

CHAPTER - IV

SUMMARY AND CONCLUSION

Plant growth and development are regulated by several environmental and endogeneous factors. This aspect has a great significance when we consider crop plants because ultimately all this influence is reflected in the gain or loss in the crop yield. In last two decades a serious attention has been paid to the chemical manipulation of crop growth and development. Plant growth regulators other than nutrients are either natural or synthetic compounds which are applied to a plant to alter its life processes or structure in some beneficial way so as to enhance yield, improve quality or facilitate harvesting. Thus this term encompasses both phytohormones as well as synthetic compounds. Further both growth promoters as well as retardants are included in this class. It has been predicted by Nickell (1983) that plant growth regulators are expected to play an important role in the efforce of this century. There are various ways in which the plant growth regulators are applied to the plants. In developing countries like India the cost of plant growth regulator and its application are definitely required consideration when one desire to apply foliar sparys. On this background presowing soaking treatment with a plant growth regulators appears somewhat beneficial. In case of sugarcane although foliar application of plant growth regulators has been extensively attempted, relatively less attention has been paid to the

presowing soaking treatment. Hence it was thought worthwhile to study physiological responses of sugarcane to presowing soaking treatment with plant growth regulators. Although CCC has been very well recognised as a growth retardant it is well established that it can increase the resistance of some plant to cold, drought and salt damage (Nickell, 1983). Ethylene generating compounds are attracted a great attention of plant physiologists in recent day prime among this compound is ethephon. Hence in present investigation an attempt has been made to study the influence of CCC and ethephon pretreatment on growth and metabolism in sugarcane cultivar CO. 671. Some of the significant finding of the present investigation can be summerised as fallows.

1. GERMINATION STUDY

In sugarcane sprouting of eye buds determines the establishment of crop stand. High rate and extent of germination which indicates the initial density of crop which is one of the major factor affecting both cane and sugar yields. For healthy stand of sugarcane crop earliness and rapidity of germination is of prime importance. It was observed that eye bud sprouting of sugarcane is markedly improved due to CCC while ethephon is less effective in this respect.

In order to understand the influence of presowing soaking treatment on bud metabolism a study of some enzymes are conducted. Catalase and peroxidase represent two important oxidative enzymes in plants. Catalase is further involved in reducing hydrogen peroxide level while peroxidase is related to auxin degradation. It was noticed that distilled water pretreatment promoted the activity of these two enzymes while CCC and ethephon were not much effected in causing significant alteration in the two enzymes. Dehydrogenases play a vital role in the respiratory process and thus in turn determine the viability and the seedling vigour. The presowing soaking treatment with distilled water, CCC and ethephon caused a marked increase in dehydrogenase activity which clearly indicate the effect of pretreatment on the metabolic processes in the bud. The presowing soaking treatment have also caused a marked increase in nitrate reductase activity and in this respect CCC pretreatment was most effective. This increment in nitrate reductase activity has a great significance in nitrogen nutrition of the plant. Since this enzyme has been regarded as a rate limiting step of nitrogen assimilation in plants.

The growth of sugarcane plants was find to be positively influenced by presowing soaking treatments. This was reflected in various growth parameters such as tiller

number, leaf area, internodal number, internodal length and weight of cane. It was noticed that even emergence of nodal roots was promoted by seed presoaking and in this respect ethephon was more effective. The quality of juice was also superior in case of pretreated plants. It was also noticed in the field study that the flowering was delay in the pretreated plants as compared to control fields. Thus prosowing soaking treatments have a definite positive effect on growth and productivity of sugarcane.

2. MINERAL NUTRITION STUDY

For assessment of influence of presowing soaking treatment on mineral nutrition a foliar analysis was performed. A marked increase in calcium and magnesium contents was evident in the leaves of pretreated plants and in this respect CCC pretreatment recorded in maximum increase since both these mineral elements are playing a vital role in leaf metabolism. Elevation of their level would have a beneficial effect on leaf metabolism. The level of two microelements manganese and cobalt was also found to be slightly increased in the leaves of plants raised from pretreated setts. Ethephon pretreatment caused an increase in macroelement potassium and slight increase in zinc and copper. That it is apparent that mineral nutrition alter to some degree due to presowing soaking treatment.

The analysis of organic constituents in the leaf tissue revealed marked changes in the level of various metabolites due to presowing soaking treatment. The level of sugars was increased in the leaves due to presowing soaking treatment. This indicates the positive influence of pretreatment on photosynthetic carbon metabolites since sugars are main products of CO₂ fixation. The presowing soaking treatment of distilled water, CCC and ethephon caused a marked increase in nitrogen content. An improvement of nitrogen status has definite significance in view of indispensability of this element for various growth processes. In contrast to sugar the organic acid content as indicated by TAN values recorded a decrease in leaves of pretreated plants. In contrast to organic acid level of secondary metabolites polyphenols was more in the leaves of pretreated plants. This may prove beneficial for sugarcane plant in tolerance against pathogen. The presowing soaking treatments caused increase in photosynthetic pigments chlorophylls in the leaf tissue. Carotenoids also showed a similar trend. Increase in both photosynthetic pigment systems would contribute to increase efficiency of harvesting the solar energy and in turn the increased productivity. The analysis of CSI in the leaves revealed that CSI values were increased due to presowing soaking treatment. This would undoubtedly contribute to the

tolerance of sugarcane plant to drought and heat stress.

In conclusion it can be stated that the overall performance of sugarcane from sprouting up to harvest is positively influenced by presowing soaking treatments with distilled water, chlorocholine chloride and ethephon. This is clearly traceable in various physiological changes caused due to these pretreatments.