad and compact crown. Its fruits very characteristic in size of cupules (2 - 4 cm in diameter) and forms of scales, are mature in the second year. *Q. macrolepis* occurs chiefly in the north-western part of the island where south of the town Rodhos lot of old, but scattered trees are observed. Young specimens are rare (eg. near Lardos). It has been found in lower altitudes, to 350 - 400 m (Fig. 17 and 99d).

11. *Quercus pubescens* Willd.

A highly polymorphic species, tree 10 - 12 m tall, represented by a few specimens only in the north-western part of the island, especially at the base of the Profitis Ilias Mts. near Salakos, up to 700 m (Fig. 18).

12. *Quercus infectoria* Olivier

Erect shrub or a low tree to 4 m high, very rare, growing in scrub on a few stands in the northern part of the island. On Rodhos only the forms with glabrous leaves have been observed (Fig. 19).

Localities: Koskino and Asguru (Rehinger 1943); Petaloudes, Rodini-valley and Filerimos (Schouten 1976); At the base of the Profitis Ilias Mts. near Salakos (B-D 16).

## ULMACEAE

*Celtis* L.

1. Leaves ovate-lanceolate, usually long acuminate, velutinous beneath ..... *C. australis*  
 1. Leaves broadly ovate, acute, minutely pubescent beneath ..... *C. tournefortii*

13. *Celtis australis* L.

Tree 10 - 12 m high with a broad crown. Very rare in the wild state and in some places probably naturalized. It is occurring sporadically and singly near settlements and roads (Fig. 20).

Localities: 1 - 2 km N of Asgourou (B-D in observ.); ca 1 km NW of Malona at the edge of Citrus plantation (B-D 159); Between Dimilia and Eleousa (B-D 208).

14. *Celtis tournefortii* Lam.

A shrub or small tree. Very rare and threatened. It was found only twice in form of very destroyed, low shrubs on the bare rocks, between 400 and 1000 m altitude (Fig. 21).

Localities: Mt. Attaviros, 800-1000 m (Rechinger 1943); Mt. Profitis Ilias near Archangelos, on S slopes, 400-500 m, only 1 grazed specimen (B-D 169).

## SANTALACEAE

*Osyris* L.15. *Osyris alba* L.

Broom-like, erect shrub up to 1-1,5 m tall. It is scattered on the whole island up to 800 m altitude. This species grows primarily on the calcareous rocks in phrygana and disturbed maquis, but also at the edges of pine forests, and on the balks among areas under cultivation. In these communities it is frequently a common element but represented only as a single specimens (Fig. 22).

## POLYGONACEAE

*Atraphaxis* L.16. *Atraphaxis billardieri* Jaub. et Spach

A small intricately branched shrub with thin tortuose twigs. The presence of this species on the island is rather enigmatic. It was collected here, but on the herbarium label the location of the stand is omitted.

## CARYOPHYLLACEAE

*Dianthus* L.17. *Dianthus fruticosus* L. subsp. *rhodius* (Rech. f.) Runem.

Intricately branched, hemispherical shrub to 1-1,5 m tall. It is an obligate chasmophyte occurring on the calcareous, vertical, mainly maritime walls of the cliffs, between 50 and 400 m altitude. As yet it has been mentioned from three stands only (in detail see Runemark 1980). We found it on new fourth locality, on the Cape Mirtias S of Lindos (Fig. 5 and 23).

Localities: Monolithos (Rechinger 1935, 7390 LD); ibidem (Runemark and Bentzer 29321 LD); Mt. Ag. Elias at Archangelo, 400 m (Rechinger 1935, 8403 E, K); S of Archangelos, 200-400 m (Snogerup and Kjellquist 1964, 22075 LD); 1,5 km S of Kalatos, Mt. Marmara, 300 m (Snogerup 22129 LD); Profitis Ilias near Archangelos, on vertical, N-exposed cliff walls, 350-400 m, numerous specimens (B-D 170); E-exposed, shady cliffs on Cape Mirtias, 150 m (B-D 143).

## RANUNCULACEAE

*Clematis* L.

1. Leaves simple; flowers creamy-white, subtended by 2 large, connate bracteoles ..... *C. cirrhosa*  
 1. Leaves pinnate; flowers yellowish; bracteoles absent ..... *C. orientalis*

18. *Clematis orientalis* L.

Woody climbers with pinnate leaves. Mentioned from Rodhos only once, but this information is rather doubtful. The nearest locality on Kos island was also never rediscovered.

Locality: Mont Profeta bei Salakos (Mazzari, after Reching er 1943).

19. *Clematis cirrhosa* L.

Woody climber with stem up to 4 m long, simple leaves and large creamy-white flowers. This species is not common, but more frequently it occurs in the mountain regions of the Profitis Ilias, Attaviros and Akramitis Mts., usually between 150 and 800 m altitude; the most elevated stands are near Salakos and Embona, at 900 m. This species grows first of all on the calcareous rocks in maquis or in the *Pinus-Cupressus* forests (Fig. 24).

## LAURACEAE

*Laurus* L.20. *Laurus nobilis* L.

An evergreen, aromatic shrub or small tree to 10 m in height. This species occurs very rare only in north-western part of the island, chiefly in shady woods along streams. The largest number and the greatest specimens of laurel have been found in the valley of Petaloudes (Fig. 25). Localities: Rodini Valley (Schouten 1976); Petaloudes (Snogerup and Kjellquist, 22084 LD; Schouten 1976; B-D 183 and 184); N slopes of the Profitis Ilias Mts. near Salakos, about 300 m (B-D in observ.).

## CAPPARIDACEAE

*Capparis* L.

1. Leaves round or round-ovate, usually not mucronate, glabrous ..... *C. spinosa*  
 1. Leaves elliptic or obovate-elliptic, usually distinctly mucronate, often more or less pubescent ..... *C. ovata*

21. *Capparis spinosa* L.

Straggling shrub with simple, entire and fleshy leaves, usually with stipular spines. The distribution of this species similarly as the distribution of *Capparis ovata* is not quite clear, so more that these two taxa are often insufficiently recognize and intermediates occur between them.

Probably it is more frequent than we have known, but only two stands are sure (Fig. 26 and 110b).

Localities: near Malona (B-D in observ.); Haraki, maritime rocks (B-D 158).

## 22. *Capparis ovata* Desf.

Similar to the previous species, probably more common in the northern and western part of the island, usually on the lower located places up to 200 m. It grows singly or in small groups in phrygana communities and at the edges of open pine forests, often on waste grounds near cultivation (Fig. 26, as *Capparis* sp.).

### CRUCIFERAE

#### *Erysimum* L.

## 23. *Erysimum rhodium* Snog.

Erect shrub 30 - 80 cm tall with lanceolate leaves 3 - 12 cm long, and yellow flowers in simple racems. It is restricted to the middle part of the island and occurs on the limestone vertical rocks between 100 and 600 m altitude (Fig. 27). Except Rodhos it was found only on the small islet Trambeto, south of the Symi Isl. (in details see Snogerup 1967).

### HAMAMELIDACEAE

#### *Liquidambar* L.

## 24. *Liquidambar orientalis* Miller

Tree to about 20 tall. On Rodhos it is represented by two varieties — var. *orientalis* having leaves with lobes more or less sparsely lobulate, and var. *integriloba* Fiori, with undivided lobes. This rare species is limited to the small segments of banks of streams and rivers that do not dry in the summer, up to 350 m altitude (Fig. 28 and 100c). Sometimes it forms a fragments of specific woods, pure or with other trees such as *Platanus orientalis* and *Salix alba*. The greatest number of its specimens is concentrated in the Valley of Petaloudes, where a special natural reservace has been established (in details see Boratyńska and Boratyński 1985).

Localities: Peveragno (Rechinger 1943), Petaloudes (B-D in observ.); Boratyńska and Boratyński l.c.); Salakos (Davis 40317 E); by the stream in Salakos (B-D 15; Boratyńska and Boratyński l.c.); by the stream about 1,5 - 2 km NW of Salakos (B-D in observ.; Boratyńska and Boratyński l.c.); along the stream between Archangelos and Malona (B-D 164; Boratyńska and Boratyński l.c.); zwischen Alaerma und Apollona am Flusse Gaduras (Fiori 131, after Rechinger 1943); on the banks of the Gadouras river about 4 - 5 km N of Laerma along the road to Apollona (B-D 199 and 200; Boratyńska and Boratyński l.c.); Convento d'Iskiati, 350 m (Fiori 130, after Rechinger 1943).

## PLATANACEAE

*Platanus* L.25. *Platanus orientalis* L.

Tree to 20(30) m tall with a wide, dense crown. This species occurs primarily along streams and rivers from almost sea level to an altitude of 400 m. Generally it grows single or in small conglomerations, however, occasionally it forms also a small fragments of carr forests (Fig. 29).

## ROSACEAE

*Rubus* L.26. *Rubus ulmifolius* Schott.

The only species of the genus *Rubus* represented on the island. It is very polymorphic prickly shrub with arching or procumbent stems, glabrous to tomentose. It grows chiefly in the northern and central parts of Rodhos, usually in lower regions up to 200 - 300 m altitude, however, it was found also higher, eg. 700 - 800 m on the north-western slopes of the Attaviros Mts. above Embona in the forest of *Cupressus sempervirens*. It can be met in open scrub on rocky slopes and banks of rivers, often in waste places near settlements (Fig. 30).

*Rosa* L.

1. Leaves evergreen, glabrous on both surfaces, shining ..... *R. sempervirens*  
 1. Leaves deciduous, more or less pubescent, dull green above ..... *R. phoenicis*

27. *Rosa sempervirens* L.

Evergreen climber with stems 5 - 10 m long and 3 - 10-flowered loose corymbs. It is a new species for the flora of Rodhos; we found it only in one place (Fig. 31).

Localities: Near the road-ramification Salakos-Kalavarda-Dimilia, on cypress up to 4 - 5 m height (B-D 23).

28. *Rosa phoenicia* Boiss.

Tall shrub with climbing stems and 10 - 20-flowered corymbs. It grows in scrub and on edges of the forest on more or less moist places. The species is very rare and was discovered on Rodhos only in two places (Fig. 32).

Localities: Wegrund bei Monolithos (Hansen and Snogerup 1966); about 2 - 3 km NW of Salakos along the road to Kalavarda, thicket on the road-side (B-D 18).

*Sarcopoterium* Spach29. *Sarcopoterium spinosum* (L.) Spach

This very spiny and intricately branched, mound-forming shrub usually no taller than 50 - 60 cm, belongs to the most distributed and

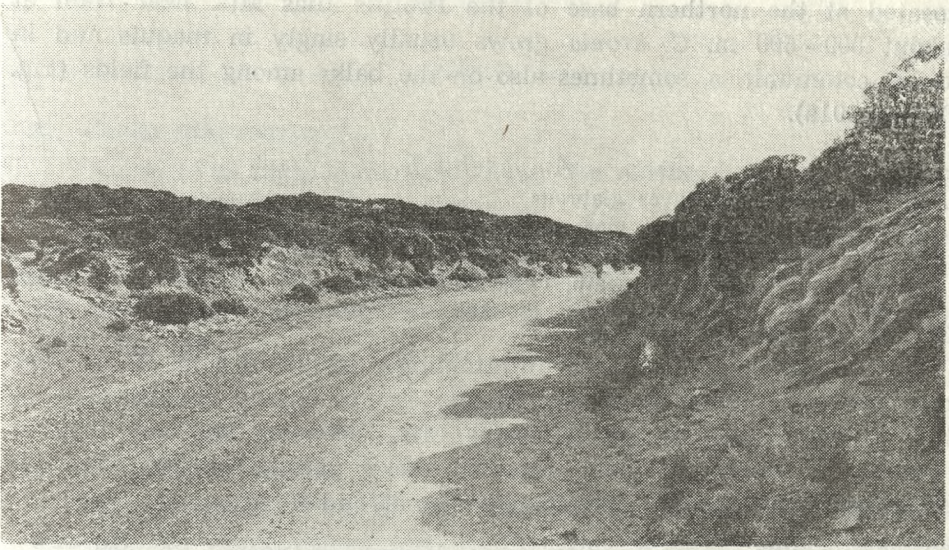


Fig. 3. The phrygana communities along the road between Mesanagros and Kattavia (Phot. A. Boratyński)

very common members of woody flora of Rodhos. It is ubiquitous which usually occurs gregariously or even in masse on waste and overgrazed regions, often ruderal in nature, from the sea level almost to the highest top of the Attaviros Mts., to 1200 m altitude. It appears also in the understorey of open pine forests in the southern and central parts of the island (Fig. 33 and 101b).

#### *Pyrus* L.

##### 30. *Pyrus spinosa* Forsskal

Spiny tree to 5-6 m tall, often a shrub. This is very frequently distributed species almost on the whole island, except the seashores. In tree form it does not exceed in the mountains 800 m altitude, but as a bush it reaches even 1100-1200 m. It is characteristic component of xerothermic thickets linking maquis and pine forests, usually occurs single or in small groups. It is also met in phrygana and on the balks in the agricultural areas, as well as near roads. The natives of Rodhos are using sometimes this tree as a stock for grafting on to it the cultivated forms of *Pyrus communis* (Fig. 34 and 101e).

#### *Crataegus* L.

##### 31. *Crataegus aronia* (L.) Bosc. ex DC.

Small, more or less spiny tree (especially when young) up to 5-6 m high, often growing as a strong, erect shrub. It is rare species occurring in the north-western part of the island. The most elevated stands are

located at the northern base of the Profitis Ilias Mts. near Nani at about 500 - 600 m. *C. aronia* grows usually singly in maquis and in forest communities, sometimes also on the balks among the fields (Fig. 35 and 101a).

### *Amygdalus* L.

- |  |                    |
|--|--------------------|
| 1. Young shoots and leaves glabrous .....                    | <i>A. webb</i>     |
| 1. Young shoots and leaves more or less tomentose .....      | 2                  |
| 2. Leaves densely white-tomentose beneath, 1-2 cm long ..... | <i>A. graeca</i>   |
| 2. Leaves grey pubescent beneath, 1-3,5 cm long .....        | <i>A. × rhodia</i> |

#### 32. *Amygdalus webbii* Spach

Much-branched, spinose shrub attaining a height of 2 m. It is rather rare species, growing singly on the few stands, chiefly concentrated on the eastern slopes of the Attaviros Mts., between 200 and 1000 m altitude. It occurs in open, insolated rocky places, but sometimes it enters also into the light pine forests (Fig. 36 and 101d).

#### 33. *Amygdalus graeca* Lindley, syn.: *A. discolor* (Spach) Roemer

A dense, spinose, shrub usually 2 m tall, occasionally also small tree to 4-4,5 m height. This species is occurring only on small region of the vicinity of Lindos and Lardos, in the south-eastern part of the island (Fig. 37 and 101c). It forms loose thickets or grows solitary on the sunny, rocky slopes of the calcareous hills, up to 250 - 300 m altitude, in phrygana communities (in detail see Boratyńska and Dolatowski in print).

Localities: Zwischen Lindos und Jennadi, Kalkfelsen (Fiori 215, after Re-chinger 1943); M. Marmara bei Lindos, 300 m (Rechinger 1935, 8457 W); roadside between Massari and Kalathos, only 1 specimen (B-D 198; Boratyńska and Dolatowski in print); E slopes of Mt. Marmari between Lardos and Pilon (B-D 142; Boratyńska and Dolatowski l.c.); SE rocky slopes of Mt. Orbi S. of Lardos, commonly to about 230-250 m altitude (B-D 121 and 122; Boratyńska and Dolatowski l.c.); S slopes Mt. Marmari between Lardos and Pefka (B-D 136; Boratyńska and Dolatowski l.c.); SE slopes of Mt. Marmari near Pefka (B-D 141; Boratyńska and Dolatowski l.c.); rocky rise on Mitrias peninsula E of Pefka (B-D in observ.; Boratyńska and Dolatowski l.c.).

#### 34. *Amygdalus × rhodia* Browicz

A spontaneous hybrid between cultivated *Amygdalus communis* and *A. graeca*, new for flora of Rodhos. We found it in abandoned orchards and near road leading from Lardos to Lindos (Fig. 38). It is a small, subspinescent tree 3-4 m tall characterized by distinctly intermediate features between parental forms. It has low, branching stem and a dense somewhat pendulous, cupular crown. This hybrid is represented here by two notomorphes — nm. *rhodia* more similar to *A. graeca* and nm. *elongata* Browicz allied to *A. communis* (in detail see Browicz in print).



## LEGUMINOSAE

*Cercis* L.35. *Cercis siliquastrum* L.

Tree to 10 m high, known only from the northern part of the island where it grows singly on 7 stands only. First of all it occurs in the stream valley in linking communities between forest of *Platanus orientalis* and maquis. The most elevated locality has been found at about 200 m altitude at the northern base of the Profitis Ilias Mts. near Salakos (Fig. 39).

*Ceratonia* L.36. *Ceratonia siliqua* L.

This evergreen, 4-8 m tall tree is quite frequently distributed through the whole island, but usually it is scattered and represented by single specimens. It occurs chiefly at low elevations, on the slopes of hills, primarily up to 300 - 400 m. The most elevated stands are known from the Attaviros Mts., on 700 - 800 m altitude. *C. siliqua* grows on dry and insolated localities in phrygana, maquis and in open pine forests. Specimens observed near settlements and at the edges of orchards are probably of cultivation origin (Fig. 40 and 102b).

*Anagyris* L.37. *Anagyris foetida* L.

An erect shrub 1 - 3 m tall with a characteristically unpleasant odour (especially the leaves when crushed). This species is rather frequent but scattered, and abundantly it occurs only on the northern slopes of the Profitis Ilias Mts. near Salakos where, similarly as in Attaviros Mts., it reaches about 700 - 800 m elevation; usually between 150 and 500 m. *A. foetida* first of all grows on the calcareous rocks in maquis and in forests, sometimes also in devastated land (Fig. 41 and 102a).

*Calicotome* Link38. *Calicotome villosa* (Poiret) Link

Very spiny, divaricately branched shrub up to 3 m tall. It occurs commonly almost from seashores to 800 m altitude. This species grows on dry and insolated places as characteristic component of maquis, phrygana and sparse pine forests. Here and there it forms impenetrable thickets and plays an important role as pioneer plants in destroyed communities (Fig. 42 and 103e).

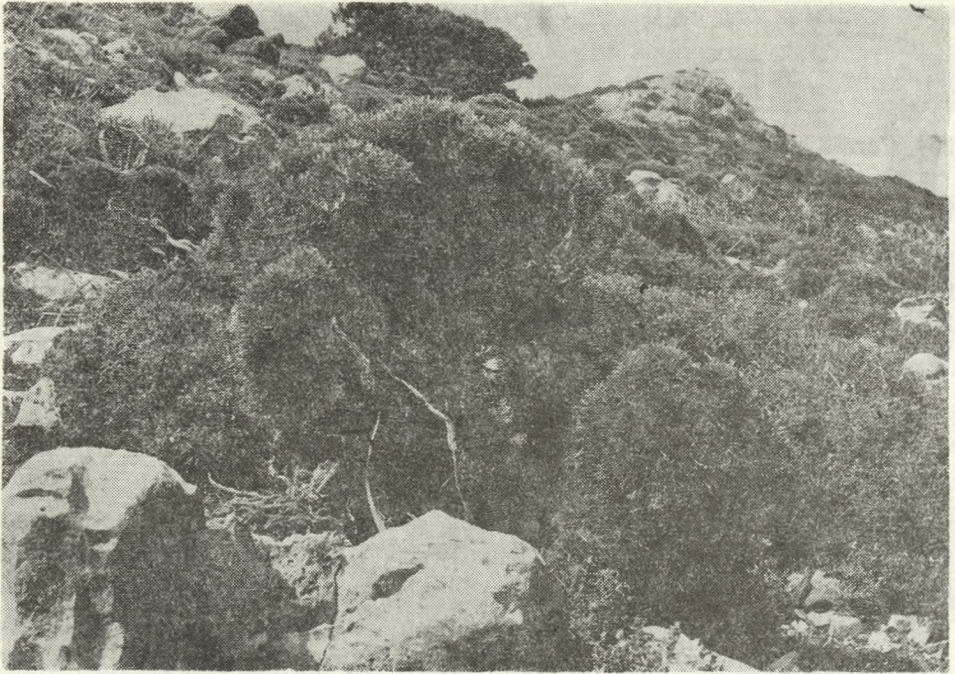


Fig. 4. *Genista acanthoclada* — semispherical shrub in phrygana on Cape Monolithos (Phot. A. Boratyński)

#### *Genista* L.

##### 39. *Genista acanthoclada* DC.

Very spiny, compact, hemispherical shrub 50 - 100 cm tall. One of the most common members of the woody flora of Rodhos, permanent component of phrygana and low, sparse maquis, penetrating also into pine forests. It occurs on sunny, dry and rocky (particularly limestone) slopes of mountains and hills, almost from the seashores to 800 m. It grows together with such shrubs as *Lithodora hispidula*, *Coridothymus capitatus*, *Sarcopoterium spinosum*, *Salvia fruticosa* and *Cistus* sp. (Fig. 4, 43 and 103d).

#### *Spartium* L.

##### 40. *Spartium junceum* L.

Erect and widely spreading shrub up to 3 m tall with green, striate, rod-like shoots. It occurs in the northern and central parts of the island and in vertical distribution it not exceed 800 m. *S. junceum* is a characteristic component of maquis but is also represented in sparse *Pinus-Cupressus* forests or in phrygana (Fig. 44 and 103a).

*Colutea* L.41. *Colutea insularis* Browicz

This is a species endemic for Rodhos, allied to the European *C. arborescens*, but more common than it was supposed in the past. It is an erect shrub ca 2 - 2,5 m tall with more or less arching twigs and yellow large flowers 20 - 25 mm long. Its distribution is irregular, chiefly limited to the northern and southern parts of the island. It grows on the gravelly or sandy steep slopes in the very sparse and light pine forests or loose thickets, up to 300 - 350 altitude (Fig. 45 and 102c).

*Ononis* L.42. *Ononis natrix* L.

Small, very viscid shrub 30 - 100 cm tall with numerous stems and yellow flowers. It is dispersed on the whole island but probably not in the central part. It grows in lower places, up to 350 - 400 m altitude in different plant communities — in low maquis and phrygana, on maritime sands and on stony slopes as well as in the beds of dry rivers (Fig. 46 and 103c).

*Medicago* L.43. *Medicago arborea* L.

Shrub 1 - 2 m tall with orange-yellow flowers and very characteristic fruits (legumes) in a flat open spiral 1 - 1,5 cm in diameter. Very rare species known only from 4 stands, where it is represented by a few specimens. It grows on open limestone hills and rocks, sometimes also in sparse pine forests, probably not higher than 200 - 300 m (Fig. 47 and 102 d).

Localities: Hills nr. Rodhos (Bourgeau 39; Davis 1965-1982); Near Paradisi (Schouten 1976); Kamiros Skala in the pine forests (B-D in observ.); Near Agios Isidoros, by the road to Embona (B-D 61).

*Anthyllis* L.44. *Anthyllis hermanniae* L.

Erect, small shrub 50 - 80 cm tall with tortuose branches, the tips of which are somewhat spiny. The species is distributed through the whole island but more frequent in the southern part. It occurs on the mountain and hill slopes almost from the seashores to about 400 - 500 m altitude, but higher up it has been found on the Attaviros Mts. at about 600 - 700 m. *A. hermanniae* enters chiefly the phrygana communities and open pine forests and also as a pioneer species it grows on the gravel heaps in the dried rivers beds and on the road escarpments (Fig. 48 and 103b).

*Coronilla* L.45. *Coronilla emerus* L. subsp. *emeroides* (Boiss. et Spruner) Hayek

Erect shrub 1 - 2 m tall with slender shoots and very narrow (2 mm) segmented legumes, 5 - 11 cm long. Its area on Rodhos is limited to the northern part of the island where it was observed on tenth localities only; the most elevated ones are at about 200 m altitude. It usually occurs singly, both in insolated places as in shade, frequently near streams in various types of thickets, chiefly in maquis (Fig. 49).

## LINACEAE

*Linum* L.46. *Linum arboreum* L.

An erect, loosy branched shrub to 1 m tall with yellow flowers and spatulate leaves often crowded in rosettes. It is extremely rare species growing only in the Profitis Ilias and Akramitis Mts., in cervices of the inaccessible calcareous steep cliffs between 500 and 700 m a.s.l. On each locality this shrub is known only to exist as a single, scattered individuals (Fig. 50 and 104d).

Localities: M. Profeta, 500 m (Rechinger 1943); Montes Akramiti. In fissuris rupium calc. ad Hag. Joannis ca 700 m (Rechinger 1935, 7453 W); NW steep slopes of the Akramitis Mts. near Monolithos, ca 600 m alt. (B-D 52 and 58).

## EUPHORBIACEAE

*Euphorbia* L.47. *Euphorbia dendroides* L.

Lactiferous shrub 1 - 2 m tall sometimes appearing as a small tree, with semiglobose crown, completely leafless in the summer. It has been observed on Rodhos only in the Akramitis Mts., where it grows on the steep calcareous rocks between 400 and 650 m altitude (Fig. 51 and 104a).

Localities: Sianna, 400 m (Davis 1965, 40367 K); Akramitis Mts.: NW slopes near Monolithos, 600 - 650 m, often (B-D 51 and 53).

48. *Euphorbia acanthothamnos* Heldr. et Sart.

Lactiferous, intricately branched and very spiny shrub 20 - 50 cm tall with cushion-like habit. This shrub is widely distributed almost on the whole island, especially in the rocky mountain regions, locally common as in the Attaviros Mts., where it grows up to the top, 1100 - 1200 m. It is characteristic component of phrygana communities developed on the stony or rocky places, but quite often it is found in the open pine and cypress forests, on dry and insolated calcareous ground (Fig. 52 and 104c).

## ANACARDIACEAE

*Rhus* L.49. *Rhus coriaria* L.

An erect, suckering shrub with stiff, poorly branched stems. It is mentioned from the one place in the northern part of the island (Fig. 53). Localities: Rodini Valley (Schouten 1976).

*Pistacia* L.

1. Leaves evergreen with broadly winged rhachis ..... *P. lentiscus*  
 1. Leaves deciduous; rhachis not winged ..... *P. terebinthus*

50. *Pistacia terebinthus* L.

An erect and broadly ramified shrub, composed of several stems, 2-3 m tall, sometimes a small tree. It occurs in the northern and central parts of the island, where it is rather rare, scattered and represented by single specimens. The most typical for it are hilly regions and feet of the mountains, between 100 and 500 m; the most elevated stands were noted on the Attaviros Mts., at 800 m. *P. terebinthus* occurs in insolated places on calcareous rocks and on rock rubble, in loose maquis or in sparse pine and cypress forests (Fig. 54 and 106b).

51. *Pistacia lentiscus* L.

An evergreen, much branched shrub 1-3 m tall. One of the most common and widely distributed members of the woody flora of Rodhos. This thermophilous and heliophilous shrub is very characteristic for xerothermic thickets of the phrygana and maquis, frequently dominating. Its vertical distribution is limited chiefly to the lower locations, between 0 and 300 m, but further up it occurs only in small groups or as a single individuals up to 550 m altitude. It occurs primarily on rocky slopes, on hillsides, on the edges of pinewoods and also on seaside dunes (Fig. 55 and 106c).

## RHAMNACEAE

*Rhamnus* L.

1. Very spiny shrub; leaves 5-20 mm long obovate-elliptic to broadly-obovate ..... *R. oleoides*  
 1. Spines absent; leaves 3-7 cm long, ovate to elliptic ..... *R. alaternus*

52. *Rhamnus alaternus* L.

An evergreen, erect shrub or small tree 1-4-(6) m tall. The species is rather rare, known only from the northern part of the island and most frequently noted at the northern slopes of the Profitis Ilias Mts.



Fig. 5. *Dianthus fruticosus* subsp. *rhodius* — basal part of the shrub in the fissure of the calcareous rock a little below the top of Mt. Profitis Ilias near Archangelos, ca 500 m altitude (Phot. A. Boratyński)

in Salakos vicinity. It does not occur at any places in larger numbers and enters into more humid fragments of maquis, sometimes also into forest, eg. the forest of *Liquidambar orientalis* in Petaloudes (Fig. 56 and 106d).

### 53. *Rhamnus oleoides* L.

Much branched and very spiny, erect to prostrate shrub 1-2 m tall. This species is frequent on the whole island from the seashores up to about 700 m altitude. It grows usually on dry and insolated rocks and stony slopes, however, it could be also found on maritime dunes. Except of so typical for it communities as maquis and phrygana *R. oleoides* sometimes occurs at the edges of the pine forests (Fig. 57 and 106a).

## THYMELAEACEAE

*Thymelaea* Miller

1. Leaves scaly, 3-5 mm long, ovate to lanceolate, glabrous on abaxial surface ..... *T. hirsuta*
1. Leaves 10-25 mm long, oblanceolate to linear-lanceolate, hairy on both surfaces ..... *T. tartonraira*

54. *Thymelaea hirsuta* (L.) Endl.

An evergreen, erect shrub to 1 m tall, very rare on the island, recorded only from 6 localities. It occurs in extremely dry places, on the infertile soils, chiefly in the ruderal communities, especially along the road, up to an elevation of 100 m (Fig. 58 and 105d).

55. *Thymelaea tartonraira* (L.) All.

An evergreen, erect or decumbent, polymorphic shrub to 50-60 cm tall, on Rodhos represented by two varieties — var. *angustifolia* (d'Urv.) Meissner with spatulato-oblanceolate leaves and var. *linearifolia* K. Tan with narrowly linear-lanceolate leaves. This is rather rare species scattered on the insolated hills through northern and southern parts of the island. It grows in phrygana communities on sandy and stony, dry slopes, reaching 350-400 m altitude (Fig. 59 and 105e).

## GUTTIFERAE

*Hypericum* L.

1. Leaves opposite, rather thin, narrowly lanceolate to broadly ovate, 2-7 cm long ..... *H. hircinum*
1. Leaves in whorls, evergreen, linear, 2-12 mm long ..... *H. empetrifolium*

56. *Hypericum hircinum* L.

An erect shrub up to 1-1,5 m tall with leaves after crushing frequently giving an unpleasant goat-smell. It occurs chiefly in the central part of the island growing gregariously near water, along rivers, streams and irrigation canals, up to 300 m altitude. Its the most numerous stands are located at the northern base of the Profitis Ilias Mts., in vicinity of Salakos and Dimilia (Fig. 60 and 107a).

57. *Hypericum empetrifolium* Willd.

An evergreen, erect or procumbent shrub 50-60 cm tall with ericoid leaves arranged in whorls. This species is rather frequent throughout the whole island, especially to about 400-500 m altitude; the most elevated stands have been found on the slopes of the Akramitis Mts. at about 600-650 m. It is scattered in phrygana communities and in low maquis, but also occurs in the open pinewoods on the calcareous rocks, sometimes also on stony gravels in the beds of periodically dry rivers (Fig. 61 and 107d).

## CISTACEAE

*Cistus* L.

1. Flowers white in lateral cymes ..... *C. salvifolius*  
 1. Flowers pink to purplish-pink; cymes terminal ..... 2  
 2. Leaves gray tomentose (bilaterally or at least beneath); flowers pink, 2-3 cm  
 in diameter ..... *C. parviflorus*  
 2. Leaves more or less greenish; flowers purplish-pink, 4-6 cm in diameter  
 ..... *C. incanus*

58. *Cistus incanus* L.

59. *Cistus parviflorus* Lam.

60. *Cistus salvifolius* L.

These three species, small shrubs 30 - 100 cm tall, belong to the most common and characteristic constituents of phrygana and low maquis, occurring also at the edges of the pinewoods. On many stands its grow side by side together with such species as *Lithodora hispidula*, *Genista acanthoclada* and *Salvia fruticosa*. Usually *C. parviflorus* occupies lower locations up to 300 - 500 m, when the remaining species reach to 700 - 900 m altitude. *C. incanus* is represented on Rodhos by two subspecies — subsp. *incanus* with flat, 25 - 50 mm long leaves and subsp. *creticus* (L.) Heywood with distinctly undulate-crispate leaves 15 - 25 mm long. In *C. salvifolius* the endemite variety (var. *rhodensis* Fiori) was described but its value is rather doubtful (Fig. 62 - 64 and 108a - c).

*Halimium* (Dunal) Spach

61. *Halimium umbellatum* (L.) Spach

This dwarf, diffuse shrub only 15 - 25 cm tall with white flowers was discovered on Rodhos only once by Heldreich in 1845 (Davis 1865 - 1982), but its locality is unknown. It was not commented neither by Rechinger (1943) nor by Cifferi (1944).

*Helianthemum* Miller

1. Inflorescences corymbose; flowers yellow ..... *H. lavandulifolium*  
 1. Inflorescences simple cymes; flowers white, petals with a yellow claw .....  
 ..... *H. apenninum*

62. *Helianthemum lavandulifolium* Miller

A small, densely tomentose shrub 10 - 50 cm tall with lanceolate, acute leaves revolute at the margins. It is occurring only on a few localities, usually in the coastal regions, up to 600 m altitude. It grows in phrygana on dry and insolated calcareous rocks (Fig. 65).

63. *Helianthemum apenninum* (L.) Miller

A lax, delicate, somewhat spreading shrub, up to 50 cm tall, with



white flowers. This species is very rare, known only from the three stands in the western part of the island. It grows in the lower locations in phrygana only (Fig. 66).

Localities: Close to Cattavia; between village Kalavarda and Castello (Goulandris and Goulimis 1968); In phrygana about 4-5 km NW of Kattavia (B-D 86).

## TAMARICACEAE

*Tamarix* L.

- |   |                      |
|---|----------------------|
| 1. Flowers 5-merous; petals strongly keeled, especially toward the base ..... | <i>T. smyrnensis</i> |
| 1. Flowers 4-merous; petals not keeled .....                                  | 2                    |
| 2. Bark black; petals more than 2 mm long (up to 3 mm) .....                  | <i>T. tetrandra</i>  |
| 2. Bark brown to purple; petals less than 2 mm long .....                     | <i>T. parviflora</i> |

64. *Tamarix tetrandra* Pallas

65. *Tamarix parviflora* DC.

66. *Tamarix smyrnensis* Bunge

The species from the genus *Tamarix* are widely distributed on the island, especially in the northern and eastern parts. They grow in form of erect shrubs or small trees along rivers and in damp places, as well inland as near seashores, chiefly in lower locations. The identification of the species is rather difficult and without flowers almost impossible, so on the map of distribution (Fig. 67) the stands are not differentiated, except those for which we collected herbarium material in bloom.

## MYRTACEAE

*Myrtus* L.

67. *Myrtus communis* L.

Evergreen, aromatic shrub to 3 m tall, sometimes small tree. This is a frequent species on the whole island and locally even common; its the most elevated stands are at about 700-800 m altitude. It occurs in the more mesophytic fragments of maquis and in the understory of sparse pine forests, especially along streams and rivers. Sporadically it forms also monotypic, pure thickets (Fig. 68).

## ARALIACEAE

*Hedera* L.

68. *Hedera helix* L.

Evergreen climber with shoots to 20 m long, climbing with the help of adventitious rootlets. This species is very rare, known only from the north-western part of the island, where it occurs singly on calcareous

rocks on the banks of streams, in humid and shady places, the most abundantly in the valley of Petaloudes. The most elevated stands are located at the northern base of the Profitis Ilias Mts., near Salakos, at about 300 m altitude (Fig. 69).

## ERICACEAE

*Erica* L.69. *Erica manipuliflora* Salisb. Syn.: *E. verticillata* Forsskal

An evergreen, erect and diffuse shrub to 100 - 120 m tall. It is rather frequent species on the whole island but especially in the more dry regions; common in the southern part. *E. manipuliflora* is distributed almost from the sea level to more or less 550 m, eg. on Mt. Koukoulari. It grows singly or in small groups in maquis, phrygana and in sparse pinewoods (Fig. 70).

*Arbutus* L.

1. Leaves 2-3 times as long as wide; panicles drooping, appearing in autumn ..... *A. unedo*  
 1. Leaves less than twice as long as wide; panicles erect, appearing in spring ..... *A. andrachne*

70. *Arbutus unedo* L.

An evergreen, erect shrub or small tree 2 - 3 m tall. This is frequent species on the whole island, to about 800 m altitude. It has been found in various communities, in maquis and phrygana, in thickets on the dunes and also in *Pinus-Cupressus* forests. Occasionally *A. unedo* forms extensive thickets, as for example between Kattavia and Oros or in Mesanagros vicinity (Fig. 71 and 107b).

71. *Arbutus andrachne* L.

An evergreen shrub or small tree 5 - 6 m tall, characterized by red bark which peels off in large patches. The species is rather rare and known only in the northern part of the island. It grows in relative rich maquis or in linking communities between maquis and phrygana but also in the brushwood of the sparse pine forests, up to 400 - 450 m. In the area of Petaloudes and between Eleousa and Dimilia it occurs side by side with *Arbutus unedo* (Fig. 72 and 107c).

## STYRACACEAE

*Styrax* L.72. *Styrax officinalis* L.

A strong shrub 2 - 5 m tall, sometimes a small tree. It is a frequent species in high maquis and in sparse *Pinus-Cupressus* forests, especially

in humid places along the streams. In the mountains it occurs up to the top of the Profitis Ilias (900 m) and Attaviros, where on the altitude of 1200 m we found one specimen (Fig. 73 and 100b).

## OLEACEAE

*Olea* L.73. *Olea europaea* L.

It is the most common evergreen tree on Rodhos represented by two varieties — var. *europaea* and var. *sylvestris* Brot. The first one, so-called cultivated olive, is widely planted in the lower places on the island. Such olive plantations are often very extensive and old, eg. between Malona and Massari. The very aged and large trees are scattered in the middle of corn fields, especially near Lahania. The second variety, var. *sylvestris* is a constituent of maquis and phrygana, but sometimes it occurs also in the sparse pine forests. Unfortunately the discrimination between wild and introduced stands is practically impossible, so more, that in many places the cultivated forms of *Olea europaea* are grafted on wild one, growing in the natural communities.

*Phillyrea* L.74. *Phillyrea latifolia* L. Syn.: *P. media* L.

An evergreen, richly branched shrub or sometimes a small tree attaining 6-8 m in height. In comparison with the continental Greece its stands are much rare and poor. It is distributed chiefly in the northern and north-western parts of the island as far as the Akramitis Mts. in the south, between 150 and 1000 m, exceptionally on the Attaviros Mts. even up to 1100-1200 m altitude. *P. latifolia* is characterized by wide tolerance as regards site conditions but on Rodhos it prefers the open, sunny places in maquis and phrygana. On the Attaviros Mts. it forms the fragments of pure or mixed forests, together with *Quercus coccifera* (Fig. 74 and 99c).

## APOCYNACEAE

*Nerium* L.75. *Nerium oleander* L.

Evergreen, strong and erect shrub 1-3-(4) m tall with bright rose, large flowers. The species is found on the whole island, from the seashores to about 800 m altitude. It is a mesophyte plant occurring commonly along the streams and in seasonally dry beds of water courses; sometimes it grows abundantly forming pure thickets (Fig. 75 and 100a).

## RUBIACEAE

*Putoria* Pers.76. *Putoria calabrica* (L.f.) DC.

Small, procumbent shrub usually not taller than 20 cm, intricately branched, often formed a compact mats. It grows only in northern part of the island, as far as Malona in south and reaches an elevation of 300 - 400 m. It is a pioneer species appearing primarily in dry and isolated places, usually on eroded slopes, mobile scarps shales and also river gravels (Fig. 76 and 104b).

*Asperula* L.77. *Asperula brevifolia* Vent.

Low semi-shrub or shrub with numerous stems up to 60 cm long with erect and ascending, delicate, quadrangular branches. It is scattered in the northern and central parts of the island reaching in the south to the Akramitis Mts. and Mt. Marmari near Lindos. It grows on the calcareous rocks and gravelly or clayey hill slopes up to 500 - 600 m altitude (Fig. 77).

*Rubia* L.78. *Rubia tenuifolia* d'Urv

Trailing or scrambling sub-shrub or shrub with woody stems to 1,5 - 2 m long, 6-angled shoots and semi-evergreen leaves in whorls of 4 - 6. In young state it can be wrongly treated as perennial *Rubia peregrina*, so the elaboration of the critical map of its distribution is now rather aimless. Judging from the approachable information the species is rather common on the island, especially in its western part; quite often it grows at the northern base of the Profitis Ilias Mts. near Salakos, in the maquis and in sparse pine forests, on rocky, calcareous slopes up to 400 - 500 m altitude.

## CONVOLVULACEAE

*Convolvulus* L.79. *Convolvulus oleifolius* Desr.

Densely sericeous, erect or spreading shrub to 30 cm tall with linear to linear-oblongate, entire leaves. This species occurs in many places, but usually scattered and solitary, chiefly in lower locations (0 - 200 m), however, on the slopes of the Akramitis Mts. it has been found at about 500 m altitude. *C. oleifolius* grows in rocky places near the sea, at the edges of pine forests and also on the balks and roadsides (Fig. 78 and 108d).

## BORAGINACEAE

*Lithodora* Griseb.

80. *Lithodora hispidula* (Smith) Griseb. Syn.: *Lithospermum hispidulum* Smith

Compact and dense shrub 30 - 100 cm tall with a cushion type of growth and sometimes with single, column-like erect stems. Beside *Genista acanthoclada* and *Cistus* species it is one of the most common small shrubs on the island having here two subspecies, subsp. *hispidula* and subsp. *versicolor* Meikle. It is represented by specimens with blue and pink flowers, but near Monolithos we found also a few specimens with white flowers. *L. hispidula* is a permanent and in some places predominant component of the phrygana communities on rocky and stony slopes, but also it appears in the pine forests, particularly at their edges. It occupies lower located regions, eg. near seaside of Prassonissi it grows on the maritime dunes; the highest stands are known from the Attaviros Mts., from ca 1000 m altitude (Fig. 79 and 98a).

## VERBENACEAE

*Vitex* L.

81. *Vitex agnus-castus* L.

An erect, bushy shrub, usually 1 - 3 m tall, sometimes even taller. Its leaves open very late, towards the end of April, when all other shrubs are already fully leaved. It is mezophyllic species growing on the whole island but in places where at least periodically water occurs, eg. on the gravells in the river valleys, along streams, on the coastal dunes and in agricultural areas along irrigation canals and roadside ditches. *V. agnus-castus* usually occupies lowland regions, but on the Attaviros Mts. it is growing even to 800 m elevation (Fig. 80 and 110c).

## LABIATAE

*Teucrium* L.

82. *Teucrium brevifolium* Schreber.

Intricately branched, canescent shrub 30 - 60 cm tall with solitary flowers in axils of the upper floral leaves. It is very rare plant represented only in the coastal region of the south-western part of the island. It grows on the dry and insolated, rocky, limestone slopes in low phrygana communities up to 200 - 300 m altitude (Fig. 81).

Localities: Below the top of Mt. Armenistis, ca. 300 m (B-D 46); Between Monolithos Castle and Cape Monolithos, open, rocky places (B-D 33); About 4 - 5 km NW of Kattavia, in phrygana on the rocky places (B-D 87); Cattavia (Reichinger 1943); Cape Prassonissi S of Kattavia, frequently in phrygana (B-D 84).

*Prasium* L.83. *Prasium majus* L.

Erect and rather delicate shrub up to 1 m tall with poorly branched shoots and white, small flowers. The species is frequent on the whole island but appearing only as single individuals in xerothermic thickets of the maquis and phrygana type, in the lower regions, to 400 - 500 m altitude, more rarely as in the Akramitis Mts. up to 700 m. It occurs usually on rocky places, on the seashore fixed dunes, on the balks and in the olive plantations (Fig. 82 and 109b).

*Phlomis* L.84. *Phlomis cretica* C. Presl.

Dwarf shrub up to 50 cm tall with few, erect stellate-lanate and glandular stems. It is rather rare species growing chiefly in the western part of the island on more humid places, in the thickets near streams and on calcareous rocks, but also in the *Pinus-Cupressus* forests, between 300 and 1000 m elevation. On the most southern locality, at Cape Prassonissi, the plants are destitute of glands (Fig. 83).

*Satureja* L.85. *Satureja thymbra* L.

Much branched, small, semispherical, glandular-punctate shrub up to 40 cm tall with many-flowered and globose, distant verticillasters and bright pink to reddish-purple flowers. The species is rather common but scattered, represented only by single, wide apart growing specimens, from the sea-level to 400 m, exceptionally higher, as in the Akramitis Mts. to 600 - 650 m. It occurs usually in open, sunny places in dry scrub and phrygana, sometimes also in the sparse *Pinus-Cupressus* forests. It was found also on the gravelly beds of dry rivers (Fig. 84 and 109a).

*Thymbra* L.85. *Thymbra spicata* L.

Small, glandular-punctate, aromatic shrub 40 - 50 cm tall with erect or ascending, usually simple flowering stems. It is a rare species known only from a dozen localities concentrated chiefly in the north-eastern part of the island. *T. spicata* grows on dry, calcareous, rocky places in phrygana and in the pebbly and wide valleys of rivers and streams, up to ca. 300 m altitude (Fig. 85 and 109e).

*Coridothymus* Reichb. f.87. *Coridothymus capitatus* (L.) Reichb. f. Syn.: *Thymus capitatus* L.

A small, erect and dense, strongly aromatic shrub about 30 - 50 cm



Fig. 6. The north-western limestone cliffs of the Akramitis Mts. near Monolithos — locality of *Linum arboreum* and *Euphorbia dendroides* (Phot. A. Boratyński)

tall, when growing freely then forming cushion-like forms. It occurs on the whole island as a characteristic representative of the more degraded and thinned phrygana, almost from the seashores up to the top of the Attaviros Mts. (1215 m), however, more commonly and gregariously to 400 - 500 m. Having very small requirements to the environmental conditions it occupies the dry, insolated places with a shallow soil developed on calcareous or sandstone rocks (Fig. 86 and 109d).

#### *Lavandula* L.

##### 88. *Lavandula stoechas* L.

A small, aromatic shrub 50 - 100 cm tall having leaflike purple or violet bracts in the upper part of compact and thick inflorescences; near the Thary Monastery we found one specimen with completely white bracts. The species occurs almost exclusively in the central part of the island dividing it into two parts, northern and southern, from Kamiros Skala in the west up to Lardos and Gennadion in the east. In this peculiar strip *L. stoechas* is often common, especially in the sparse pine forests, up to 500 - 600 m altitude. Moreover it occurs in phrygana and also on the gravelly valleys of the rivers, eg. near Apolakkia (Fig. 87 and 109c).

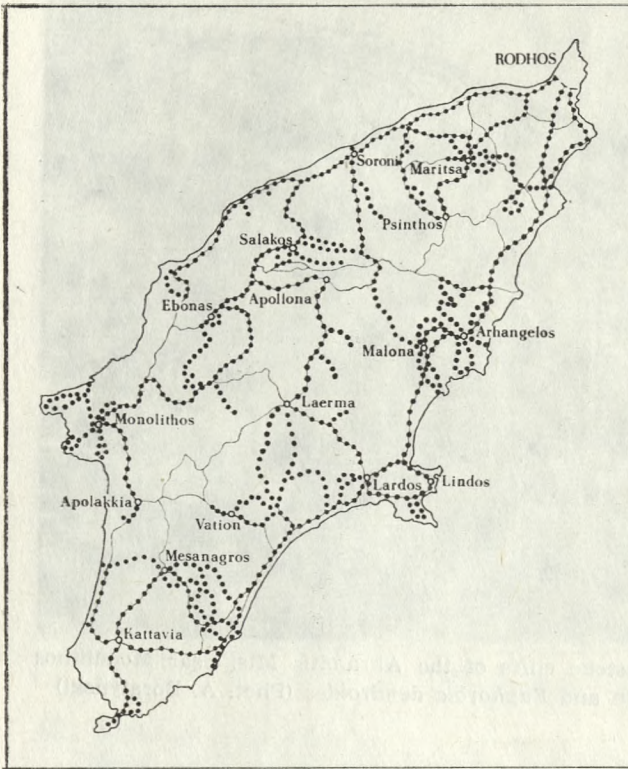


Fig. 7. Map of the authors itineraries through Rodhos Is.



Fig. 8. *Pinus brutia* Ten.



Fig. 9. *Cupressus sempervirens* L. f. *horizontalis* (Miller) Voss

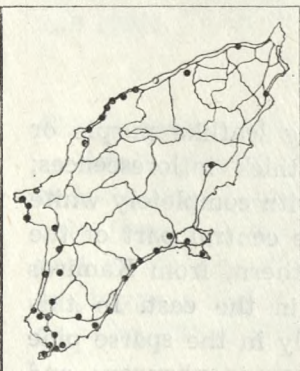


Fig. 10. *Juniperus oxycedrus* L. subsp. *macrocarpa* (Sibth. et Sm.) Ball

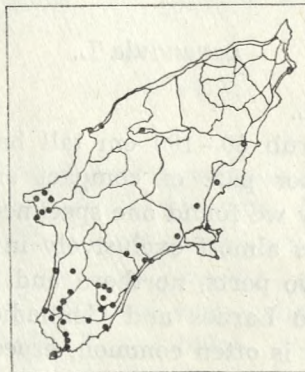


Fig. 11. *Juniperus phoenicea* L.

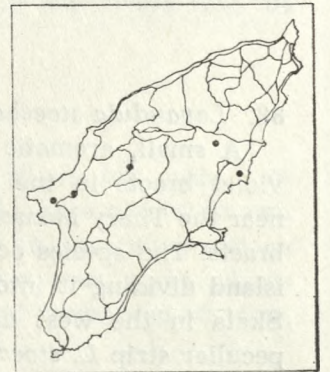
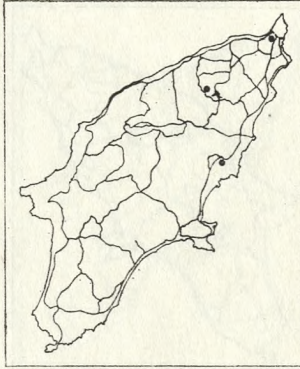
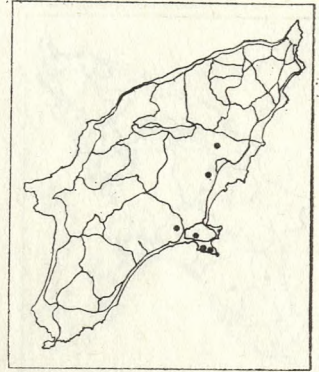
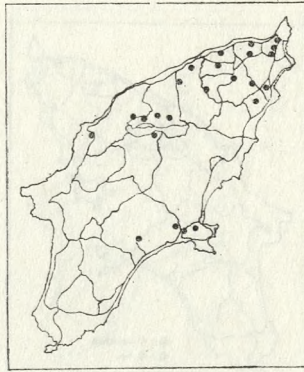
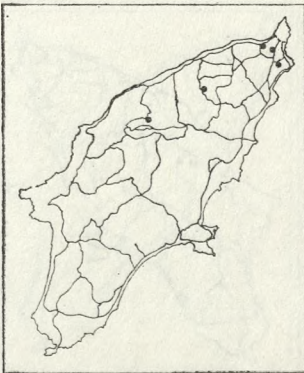
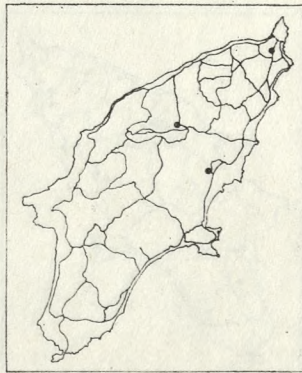
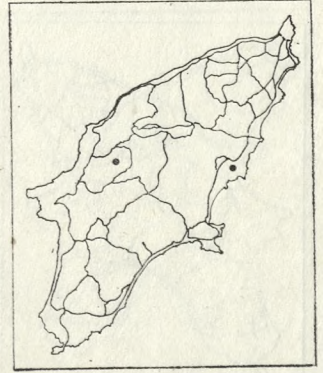
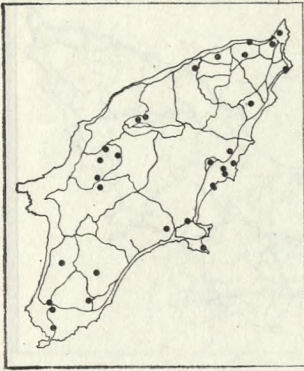
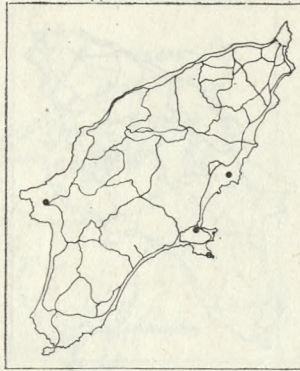
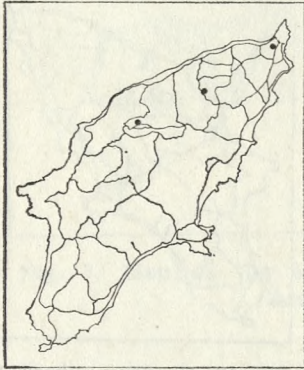
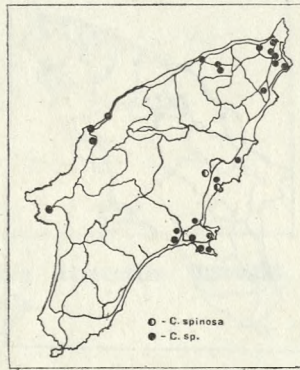
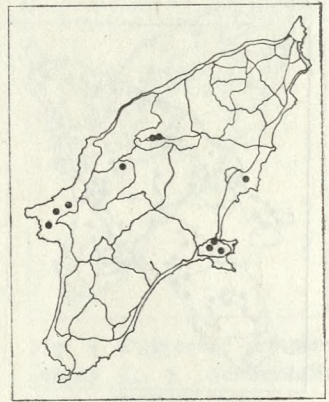
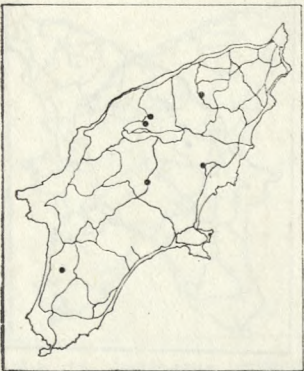
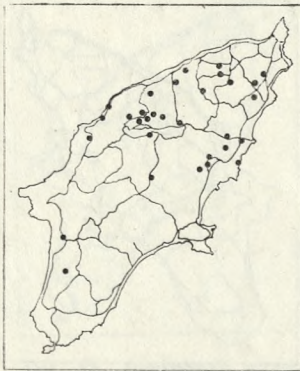


Fig. 12. *Ephedra campylopoda* C. Meyer



Fig. 13. *Salix alba* L.Fig. 14. *Quercus ilex* L.Fig. 15. *Quercus aucheri*  
Jaub. et SpachFig. 16. *Quercus coccifera*  
L.Fig. 17. *Quercus macrolepis*  
KotschyFig. 18. *Quercus pubescens*  
Willd.Fig. 19. *Quercus infectoria*  
OlivierFig. 20. *Celtis australis* L.Fig. 21. *Celtis tournefortii*  
Lam.

Fig. 22. *Osyris alba* L.Fig. 23. *Dianthus fruticosus*  
L. subsp. *rhodius* (Rech. f.)  
Runem.Fig. 24. *Clematis cirrhosa*  
L.Fig. 25. *Laurus nobilis* L.Fig. 26. Genus *Capparis* L.  
(C. sp. = probably *C. ovata*  
Desf.)Fig. 27. *Erysimum rhodium*  
Snog.Fig. 28. *Liquidambar orientalis*  
MillerFig. 29. *Platanus orientalis*  
L.Fig. 30. *Rubus ulmifolius*  
Schott

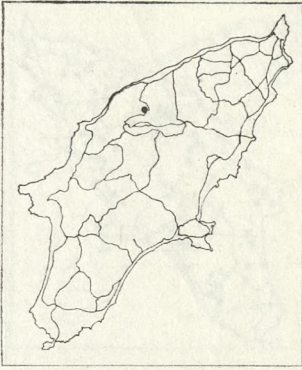


Fig. 31. *Rosa sempervirens*  
L.

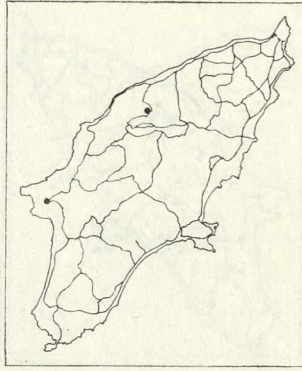


Fig. 32. *Rosa phoenicia*  
(L.) Bosc.



Fig. 33. *Sarcopoterium spi-*  
*nosum* (L.) Spach

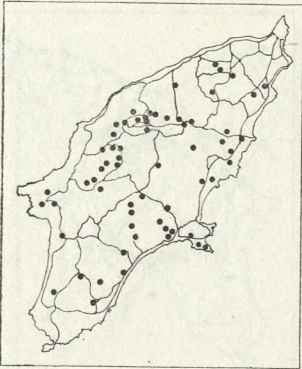


Fig. 34. *Pyrus spinosa*  
Forsskal

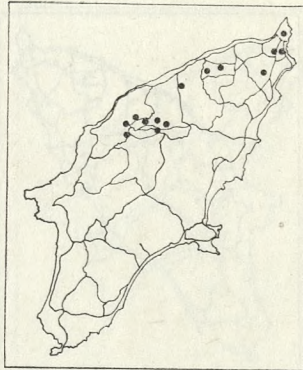


Fig. 35. *Crataegus aronia*  
(L.) Bosc. ex DC



Fig. 36. *Amygdalus webbii*  
Spach

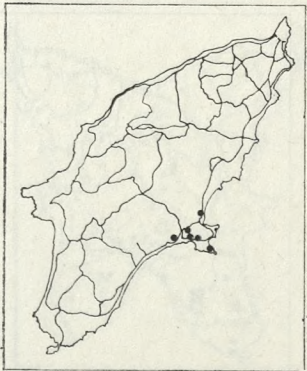


Fig. 37. *Amygdalus graeca*  
Lindley

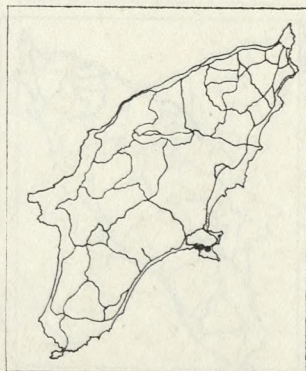


Fig. 38. *Amygdalus* × *rho-*  
*dia* Browicz

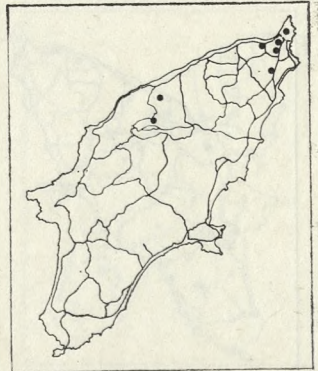


Fig. 39. *Cercis siliquastrum*  
L.



Fig. 40. *Ceratonia siliqua*  
L.

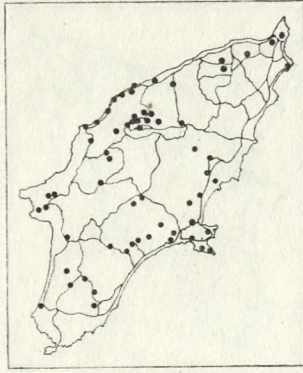


Fig. 41. *Anagyris foetida* L.

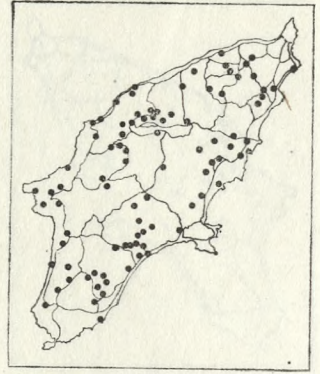


Fig. 42. *Calicotome villosa*  
(Poiret) Link



Fig. 43. *Genista acanthocla-*  
*da* DC.

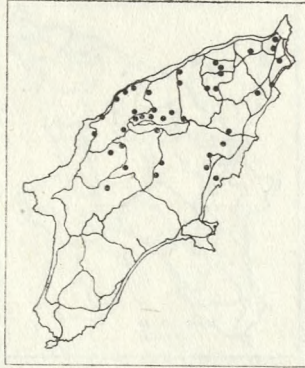


Fig. 44. *Spartium junceum*  
L.

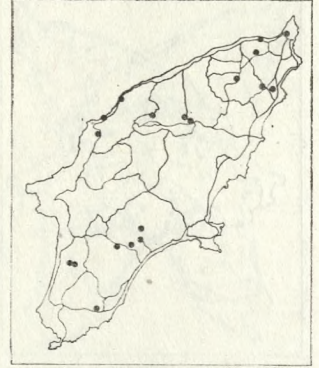


Fig. 45. *Colutea insularis*  
Browicz



Fig. 46. *Ononis natrix* L.

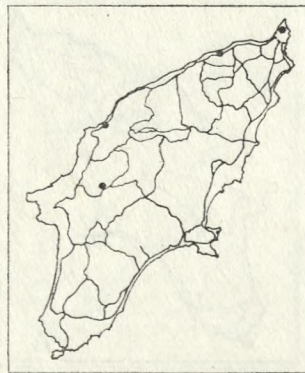


Fig. 47. *Medicago arborea*  
L.

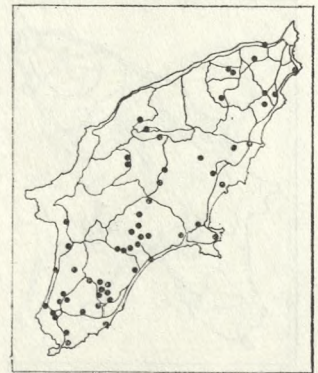


Fig. 48. *Anthyllis herman-*  
*nae* L.



Fig. 49. *Coronilla emerus* L. subsp. *emeroides* (Boiss. et Spruner) Hayek

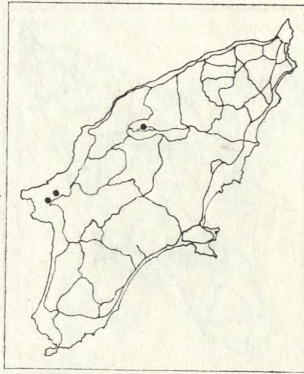


Fig. 50. *Linum arboreum* L.



Fig. 51. *Euphorbia dendroides* L.



Fig. 52. *Euphorbia acanthothamnus* Heldr. et Sart.



Fig. 53. *Rhus coriaria* L.



Fig. 54. *Pistacia terebinthus* L.

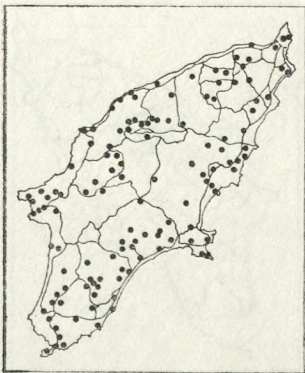


Fig. 55. *Pistacia lentiscus* L.



Fig. 56. *Rhamnus alaternus* L.



Fig. 57. *Rhamnus oleoides* L.

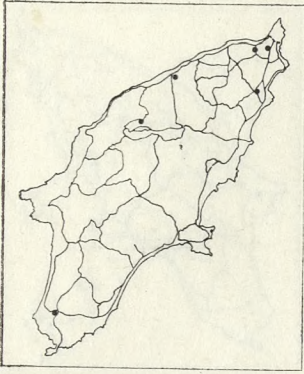


Fig. 58. *Thymelaea hirsuta* (L.) Endl.

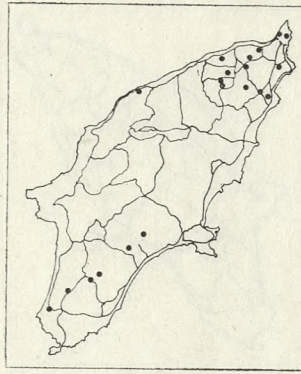


Fig. 59. *Thymelaea tartonraira* (L.) All.

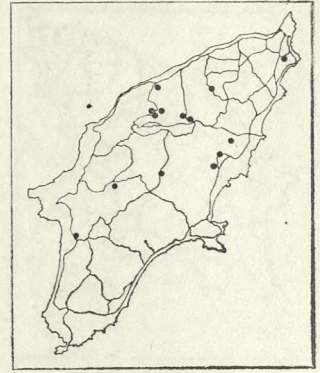


Fig. 60. *Hypericum hircinum* L.



Fig. 61. *Hypericum empetrifolium* Willd.

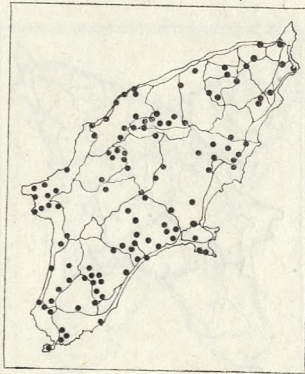


Fig. 62. *Cistus incanus* L.

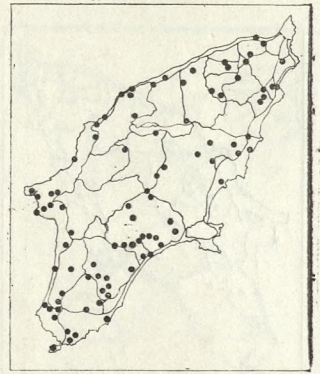


Fig. 63. *Cistus parviflorus* Lam.

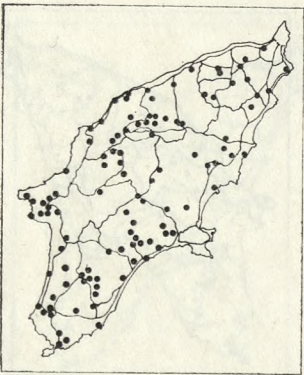


Fig. 64. *Cistus salvifolius* L.

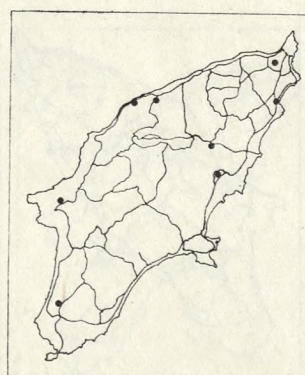


Fig. 65. *Helianthemum lavandulifolium* Miller

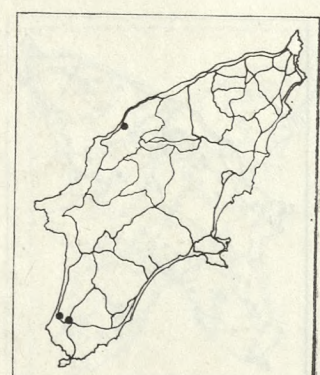
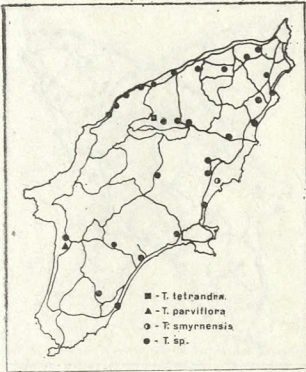
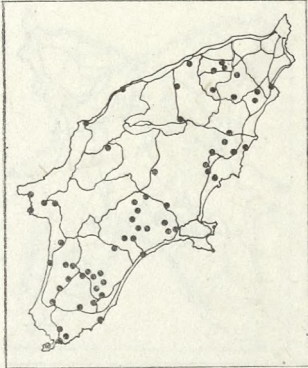
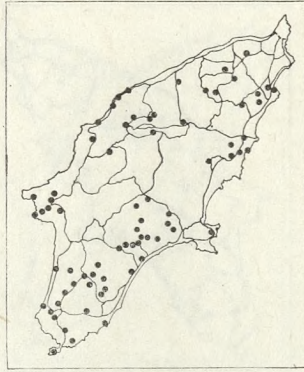
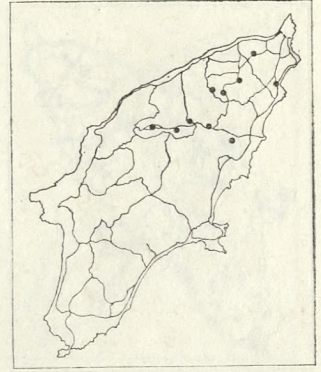
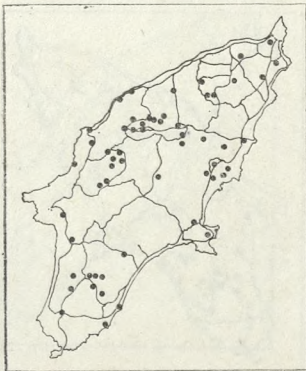
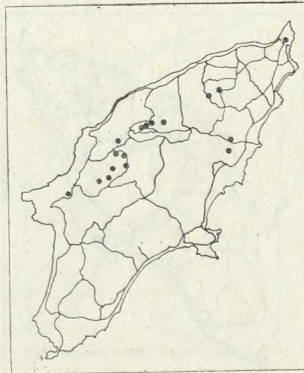
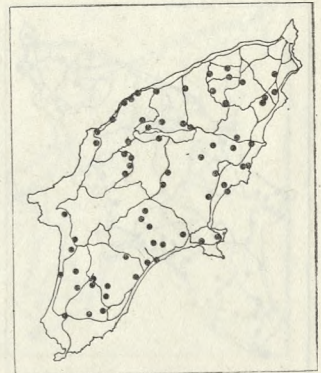


Fig. 66. *Helianthemum apenninum* (L.) Miller

Fig. 67. Genus *Tamarix* L.Fig. 68. *Myrtus communis* L.Fig. 69. *Hedera helix* L.Fig. 70. *Erica manipuliflora* Salisb.Fig. 71. *Arbutus unedo* L.Fig. 72. *Arbutus andrachne* L.Fig. 73. *Styrax officinalis* L.Fig. 74. *Phillyrea latifolia* L.Fig. 75. *Nerium oleander* L.

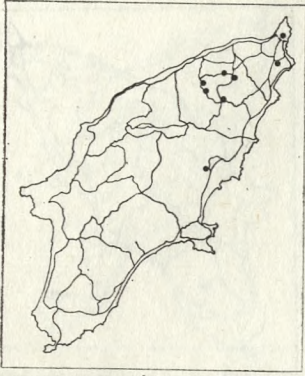


Fig. 76. *Putoria calabrica*  
(L. f.) DC.

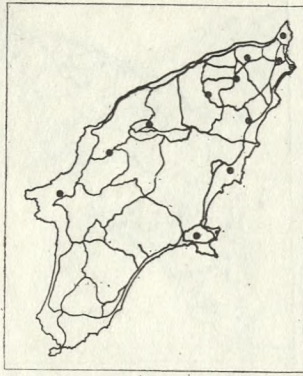


Fig. 77. *Asperula brevifolia*  
Vent.

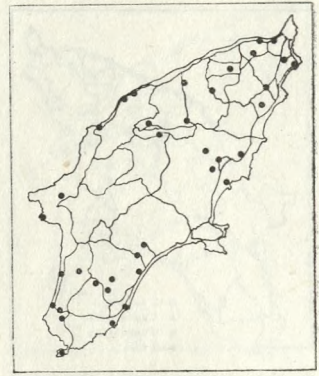


Fig. 78. *Convolvulus olei-*  
*folius* Desr.



Fig. 79. *Lithodora hispidula*  
(Smith) Griseb.

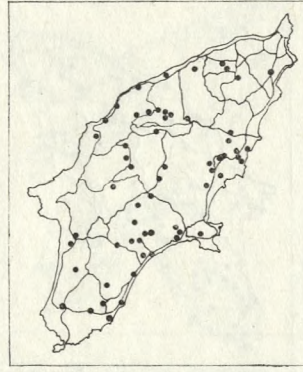


Fig. 80. *Vitex agnus-castus*  
L.

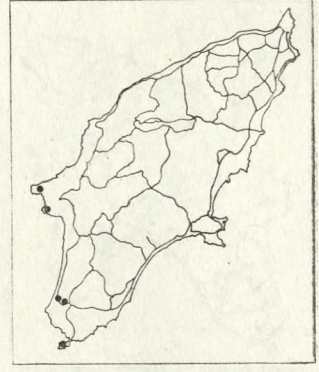


Fig. 81. *Teucrium brevifo-*  
*lium* Schreber



Fig. 82. *Prasium majus* L.

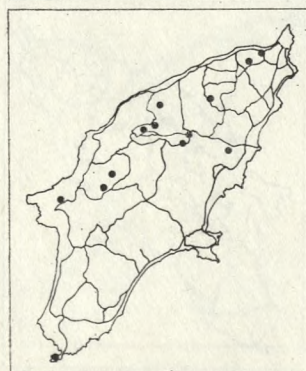


Fig. 83. *Phlomis cretica* C.  
Presl.

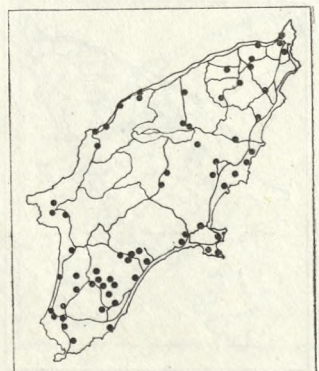
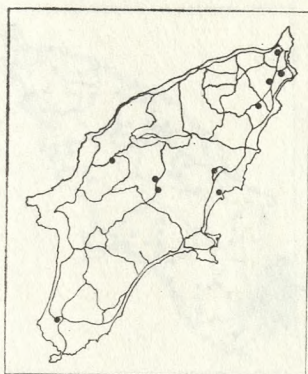
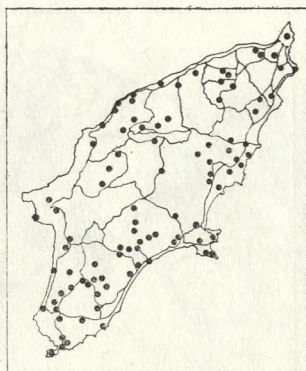
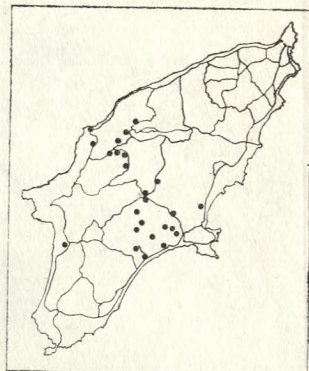
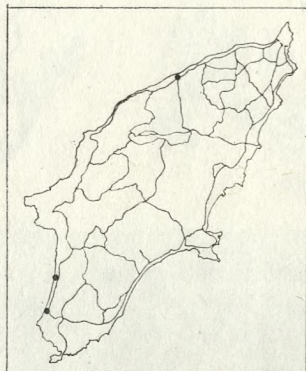
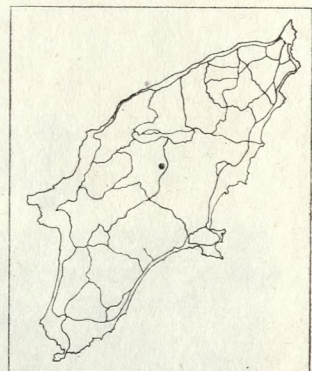
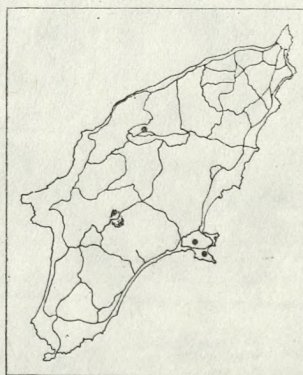


Fig. 84. *Satureja thymbra*  
L.



Fig. 85. *Thymbra spicata* L.Fig. 86. *Coridothymus capitatus* (L.) Reichenb. f.Fig. 87. *Lavandula stoechas* L.Fig. 88. *Salvia fruticosa* MillerFig. 89. *Lycium schweinfurthii* DammerFig. 90. *Globularia alypum* L.Fig. 91. *Lonicera etrusca* SantiFig. 92. *Scabiosa variifolia* Boiss.Fig. 93. *Achillea cretica* L.

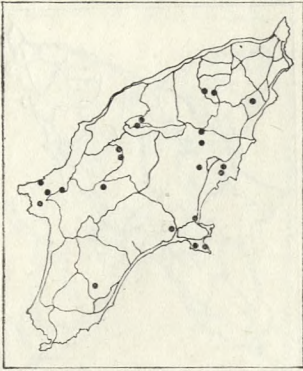


Fig. 94. *Ptilostemon chamaepeuce* (L.) Less.

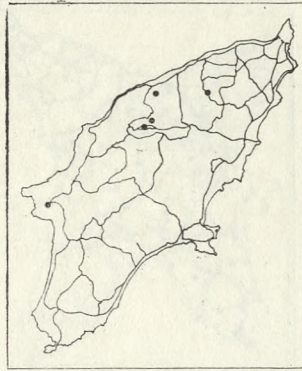


Fig. 95. *Ruscus aculeatus* L.

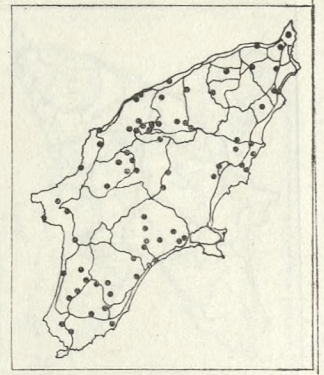


Fig. 96. *Smilax aspera* L.



Fig. 97. *Ficus sycomorus* L. — an old specimen in Rodhos town (Phot. A. Boratyński)



Fig. 98. a. *Lithodora hispidula*, b. *Juniperus oxycedrus* subsp. *macrocarpa*, c. *Juniperus phoenicea*, d. *Lycium schweinfurthii* (Drawn by J. Dolatowski)

#### *Salvia* L.

#### 89. *Salvia fruticosa* Miller Syn.: *S. triloba* L.f.

Erect, adpressedly white tomentose shrub, with inflorescence stems up to 1,5 m tall. The species is polymorphic, especially in density of indumentum and in its height. *S. fruticosa* belongs to the very common shrubs occurring almost in everyone community and on everyone substratum, in open or in partly shaded places, on lowlands and in the mountains up to 700 - 800 m altitude, however, except of the maritime dunes. Usually it is a permanent component of maquis and tall phrygana but in the central part of the island also of the sparse *Pinus-Cupressus* forests (Fig. 88 and 105a).

#### SOLANACEAE

#### *Lycium* L.

#### 90. *Lycium schweinfurthii* Dammer

Intricately branched and very spiny shrub up to 2 m tall with more



Fig. 99. a. *Quercus coccifera*, b. *Quercus aucheri*, c. *Phillyrea latifolia*, d. *Quercus macrolepis* (Drawn by J. Dolatowski)

or less arching stems, stout and rigid spines and black berries. It is one of the rarest woody plants of Rodhos, occurring only on three stands and represented by a few specimens. *L. schweinfurthii* is limited in its distribution to the western coastal region, to the beaches (Fig. 89 and 98d).

Localities: Soroni, Cattavia, Strand v. San Theodoro (Rechinger 1943, as *L. europaeum* L.); Between Kattavia and Apolakkia, at the seaside, near the bifurcation of the road to M. Skiadi (B-D 85).



Fig. 100. a. *Nerium oleander*, b. *Styraax officinalis*, c. *Liquidambar orientalis*  
(Drawn by J. Dolatowski)

GLOBULARIACEAE

*Globularia* L.

91. *Globularia alypum* L.

A dwarf, evergreen shrub up to 50 - 60 cm tall with bluish flowers collected into terminal heads. It was mentioned from Rodhos only once



Fig. 101. a. *Crataegus aronia*, b. *Sarcopoterium spinosum*, c. *Amygdalus graeca*, d. *Amygdalus webbii*, e. *Pyrus spinosa* (Drawn by J. Dolatowski)

by Finkl, who observed it in April, time of bloom, so the mistake in determination is rather impossible (Fig. 90).

Localities: Im Walde zwischen Alaerma und Apollona, etwa 200 m von der Strasse entfernt (Finkl 1961-1962).

#### CAPRIFOLIACEAE

#### *Lonicera* L.

#### 92. *Lonicera etrusca* Santi

A strong climber with stems reaching a length of 4-5 m and yellowish-white flowers in terminal pedunculate heads. It is rather



Fig. 102. a. *Anagyris foetida*, b. *Ceratonia siliqua*, c. *Colutea insularis*, d. *Medicago arborea* (Drawn by J. Dolatowski)



Fig. 103. a. *Spartium junceum*, b. *Anthyllis hermanniae*, c. *Ononis natrix*, d. *Genista acanthoclada*, e. *Calicotome villosa* (Drawn by J. Dolatowski)

rare species with stands chiefly concentrated in the western part of the island, in the massif of the Profitis Ilias, Attaviros and Akramitis, between 200 and 800 m altitude. It usually grows singly in maquis and on the edges of the *Pinus-Cupressus* forests (Fig. 91).

#### DIPSACACEAE

#### *Scabiosa* L.

#### 93. *Scabiosa variifolia* Boiss.

Semispherical, compact shrub 80 - 100 cm tall with branches bearing rosettes of sericeous (when young) leaves. It is one of the most rare species known on Rodhos only from three stands. It grows on the





Fig. 104. a. *Euphorbia dendroides*, b. *Putoria calabrica*, c. *Euphorbia acanthothamnus*, d. *Linum arboreum* (Drawn by J. Dolatowski)

calcareous cliffs, between 150 and 600 m altitude, where it is represented by single and scattered individuals (Fig. 92 and 105c).

Localities: In rupibus insulae Rhodi, mons Hagios Elias prope Salakos (Bourgeau 79; Davis 1965-1982); M. Profeta: Felswände in der Schlucht bei Salakos, 500 m, Felspartie "Turka", 600 m, M. Marmara b. Lindos (Rechinger 1943); Cliffs at the base of the Cape Mirtias near Pefka, ca 150 m (B-I) 142-144).

#### COMPOSITAE

#### *Achillea* L.

#### 94. *Achillea cretica* L.

A dwarf, tomentose shrub with ascending stems up to 40-60 cm long and white, compact corymbs. The species is chiefly distributed



Fig. 105. a. *Salvia fruticosa*, b. *Ptilostemon chamaepeuce*, c. *Scabiosa variifolia*, d. *Thymelaea hirsuta*, e. *Thymelaea tartonraira* (Drawn by J. Dolatowski)



Fig. 106 a. *Rhamnus oleoides*, b. *Pistacia terebinthus*, c. *Pistacia lentiscus*, d. *Rhamnus alaternus* (Drawn by J. Dolatowski)



Fig. 107. a. *Hypericum hircinum*, b. *Arbutus unedo*, c. *Arbutus andrachne*, d. *Hypericum empetrifolium* (Drawn by J. Dolatowski)

in the northern and western parts of the island where it grows on calcareous rocks and waste grounds, up to 300 m elevation. Time of bloom this plant is easy to find and visible some distance off in connection with its numerous flowers forming a very white patches (Fig. 93).

#### *Ptilostemon* Cass.

95. *Ptilostemon chamaepeuce* (L.) Less.

A dwarf shrub 30 - 100 cm tall, sometimes even up to 1.5 m, when



Fig. 108. a. *Cistus incanus*, b. *Cistus salvifolius*, c. *Cistus parviflorus*, d. *Convolvulus oleifolius* (Drawn by J. Dolatowski)

growing freely then forming semispherical crown. The species has scattered stands but is absent in the most northern and the most southern parts of the island. It occurs on different slopes and in the crevices of steep calcareous rocks, sparsely in the stony beds of dry rivers. The biggest and oldest specimens of this shrub were observed in the rocky, maritime gorge at the northern end of Mt. Armenistis and on the northern slopes of the Akramitis Mts., here up to 650 m elevation. In one stand, near Malona, in the valley of river Platanero, *P. chamaepeuce* forms a small, pure thickets (Fig. 94 and 105b).



Fig. 109. a. *Satureja thymbra*, b. *Prasium majus*, c. *Lavandula stoechas*, d. *Coriodythmus capitatus*, e. *Thymbra spicata*. (Drawn by J. Dolatowski)

#### LILIACEAE

#### *Ruscus* L.

#### 96. *Ruscus aculeatus* L.

Evergreen, rhizomatous, small shrub 30-40 cm tall with characteristic coriaceous and dark green leaf-like cladodes 1-4 cm long. The species is very rare and known only from a few stands in the western part of the island. It grows in more or less humid and shady places, near the calcareous rocks and in woods not far from the streams, between 150 and 750 m altitude; all specimens are small and poor so the species gives the impression of threatened (Fig. 95 and 110d).



Fig. 110. a. *Smilax aspera*, b. *Capparis spinosa*, c. *Vitex agnus-castus*, d. *Ruscus aculeatus*. (Drawn by J. Dolatowski)

Localities: Petaloudes, in upper part of the stream valley (B-D in observ.); ibidem (Schouten 1976); Zwischen Salakos und Fanez (Rechinger 1943); At the base of the Profitis Ilias Mts., just near Salakos (B-D 205); Northern slope of the Profitis Ilias Mts., above Salakos, 700-750 m (B-D in observ.); Monolithos (Schouten 1976).

### *Smilax* L.

#### 97. *Smilax aspera* L.

An evergreen, prickly creeping, scrambling or climbing shrub with stems up to 10 m long. It occurs on the whole island in everyone plant community, from the sea level to about 700-800 m. The most favourable conditions it finds in the stream valleys, in maquis and in *Pinus-Cupressus* forests forming sometimes impenetrable thickets (Fig. 96 and 110a).

### INTRODUCED TREES AND SHRUBS

The mild Mediterranean climate of Rodhos provides ideal conditions for the introduction and cultivation on the island of numerous plant species, including trees and shrubs originating not only from adjacent neighbouring regions but also from more distant places, from Africa, southeastern Asia, Central and South America and even from Australia. Origins of these introductions date back to antiquity (most probably the fruit trees) and then to the Mediaeval times. It is possible that in the latter period, together with the appearance on the island of the Knights of the Order of St. John *Pistacia mutica* appeared on Rodhos. On the other hand in the collections of Forsskal, that is the latter part of the XVIII c. there occurs the introduced plant *Acacia farnesiana*. The Eucalypts have been introduced probably much latter, possibly as late the XX c., during the Italian rule on the island. Of considerable importance also is the development of the turist industry on the island in the last half of century, which has led to the development on Rodhos of several new settlements for the decoration of which various ornamentals have been introduced.

The number of introduced trees and shrubs presumably surpasses the number of native ones. It is rather difficult to determine accurately, since as always happens with cultivated plants it is very variable. For some reasons some species disappear or are not being promoted while on the other hand new species are being continuously introduced depending on the interests and periodic and local fashions. The list of introduced trees and shrubs of Rodhos can be found in the work of Cifferi (1944) and covers about 70 species.

While on the island we have also tried to make up a list of in-



troduced species on Rodhos, however, we have included only those which have been outplanted in parks and squares, along roads and streets and near houses, but we have ignored the trees and shrubs which grew in various private gardens. One can suspect that the number of plants growing in such gardens is very large and individual species may be frequently represented by only single individuals or perhaps by one only, thus they do not play any significant role in the "exotic" flora of Rodhos. In the list of plants given below we have not used data from literature basing exclusively on our own observations.

Particularly rich is the introduced dendroflora of the capital town, Rodhos, which is truly a green town. Besides, numerous "exotic" species grow also in the turist oriented coastal localities, both on the eastern and the western shores of Rodhos, especially on the northern tip. However, they are also to be found even in the smallest hamlets. Everywhere such trees are treasured which thanks to the compact and wide crowns (Fig. 97) provide much shade so very much in demand during sunny, hot parts of the year (especially *Ficus benjamina*). Introduced species can be divided into two categories: fruit trees and shrubs and ornamentals.

Species of the first group usually play significant economic role on the island (eg. *Citrus* sp., figs, vines and almonds). While the majority of these are being cultivated on special plantations, or in household gardens, they can also be found along streets and roads and in the vicinity of houses. There are 20 such species (not mentioning the varieties) on Rodhos and they represent eight families.

#### FRUIT TREES AND SHRUBS

##### *Juglandaceae*

1. *Juglans regia* L.

##### *Fagaceae*

2. *Castanea sativa* Miller

##### *Moraceae*

3. *Ficus carica* L.
4. *Morus alba* L.
5. *Morus nigra* L. (very rare)

##### *Rosaceae*

6. *Eriobotrya japonica* (Thunb.) Lindley
7. *Cydonia oblonga* Miller
8. *Pyrus communis* L. (cultivated forms grafted on *Pyrus spinosa*)

9. *Amygdalus communis* L.
10. *Armeniaca vulgaris* Lam.
11. *Persica vulgaris* Miller
12. *Prunus* × *domestica* L.
13. *Cerasus vulgaris* Miller

#### Rutaceae

14. *Citrus limon* (L.) Burm. f.
15. *Citrus sinensis* (L.) Osbeck
16. *Citrus reticulata* Blanco (maybe also other species)

#### Anacardiaceae

17. *Pistacia vera* L. (young plantations)

#### Vitaceae

18. *Vitis vinifera* L.

#### Punicaceae

19. *Punica granatum* L.

#### Palmae

20. *Phoenix dactylifera* L.

### DECORATIVE TREES AND SHRUBS

#### Araucariaceae

1. *Araucaria heterophylla* (Salisb) Franco

#### Pinaceae

2. *Pinus pinea* L. — frequently, single specimens or along roads, eg. between Cape Minas and Ancient Kamiros.

#### Cupressaceae

3. *Platyclusus orientalis* (L.) Franco — rare, Rodhos town

#### Salicaceae

4. *Populus alba* L. — single specimens
5. *Populus nigra* L. 'Italica' — Rodhos town
6. *Populus usbekistanica* Komarov 'Afghanica'
7. *Populus* × *canadensis* Moench

#### Casuarinaceae

8. *Casuarina equisetifolia* L. — along streets, Rodhos town

*Moraceae*

9. *Broussonetia papyrifera* (L.) Vent.
10. *Maclura pomifera* (Raf.) C. Schneider — near Damatria
11. *Ficus benjamina* L. — commonly in Rodhos town, as well as near the streets and on the squares in other towns and villages
12. *Ficus sycomorus* L. — Rodhos town
13. *Ficus elastica* Roxb. — single specimens in Rodhos town

*Nyctaginaceae*

14. *Bougainvillea spectabilis* Willd. in varieties — vigorous climbers, frequently on the walls of the houses

*Phytolaccaceae*

15. *Phytolacca dioica* L. — old town in Rodhos

*Pittosporaceae*

16. *Pittosporum tobira* (Thunb.) Aiton f. — frequently, especially in Rodhos town, in hedges

*Platanaceae*

17. *Platanus Xacerifolia* (Aiton) Willd. — rare, single trees, eg. in Lardos

*Rosaceae*

18. *Rosa* sp. — numerous varieties
19. *Pyracantha coccinea* Roemer — rare

*Leguminosae*

20. *Parkinsonia aculeata* L. — rare
21. *Acacia farnesiana* (L.) Willd.
22. *Acacia longifolia* Willd.
23. *Acacia cyanophylla* Lindley — those three species one could meet in single specimens in different parts of the island, near the roads and houses
24. *Robinia pseudoacacia* L. — single trees in settlements; in Monolithos it blooms as early as end of April
25. *Wisteria sinensis* (Sims) Sweet — Rodhos town
26. *Erythrina caffra* Thunb. — rare in Rodhos town

*Euphorbiaceae*

27. *Ricinus communis* L. — shapely specimens in old town Rodhos, especially near Palace of the Great Masters; frequently in redleaved variety ('Sanguineus'), eg. in Lardos and Malona, it runs wild

*Simarubaceae*

28. *Ailanthus altissima* (Miller) Swingle — frequently

<http://rcin.org.pl>

*Meliaceae*

29. *Melia azedarach* L. — frequently, mainly along the roads

*Anacardiaceae*

30. *Pistacia atlantica* Desf. subsp. *mutica* (Fischer et C. Meyer) Rech. f. — numerous old trees in Rodhos town, especially near Palace of the Great Masters; also along the roads, eg. near Salakos, and between Malona and Archangelos; it runs wild
31. *Schinus molle* L. — mainly in Rodhos town, but also in other settlements; beautiful group of trees in Apolakkia

*Celastraceae*

32. *Evonymus japonicus* L. f. — in Rodhos town; frequently planted in pots

*Vitaceae*

33. *Partenocissus quinquefolia* (L.) Planchon — it frequently covers verandas of cafés

*Malvaceae*

34. *Hibiscus rosa-sinensis* L. — frequently in tree-like forms; one of the commonest decorative species on the island, especially widespread in Rodhos town

*Elaeagnaceae*

35. *Elaeagnus angustifolia* L. — in different parts of the island

*Lythraceae*

36. *Lagerstroemia indica* L. — Rodhos town

*Myrtaceae*

37. *Eucalyptus camaldulensis* Dehnh.
38. *Eucalyptus globulus* Labill. — probably only these two species; more frequently in the northern part of the island

*Cornaceae*

39. *Aucuba japonica* Thunb. — Rodhos town

*Oleaceae*

40. *Ligustrum lucidum* Aiton f. — mainly in Rodhos town
41. *Jasminum officinale* L.
42. *Syringa vulgaris* L. (in varieties) — not so frequently, near houses

*Apocynaceae*

43. *Plumeria rubra* L. — here and there, particularly in Rodhos town

*Verbenaceae*

44. *Lantana camara* L. — on the walls and near the houses, frequently

*Labiatae*

45. *Rosmarinus officinalis* L. — rare, only Rodhos town and near Apolakkia and Kattavia

*Solanaceae*

46. *Nicotiana glauca* R. C. Graham — Rodhos and Lindos towns

*Buddlejaceae*

47. *Buddleja* sp. — Rodhos town

*Bignoniaceae*

48. *Campsis radicans* (L.) Seeman  
49. *Jacaranda mimosifolia* D. Don

*Caprifoliaceae*

50. *Viburnum tinus* L. — Rodhos town, in parks  
51. *Lonicera japonica* Thunb. (also 'Reticulata') — quite frequently

*Compositae*

52. *Artemisia arborescens* L. — rare, eg. between Lardos and Lindos

*Palmae*

53. *Phoenix canariensis* Chaub.  
54. *Washingtonia filifera* H. Wendl.

## THE NATIVE ON THE RODHOS TREES AND SHRUBS UNDER CULTIVATION

1. *Pinus brutia* Ten. — forest plantations
2. *Cupressus sempervirens* L. f. *sempervirens* (=var. *pyramidalis* Nyman) — mainly near monasteries
3. *Quercus ilex* L. — street tree in Rodhos and Lardos towns
4. *Celtis australis* L. — particularly in Rodhos town, near Palace of the Great Masters
5. *Laurus nobilis* L. — Rodhos town
6. *Platanus orientalis* L. — frequently in the towns and settlements
7. *Cercis siliquastrum* L. — Rodhos town
8. *Ceratonia siliqua* L.
9. *Tamarix* sp. — along the seashores, especially in health resorts on the beaches
10. *Hedera helix* L. — on the walls of the old town in Rodhos

11. *Olea europaea* L. var. *europaea* — commonly planted on the whole island; number of the olive trees is here evaluated as about 8 millions specimens; the oldest, impressives specimens one can see in the vicinity of Malona, Vation and Lahania.
12. *Nerium oleander* L. (in varieties) — frequently planted near houses and along streets

#### SUMMARY

In 1983, from April 24th to May 24th floristic observations were being conducted on Rodhos devoted exclusively to the woody flora of the island. The main aim was to establish the full list of tree and shrub species occurring both natively and in cultivation, and on the other to characterize their occurrence and to prepare point maps of distribution for the native ones (89 maps).

Basing on our own herbarium collections and on field notes, as well as on materials from several European herbaria and literature reports we have established that on Rodhos there occur in the natural conditions 97 species of woody plants (*Gymnospermae* 5, *Angiospermae* 92). They belong to 42 families and 74 genera. Richest in terms of number of species are the following: *Leguminosae* — 11 species, *Rosaceae* — 9, *Labiatae* — 8, *Fagaceae* and *Cistaceae* — each 6. The richest genera are *Quercus* — 6 species and *Cistus* and *Tamarix* each 3 species. These data, however, are not fully accurate because with respect to a few species there are still some doubts whether they still exist on the island and whether they are native or perhaps only gone wild from cultivation. Besides the distinction between woody perennials and shrubs has sometimes created serious problems. The authors have discovered three new woody species for the flora of Rodhos, namely *Quercus aucheri*, *Rosa sempervirens* and *Tamarix tetrandra* as well as a new hybrid of almond *Amygdalus* × *rhodia* (*A. communis* × *A. graeca*).

When compiling the list of introduced species the authors took into consideration only such trees and shrubs which are being planted in the streets, squares and parks (particularly in Rodhos town) and also along the roads and near houses. The list contains 74 species, 20 of which are fruit trees and 54 are ornamentals. It turned out that 12 species of native flora of Rodhos have been introduced into cultivation and sometimes even on considerable scale, such as *Olea europaea* var. *europaea*.

The authors present a short characteristic of the more important plant communities such as forests (coniferous, carr, oak and remnant forests of *Phillyrea latifolia*), maquis, phrygana and also they point to specific agglomerations of trees and shrubs on cliffs, coastal dunes and in beds of seasonally drying rivers.

The literature listing included with the paper provides data on the flora of Rodhos which appeared in publications after 1943, that is after publication of the fundamental study of K. H. Rechinger "Flora Aegaea".

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## Drzewa i krzewy Rodosu — studium monograficzne

### Streszczenie

W roku 1983, od 24 kwietnia do 24 maja prowadzone były na Rodosie prace florystyczne poświęcone wyłącznie drzewiastej florzynie wyspy. Głównym celem było z jednej strony ustalenie pełnej listy gatunków drzew i krzewów, występujących tu zarówno w stanie dzikim, jak i w uprawie, a z drugiej strony scharakteryzowanie ich występowania oraz opracowanie punktowych map rozmieszczenia (89 map).

Opierając się na własnych zbiorach zielnikowych i notatkach terenowych, materiałach z kilku zielników europejskich i danych z literatury ustalono, że na Rodosie w warunkach naturalnych rośnie 97 gatunków drzew i krzewów (*Gymnospermae* 5, *Angiospermae* 92). Należą one do 42 rodzin i 74 rodzajów. Najbogatszymi pod względem liczby gatunków są następujące rodziny: *Leguminosae* — 11 gatunków, *Rosaceae* — 9, *Labiatae* — 8 i *Fagaceae* oraz *Cistaceae* po 6, a najbogatszymi rodzajami są: *Quercus* — 6 gatunków oraz *Cistus* i *Tamarix* po 3. Dane te nie są jednak zupełnie ścisłe, gdyż w stosunku do kilku gatunków istnieją wątpliwości, czy jeszcze nadal rosną na wyspie i czy na pewno są dzikimi a nie naturalizowanymi przedstawicielami flory Rodosu. Oprócz tego oddzielenie od siebie krzewów od tzw. zdrewniałych bylin stwarzało nieraz poważny problem. Autorzy odkryli 3 nowe dla flory Rodosu gatunki drzew i krzewów, a mianowicie: *Quercus aucheri*, *Rosa sempervirens* i *Tamarix tetrandra*, a ponadto nowy mieszańiec migdału — *Amygdalus* × *rhodia* (*A. communis* × *A. graeca*).

Przy zestawianiu listy gatunków introdukowanych autorzy brali pod uwagę tylko te drzewa i krzewy, które były wysadzone na ulicach, placach i w parkach (szczególnie w mieście Rodos) a także wzdłuż dróg i w pobliżu domów. Lista ta obejmuje 74 gatunki, z czego 20 przypada na drzewa i krzewy owocowe a 54 na ozdobne. Okazało się, że 12 gatunków dzikiej flory Rodosu wprowadzonych zostało również do uprawy i to niekiedy na dużą skalę, jak np. *Olea europaea* var. *europaea*.

Autorzy podają w swej pracy krótką charakterystykę najważniejszych zbiorowisk roślinnych, takich jak: lasy (szpilkowe, łęgowe, dębowe i szczytkowe lasy *Phillyrea latifolia*), makia i frygana, a ponadto zwracają uwagę na specyficzne zgrupowania drzew i krzewów na urwiskach skalnych, wydmach nadmorskich oraz w korytach wysychających w lecie rzek.

Załączone do pracy zestawienie literatury o florzynie i roślinności Rodosu dotyczy publikacji, które ukazały się po roku 1943, a więc po wydaniu fundamentalnego opracowania K. H. Rechinger'a „Flora Aegaea”.

## Деревья и кустарники Родоса — монографическое исследование\*

### Резюме

В 1983 году, с 24 апреля по 24 мая велись на о. Родос флористические исследования, темой которых являлась исключительно дендрофлора этого острова. Главной целью было, с одной стороны, определение полного состава видов деревьев и кустарников встречающихся здесь как в естественном состоянии так и в культуре, а с дру-

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гой стороны характеристика их встречаемости и разработка точечных карт их размещения (89 карт).

Основываясь на собственных гербарных коллекциях, полевых записях, материалах с нескольких европейских гербариев и литературных источниках было установлено, что на о. Родос, в естественных условиях, произрастает 97 видов деревьев и кустарников (*Gymnospermae* 5, *Angiospermae* 92). Они принадлежат к 42 семействам и 74 родам. Наиболее богатыми по числу видов являются следующие семейства: *Leguminosae* — 11 видов, *Rosaceae* — 9, *Labiatae* — 8 и *Fagaceae* а также *Cistaceae* по 6, а наиболее многочисленными родами *Quercus* — 6 видов и *Cistus*, *Tamarix* по 3. Приведенные данные не являются однако совершенно точными, так как по отношению к нескольким видам существуют сомнения растут ли они еще на острове и являются ли они дикими, а не интродуцированными представителями флоры Родоса. Кроме того отделение кустарников от одревесневших многолетних травянистых растений доставляло иногда больших трудностей. Авторами найдено 3 новых для о. Родос вида деревьев и кустарников, а именно: *Quercus aucheri*, *Rosa sempervirens* и *Tamarix tetrandra*, а кроме того новый гибрид миндаля *Amygdalus* × *rhodia* (*A. communis* × *A. graeca*).

При составлении списка интродуцированных видов авторами учитывались только те деревья и кустарники, которые высаживались на улицах, площадях и в парках (особенно в г. Родос), а также вдоль дорог и поблизости домов. Этот список состоит из 74 видов. Из этого числа 20 приходится на плодовые деревья и кустарники, а 54 на декоративные. Оказалось, что 12 видов естественной флоры о. Родос было также введено в культуру и то иногда в больших масштабах, как например *Olea europaea* var. *europaea*.

Авторы приводят в своей работе краткую характеристику важнейших растительных ассоциаций, таких как: леса (хвойные, пойменные, дубовые, остаточные леса *Phillyrea latifolia*), маквиц, фригана, а кроме того обращают внимание на специфические гриппировки деревьев и кустарников на скальных обрывах, приморских дюнах и руслах высохших рек.

Приложенный к работе список литературы о флоре и растительности о. Родос включает те публикации, которые вышли с 1943 г., то есть после опубликования фундаментального труда К. Г. Речингера (К. Н. Rechinger „Flora Aegaea”).