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Effect of integrated nutrient management on papaya (carica papaya) cv.Red lady

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Introduction

Papaya (*Carica papaya* L.) belonging to family Caricaceae, one of the important delicious fruit crop is commercially grown in tropical and sub-tropical areas of the world (Yadava et al., 1990). Successful commercial cultivation of improved high yielding varieties of papaya crop depends on critical nutrient management practices due to its continuous growth, flowering and fruiting habit.

The response of any crop to added nutrients largely depends on nutrient supplying capacity of soil and crop requirement and is also highly influenced by several ecoadaphic factors and management practices owing to increased cost of fertilizers, their short supply and sustainability issues gaining importance (Hazarika and Ansaris, 2007).

Papaya is frequently referred to as the "Heavy feeder crop" because of quick growth grows, continuous flowering and fruiting, and how much fruit it produces compared to other fruit crops. In order to maintain the health of the plant and the soil and to provide a lucrative harvest, timely and effective manuring of young and mature plants is absolutely necessary. Because papaya requires a lot of nutrients continuously, using a lot of chemically prepared fertilizers on its own is not only non practical, but also expensive for the poor farmers because the bulk of them are small and marginal ones. Aside from that, the usage of chemical fertilizers has led to an increase in multi-nutrient deficits, nutrient imbalances, and a decline in soil health and production over time (Singh and Varu 2013).

Integrated nutrient management:

Fertilizers and organic manures to sustain crop production and maintenance of soil health. However, biofertilizers offer an alternative to chemical inputs, which have an ability of mobilizing the nutrionally important elements from nonuseable to useable form through chemical processes and known to

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increase yield (Alarcón et al., 2002). In this context, the present investigation was under taken with an objective of finding out the effect of integrated nutrient management in papaya.

The use of chemical fertilizers has resulted in progressive rise in multi nutrient deficiencies, nutrient imbalances, deterioration of soil health and productivity with time. Although, the organic manure contains plant nutrients in small quantities as compared to fertilizers, they influence in building up of organic matter, good soil aggregation, permeability of soil and related physical properties to long lasting supply of several macro and micronutrients, vital plant promoting substance substances apart from increasing the density of microbes in the soil. This helps in maintenance and possible improvement of soil fertility and health for sustaining crop productivity. The nutrition of papaya differ from other fruit crops due to its quick growth, continuous flowering and fruiting habit and heavy production as plant would exhibit sensitiveness to low supply of major and minor nutrients. Considering all these facts, the present investigation was carried out with an objective to find out the effect of combined use of organic, inorganic and biofertilizers on the growth, flowering and yield.

Result:

Urea, Single Super Phosphate, and Murate of Potash were applied to the plant in the form of Urea, SSP, and MOP. During field preparation, 1/3 of the fertilizer was applied during pit filling. The remaining are divided in half and applied at a 45days interval. When using Factor F1 as a bio-fertilizer, *Azotobactor* is well mixed with PSB and 100gm of the mixture is applied to the pit during field preparation. During field preparation, FYM used @20 kg plant^{-1}. During the field preparation for Factor F_3, vermicompost was applied at a rate of 5 kg plant^{-1}. In the case of micronutrient application, combine the required amounts of Zn and B with water and thoroughly apply to the plants. The micronutrient application procedure was carried out in the evening.

The application of biofertilizers like *Azotobacter, Azospirillum* and PSB increased the availability of nitrogen in soil and also their availability to the plant which reflected higher plant growth. Beneficial effect of applied nutrients in promoting growth was also noted by Tarai and Ghosh (2006) in sweet orange. Organic manures are known to promote microbial population and their activity in the soil that may help to decompose and mobilize the nutrients in available forms (Mustaffa et al., 2002). Similarly, application of biofertilizers along with FYM created

feasible condition for enhanced activity and build-up of microbes. Biofertilizers like *Azotobacter and Azospirillum* fixes the atmospheric nitrogen and PSB solublize the phosphorous content and help in making it available to the plant. The Azotobacter and *Azospirillum* in addition to N2 fixation might secrete growth promoting substrates like gibberlic acid, indol acetic acid and cytokinins etc which influence root growth. Their proliferation and enhanced cation exchange capacity (Pattanayak et al., 2008) for nutrient absorption might result higher plant growth in papaya. Organic manures along with biofertilizers also improve aeration in the soil which ultimately improved the physiological activities inside the plant like plant height, plant girth, number of leaves and petiole size.

Conclusion:

The growth-related parameter viz. plant height, plant grith, number of leaves was responded significantly in reference with integrated nutrient management practices. The combination of inorganic fertilizers, organic manure, vermicompost, and biofertilizers that provide nutrients to the plant in the right proportion and amount at the right time may have helped improve soil aeration, which may have contributed to the maximum improvement of the growth-related parameters. Results for organic nutrient management, including vermicompost and bio fertiliser, were almost equal according to Chaudhary et al. (2004). They found that the amplification of growth characters like Plant grith, plant height, total number of leaves may be caused by the presence of growth-promoting molecules like auxins and cytokinins, which aid in cell division and cell elongation. The interplay of organic, inorganic, biofertilizers, and micronutrients on the overall number of blooms on papaya plants was favorable. The reproductive stage data showed that there was significant variability amongst the treatments. The plants that received the aforementioned treatments produced the most fruits when fed. The above findings are closely in line with Srinu et al. (2017) in papaya.

The use of biofertilizers in conjunction with vermicompost and chemical fertilizers may have a positive impact on the development of inflorescences, which may lead to higher nutrient levels in the crop's assimilating area and an increase in the rate of dry matter production, which is positively correlated with the number of flowers and fruits set. A sufficient food supply and the induction of growth hormones increased cell division and cell elongation, which led to an increase in the number of flowers and fruits. In addition to total flower and fruit, fruit set percentage was also successfully replied to in terms of integrated nutrient management techniques. Maximum fruit set percentage was

likewise noted under the same treatment combination, according the experiment's findings. This kind of observation might have been made because more flowers and fruits were generated, increasing the proportion of fruit set. Vermicompost, various chemical fertilizers, and bio fertilizer may have all contributed in this regard. Srinu et al. (2017) in papaya Chandler made comparable discoveries. Early fruiting is a considerably more important criterion that can help producers start making money right away. The number of days needed for fruit to form during the growth period varied among treatments.

References:

1. Alarcón, A., Frederick, T., Davies, J., Johnatan, N.E., Theodore, C.F., Arturo, A.E. and Ferrera, C.R. (2002). Short term effects of Glomus claroideum and *Azospirillum brasilense* on growth and root acid phosphates activity of *Carica papaya* L. under phosphorus stress. Revista Latinoamericana de microbiology, 44 (1): 31 – 37
2. Chaudhary, D. R., Bhandari, S. C., and Shukla, L. M. (2004). Role of vermicompost in sustainable agriculture. Agricultural Reviews, (1): 29-39
3. Hazarika, B. N., and Ansari, S. (2007). Biofertilizers in fruit crops. Agriculture Review, 28(1): 69-74.
4. Hazarika, B.N., and Ansari, S. (2007). Biofertilizers in fruit crops. Agriculture Revie, 28(1): 69-74
5. Kumar, A., Tripathi, V. K., Dubey, A. K., and Vishal, D. (2015). Effect of Integrated Nutrient Management on Fruits Set, Yield and Physico-Chemical Parameters of Winter Season Guava (*Psidium guajava* L.) cv. L-49. *Progressive Research International Journal*, 10: 3722- 37240.
6. Kanwar, A. G., Sahu, D. and Panigrahi, H. K. (2020). Impact of integrated nutrient management on growth parameters of papaya (*Carica papaya* L.) Cv. red lady under net house. *Journal of Pharmacognosy and Phytochemistry*, 9(2): 1098-1100.
7. Mustaffa, M., Kumar, V., Tanujapriya, B., Sivakumar, K. C., and Sathimoorthy, S.,(2002). Organic farming of Karpuravalli. Global Conference on Banana and Plantain,28-31 October, Bangalore. Pp.130.
8. Pattanayak, S.K., Mohanty, S., Mishra, K.N. and Nayak, R.K. (2008). Biofertilizer for tropical vegetables, bulletin published by ICAR.
9. Srinu, B., Manohar, R., Joshi, V., Reddy. N., and Sharma, H. K. (2017). Effect of Different Integrated Nutrient Management on Growth, Yield and

Quality of Papaya (*Carica papaya* L.) cv. Red Lady. *Bulletin of Environment, Pharmacology and Life Sciences*, 6(1): 132-135.

10. Singh, S. K. and Varu, D. K. (2013). Effect of Integrated nutrient management in Papaya (*Carica papaya* L.) cv. Madhubindu. *The Asian journal of Horticulture*, 8. Iss: 2. 667-670.

11. Tarai, R.K. and Ghosh, S.N. (2006). Integrated nutrient management in Sweet orange cv. Mosambi (*Citrus sinensis Osbeck*) grown under rainfed condition of laterite soil. The Orissa J. Hort., 34(1): 72-75.

12. Yadav, P.K., Yadav, A.L., Yadav, A.S. and Yadav, H.C. (2011). Effect of integrated nutrient nourishment on vegetative growth and physic chemical attributes of Papaya. Plant Archive, 11: 327-329.

13. Yogiraj, V., Goyal, P. K., Chauhan, C. S., Goyal, A., and Bhupendra, V. (2014). *Carica papaya* Linn: An Overview *International Journal of Herbal Medicine*, 2(5): 01-08.