CHAPTER IV

SUMMARY AND CONCLUSIONS

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The selection and breeding of salt tolerant crops is regarded as one of the main approach to deal with a serious problem of salt affected soils through out the world. In order to achieve this strategy it is necessary to identify the mechanisms of salt tolerance in the plant species well adapted to such problem soils. *Prosopis juliflora* is one such plant species which can successfully grown and complete its life cycle in variety of wastelands. It is noticed that the plant has successfully established in farmlands of Digraj (Dist. Sangli) which are heavily affected by secondary salinization. Hence an attempt has been made to study some aspects of physiology of salt tolerance in this plant species.

Seed germination:-

The preliminary germination studies showed that even at high level (200 and 300mM) of NaCl and Na_2SO_4 there is more than 20-30% seed germination. Na_2SO_4 was found to be more inhibitory than NaCl.

Growth:

In order to study influence of NaCl salinity the *Prosopis juliflora* plant were raised in sand culture in Hoagland nutrient medium and subjected to increasing doses (0,100,200,300mM) of NaCl in Hoagland medium in tap water. The growth of *Prosopis juliflora* was not affected by low concentration i.e. (100mM) of NaCl while higher concentrations hampered growth and caused marked decrease in fresh weight (60%) and dry weight (68%). While low salinity

stimulated the growth of plant. The root to shoot ratio was increased due to salinity increasing more investment of carbon development of root system.

Mineral Nutrition:-

Sodium chloride salinity caused alteration in mineral nutrition with increasing salt concentration. The level of sodium and chloride increased both in leaves and roots. Chloride content was more in leaves than roots in salt stressed plants. Reduction in root potassium content at 100mM and 300mM NaCl treatment while it increases at 200mM. In leaf potassium increased due to both low (100mM) and high (300mM) salinity. Calcium content is found to be increased in both leaves and root due to increase in salt stress and it may contribute to salinity tolerance in the plant. Phosphorus content in leaf and root tissue is lowered with increasing NaCl treatment. Thus, the phosphorus nutrition appears rather sensitive to salt stress.

Lipid Composition:-

The TLC analysis revealed that the lipid composition in both roots and leaves were found to be altered due to salt stress. The synthesis of neutral lipids and some phospholipids is probably affected by salinity at the same time some new lipids are synthesized due to salinity which may contribute to salt tolerance process.

Enzymes of Carbohydrate Metabolism:-

The activity of major hydrolytic enzyme alpha-amylase in the roots and leaves of *Prosopis juliflora* is decreased with increasing salinity treatment. In contrast to α-amylase the activity of a key enzyme of sucrose metabolism invertase has recorded increase in roots and leaves of salt stress plants. Thus the starch metabolism is rather stable under saline conditions while sucrose metabolism in cytosol is altered due to salinity.

Enzymes of Phosphorus Metabolism:-

In roots and leaves of *Prosopis juliflora* the activity of acid phosphatase is increased with increasing salt stress. This may play a role in maintaining iP supply to different parts within a plant in saline conditions. In contrast to acid phosphatase the activity of alkaline phosphatase has shown a decrease under saline condition.

The activity of enzyme ATPase in root and leaves of *Prosopis juliflora* is increased in response to increasing salt concentration of the medium. This increase may help in regulation of ion uptake as well as contribute energy to growth processes. In contrast to ATPase the activity of enzyme inorganic pyrophosphatase was found to be decreased in root and leaves under saline conditions. Such decrease can indirectly cause disturbance in the synthesis of carbohydrates since PPi production occurs during biosynthesis of these compounds and its degradation is essential for continuity of the process. Due to

sufficient availability of regular biological currency ATP in this salt tolerant plant, pyrophosphate (PPi) is perhaps not used as energy currency under stress condition.

In conclusion it can be stated that due to salinity, there are definite changes in mineral uptake and distribution, lipid composition, carbohydrate and phosphorus metabolism in the salt tolerant species *Prosopis juliflora.* Some of these changes are probably related to mechanisms underlying salt tolerance in this species.