CHAPTER-VI
SUMMARY

Investigation was carried out during Kharif (1998) and Rabi (1999) seasons to study the effect of biological sources and graded levels of chemical fertilizers on tomato (Lycopersicon esculentum Mill.) cv, PKM.1 at the University Orchard, Gandhigram Rural Institute (Deemed University), Gandhigram. The salient findings of the study are summarised here under in this chapter.

6.1 Nursery Experiment

a. Tomato seeds were treated with Azospirillum and Phosphobacteria before sowing and VAM was applied in the nursery bed before sowing (T7). The tripartite inoculation of Azospirillum, Phosphobacteria and VAM increased the germination percentage of tomato seeds, shoot length and root length of tomato seedlings in Kharif and Summer season.

b. Inoculation of Azospirillum, Phosphobacteria, and VAM (T7) recorded the highest vigour index and seedling height in both the seasons.

c. Seed treatment with Azospirillum and Phosphobacteria and soil inoculation with VAM in the nursery (T7) registered the maximum fresh and dry weight of seedling in both Kharif and Rabi seasons.

d. The treatment T7 showed the highest fresh and dry weight of shoot and root in both the seasons.

e. The highest number of primary and secondary branches were produced in treatment T7 in both Kharif and Rabi seasons.
6.2. Main Field Experiment

6.2.1 Plant Characters

a. Application of 112.5kg N 75Kg P (75% of the recommended dose) and 30 kg K ha⁻¹ level in combination with *Azospirillum* phosphobacteria, VAM and vermicompost (T₃₇ - NPK₁ x B₁₂) significantly increased the establishment during Kharif and Summer seasons.

b. The treatment T₃₇ significantly increased the plant height during vegetative, flowering and fruiting phase of the crop in both the seasons.

c. The highest root length and root spread was observed by the application of 75% N, 75% and 100% K along with the biological sources (T₃₇) in both Kharif and Rabi seasons.

d. Application of NPKᵢ fertilizer level along with the biological sources (T₃₇) produced the highest number of primary branches in Kharif and Summer seasons.

6.2.2. Flowering and Fruit Parameters

a. Earliness in flower appearance was observed due to the application of 112.5 kg N, 75kg P and 30 kg K ha⁻¹ in combination with *Azospirillum*, phosphobacteria, VAM and vermicompost (T₃₇) in Kharif and Rabi seasons.

b. The treatment T₃₇ significantly influenced the number of flowers and produced the highest number of flowers in both the seasons.

c. Application of NPKᵢ level fertilizer along with biological sources (T₃₇) significantly increased the percentage of fruit set and number of fruits in Kharif and Summer season.
d. The highest weight of fruit, length of fruit and diameter of the fruit was noticed by the application of 75% N, 75% P and 100% K along with biological sources (T37) in both the seasons.

e. Application of 112.5 kg N, 75 kg P and 30 kg K ha\(^{-1}\) in combination with *Azospirillum*, Phosphobacteria, VAM and Vermicompost (T\( _{37} \)) significantly increased the flesh thickness, fruit firmness and peel thickness in Kharif and Rabi season.

f. The treatment T\( _{37} \) significantly increased the yield plant\(^{-1}\), yield plot\(^{-1}\) and yield ha\(^{-1}\) in both the seasons.

g. Keeping quality of fruits was also significantly increased due to the treatment T\( _{37} \) in both the seasons.

6.2.3. Physiological Parameters

a. Application of 112.5 kg N, 75 kg P and 30 kg K ha\(^{-1}\) in combination with *Azospirillum*, phosphobacteria, VAM and vermicompost (T\( _{37} \)) significantly increased the total dry matter production during vegetative, flowering and fruiting phase in both Kharif and Rabi season.

b. The total chlorophyll content of leaves was not significantly increased by the application of NPKi level fertilizer along with biological sources (T\( _{37} \)) during vegetative, flowering and fruiting phase in both the seasons.

c. The treatment T\( _{37} \) significantly increased the leaf area index at harvesting phase in Kharif and Rabi season.

d. The highest crop growth rate was observed in the treatment T\( _{37} \) in both the seasons.
6.2.4. Quality Characters

a. Application of 112.5 kg N, 75 kg P and 30 kg K ha\(^{-1}\) in combination with *Azospirilhthm*, phosphobacteria, VAM and vermicompost (T\(_{37}\)) significantly increased the pH of the pulp and acidity and total soluble solids in Kharif and Rabi season.

b. The treatment T\(_{37}\) significantly increased the reducing sugars, total sugars and non-reducing sugars of tomato fruits in both the seasons.

c. The ascorbic acid content and lycopene content was also significantly increased due to the application of NPKi level fertilizer along with biological sources (T\(_{37}\)) in Kharif and Rabi season.

6.2.5. Microbial Population

a. Application of NPKi level fertilizer along with biological sources (T\(_{37}\)) significantly increased the soil bacteria, actinomycetes and fungal population during vegetative, flowering and fruiting phase in Kharif and Rabi season.

6.2.6. Plant Nutrient Content and Uptake of Nutrients

a. The highest nitrogen content and nitrogen uptake was observed in the treatment T\(_{37}\) during vegetative, flowering and fruiting phase in both the seasons.

b. Significant increase in phosphorus content and phosphorus uptake was noticed due to the application of NPKi level fertilizer in combination with biological sources (T\(_{37}\)) during vegetative, flowering and fruiting phase in Kharif and Rabi seasons.
c. Application of 112.5 kg N, 75 kg P and 30 kg K ha$^{-1}$ in combination with Azospirillum, phosphobacteria, VAM and vermicompost (T37) significantly increased the potassium content and potassium uptake of tomato plants during vegetative, flowering and fruiting phase in both the seasons.

d. The percent of calcium recovered from tomato leaf and the uptake of calcium was highest in the treatment T37 during vegetative, flowering and fruiting phase in Kharif and Rabi season.

e. The highest content of magnesium and uptake was observed by the application of NPKi level fertilizers along with biological sources' (T37) during vegetative, flowering and fruiting phase in both the seasons.

f. The highest available nitrogen, phosphorus and potassium was observed by the application of NPKi level fertilizers along with biological sources (T37).

6.2.7. Cost Benefit Ratio

The cost benefit ratio for each treatment was computed and it was found that the application of vermicompost along with NPKi level fertilizer and biofertilizers (T37) recorded the low cost benefit ratio of 1:2.87 and 1:2.58 in Kharif and Rabi season respectively, although high yield was recorded for this treatment. The highest cost benefit ratio of 1:3.57 and 1:3.26 was observed in Kharif and Rabi season respectively by the application of NPKi level fertilizer in combination with biofertifoers (T34) without vermicompost.