Chapter IV

SUMMARY AND CONCLUSIONS

Euphorbia geniculata Orteg. a member of family euphorbiaceae is a tropical weed and shows cosmopolitan distribution. It is a native of tropical America and is naturalised and well established in many countries including India as a weed of cultivated fields, waste lands and gardens etc.. E. geniculata is an annual herb. The weed shows its growth throughout the year. At Karad the weed is of common occurrence in cultivated fields and gardens. Present investigation is an attempt to understand some of the basic ecophysiological parameters of the weed. These basic aspects can throw some light on the further aspects of E. geniculata, which is a one of the important petroplants.

The present dissertation on eco-physiology of E. geniculata is divided into four chapters. Review of literature on weeds is taken in Chapter I. Chapter second deals with the material and methodology employed during present investigation. Obtained results are discussed in light of available references in third chapter of results and discussion. For ecophysiological studies of E. geniculata we have started from its origin and distribution, studied its morphology, seed attributes, various constituents of plant body with respect to seasonal variations. Nitrogen metabolism is worked out little deep and pathophysiology is the last aspect of present study. The main conclusions of the dissertation can be listed as follows,

1. E. geniculata is very common weed of cultivated fields and gardens at Karad (L 21^{o}, 10'N, L 72^{o}, 50'E) which is included in the Western Ghat region of India. E. geniculata is common both in moist as well as dry habitats however frequency is more in moist places. The weed was also recorded from the fields of sugarcane, jowar, rice and bajara.

2. E. geniculata is an annual herb with tap root system, erect unbranched or branched cylindrical stem with simple leaves and cyathium inflorescence.

3. Pollination mechanism in this plant is achieved through the agency of some arthropods.

4. The multiplication of E. geniculata mainly takes place by means of seeds. The seed output per plant was observed to be 168. The seeds produced from parent plant shows 91% germination and seeds are without any dormancy period.

5. The liberation of seeds takes place by explosive mechanism of the capsule. Due to explosive mechanism seeds are dispersed upto 20 cm. around the parent plants.

6. Generally the weed E. geniculata thrives well throughout the year. It completes its life cycle within $2\frac{1}{2}$ to three months. However, maximum density of the plant is observed after the commencement of monsoon season.

7. Better growth performance of E. geniculata was observed in moist and shady habitat.

8. E. geniculata basically is a member of grassland community. It was found to be associated with grasses and herbaceous members of other families.

9. Seeds are produced in large number, they are without any dormancy period and there occur 98% viability of the seeds.

10. The seeds of E. geniculata produces the mucilagenous helices when they are moistened. This helps further in dispersal and germination.

11. E. geniculata seeds can withstand the maximum temperature of $80^{o}C$. Further the seeds can remain viable for a period more than $2\frac{1}{2}$ years. This longevity of the seeds is due to its optimum i.e. 9% moisture content.

12. E. geniculata is characterized by its alternate phyllotaxy in lower part while opposite in upper part of the stem.

13. Both alternate and opposite leaves show normal dorsiventral type of leaf anatomy. 'Kranz' syndrome is absent in E. geniculata. Thus, in leaves C_3 path of carbon assimilation is judged from the anatomical features. Non CAM nature is evident from TAN estimates and Mesophyll succulence. Chl. a/b ratio further signifies the C_3 nature of Euphorbia geniculata.

14. The stomatal frequency ratio indicates the C_3 nature of the plant. Stoma tal behaviour shows two peaks- one at 8 a.m. and other at 3 p.m. The morning peak of opening of stomata speaks more about its C_3 nature. Rate of transpiration is more in lower epidermis of both, alternate and opposite leaves.

15. Based upon the organic constituents of leaves we have predicated E. geniculata to be a nitrophilous plant. Nitrogen content, values of total proteins and the activities of enzymes nitrate reductase and nitrite reductase confirms that the E. geniculata is a nitrophilous plant.

16. In vitro effect of NaCl on activities of nitrate reductase and nitrite reductase from leaves of E. geniculata show that nitrate reductase is

inhibited due to presence of salt while nitrite reductase is stimulated.

17. E. geniculata thrives well throughout the year. It responds well to the various seasons of the year by having seasonal variations in different mineral constituents. Various parameters like moisture percentage, dry matter production, pH, titratable acid number etc. they vary according to the environmental conditions. Chlorophyll contents and status of nitrogen metabolism also show seasonal variations so that the plant can cope up with the particular set of environment.

18. Seasonal variations in inorganic constituents like Na, K, Ca also helps the existence of the weed throughout the year. High potassium content also adds towasrds the nitrophilous nature of the weed. Comparatively high values of calcium can be the additional means towards achieving the healthy growth throughout the year. The seasonal variatioins in the values of microelements like Mg, Mn, Si, Zn, Cu, Ni and Co also indicate that the mineral nutrition of the plant is maintained well and the good growth of the plant is achieved throughout the year.

19. The weed E. geniculata was found to be infected with Melampsora sps. The fungus is characterised by its sessile teliospores which unite laterally to form a pallisade layer below the epidermis. Uredospores are yellowish orange in colour.

20. Some physiological changes are induced in the E. geniculata due to infection by Melampsora sps. Values of TAN, Chlorophylls, Nitrate reductase, Nitrite reductase, Total nitrogen and proteins are altered due to infection. Reduced TAN values and Chl. a/b ratio indicates the defence mechanism of E. geniculata to the infection. Rust infected leaves of

E. geniculata contain more Na, Fe and Si and reduced levels of K, Ca, Mg, Cu, Zn, Mn while Cobalt remains unaffected. High potassium values may be inhibitory to the growth of fungal mycelium in the host tissue. Increase in iron and silicon content can also 'add to the defence mechanism of E. geniculata.

From the study it appears that the E. geniculata is a nitrophilous, shade loving and fast growing herbaceous weed. It continues its life cycle mainly through seeds throughout the year. The optimum growth performance is maintained through various seasons by showing the seasonal variations in various plant constituents.

The weed is infected by a fungus Melampsora. However a defence mecha nism is developed by various means. Leaf architecture study leads us to judge that E. geniculata follows a C_3 path of carbon assimilation.

It is clear that the present work takes us to understand something about the eco-physiology of E. geniculata. In spite of available library and laboratory assets we have tried maximum to keep the data upto date. However, it will require several attempts to understand and to draw a clear picture with respect to the weed science.