SUMMARY AND CONCLUSION

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Ipomoea carnea Jacq spp. fistulosa Mart ex. Choicy, is a shrub native to South America and is grown as an ornamental plant in India. In many parts of India it is generally used for fencing the field crops. The plant is also used for fuel purpose. The plant produces dense foliage and flowers throughout the year. Its flower contains Anthocyain Peonidin, 3-O- β larabinopyranosyl, O-β-D Glycopyranolside and the flovonal kaempferol and leaves contain agroclavine and ∧-dihydrolyseral.

Ipomoea species has wide ecological amplitude for most of the factors. The information on ecophysiological aspect is inadequate. From this point of view the present work is planned.

In the present investigation an attempt has been made to undertake ecology of Ipomoea species which includes seed germination, growth analysis, phenology, stomatal behaviour, leaf behaviour pattern, air pollution tolerance index, relative water content and ecological anatomy. For this the routine methods of analysis were used. The parameters have been carried out to find out variations from two different habitats (arid and aquatic). The present work was undertaken at three different localities viz. Dahiwadi, Ichalkaranji and Kolhapur. Selection of the sites was done on the basis of varied habitat of Ipomoea carnea spp. fistulosa distribution.

Ecological status of any species is very important. Because different species have different genotypes, a genotype is the sum total of all genes expressed by an organism. The species differ from one another appreciably exhibiting different strategies with respect to environmental changes and interaction.

Keeping in view various uses, performance and adaptibility under various habitats of this species was evaluated for its ecological status.

The species propagates mainly by means of cuttings. It produces dormant seeds. Seed germination and viability studies were carried out. Eight years old seeds were tried to test viability. The seeds under investigation exhibited dormancy as no germination was observed under controlled conditions. Maximum percentage of seed germination was recorded in old stored scarified seeds. H_2SO_4 treatment enhanced the germination percentage in fresh seeds. It is clear from the observations that germination percentage in Ipomoea carnea spp. fistulosa can be improved with scarification and acid treatment.

The study of growth analysis at initial and after establishment was conducted. Growth rate remains same at initial phase as well as after establishment. There was no significant increase in girth of the shoot.

Observations were made for leaf area under natural condition during the end of rainy and summer season, maximum leaf area was noticed under natural habitat than controlled condition.

The established plants of one year old were analysed for root, shoot length and total biomass. The total biomass of plant was maximum in set D and minimum in set B. The aquatic habitat cuttings enjoy diverse edaphic environment as it is evident from its normal growth under laboratory and field condition. The species under controlled condition maintains its stability and individuality pertaining to its ecophysiological behaviour.

The life history of a species involves seed germination, vegetative phase, reproductive phase flowering, seed setting etc. Environmental factors influence the temporal behaviours of a species. These phenological events were recorded diagramatically (phenogram).

Initiation of first vegetative bud was recorded after 11 days. The floral bud initiation was seen after 10 months. The species flowers throughout the year.

There is no information on stomatal behaviour of this plant from different habitat. Therefore, in the present investigation an attempt was made to determine the variations in stomatal behaviour at different sites. Stomata were maximum

in sample F and minimum in Sample A. Less variation was observed in D and B samples. Controlled condition sets showed negligible difference as compaired with the samples from natural habitats.

Stomatal index varied much under natural habitat.

It was also planned to establish the leaf behaviour pattern under laboratory condition.

The diffusive resistance was maximum for upper leaf surface than lower surface. Leaf temperature was more for upper leaf surface for all sites.

More diffusive conductance for CO_2 and less diffusive resistance for CO_2 was recorded for all samples but with variations, because of adaptibility of species.

The species under study was recorded in many polluted areas with luxurient growth. Therefore it was decided to find out tolerance index.

The APTI value ranges between 7.08 - 8.1. The data indicates that the amount of ascorbic acid content experienced a significant loss in the polluted atmosphere. It appears that in this species ascorbic acid contents are more susceptible to pollution hazards than chlorophylls.

The present investigation (APTI) on Ipomoea carnea spp. fistulosa may be helpful during preparation of plans

for the abatement of pollution as well as management of the environment quality.

Various aspects of plant growth and metabolism are related with the energy captured by the chlorophyll pigments. These pigments mainly consist of chl.a, b, carotenoids and xanthophylls. The levels of pigments differ greatly from species to species and within a species from season to season. The chlorophyll content varies from site to site. The values of chlorophyll a dominates over chlorophyll b. The values of chlorophyll a was maximum in summer sample A. The species have higher amount of chl. b during summer for all sites. The diference in pigment level was due to influence of ecological conditions.

Aquatic species have less amount of carotenoids than arid species. It is observed that there is direct correlation between the amount of carotenoids and habitat.

Electrical conductivity is usually caused due to the water soluble solutes. Electrical conductivity was recorded from plants of various habitat. Though the values are less there is fluctuations in the values which may be due to different levels of solutes in different habitats.

Maximum pH was recorded in sample D and minimum in Sample F. pH remained constant for all the samples under

controlled condition. pH variations are due to different states of habitat.

Macro and micro elements vary with change in the ecological conditions. Different plant parts of Ipomoea carnea spp. fistulosa were used for elemental analysis. Significant variations in the nitrogen content was recorded in leaf stem and root. It is concluded that the leaf is important source of nitrogen. The results are helpful in increasing the soil fertility using species as green manure.

The range of phosphorus was 0.075 - 0.20%. In root, maximum quantity was observed in sample E.

The potassium levels were maximum in plant parts of aquatic habitat than arid.

Sodium content of Ipomoea carnea spp. fistulosa fluctuates with sites. The aquatic habitats show significant difference in sodium level.

The observed levels of Mn^{2+} are adequate for the growth. Maximum Mn quantity was observed in root sample 'A'. The values range between 0.0038 - 0.058%.

Maximum quantity of Mg was found in stem sample. Higher quantity of cobalt was observed in roots of sample E. The elements show variation in different plant parts of the species.

The energy content was determined by quantifying its calorific value from two extreme habitats. The energy content was very high in Ipomoea carnea spp. fistulosa of arid habitat than aquatic. But energy accumulation is high in Ipomoea species than other aquatic macrophytes.

The amount of solar energy stored in plant biomass depends upon the type of species and ecological habitat.

The amount of soil water available to plants depends upon the type and properties of soil. Thus, in the present investigation, the soil samples from the root zone of Ipomoea carnea spp. fistulosa were analysed for pH, organic matter content and waterholding capacity.

The pH of soil changes in relation to sites. The values are in alkaline range. The water holding capacity of the soil from aquatic habitat was found to be higher than arid habitat.

Thus, it is clear from the present status that the water relations of plants are directly related to the amount of moisture available in the soil.

Allelopathy is a new and potential field of research. Some allelopathic effects are helpful in maintaining the soil productivity and also in keeping the soil free from pollution.

The extracts of Ipomoea carnea spp. fistulosa

inhibited the seedling growth of Jowar, Wheat and Rice. The inhibitory effects increased with increasing extract concentration in Wheat and Jowar.

The toxicity in terms percent inhibition of the seed germination followed the order Corolla , leaves , root extracts. The differential inhibition may possibly be due to the presence of variable concentrations of inhibitors in plant parts. This study showed that kidney bean is more tolerent to Ipomoea carnea spp. fistulosa extracts than Wheat, Jowar and Rice. These inhibitory effects of Ipomoea carnea spp. fistulosa on the field crops may not be compitative but allelopathic.

The main advantages of this species is its ability to grow in arid, semi-arid and aquatic environments. Therefore it can be used for soil conservation and rehabilitation. The species also yields high quality fuel wood and also suitable for making baskets. Hence the term multipurpose can be used to the species.

The present investigations on ecophysiology of Ipomoea carnea spp. fistulosa contributes new approaches to the existing knowledge. The ecological status and allelopathic effect of Ipomoea carnea spp. fistulosa on crops are entirely new areas which form an interesting ground for further problem of investigation. The analytical part of plant and soil throws light on characterstic feature of the species.

1. Seed germination, viability and growth analysis exhibits different strategies with respect to environmental changes. The germination percentage can be improved with scarification and H_2SO_4 treatment.

2. The species has wide ecological amplitude.

3. The species propagates by vegetative means and produces dormant seeds. Seeds remain viable upto eight years.

4. The aquatic habitat cuttings enjoy diverse edaphic environment.

5. Phenogram represents the phenological events. The species flowers throughout year.

6. Stomatal index varies from habitat to habitat. Leaf behaviour pattern varies with site because of adaptability and structural set up of the species.

7. The species under study was recorded in many heavily polluted areas with luxurient growth during field survey.

8. From APTI value it is concluded and suggested that Ipomoea carnea spp. fistulosa can serve as biomonitors in polluted environment. Further investigations on these lines are under progress.

9. There is direct correlation between the amount of carotenoids and habitat. Arid plants have more amount of carotenoids than aquatic.

10. The kidney bean is more tolerant to Ipomoea carnea spp. fistulosa extracts than Wheat, Jowar, Rice and inhibitory effects on the field crops are allelopathic.