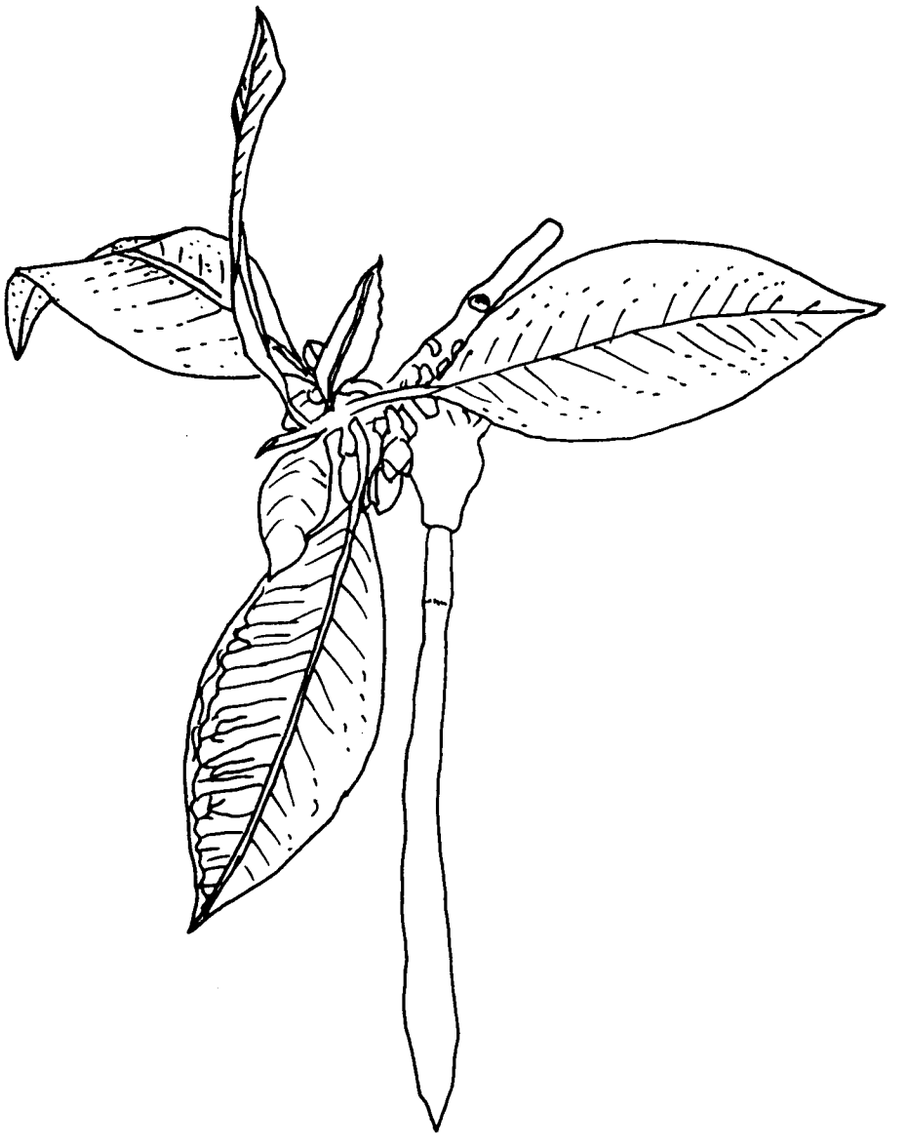

Summary and conclusions

Mangroves are characteristic littoral plant formations growing in sheltered coastline of tropics and subtropics. The mangroves extend up to 30° latitude in both the hemispheres. The mangroves form, at many places, very extensive and productive forests. Mangroves not only dominate the estuarine habitat as bridging ecosystems between land and sea but also define an economic resource. The work done on these ecosystems was restricted formerly to ecology, anatomy and embryology. However, ecology did not cover autecology of all species.

So far taxonomy and autecology, are concerned lot of work has been done on R. mangle and R. stylosa, however there is very little or no information available on R. apiculata and K. candel.

Scope of investigation

Looking into the necessity of literature on R. apiculata and K. candel present study was designed. It deals with taxonomic aspects as well as physiological aspects of study of R. apiculata and K. candel. The main aim of the study is to fill up the gaps in the available literature with respect to autecology, some of the estimations will lead to point out physiological status of the two species.

Thus the present study is restricted to soil analysis from root zones, analysis of water bathing the plants and mineral status of the plants, as judged from the leaves. Further

leaves were subjected to analysis for TAN, chlorophylls, polyphenols and carbohydrates. The mineral constituents from the leaves of mature plants are compared with different organs at seedlings stage. The vivipary in K. candel was studied with respect to major inorganic constituents.

AUTECOLOGY

The site for collection of plant material and other samples is from Ratnagiri district situated to the south of Ratnagiri city. It is the Ratnagiri river locally known as Bhatya estuary. The plants under present investigation are found only along this estuary in the areas near by Ratnagiri. The species are Rhizophora apiculata Blume and Kandelia candel (L) Druce. The details of characteristic features in both the genera are given in the present work. Further, keys for identification of genus and species have also been described.

During several visits to the site, it was found that there occurs a sort of zonation from the mouth of estuary towards the upstream areas. To begin with Sonneratia alba, on the south bank of estuary, forms pure patches. These were then substituted by mixed vegetation. It was found that in the stand of mixed vegetation R. apiculata constituted 45 %, K. candel 25 % and remaining 30 % was occupied by Aegiceras corniculatum, Sonneratia alba and Avicennia officinalis.

Flowering :

Both the plants under present study exhibit viviparous germination. However their flowering period varies in R. apiculata initiation of flowering takes place in the month of June and continues up to October. The whole cycle of producing viviparous propagules requires about ten months. In case of K. candel flowering, fruiting and seedling development processes overlap. The initiation of flowering was seen in the month of March and the maturation of propogules takes complete one year.

Substratum :

There are several attempts to investigate and characterize the substratum of mangrove species. It has been reported by many workers that the soil at the root zone of different mangrove species differs. Therefore in the present investigation the soil analysis was also covered. The soil was obtained from 0 to 15 cm layer from the root zone of each species. That was subjected to texture determination as well as to find out pH and water soluble salts. It was observed that the difference in the texture in two soils was with silt and clay components R. apiculata soil was more coarse than that of K. candel.

The pH of the water surrounding the species was almost natural (6.9). However the pH of soil was acidic and there was a difference of 0.5 in the pH of two soils. The electrical conductivity of water and soil did not differ much. The major

inorganic constituents of estuarine water and soil are sodium and chloride. The water consisted of large amounts of both these elements, whereas potassium value for water was low. The Na/K ratio for water was 17, which was reduced to 11.46 in the soil from K. candel root zone and to 8.6 for the other soil. The K. candel soil indicated higher value for chloride also. Thus the overall salinity in the soil was more at the root zone of K. candel.

PHYSIOLOGY

The study was restricted to major mineral constituents and physiological processes from the leaves of mature trees. However the mineral constituents were determined from different parts of seedlings growing near the mother plant as well as from the propogules still hanging on the mother plants.

I. Inorganic constituents :

The study indicated that the leaves from mature tree contained less amount of Na than the leaves of seedling in both the species. Na in stem and roots was lower than the leaves. The value for Na in R. apiculata was 5.95 % for seedling-leaves. However the mature leaves showed low values. This may be possibly because of inability of the seedlings to regulate the salts.

The levels of the potassium were less than 1 %. Calcium was found in higher quantities in mature leaves but at seedling stage Ca absorption was inadequate. Na/K and Na/Ca ratios paralleled each other. The study showed existance of ion antagonism between Na and K and Na and Ca. Very high percentage of chloride was recorded in the present study. This is more so with K. candel.

II. Vivipary :

Vivipary is a common feature in the members of family Rhizophoraceae which occur as mangroves. It has been reported in the earlier work by several investigators that vivipary is the adaptation to salinization, on the mother plant itself. In the present study the hypocotyl portion along with plumular end was subjected to analysis. It was found that though the seedling established in the soil contained large amounts of sodium and chloride. The mature propogule from mother plant contained very low levels of socium and chlorides. However, comparatively potassium level was higher. Na/K ratio in the propogule is less than 1. This shows that the viviparous propogules in K. candel are kept away from high levels of harmful ions by the mother plants. The whole study throws light upon mechanism of salt regulation in these two plants.

III. Organic constituents :

i) TAN

Titratable acid number gives the idea about free organic acid in the tissue. It was found that the TAN value of 40, in the leaves of R. apiculata was higher than K. candel leaves (30). This may be because of higher level of salts in the leaves of K. candel.

ii) Chlorophylls

The chlorophyll values reported for mangroves by different workers vary in different species. In general, the chlorophyll levels in mangroves as compared to glycophytes are low. There occurs seasonal variation in the chlorophyll contents of the leaves of mangroves. Some investigators have reported that salinity decreases the chlorophyll levels in the mangroves. The present investigation supports this view. It was observed that the chlorophyll contents of the leaves of K. candel were lower than those of R. apiculata.

iii) Polyphenols

Mangroves are known for high contents of polyphenols (tannins) especially in the bark. The polyphenol contents of the leaves differ from species to species. In the present study it was observed that R. apiculata leaves have more polyphenols

than those of K. candel. This can be attributed to high salinity in the leaves of K. candel.

iv) Carbohydrates

Earlier workers have reported higher levels of carbohydrates in the leaves of mangroves. It has been shown that the salinity increases starch levels in these plants. It was observed in R. apiculata that the level of starch was very high, however, in K. candel the starch values are lower. These results are on the similar lihes of investigations on A. officinalis and A. marina. It seems possible that the response of carbohydrate metabolism to salinity differs with species in the saline environment. It may also depend upon other adaptive features that the species possesses to overcome harmful levels of salt in the plant.

The study indicated that K. candel acquires higher levels of salt in the tissues. The physiological processes in this plant are in response to high salinity.