

## Impacts of Natural Manure on Development and Yield of *Solanum lycopersicum*

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### Abstract

An experiment was carried out during the rabi season of 2019–2020 to examine the beneficial benefits of organic fertilizer on *Solanum lycopersicum* growth and yield. Five treatments were split up into three (03) compacted replicate blocks in the experiment, which was set up using a randomized complete block design (RCBD). T1: 100% Recommended Chemical Fertilizer (RCF), T2: 85% CF + 3 tha<sup>-1</sup> Organic Fertilizer (OF), T3: 85% CF + 1 tha<sup>-1</sup> OF, T4: 70% CF + 3 tha<sup>-1</sup> OF, and T5: 70% CF + 1 tha<sup>-1</sup> OF were the different treatments. Due to a higher quantity and weight of fruit plants, T2 had the best production (50.59 t ha<sup>-1</sup>), whereas T5 had the lowest yield (35.32 t ha<sup>-1</sup>). These outcomes could be a result of the parameters of growth components increasing with the application of more organic and inorganic fertilizers. Plots treated with a combination of organic and inorganic fertilizer yielded more than plots untreated with the fertilizer. T2 therapy had the highest gross return (BDT: 607080), whereas T5 treatment had the lowest gross return (BDT: 423840). T2 produced the highest gross margin (BDT. 328520 ha<sup>-1</sup>). T5 provided the lowest gross margin (Tk. 145280 ha<sup>-1</sup>). The best strategy for increasing tomato output in India is integrated nutrient management (a combination of organic and inorganic fertilizer).

Keywords: Natural compost, Soil richness, Synthetic Manure, *Solanum lycopersicum*

### Introduction

The term Organic fertilizer refers to substances with a plant or animal origin. It includes all soil additives that increase the amount of organic matter in the soil, specifically organic compounds and carbon (C). By enhancing the structure and water-holding capacity of the soil and reducing nutrient loss, soil organic matter enhances the physical attributes of the soil. In order to sustain long-term soil fertility, organic matter addition to soils is especially crucial because high temperatures encourage the breakdown of organic matter in soils. In addition to N, P, and K, organic fertilizers frequently include different concentrations of micronutrients. In India, a significant production barrier is the low organic matter content of the soil, which results in poor soil fertility. In this regard, farmers frequently applied massive amounts of inorganic fertilizers and pesticides to their crop fields, endangering the ecosystem (Islam *et al.*, 2015a). Sustainable agricultural production requires fertile soil with a higher organic matter content, and organic

manure can help improve soil fertility and crop yields. According to studies (Garg *et al.*, 2005; Islam *et al.*, 2010), applying organic manures has been shown to increase crop output and improve soil quality, particularly soil organic matter content. Although synthetic fertilizer includes more plant nutrients than organic fertilizer, organic fertilizer is still crucial for boosting soil fertility and production since it contains growth-promoting chemicals (Sanwalet *et al.*, 2007; Yadav and Garg, 2016).

Cropping systems and Yield management techniques like tillage, synthetic fertilizer, and organic manure management have an impact on soil productivity and increase the reasons why products contain pesticide residues (Anwar *et al.*, 2017; Bhushan and Sharma, 2002; Islam *et al.*, 2015b,c; Yeasmin *et al.*, 2019). According to reports, the physicochemical and biological soil environment deteriorates when synthetic fertilizer is used continuously and in an uneven manner (Mahajan *et al.*, 2007). In order to maximize crop yield potential, balanced fertilization is necessary. Research has shown that organic manure has positive benefits on crop production (Ferdous *et al.*, 2011; Mahamood *et al.*, 2016; Moyin-Jesu, 2015). A viable soil management technique to increase crop yield, soil fertility, and sustainability may be the combined application of organic and synthetic fertilizer.

Due to their greater adaptation to varied agro-climatic conditions, tomatoes (*Solanum lycopersicum* L.) are a very significant vegetable crop and are grown in most regions of the world, from small backyard gardens and greenhouses to big commercial farms. It is consumed with great relish and is one of the most popular salad vegetables. According to several studies (Shimbo *et al.*, 2001; Islam *et al.*, 2020a,b; Uddin *et al.*, 2015), the continued use of chemical fertilizers degrades the soil's properties and fertility and may result in the buildup of heavy metals in plant tissues, which reduces the nutritional value and edible quality of fruit. Crops grown with chemical fertilizer had lower protein content and lower-quality carbohydrates (Marzouk & Kassem, 2011). Composted livestock manure, plant residues, and industrial wastes are the principal sources of organic fertilizers (Mondolet *et al.*, 2020). The nutritional requirements of plants are met by organic fertilizers, which also control plant pest populations. Additionally, they raise the soil's organic matter and carbon content, anion and cation exchange capacity, and microbial activity. Similar to inorganic fertilizers, organic fertilizers boost crop yield and quality without causing issues (such as pesticide residues) during crop production or quality maintenance (Liu *et al.*, 2007; Tonfacket *et al.*, 2009; Islam *et al.*, 2015b,c). Agomoni is a recently developed organic fertilizer that can increase crop yield. In order to determine the beneficial benefits of organic fertilizer on *Solanum lycopersicum* growth and yield, the study was undertaken.

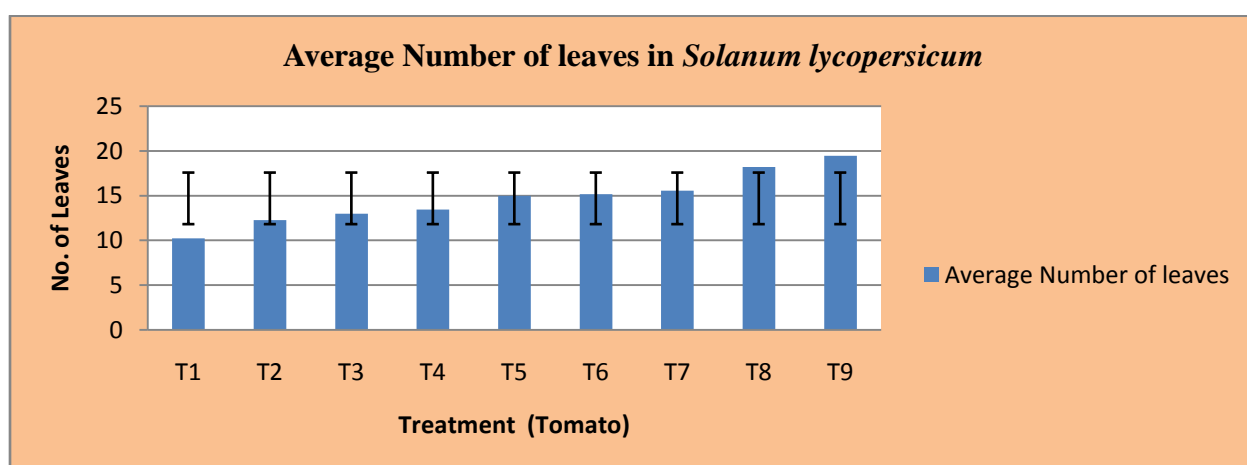
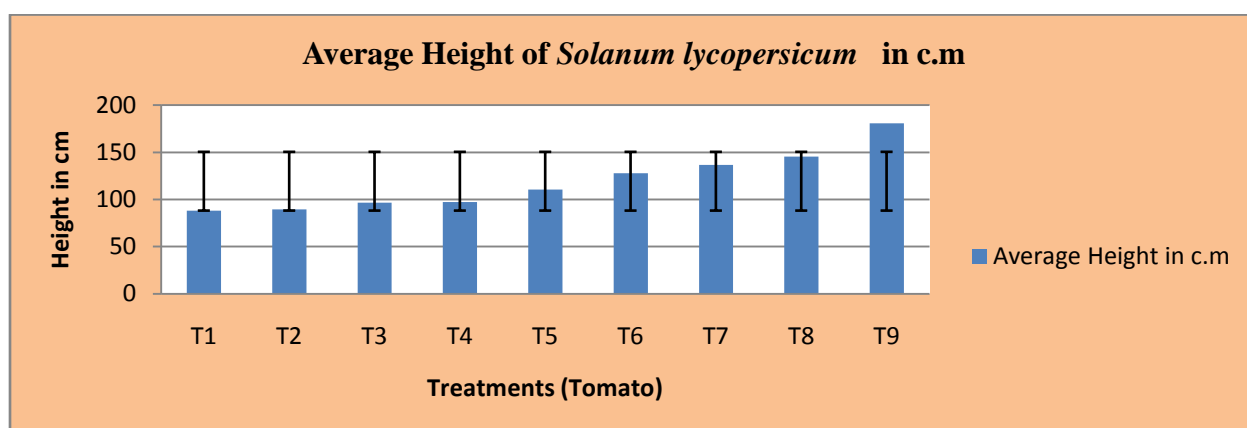
## Methodology

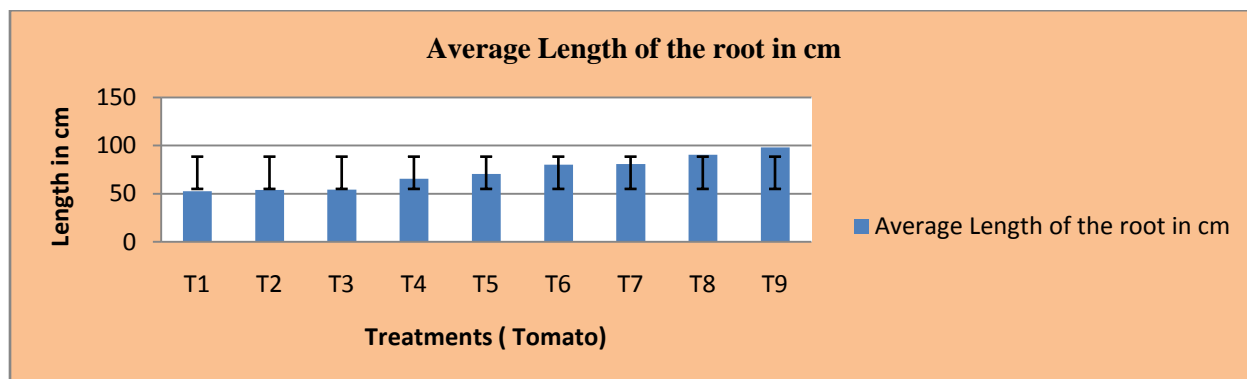
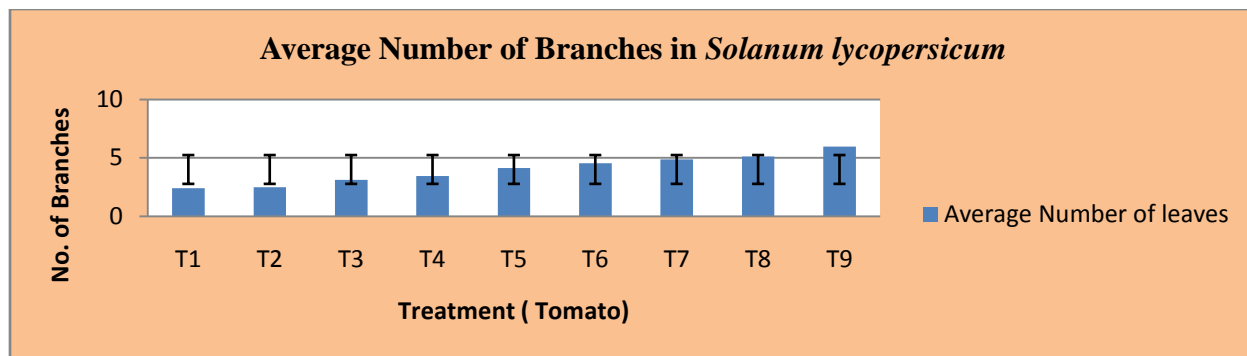
At the Agricultural Research Station, On Farm Research Division, Raipur Chhattisgarh India, which is situated at 21.2514° N, 81.6296° E longitude and has an elevation of 298 m above mean sea level, the experiment was carried out. Five treatments were split up into three (03) compacted replicate blocks in the experiment, which was set up using a randomized complete block design (RCBD). The different treatments were T<sub>1</sub> - Soil, T<sub>2</sub> Soil + VC, T<sub>3</sub> Soil + NPK + *Solanum lycopersicum* L., Soil + AZO + *Solanum lycopersicum* L., Soil + VAM + *Solanum lycopersicum* L., Soil + AZO + VAM + *Solanum lycopersicum* L. Soil + AZO + VAM + VC + *Solanum lycopersicum* L., Soil + AZO + VAM + NPK + *Solanum lycopersicum* L., Soil + AZO + VAM + NPK + VC + *Solanum lycopersicum* L. Each plot has a 4 m by 5 m size. Seedlings that were thirty days old were transplanted. Other cross-cultural procedures were carried out as required. Growth characters were analyzed - Height of the plant, Number of branches per plant, Number of leaves per plant, Length of the root

## Results

A widely farmed and well-liked vegetable is the tomato. The usage of organic fertilizers has a big impact on the quantity and quality of tomato production. Organic fertilizers have been shown to boost tomato yield and enhance fruit quality. It has been demonstrated that the impact of organic fertilizers on tomato production and quality is complicated and influenced by a number of factors, including soil organic matter, total soil nitrogen, the type of organic fertilizer, and others. By 42.18%, organic fertilizers can increase tomato yield. Soluble solids, soluble sugar, lycopene, vitamin C, and nitrate levels increased in comparison to the control group by 11.86%, 42.18%, 23.95%, 18.97%, and 8.36%, respectively. The sugar/acid content ratio and VC of tomatoes were generally significantly improved by soil organic matter >20 g•kg<sup>-1</sup> and organic fertilizers, whereas under conditions of total soil nitrogen >1 g•kg<sup>-1</sup>, organic fertilizers significantly affected tomato soluble solids, soluble sugar, lycopene, and vitamin C levels. We found that tomato quality differed significantly when comparing animal and plant organic fertilizers to other types of organic fertilizers. On the production and quality of tomatoes, we also assessed the effects of various cultivation techniques, soil organic matter, total soil nitrogen, soil pH, and several kinds of organic fertilizers. The outcomes provided insightful guidance and useful information for the usage of organic fertilizers in greenhouse production. Tremendous contrast in plant level was noticed all through the plant developing stages with various natural compost application. Plants that kept in treatment 9 brought about greatest level at all development stages. Impact of medicines on the length of the plants, results showed that vermicompost with microbial vaccination had critical effect on the level of Plant tests over different medicines. Significant difference in plant height was observed throughout the plant growing stages with different organic manure application. Plants that recorded in treatment 9 resulted in maximum height at all growth stages. Influence of treatments on the length of the plants, results indicated that vermicompost with microbial inoculation had significant influence on the height of Plant samples over other treatments.

Vermicompost with microbial fertilizers significantly influenced the number of leaves of plants. At the time of transplantation the no.of leaves in all the treatments were almost same. Lowest leaves number showed was in treatment 1 (see control). Between controls significant difference were noted at all stages. Compared to controls number of branches were higher in treatment 9 followed by treatment 8. No.of branches at the time of harvest.Length of the root in each treatment was observed after harvesting the plants. Maximum root length was observed in treatment 9 than treatment 8. Lowest root length was observed in control treatment.





## Conclusion

For smallholder farmers in the northern region of Raipur Chhattisgarh India, fertilizer application, particularly for chemical fertilizer and organic manure put to tomato fields, can be extremely profitable with sustainable production gains. The best strategy for increasing tomato output in Raipur Chhattisgarh India is integrated nutrient management combination of organic fertilizer and black soil or river mud can increase yield of tomatoes production in central Chhattisgarh region as Raipur. According to the study, soil health will ultimately improve if organic fertilizer use is increased and chemical fertilizer use is reduced.

## References

1. Anowar, M., Parveen, A., Ferdous, Z., Kafi, A. H. and Kabir, M. E. (2021). Baseline survey for farmer livelihood improvement at farming system research and development, Lahirirhat, Rangpur. *Int. J. Bus. Manag. Soc. Res.*, 2: 92-104.
2. Bulluck, L.R., Ristaino, J.B. (2019). Effect of synthetic and organic soil fertility amendments on southern blight, soil microbial communities, and yield of processing tomatoes. *Phytopathology*, 92: 181-189.
3. Chauhan, B.S., Mahajan, G., Sardana, V., Timsina, J. and Jat, M.L. (2019). Productivity and sustainability of the rice-wheat cropping system in the Indo-

Gangetic Plains of the Indian subcontinent: problems, opportunities, and strategies. *Adv. Agron.*, 117: 316-355.

4. Bello, O.D., Akponikpe, P. B. I., Ahoton, E.L., Saidou, A., Ezin, A.V., Kpadonou, G.E., Balogoun, I., Aho, N. (2016). Trend analysis of climate change and its impact on cashew nut production (*Anacardium occidentale* L.) in Benin. *Oct. Jour. Env. Res.*, 4(3): 181-197.
5. Datta, A., Shrestha, S., Ferdous, Z., Win, C. C. (2015). Strategies for Enhancing Phosphorus Efficiency in Crop Production Systems. In: A Rakshit, HBSingh, A Sen (Eds.), *Nutrient Use Efficiency*.
6. Anwar, M., Ferdous, Z., Sarker, M. A., Hasan, A. K., Akhter, M. B., Zaman, M. A. U., Haque, Z. and Ullah, H. (2017). Employment Generation, Increasing Productivity from Basics to Advances. 59–71.
7. Datta, A., Ullah, H. and Ferdous, Z. (2017). Water Management in Rice. In: BS Chauhan, K Jabran, G Mahajan (Eds.), *Rice Production Worldwide.*, 255–277.
8. Ferdous, Z., Datta, A. and Anwar, M. (2018). Synthetic pheromone lure and apical clipping affects productivity and profitability of eggplant and cucumber. *International Journal of Vegetable Science*. 5: 26-38.
9. Dobermann, A., Witt, C., Abdurachman, S., Gines, H. C., Nagarajan, R., Son, T. T., Tan, P. S., Wang, G. H., Chien, N. V., Thoa, V. Y. K. , Phung, C. V., Stalin, P., Muthukrishnan, P., Ravi, V., Babu, M., Simbahan, G.C. and Adviento, M. A. A. (2003a). Soil fertility and indigenous nutrient supply in irrigated rice domains of Asia. *Agron. J.*, 95: 913-923.
10. Haque, M. A., Jahiruddin, M., Islam, M.S., Rahman, M. M. and Saleque, M.A. (2018). Effect of bioslurry on the yield of wheat and rice in the wheat–rice cropping system. *Agricultural Research*, 7: 432-42.
11. Islam, M.A., Hossain, M.S. and Rahman, M.S. (2020). Heavy metals accumulation in soil and uptake by plant species: focusing phytoremediation, *International Research Journal of Environmental Sciences*, 9 (1): 1-7.
12. Ferdous, Z., Anwar, M., Haque, Z., Islam, M.K., Khatun, M.U.S. and Alam, M. A. (2017). Sustainable food security through cropping system analysis using different farming technologies at northern region of Bangladesh. *Progressive Agriculture*, 28(3): 204-215.