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Distribution and Plasticity of *Myrtus communis*

By

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With 4 Figures

Introduction

One of the characteristics of floristically rich mediterranean basin is the occurrence of plant community known as maquis or macchie (Fig. 1). In almost all the investigations carried out on macchie, *Myrtus communis* L. (Fig. 2) has been regarded as an important member of this very characteristic and natural type of mediterranean plant community (REGEL 1963: 25; POLUNIN & HUXLEY 1967: 11; PESMEN 1971: 39; VARDAR & AHMED 1972: 252). It is a successful species characterised not only by a wide distribution (Fig. 3 and 4) but also occupying many ecological habitats and representing a case of wide ecological plasticity. The present communication will thus review those of the morphological and ecological features of this species which have been mainly responsible for its distribution.

Results and Discussion

A perusal of literature reveals that there are a large number of external and internal factors which govern the distribution and occurrence of plants in nature and fit them in defined niches. These are origin, reproductive capacity, ability to disperse disseminules, range of tolerance of the species and number of other environmental factors acting individually or collectively on the seed during germination and upon the seedling or mature plants. For a long time, distribution of plants has been explained on the basis of dispersal (GOOD 1925: 409). In general, mountains, deserts, swamps and seas have been reported to hinder the dissemination of the plants. Although plants have in course of time adapted themselves in such a way that they can overcome these obstacles but, they are mainly dependent on

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passive factors, such as man, animals, water, wind etc., in surmounting them. The medicinal and ornamental importance of *Myrtus communis* vis-a-vis the means of its dispersal and efficiency to propagate vegetatively give it ample chances to catch hold of any opportunity for dissemination as may be offered to it. The berries of *Myrtus communis* begin maturing in autumn and as they dry up and shrivel on the plant they fall to the ground. Rain and wind carries these fruits farther away from the parent plant and these get embedded in damp bed of alluvium which forms a suitable medium for its germination. The species owes a great deal of its distribution to water and it appears to be a causative factor for its recurrence in places like banks of streams. In the tests conducted in the laboratory it was observed that the minimum period of floating of an individual fruit was 4 days and the maximum 15—17 days; the majority of course sank within 11—13 days. Birds are also responsible for the dispersal of this species to a large extent. When the berries are ripe enough flocks of birds visit these plants so as to feed upon the succulent tissue encasing the seeds. During this, birds swallow the seeds too but these pass out of their gut undigested. The presence of aromatic oil in its leaves and its ornamental appearance have attracted human beings since ancient days as such, the species has been aided in its dispersal by man too. The combined action of the factors discussed above, though gradual and indiscernable, has resulted in the dispersal and theirby the distribution of this sp ecies in all directions.

Fig. 3: Distribution of *Myrtus communis* L. in the World. ● = Naturally occurring; ○ = Cultivated only.

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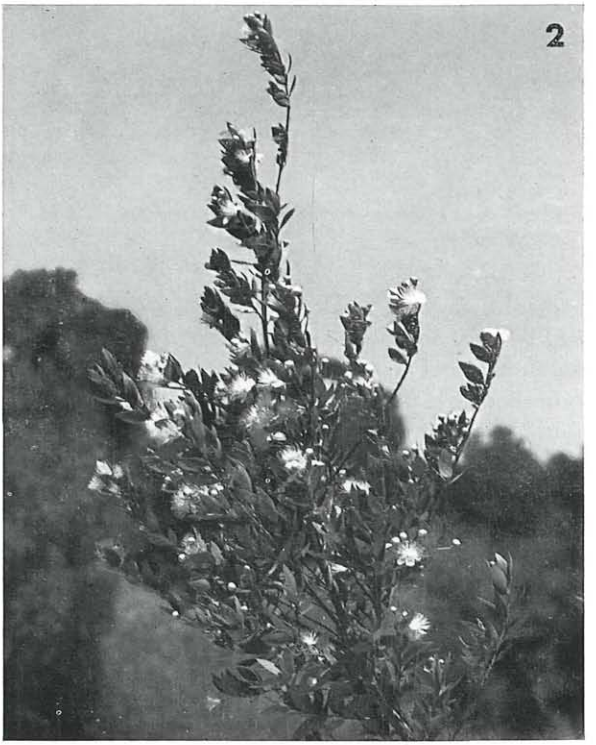

Fig. 1: A general outlook of macchie formation in Turkey.
Fig. 2: A flowering shoot of *Myrtus communis* L.

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The geographico-ecological distribution of the plants has been further correlated with such factors as, seed mortality before, during and after dispersal, resistance of seeds to dessication, their size, weight, longevity, dormancy and viability and the reproductive capacity of the plant as a whole (STONE & JUHREN 1951: 368; PELTON 1953: 619). The importance of seed germination studies in relation to the multifactorial environment for an understanding of the distribution of the plants, has been emphasized by CLAPHAM 1956: 1 and WENT 1957: 259. *Myrtus communis* is a prolific seed producer and the viability of the seeds is retained under diverse storage conditions. The seeds possess a very high germination rate. Germina-

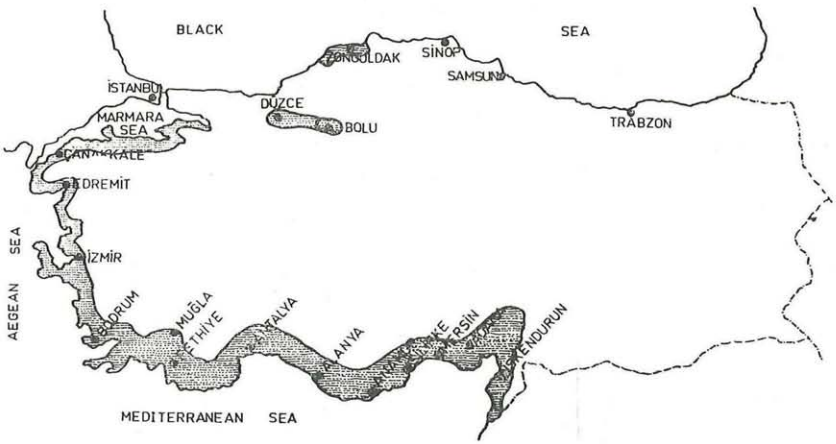

Fig. 4: Distribution of *Myrtus communis* L. in Turkey.

tion tests carried out on this species have yielded valuable information on the effects of various environmental parameters on the process. As the seeds mature their moisture content decreases but germination capacity increases. This is further supported by the fact that drying seeds over $CaCl_2$ from 24—36 hours gave optimum germination. The germination takes place in a wide range of soil moistures between 15—100 percent but, the optimum being obtained from 60—100 percent (VARDAR & AHMED 1971: 73). The latter explains the restriction of the germination to the rainy season in nature. It has been further observed that an increase in the duration of light results in a corresponding increase in the percentage germination. The optimum germination is obtained by exposing seeds from 9—15 hours light duration. As regards the light quality, green light seems to be stimulatory than red and blue light. Latter observations are at variance with those of EVENARI 1956: 519 and others, who report that

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red light is always stimulatory in case of photoresponsive seeds, but are in agreement with those made by WAKHLOO 1964: 237. The effects of temperature on germination show that seeds of *Myrtus communis* germinate within a range of 12°—30°C. The optimum germination is, however, obtained at temperatures of 27°C constant and 30°—22°C alternate. This explains the occurrence of this species in temperate regions. The seeds do not show dormancy and germinate immediately under favourable conditions. They generally remain viable from 12—18 months under various storage conditions. The high reproductive capacity (98752) combined with high germination rate (80%) of this species and various dispersal means discussed herein are the factors that allow it to invade new areas and produce thick and large stands in northern, western and southern parts of Turkey and elsewhere in the mediterranean region.

Dispersal and germination alone are not sufficient to explain the distribution of various species in nature. It is also limited by such factors as chemical antagonism, nutritional conditions etc., bound up with the soil. According to DAUBENMIRE 1959: 6, OOSTING 1958: 175 and GORHAM 1954: 97 growth of plants is also determined by such factors as mechanical and chemical properties of the soils and their moisture content. Studies carried out on the edaphic correlations of *Myrtus communis* show that it grows on variety of soil types and in diverse habitats being thus indifferent to the edaphic factor. However, the species is of frequent occurrence on alkaline soils rich in calcium (AHMET 1971: 131). The watering experiments have shown that seedlings require abundant moisture for successful establishment and growth. The plants growing in moist and well drained soils exhibit a luxuriant growth. The dependence of this species on moisture fully supports the fact why this species grows in regions and situations where prolonged desiccation is unknown.

Distribution of plants is also determined to some extent by temperature. Every plant species requires definite temperature for the continuance of its live processes. The different climates or the seasons are characterised by different temperatures and these limit the distribution of plants. *Myrtus communis* is a typically moderate temperature loving plant which is fully supported by its absence from areas like central and eastern parts of Turkey and other regions of the world where temperatures go down much below 0°C.

Though typically a shady mesophyte, this species can grow in extremes of light conditions. In full sunlight it becomes bushy by profuse branching and short internodes which leads to an overshadowing of the leaves by each other theirby reducing the effects of high insolation. Latter is further acheived by the smaller size of the leaves. Plants growing in conditions deficient in light compensate for low photosynthesis rate by increased leaf area minimising overshadowing by longer internodes and less crowded

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branching. The photoperiodic studies have revealed the fact that this species is a day neutral.

Another important aspect of the plant environment is biotic factor. Examining the behaviour of *Myrtus communis* in this context, it was observed that owing to their unpalatibility, plants of this species are not generally eaten by cattle. They do not get trampled under foot due to their habit. However, man being merely one of the factors in its environment is the chief agent for the destruction of the plants of this species. He continuously eradicates these plants for various purposes. The plant is not much attacked by insects and fungi, as such, the effects due to this biotic operation can be regarded as negligible.

Reviewing in retrospect the facts discussed in the foregoing account we may say that *Myrtus communis* shows a wide range of tolerance to the vicissitudes of physiographic, edaphic, climatic and biotic factors during almost all the ontogenic phases of its life cycle representing a case of wide ecological plasticity.

Summary

Myrtus communis L., an important member of the macchie formations in the mediterranean region, is a widely distributed shrub occupying different ecological niches. Populations of this species in ecologically different habitats show morphological, ecological and physiological characteristics which are often adaptive in nature. The wide ecological amplitude, high germination rate, high reproductive capacity, indifference to the edaphic factor, extensive dispersal means and ability to propagate vegetatively are the adaptations that allow it to face various constituents of the multifactorial environment and at the same time overcome the unfavourable conditions. The combined action of all these factors helps this species to hold on to the niche and the geographical area once occupied.

Zusammenfassung

Myrtus communis L., ein wichtiger Bestandteil der Macchie-Formation im mediterranen Raum, ist ein weit verbreiteter Strauch, der verschiedene ökologische Nischen besiedelt. Bestände dieser Art, auf ökologisch unterschiedlichen Standorten zeigen morphologische, ökologische und physiologische Merkmale, die auf Anpassungsfähigkeit beruhen. Der breite ökologische Spielraum, reiche Samenbildung, hohe Fortpflanzungsrate, Unempfindlichkeit gegenüber edaphischen Faktoren und die Fähigkeit zu vegetativer Vermehrung erlauben es der Art, den sehr verschiedenen Ansprüchen der vielfältigen Umwelt nicht nur zu entsprechen, sondern gleichzeitig auch ungünstige Bedingungen zu überdauern. Das Zusammenwirken aller dieser Tatsachen hilft der Art, ihre Nischen und das einmal eroberte geographische Areal zu behaupten.

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