

Summary and conclusion

5.0 SUMMARY AND CONCLUSION

India's own achievements in agricultural production after the green revolution in the mid -1960s has been exemplary and mainly due to increased use of the components of modern agriculture, namely fertilizers, pesticides and farm machinery. Overuse of pesticides especially in vegetables and fruits, resulted in residues above safety levels, and this brought to attention on the adverse effects of modern agriculture. These adverse effects of modern agriculture forced the people, specially in countries with high-income economics to demand food grown without fertilizers and pesticides. This paved the way for organic farming (Prasad, 2005). Organic farming had beneficial effects on human health, sustainability of soil, water and environmental resources and crop yields in the long run (Blaise, 2006).

Bio-fertilizers are the products containing living cells of different types of microorganisms capable to mobilize important elements from non-usable to usable form through a natural process. In recent years, biofertilizers have emerged as an important component of integrated nutrient supply system in Indian Agriculture and hold a great promise to improve the crop yield through better nutrient supply by increasing biological nitrogen fixation and increased availability of uptake through solubilisation or increased absorption (Singh and De, 2007).

The vermicomposting is a method of preparation of organic manure from bio agro wastes with the help of earthworm and the excreta of earthworms is called as vermicast. These castings are biologically active, and provide many available nutrients to plants. Worms convert organic and agricultural wastes into safe soil amendments or ingredients for potting soil mixers (Kumar *et al.*, 2007).

The present study entitled "A comparative study of the effect of biofertilizer, vermicompost and chemical fertilizer on the growth and yield of green chilli (Gundu variety)" was analyzed by recording the response of the above crop to vermicompost,

biofertilizer, chemical fertilizers and combinations of these three under pot culture conditions.

A pot culture study was laid out in completely randomized block design and each treatment was replicated four times. Each pot was uniformly filled with 8 kg of soil and enriched with different combinations of vermicompost, biofertilizers and triple - 17 complex.

The various treatments were

T₁- Uninoculated control

T₂ - Triple - 17 complex

T₃- *Azophos*

T₄- Vermicompost

T₅- Triple - 17 complex + Vermicompost

T₆- Triple - 17 complex + *Azophos*

T₇- *Azophos* + Vermicompost

T₈-Triple-17 complex + *Azophos* + Vermicompost

The vermicompost was analyzed for nitrogen, phosphorus, potassium, organic carbon, calcium and magnesium. At the end of the 50th and 90th day of growth, the chilli plant was subjected to various biometric observations (root length, shoot length, fresh weight, dry weight, number of leaves and moisture content) and biochemical analysis (chlorophyll, carotenoids, protein, phenols, carbohydrates, nitrogen, phosphorus and potassium). The pH, electrical conductivity, lime, texture, nitrogen, phosphorus and potassium levels of the soils were analyzed both at the initial and post harvest stages.

From the present study it was concluded that

1. The vermicompost was rich in micro and macronutrients like calcium, magnesium, organic carbon, nitrogen, phosphorus and potassium.

2. Root length of the chilli was found to be maximum in the treatment, T₃ (*Azophos*) on the 50th day of growth, whereas T₇ (*Azophos* + vermicompost) registered the maximum root length on the 90th day of growth.
3. Among the treatments, T₇ recorded the maximum shoot length on the 50th day but the treatment T₂ (triple - 17 complex) was found to be superior on the 90th day registering the maximum shoot length.
4. The treatment, T₈ (triple-17 complex + *Azophos* + vermicompost) had tremendously increased the fresh weight on the 50th day of growth, whereas the fresh weight was found to be significantly ($P < 0.05$) higher in T₇ on the 90th day of growth.
5. The dry weight of the treatments T₅ (triple - 17 complex + vermicompost) and T₈ was found to be higher on the 50th day of growth. The treatment T₇ recorded the maximum dry weight on the 90th day of growth.
6. The maximum number of leaves was registered in T₇ (*Azophos* + vermicompost) on the 50th day and T₄ (vermicompost) was found to be superior on the 90th day of growth.
7. The treatment, T₈ has recorded the higher moisture content on the 50th day of growth, whereas on the 90th day, T₇ seems to have superior moisture content.
8. Among the treatments T₈ (triple-17 + *Azophos* + vermicompost) exhibited the highest chlorophyll content on the 50th day of growth. The treatment T₆ (triple - 17 complex + *Azophos*) recorded the maximum level of chlorophyll on the 90th day of growth.
9. The application of *Azophos* in combination with vermicompost and triple – 17 complex (T₈) was found to be superior throughout the growth period recording a

- high carotenoid content over the other treatments on the 50th as well as on the 90th day of growth.
10. The protein content was found to be higher in the treatment T₆ (triple - 17 complex + *Azophos*) on the 50th day of growth and the treatment T₈ (triple-17 complex + *Azophos* + vermicompost), had shown a higher protein content over rest of the treatments on the 90th day of growth.
 11. The phenolic content of leaves in the treatment T₈ was found to be greater on the 50th as well as on the 90th day of growth.
 12. The treatment receiving *Azophos* and vermicompost have recorded the higher carbohydrate content on the 50th day of growth whereas the combined treatment of triple-17 complex, *Azophos* and vermicompost have recorded a higher carbohydrate content on the 90th day of growth.
 13. The nitrogen level was found to be higher in T₆ on the 50th day. Whereas on the 90th day T₃ (*Azophos*) recorded a higher nitrogen content.
 14. Among the treatments, T₈ had registered the maximum phosphorus content on the 50th as well as on the 90th day of growth.
 15. The potassium content was found to be maximum in T₇ (*Azophos* + vermicompost) on both the stages of growth.
 16. Soil analysis at the post harvest stage revealed that there was only a slight variation in the soil pH and it was found to be higher with triple -17 complex.
 17. By studying the electrical conductivity of the soil at the initial and post harvest stage, the saline content of the soil was found to be very low at both the stages.

18. The texture of the soil was found to be sandy clay loam and it is of non-calcareous in nature both at the initial and post harvest stage of analysis
19. Only in few treatments there was only a slight improvement in the nitrogen content of the soil. Among the treatments T₇ (*Azophos* + vermicompost) recorded a higher nitrogen content.
20. The phosphorus level was found to be higher in the treatment T₃ (*Azophos*) when compared to all the other treatments.
21. There was a significant improvement in the potassium content at the post harvest stage when compared to the initial stage of the soil. The treatment, T₂ (Triple - 17 complex) recorded a higher potassium content.

From the foregoing results summarized above we conclude that the application of triple -17 complex (T₂) alone had exhibited higher pH and potassium levels in the soil and higher shoot lengths in chilli plants. The single inoculation of *Azophos* (T₃) had increased the phosphorus levels in soils and nitrogen levels in plants. Inoculation with vermicompost (T₄) alone had increased the number of leaves in the chilli plants. The combined application of triple - 17 complex plus *Azophos* (T₆) had increased the chlorophyll contents in chilli leaves. The root length, fresh weight, dry weight, moisture content of the plants, potassium levels in leaves and nitrogen contents in soils were enhanced by the dual inoculation of *Azophos* plus vermicompost (T₇). The use of vermicompost in conjunction with triple – 17 complex and *Azophos* (T₈) showed an enhanced effect of carotenoid, protein, phenol, carbohydrates and phosphorus contents in leaves.

From this study it was concluded that the integrated supply of nutrients through biofertilizers, chemical fertilizers and vermicompost is an efficient method of increasing the nutrient content in chilly plant as well as in soil. Therefore in future locally available

sources of organic fertilizers should be used on a continuous basis for replenishing the degraded physicochemical properties of the soil.

Recommendations

Biofertilizer (*Azophos*), inorganic fertilizer (triple-17 complex) and vermicompost have bright future in developed and developing countries, as it was involved in the prevention of pollution hazards, improvement in nutrient content in plants, reduction of soil fertility. Further research work can be continued on

- ✓ Development of soil and plant testing approaches for making fertilizer recommendation on the basis of system approach.
- ✓ By using organic manures, the yield of chilli is improved and the product was processed and used for pharmaceutical preparations (Capsaicin and Ascorbic acid).