

COMPARITIVE STUDY ON APPLICATION OF BIOFORMULATION KKKP AND VERMICOMPOST ON CHILLI FIELD AND ANALYSIS OF GROWTH, YIELD PARAMETERS

Manoj Kumar¹ and Dr. S. Shanthi ²

¹ Department of Microbiology, Srimad Andavan Arts and Science College, Thiruchirappalli-
Tamil Nadu, India. Email: manobozz20@gmail.com

² Department of Microbiology, Shrimati Indira Gandhi College, Thiruchirappalli-620 002,
Tamil Nadu, India

ABSTRACT

Biostimulants have been generally applied to crops like fruits and vegetables to promote the growth and increase yield. The field study compares the application of new Biofertilizer contain Kirmi-Kathak-Krishi-Poshak with/without Vermicompost on physiological parameters and yield of Chilli plant (*Capsicum annum L.*). The soil land enriched with Phosphobacteria, Azospirillum and Vermicompost. One section of land was treated with KKKP and second section was untreated with KKKP and maintained as control. The test revealed that KKKP has the ability to enhance the Physiological parameters of chilli plant like increased length of Plant, Number of branches, Number of fruits and Size of the fruit as compared with the land treated only with the Vermicompost. Addition of KKKP as biostimulating agent to plants showed positively influenced yield on chillies.

KEY WORDS: KKKP (Kirmi Kathak Krishi Poshak), Chilli, Vermicompost, Azospirillum, Phosphobacteria.

INTRODUCTION

Capsicum annum L. is a highly consumed vegetable that is better adjusted to and, therefore, most frequently produced under greenhouse conditions (Herman et al. 2008). In India Chilli is the main spicy item in the kitchen of India. Edible portion of 100 gram chilli contains 1.3 grams of protein, carbohydrate 4.3 grams, fat 0.3 grams, 24 K cal of energy. About five domesticated species of genus *Capsicum (Solanaceae)* has been detected *Capsicum annum L.*, *Capsicum baccatum L.*, *Capsicum chinense Jacq.*, *Capsicum frutescens L.* and *Capsicum*

pubescens. Naga chilli is the hottest chilli with high pungency and aroma, growing in North eastern part of India which brought attention from scientific community and acknowledged with hottest chilli in the world.. The extremely hot or burning sensation of chilli is due to the presence of capsaicinoids attributed by application of capsaicinoids in pharmaceutical point of view (Prasad et al., 2005). India is the leading chilli producer in the world about 38.78%, Of its production is 13 million tonnes (Patel, 2014). Tamilnadu also has the potentiality to increase the chilli production, farmers use organic method of farming to increase the pungency of chilli. Main problem is failure of seed germination and fungus root rot disease in chilli plant, and foliar disease, choosing of unhealthy chilli plant during seedling, Pests like Sucking pests (Aphids, Thrips, White fly) Fruit borers, Mites, Bacterial leaf spot, Coenfora blight, and Powdery mildew. Framers find very difficult in controlling such disease even after the application of chemical Pesticides and Fungicides. Organic farming involves the use of organic materials without chemical contributions for growing crops (Arancon et al.,2003). Organic method of farm practice reverts back to old system of farming methods, which uses the organic farm waste manures, cow dung compost, Vermicompost, Nitrogen fixing plants like Sanapai, Thakapodu, Three in one Bioformulation KKKP, Panchagavya, Fish amino acids, and various herbal leaves that are available in and around the farmland areas especially in Tamil nadu India. This is a ancient method of farming and it acts as a substitution to the chemical farming and encourages the sustainable agricultural practice and at a mean while saving nature from the pollution. Biostimulants are recognized as environment-friendly heterogenous compounds with unknown plant growth stimulating physiological role (Muscolo et al., 2013). They decrease the use of mineral fertilizers by increasing the uptake of micro- and macro-nutrients by plants and directly influencing root morphology and plant growth (Ertani et al.,2013). Plant biostimulants are defined as products obtained from different organic or inorganic substances and/or microorganisms, that are able to improve plant growth, productivity and alleviate the negative effects of abiotic stresses contains Mineral elements, vitamins, amino acids, and polyand oligosaccharides, trace of natural plant hormones (Rouphael et al., 2018). Vermicompost is a well known organic manure, which constitutes of 95 % of beneficial microbes and organic matter, NPK with good ratio and micronutrient content. Koleška et al. (2017) showed that the application of a biostimulant on tomato plants, growing under reduced NPK nutrition, help counteract the negative effects of nutrient deficiency. Studies reported that the applications of some commercial protein hydrolysate products from animal origin were phytotoxic, having negative effects on plant growth when compared to a commercial protein hydrolysate of plant origin (Lisiecka et al.,

2011). Vermicompost is extensively used in Horticulture crops, for germination and seedling purpose in Agriculture and to enrich the soil as a organic fertilizer. As a well known organic formulation is Panchgavya it is been used by the Indian farmers which as the traditional way KKKP is used by the farmers in Karur and Trichy districts of Tamilnadu India, to control such disease and also for the growth promotion and Pest control in Chilli plant. The Organic Bioformulation (KKKP) has certain microbial metabolite which has Pest control effect, and due to the presence of growth regulatory substance like IAA,Cytokinins,GA and beneficial microbes, essential micronutrient it has the ability to promote plant growth. Most of studies testing biostimulants analyze their effects on seed germination and plants growth in short-term experiments, but little information is available on their effects at flowering and maturity stages of plants.

MATERIALS AND METHOD

SOIL APPLICATION

Vermicompost and Organic Bioformulation KKKP combination as a source of organic fertilizers. In either of the cases no chemical pesticides and chemical fertilizers are used. During the descending period of moon, 20 litres of 3% KKKP was flooded in soil for 1 acre of field.

FIELD PREPARATION (Herman et al., 2008)

The field was ploughed thoroughly, and the mixture of 1 kg Azospirillum + 1 kg Phosphobacteria was mixed with 40 kg of Vermicompost and spread manually using workers of the farm and again the land is thoroughly ploughed and mixed using the Rotators tiller so that applied manures and biofertilizers gets mixed properly.

SEED TREATMENT

Local variety of Chilli seed weighing 200 grams was soaked in 3% KKKP solution for 1 hour and shade dried, and sown on the nursery bed 4.5ft×3ft.

FOLIER SPRAY

3 litres of KKKP was mixed with 100 litres of water that is 3% solution of KKKP is required Per acre of land.

EXPERIMENTAL PLOT PREPARATION

While planting two portions of seedlings were divided. One half was maintained as control and its not treated with any spray, and other half of the row was treated with KKKP spray. 73 days after planting the seedlings, 3% KKKP is applied as a first spary. The KKKP spray is given at every 20 days time interval up to the complete harvest is done. About 5 times the hoeing is done at regular intervals. Sprinklers and drip irrigation were used for watering depending on the environmental condition and also chilli requires dry and medium moist condition for better yield. On 8th day after plantation flowerings were observed in both the Control and KKKP treated experimental plots. And the results were observed, tabulated and analysed.

RESULT AND DISCUSSION.

Experimental field observation revealed that Bioformulation KKKP has enhanced the Physiological parameters of the Chilli plant like increase in Growth rate, number of flowers, number of branches, and Total yield of the chilli plant. Comparing with the control plant, the KKKP treated chilli plant showed better results. The control plant also showed best result in comparison with the inorganic chilli crop farming. The various studies on physiological parameter of chilli crop are represented in the Table-1. The chilli plant grown only on Vermicompost alone compare with the combination of Vermicompost and KKKP follower by measurement of physiological parameter like leaf length and leaf width.

In the experimental study method we have noticed the 28 branches per plant and control bearing 16 branches. Treatment with Vermicompost as a manure along with spray of Bioformulation KKKP, showed the maximum height of 108 cm and control with 86 cm is been observed. The different combination of Farmyard manure and NPK has given better results reported by many workers. Cultivation management also play an important role in chilli production reported by Rao and Rao (2014). By using farmyard manure, VAM (Mycorrhiza) and Vermicompost alone maximum plant height of 73.7 cm and branches of 25 per plant has been observed by Natesh et al,2005.

In the experimental study we have observed treatment with KKKP obtained 210 fruits per plant and treatment with Vermicompost alone yields 135 fruits per plant. Dange et al.(2002) reported yield of 168 fruits per plant were obtained by application of NPK in ratio of 60:40:25 per acre, while treating with Zinc, boron, iron and NPK yields 184 fruits per plant

by Hatwar et al. (2003). we have observed an average of 0.97 g of fruit yield on application of KKKP. The production of 199 g per plant was observed in KKKP treated plants and 80 g in control plant. Considerably high yield has been observed compared with the similar report available. Malawadi et al, 2004 reported Farm yard manure and NPK application produced 0.86 g per plant. From the experimental study data it is confirmed that Bioformulation KKKP and Vermicompost have produced satisfactory better results on comparing with the other forms of traditional manuring in chilli plantation.

Conclusion

Use of KKKP and organic manures like Vermicompost for better growth, Pest control, and to get Good yield of chilli plant as it performs three activities in a single spray. From this it is concluded that use of Bioformulation KKKP and Vermicompost enhanced the chilli fruit yield considerably. Bioformulation KKKP is recommended to the Indian farmers to benefit economically and to encourage themselves in the organic farming to produce safe vegetable without any chemical residues for the consumer and environment.

Table-1 The physiological parameters and yield parameters of chilli crop with and without the treatment of KKKP

Sl.NO	Growth parameters	Treated with Bioformulation KKKP	Untreated	Comments
1.	Average length of Plant	108 cm	86 cm	
2.	Average number of Branch	28	16	
3.	Average number of Flowers	151	112	The flower fall from Chilli plant is considerably reduced on application of Bioformulation KKKP.
4.	Average number of Green chilli per Picking	25	15	

5.	Number of Picking	14	10	
6.	Total number of chillies	210	135	
7.	Average length of chilli	11.5 cm	9.5	
8.	Average weight of chilli	0.97 gm	0.80 gm	

REFERENCES

1. Arancon N, Edwards C, Bierman P, Metzger J, Lee S, Welch C. Effects of vermicompost on growth and marketable fruits of field grown tomatoes, peppers and strawberries. *Pedobiologia*. 2003, 47:731-735
2. Ertani A, Nardi S and Altissimo A. Review: long-term research activity on the biostimulant properties of natural origin compounds. *Acta Hort* 2013, 1009:181–188.
3. Hatwar P, Gonde SU, Urkude SM, Gahakar OV. Effect of micronutrients on growth and yield of chilli. *J. Soil Crops* 2003, 13: 123-125.
4. Herman MAB, Nault BA, Smart CD. Effects of plant growth-promoting rhizobacteria on bell pepper production and green peach aphid infestations in New York. *Crop Prot* 2008, 27:996–1002
5. Kolečka I, Hasanagi D, Todorovi' V, Murti S, Kloki' I, Paradikovi' N, Kukavica B. Biostimulant prevents yield loss and reduces oxidative damage in tomato plants grown on reduced NPK nutrition. *J. Plant Interact*. 2017, 12, 209–218.
6. Malawadi MN, Shashidhara GB, Palled YB. Effect of secondary and micronutrients on yield, nutrient uptake and quality of chilli. *Karnataka. J. agric. Sci.*, 2004, 17(3): 553-556
7. Muscolo A, Sidari M and Nardi S. Humic substance: relationship between structure and activity. Deeper information suggests univocal findings. *J Geochem Explor* 2013, 129:57–63.
8. Natesh N, Vyakarnahal BS, Shekargouda S, Deshpande VK. Effect of stratified harvesting of fruit on seed yield and quality of chilli. *Karnatka J. Agric Sci*. 2005, 18 (2): 505-507
9. Patel VK. An economic analysis of production and marketing of chilli (*Capsicum annum L.*) in Raigarh district of Chhattisgarh. M.Sc. thesis submitted to the Department of Agricultural Economics, College of Agriculture, 2014, Raipur, India.

10. Prasad N.B.C, Shrivastava R.,Ravishankar, G.A. Capsaicin: a promising multifaceted drug from Capsicum spp. Evidence-Based Integrative Medicine **2005**, 2, 147-166.
11. Rao VCS and GVK Rao. International Journal of Business and Administration Research Review, **2014**, 2(3), 144-155.
12. RG Dange, DM Naik, T Prabu. Effect of organic and inorganic fertilizers on growth, yield and quality of chilli. South Indian Hort., **2002**, 50 (4-9), 578-583.
13. Roupael Y and Colla G. Synergistic Biostimulatory Action: Designing the Next Generation of Plant Biostimulants for Sustainable Agriculture. Front. Plant Sci. 2018, 9, 1655