SUMMARY
VII-SUMMARY

➢ For the present study dyeing industry effluent was collected from Chinnalapatti, Tamil Nadu, India and estimated for physico-chemical parameters, viz. pH, electrical conductivity, total solids, total dissolved solids, total suspended solids, total hardness, calcium, magnesium, sodium, potassium, chloride, sulphate, dissolved oxygen, biological oxygen demand, chemical oxygen demand, heavy metals such as zinc, nickel and copper. Unpolluted water from Gandhigram Rural Institute–Deemed University campus served as control.

➢ Dyeing industry effluent was evaporated in a glass tray (3litre capacity) in order to collect the residue. After evaporation the residue was scratched, collected and used for the pot culture and field trial studies.

➢ Physico-chemical parameters of dyeing industry effluent residue such as pH, electrical conductivity, calcium, magnesium, sodium, potassium, chloride, sulphate, zinc, nickel and copper were estimated.

➢ Vegetable crops such as Lady’s finger Abelmoschus esculentus (L) Moench., Brinjal Solanum melongena L. and Cluster bean Cyamopsis tetragonoloba (L.) Taub. were selected for pot culture and field trial studies based on their easy availability, relative importance in daily diet of a common man, surviving capacity, growth capabilities and economic value.
The pretreated quality seeds were procured from Horticultural College and Research Institute, Tamil Nadu Agricultural University, Periyakulam, Theni District, Tamil Nadu, India. Healthy, uniform and dried seeds were used in the present study.

Physico-chemical parameters of red soil used for pot culture studies such as pH, electrical conductivity, nitrogen, phosphorus, potassium, organic carbon, zinc, iron, nickel and copper were estimated.

Physico-chemical parameters of experimental field soil such as pH, electrical conductivity, phosphorus, potassium, zinc, nickel and copper were estimated before treating the soil with various ranges of dyeing industry effluent residue and after harvesting the crops.

The dyeing industry effluent residue was standardized for the present study by a pilot study with various weight ranges from 200 mg to 2000 mg. From the pilot study it was found that the dyeing industry effluent residue beyond 1200 mg was not suitable for germination hence residue weight ranges from 200 to 1200 mg was used in the present study.

The seeds were soaked in ground water and kept as control. The seeds were sown in various pots containing red soil, sand and cow dung (control), with various quantities (200, 400, 600, 800, 1000 and 1200 mg) of dyeing industry effluent residue.

Both the control and experimental seeds were allowed to grow in plastic pots. All the pots were kept in net house. The experimental plants were supplied with 200 mg to 1200 mg of respective quantities of dyeing industry effluent residue. In each treatment three replicates were maintained and regularly watered with groundwater.

Like pot culture studies, experimental plants in field studies also had seven treatments supplied with different quantities of dyeing industry effluent residue such as 0, 200, 400, 600, 800, 1000, and 1200 mg for treatment T0 (control) T1, T2, T3, T4, T5 and T6 respectively and had three replicates in the field layout. The field trial was conducted in microplots with six treatments of different quantities of dyeing industry effluent residue in triplicates and one control. Ten plants were raised in each microplots with appropriate spacings between rows and plants for each crop plants.
The seedlings were allowed to grow in the respective pots and microplots in field. The growth and biochemical characteristics of vegetable crops were estimated on 15th, 30th and 45th day for Lady’s finger *Abelmoschus esculentus* (L.) Moench., Cluster bean *Cymopsis tetragonoloba* (L.) Taub. and on 30th, 60th and 90th day for Brinjal *Solanum melongena* L. After harvesting the vegetable crops, the yield performance was also measured.

Effect of various quantities (200, 400, 600, 800, 1000 and 1200 mg) of dyeing industry effluent residue on yield performance such as number of fruits, length of fruit/pod and weight of fruit/pod were measured.

Germination efficiency of Lady’s finger *Abelmoschus esculentus* (L.) Moench., and Brinjal *Solanum melongena* L. was 100% in T3 whereas T2 and T3 of Cluster bean *Cymopsis tetragonoloba* (L.) Taub. showed 100% in pot culture studies. In the field trial all the three crop plants showed 100% germination efficiency in T4.

The growth characteristics, i.e. shoot length, root length, total fresh weight, total dry weight, leaf area and vigour index showed a considerable reduction from 800 mg of dyeing industry effluent residue in pot culture on 15th, 30th and 45th day for Lady’s finger *Abelmoschus esculentus* (L.) Moench., Cluster bean *Cymopsis tetragonoloba* (L.) Taub. and on 30th, 60th and 90th day for Brinjal *Solanum melongena* L.

The growth characteristics, i.e. shoot length, root length, total fresh weight, total dry weight, leaf area and vigour index showed a considerable reduction from 1000 mg of dyeing industry effluent residue in field trial on 15th, 30th and 45th day for Lady’s finger *Abelmoschus esculentus* (L.) Moench., Cluster bean *Cymopsis tetragonoloba* (L.) Taub. and on 30th, 60th and 90th day for Brinjal *Solanum melongena* L.

The effect of dyeing industry effluent residue revealed significant increase of pigment chlorophyll a, b, total chlorophyll and carotenoides content upto 600 mg when compared to those of the control in pot culture studies. However, the anthocyanin level in the leaves of all the selected three vegetable crops increased from 800 mg quantity of dyeing industry effluent residue whereas chlorophyll a, b, total chlorophyll and carotenoides content increased upto 800 mg when compared to those of the control in field trial and anthocyanin level increased from 1000 mg quantity of dyeing industry effluent residue.
The total soluble protein was found to decrease from 800 mg with increasing quantity of dyeing industry effluent residue in pot culture studies whereas it decreases from 1000 mg in field trial.

The reduction of protein content also correlated to increase in the accumulation of free amino acids. The free amino acid and L-proline accumulated beyond 800 mg in pot culture studies and beyond 1000 mg in field trial in all the three crop plants. Anthocyanin and L-proline levels increased in 1200 mg of dyeing industry effluent residue treated plants.

Nitrate content increased at 1200 mg than control in both pot culture studies and field trial in all the three crop plants.

The yield performance such as number of fruits, length of fruit/pod and weight of fruit/pod were higher at 600 mg of dyeing industry effluent residue in pot culture and 800mg in field trial in all the selected crop plants.

Physico-chemical parameters such as pH, electrical conductivity, nitrogen, phosphorus, potassium, zinc, nickel and copper of experimental field soil after harvest of crop plants were estimated and observed that there is a reduction in nitrogen, phosphorus, potassium, zinc, nickel and copper indicating the absorption of such macro and micro nutrients by crops.

The present investigation brings out the effects of dyeing industry effluent residue in pot culture studies and in field trial in all the three selected crop plants. In addition it brings out the effects of physical and chemical properties of experimental field soil due to treating with effluent residue and also suggests that there is a feasibility of evaporating dyeing industry effluent, collecting the residue and optimizing the dyeing industry effluent residue for the growth and high yield of selected vegetable crop plants (600 mg and 800 mg for pot culture and field respectively) beyond this level may be phytotoxic to the vegetable crops.