

## *Summary and Conclusion*

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## 5.0. SUMMARY AND CONCLUSION

The present study entitled “Effect of Liquid Biofertilizers, Chemical fertilizers and Vermicompost on the Growth and Yield of *Hibiscus surattensis* (L.)” was analyzed by recording the response of the above crop to liquid biofertilizer, chemical fertilizer and vermicompost under pot culture conditions. The experiment was laid out in completely randomized block design. Each pot was filled with 8 kg of soil and treated with liquid biofertilizers such as *Azospirillum*, *Phosphobacteria*, *Azophos* and *Azophosmet* and different percentage of chemical fertilizer. Vermicompost was mixed at the rate of 5 tonnes ha<sup>-1</sup>.

The various treatments were

C- *Azospirillum*+ *Phosphobacteria* + 100% recommended dose of N and K

T<sub>1</sub>- *Azospirillum* + 50% recommended dose of N and K

T<sub>2</sub> – *Phosphobacteria* + 50% recommended dose of N and K

T<sub>3</sub>- *Azophos* + 50% recommended dose of N and K

T<sub>4</sub>- *Azophosmet* + 50% recommended dose of N and K

T<sub>5</sub>- *Azospirillum* + 25% recommended dose of N and K

T<sub>6</sub>- *Phosphobacteria* + 25% recommended dose of N and K

T<sub>7</sub>- *Azophos* + 25% recommended dose of N and K

T<sub>8</sub>- *Azophosmet* + 25% recommended dose of N and K

The 100% recommended dose of N is 75 kg ha<sup>-1</sup> and that of K is 25 kg ha<sup>-1</sup>. The control group has the carrier based inoculum with the microbial population of about 18x10<sup>6</sup> cells of *Azospirillum*/g and 15x10<sup>5</sup> cells of *Phosphobacteria*/g. The treatment T<sub>1</sub> to T<sub>8</sub> consists of liquid biofertilizers with the microbial population of about 12x10<sup>7</sup> cells of *Azospirillum*/ml, 9x10<sup>7</sup> cells of *Phosphobacteria*/ml and 3x10<sup>6</sup> cells of *Azophosmet*/ml.

At the end of the 30<sup>th</sup> and 45<sup>th</sup> day of growth, the plant was subjected to various biometric observations (root length, shoot length, number of leaves, fresh weight and dry weight) and biochemical analysis (such as chlorophyll, carotenoid, protein, total phenol, reducing sugar, phosphorus, iron and total free aminoacid).

The soil was analysed for the activity of enzymes like  $\alpha$ - amylase, cellulase, dehydrogenase, phosphatase and urease at the post harvesting stage. The pH, electrical conductivity, nitrogen, phosphorus and potassium levels of the soil were analysed both at the initial and post harvesting stage. The vermicompost was analysed for the organic carbon, calcium and magnesium.

From the present study it was concluded that the

- ❖ Root length of the *Hibiscus surattensis* (L.) was found to be maximum in the treatment, T<sub>3</sub> (*Azophos*+ 50% N and K + vermicompost) on the 30<sup>th</sup> and 45<sup>th</sup> day of growth.
- ❖ Among the treatments, T<sub>3</sub> recorded the maximum shoot length on the 30<sup>th</sup> day but the treatment T<sub>8</sub> (*Azophosmet*+ 25% N and K + vermicompost) was found to be superior on the 45<sup>th</sup> day registering the maximum shoot length.
- ❖ The maximum number of leaves was registered in T<sub>3</sub> on the 30<sup>th</sup> day and T<sub>2</sub> (*Phosphobacteria*+ 50% N and K + vermicompost) was found to be superior on the 45<sup>th</sup> day of growth.
- ❖ The treatment, T<sub>3</sub> and T<sub>4</sub> were tremendously increased the fresh weight on the on the two stages of growth.
- ❖ The dry weight of the treatments T<sub>3</sub> (*Azospirillum* + 25% N and K+ vermicompost) was found to be higher on the 30<sup>th</sup> day of growth. The treatment T<sub>7</sub> (*Azophos* + 25% N and K + vermicompost) recorded the maximum dry weight on the 45<sup>th</sup> day of growth.
- ❖ Among the treatments, T<sub>3</sub> was found to be superior throughout the growth period recording high chlorophyll content over the rest of the treatments on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.
- ❖ Among the treatments, T<sub>2</sub> exhibited the highest carotenoid content on the 30<sup>th</sup> day of growth. The treatments, T<sub>7</sub> recorded the maximum carotenoid content on the 45<sup>th</sup> day of growth.
- ❖ The protein content of leaves in the treatment, T<sub>3</sub> was found to be greater on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.

- ❖ The treatment, T<sub>4</sub> and T<sub>7</sub> were tremendously increased the phenolic content on the 30<sup>th</sup> day of growth, whereas the treatment T<sub>4</sub> recorded a significantly ( $P < 0.05$ ) higher phenolic content on the 45<sup>th</sup> day of growth
- ❖ The treatment receiving *Azophos*, 50% N and K and vermicompost (T<sub>3</sub>) recorded the maximum reducing sugar and phosphorus content on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.
- ❖ The iron content was found to be higher in T<sub>1</sub>, T<sub>3</sub> and T<sub>6</sub> on the 30<sup>th</sup> day. Whereas the treatments, T<sub>3</sub> and T<sub>4</sub> recorded a higher iron content on the 45<sup>th</sup> day of growth.
- ❖ Among the treatments, T<sub>3</sub> and T<sub>4</sub> were registered the maximum total free amino acid content on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.
- ❖ The catalase, peroxidase, superoxide dismutase and glutathione S- transferase, activity of the leaves were found to be maximum in T<sub>3</sub> (*Azophos*, 50% N and K and vermicompost ) on both the stages of growth.
- ❖ Among the treatments, T<sub>4</sub> had registered the maximum glutathione peroxidase activity on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.
- ❖ The ascorbic acid content was found to be higher in T<sub>3</sub> on the 30<sup>th</sup> day. Whereas T<sub>5</sub> recorded a higher ascorbic acid content on the 45<sup>th</sup> day of growth.
- ❖ The treatment receiving *Azophosmet*, 50% N and K and vermicompost (T<sub>4</sub>) has recorded the highest tocopherol content on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.
- ❖ The reduced glutathione content was found to be higher in T<sub>4</sub> and T<sub>3</sub> on the 30<sup>th</sup> as well as on the 45<sup>th</sup> day of growth.
- ❖ The treatment receiving *Azophos*, 50% N and K and vermicompost (T<sub>3</sub>) has recorded the highest amylase and cellulase activity over the control.
- ❖ The soil dehydrogenase activity was found to be higher in the treatment T<sub>1</sub> followed by the treatment T<sub>7</sub> and T<sub>4</sub> respectively.
- ❖ The phosphatase activity in the soil of the treatment, T<sub>4</sub> and T<sub>6</sub> alone was increased significantly ( $P < 0.05$ ) when compared to the control. The rest of the treatments do not influence the soil phosphatase activity very much.

- ❖ The urease activity was found to be higher in treatment T<sub>4</sub>.
- ❖ Soil analysis at the post harvesting stage revealed that there was only a slight variation in the soil pH and was found to be higher in the treatment T<sub>7</sub>.
- ❖ By studying the electrical conductivity of the soil at the initial and post harvesting stage, the saline content of the soil was found to be very low at both the initial and post harvesting stage.
- ❖ There was only a slight improvement in the nitrogen content of the soil. Among the treatments, T<sub>4</sub> enhanced the nitrogen content of the soil to the maximum when compared to the rest of the treatments.
- ❖ The phosphorus level was found to be higher in the treatment T<sub>4</sub> when compared to all the other treatments.
- ❖ There was only a slight improvement in the potassium content at the post harvesting stage when compared to the initial stage of the soil. The treatment, T<sub>4</sub> influenced the potassium content very much when compared to other treatments.
- ❖ The vermicompost was rich in nutrients like organic carbon, calcium and magnesium

From this study it was concluded that the application of *Azophos* + 50% recommended dose of N and K and vermicompost proved to be beneficial not only in terms of economizing chemical fertilizers but also improved the nutrient content of the leafy vegetables. Thus this technology can be adapted by farmers as cost effective and ecofriendly approach to sustain the productivity of the leafy vegetable crops.

#### **Recommendations**

- ❖ The biofertilizer used for this study can be further used to cultivate hybrid varieties.
- ❖ Similar work can also be carried out on other green leafy vegetables.