

CHAPTER 6
SUMMARY

SUMMARY

The present study entitled “Studies on the effects of a fertilizer factory effluent on *Capsicum annuum* L. a ‘food adjunct’ of Solanaceae” elucidates the effects of industrial effluent on four plants of *Capsicum annuum* L. belonging to the family Solanaceae.

The liquid industrial waste selected for the present study was from FACT, Ammonium sulphate plant at *Udyogamandal* near *Alwaye*, *Ernakulam* District, Kerala State. The present investigation concentrated on *Capsicum annuum* L. varieties *Ujwala* , *Jwalamukhi* , *Jwalasakhi* and *Wild*.

The impact of different concentrations of effluent on germination, growth of the seedlings, vigour index, phytotoxicity, height of the plant, number of leaves, number of branches, number of days taken to flower, arrangement and fusion of floral parts and their abnormalities, root length, number of fruits per plant, weight of fruits, length of fruits and number of seeds per fruit, cytological features, analysis of content of chlorophyll, carotenoid, total carbohydrate and total protein, stomatal index, phytomass, net primary productivity, SEM studies of seed surface and leaf surface and pollen morphology was studied.

The effluent was collected at different intervals and each time physico-chemical characteristics were analysed. The plants were treated with different concentrations of effluent. The different parameters were analysed regularly

and the values were compared with the control. The results obtained were analysed statistically and discussed with previous literature.

The results of the experiment disclosed relative sensitivity of plant species. Lower concentrations of the effluent stimulated the germination and growth in all treated plants. Upto 50% effluent concentration showed the optimum results in all the test materials. Wild showed tolerance even in 75% effluent concentration.

The reduction in biochemical contents of the plants at the elevated level of effluent reflects their toxicity. Augmented results in the lower concentrations unveil the micronutrient nature of the effluent.

In all the four treated plants the morphological characters showed an incited effect at lower concentration. In higher concentrations of effluent (75% and 100%) the plants displayed a retarded performance with reduction in the height of plant, length of root, number of branches and number of leaves. In all the treated plants the mean days taken to flower reduced significantly as the treatment concentration increased. Yield and productivity were also found to be decreasing with increased concentrations. The stomatal characters varied with plants and effluent concentration. Reduced values were registered at the 100% treatment.

The cytological aberrations observed after the treatment with effluent revealed that there exists few types of aberrations while their frequency was

very low. The result of the palynological investigation concludes that the treatment could not account for any change in the basic characteristics of pollen either in variety or Wild.

The leaf epidermal scanning electron microphotograph showed that the guard cells of the stomata were elongated and showed size dimorphism in treated plants. The phytomass and productivity showed considerable reduction in high concentrations of the effluent. Upto 50% effluent concentration the effluent was found more beneficial for the phytomass and net primary productivity.

In Jwalamukhi the frequency of stomata per unit area was found to be increased in treated population and the ridges became flattened and the grooves became lesser deep due to the internal secretion and deposition, so that the leaf surface become hard in texture.

The seed surface pattern was found to be greatly affected by the treatment with effluent. When considering the microsurface pattern, more sensitive was Jwalamukhi that it showed diverse distinction from that of control. The seeds showed variation in number and size as a result of the treatment with effluent.

In Jwalamukhi and Jwalasakhi the size of the seeds was found to be increased at lower concentrations, while at higher concentration the size was found to be reduced. From the present study it becomes clear that at lower

concentrations the effluent acts as a micronutrient while at higher concentrations the same effluent induces toxic results. But the extent of effluent toxicity varies with plants and their different concentrations.

The analysis of the effluent revealed fluctuations in the physico-chemical parameters, during intervals. The contamination of the waterways was intensified several times due to the uncontrolled disposal of the different industrial effluents into it.

The result of the study shows that the effluents discharged into the aquatic systems affect the physico-chemical parameters of the water bodies and this is harmful for the normal life of the plants irrigated with river water and also the aquatic community.