

“Effect of soil amendments with organic composting on the yield of capsicum (*Capsicum annuum L.*)”

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Abstract

In the recent years, the most important problem faced by the world is to produce good quality and quantity food to meet the demands of increasing population. Hence, fertilizers, or pesticides along with genetically engineered varieties are being used to enhance the yield and productivity. This combination has helped to develop a food supply but soil health, pesticide toxicity, environmental pollution, and sustainability of agricultural production became a big concern. In this concern organic farming has emerged as a promising alternative with safe and good effects on food quality and environment. A variety of substances are used as raw material for this purpose. Present article reviews the use of organic waste especially green waste as a fertility component of soil thereby increasing growth and production of *Capsicum annuum L.*

Keyword: Biofertilizers, *Capsicum annuum L.*, organic farming, green manure

1. Introduction:

Capsicum (Capsicum annuum L.) is a Solanaceous vegetable crop with high economic and nutritional value grown extensively in Karnataka, Tamil Nadu, Himachal Pradesh, Uttarakhand West Bengal states of India. It is commonly used as condiments (Alabi, 2006) and eaten raw as salad. Some varieties which are stronger in flavour are used as pungent spices in cookery. It is also used in sauces, soups and other dishes made with seasoning. Pepper is also used as a medicinal plant, in the prevention and treatment of cold and fever (Udoh *et al.*, 2005; Bosland and Vostava, 2000). Pepper fruit has been known as a great source of water-soluble vitamin such as vitamin c, carotenoids and phenolic compounds which are famous as an excellent source of dietary antioxidant (Marin *et al.*, 2004; Slimestad and Verheul, 2005). As it is well known that nutrition plays an important role in the growth and development of any crop including capsicum, organic manure and biofertilizers release growth promotion as well as exhibiting positive

response to the application of substances including auxins and vitamins which ultimately improve germination of seeds and of seedlings (Arancon *et al.*, 2003).

Use of organic manure also helps in improving biological activities of desired micro-organisms in the soil which increases yield and quality of crop. The combined application of organics such as farm yard manure, compost, green leaf manure, vermicompost etc. and liquid organics which contain growth promoting substances which stimulate growth, yield and quality of crops. Further it supports to upgrade soil organic matter and minimizing the cost of cultivation (Yadav *et al.*, 2013).

Panchagavya, a kind of natural liquid manure is also used in organic farming. These organic manures promote growth and enhance immunity of plant system. The application of organic manures supports and strengthens biological processes without completely eliminating inorganic support materials. Furthermore, the organic wastes such as sewage sludge, green waste from kitchen, farms and poultry have been successfully used directly or composted to increase crop productivity of horticultural soils (Arancon *et al.*, 2005).

2. Role of organic compost in growth of capsicum:

Vermicomposts are alleviated products, which are being produced by adding earthworms and microorganisms together to organic waste that might be green or dry. These are known for their potential as soil amendments (Arancon *et al.*, 2005).

Vermicomposts consist of finely divided constituents with high porosity, aeration, water-holding capacity and high microbial activities, which make it suitable for sustainable crop development (Atiyeh *et al.*, 2000). Karakurt *et al.*, (2009) also reported that application of humid substances like manure will considerably influence total sugar content and total yield of bell pepper. In a study, vermicompost

made from food waste was used for soil treatment and its effect on antioxidant compounds, fruit yield and quality of capsicum grown in field were evaluated. The results showed that treatment of soil with this vermicompost positively influenced fruit antioxidant compounds. The highest antioxidant activity and carbohydrate content were obtained in plants treated with vermicompost, while their lowest values were recorded in the control plants. It was also observed that soil application of vermicompost can positively influence antioxidant compounds, fruit yield and quality of pepper (Aminifard and Bayat, 2016).

Similar results were obtained and showed that the content of pigments enhanced in capsicum plants treated with the biofertilizer. Overall quality of pepper fruit was improved on treatment with manure made from bio-waste (Berova *et al.*, 2010).

Desai (1992) reported that the application of vermicompost in pepper shrub resulted in higher earnings because of high output gained. Jasvirsingh *et al.* (1997) recorded larger plant height in chilli with the application of vermicompost.

Hsieh-Ching Fang and Hsu-Kuonan (1994) observed the impact of organic manures on the growth of chilli plant and found that considerably increased plant height, fruit size, fruit range and yield of sweet pepper than with the chemical fertiliser can be obtained. Kale and Bano (1994) found that

chemical fertiliser application can be reduced upto half if vermicompost is applied. Kalembasa and Deska (1998) found that application of vermicompost and nitrate (1:1) increased the sweet pepper yields. Shashidhara *et al.* (1998) also obtained similar results in field experiments with organic fertilizers application on chilli plant. Application of yard manure combined with poultry manure resulted in considerably higher fruit yield of pepper compared with mineral fertilizers (Aliyu, 2000). Ribeiro *et al.* (2000) found that yield of sweet pepper has redoubled with organic manure treated plot than mineral fertilizers under field conditions. Varghese (2000) determined that application of vermicompost on soil condition together with organic fertilizers considerably amplified growth and yield attributes of pepper as compared to organic fertilizers alone. Hangarge *et al.* (2002) found that organic amendments like compost made from coconut husk and organic booster resulted in highest yield of capsicum crop. Hiramani and Vijayakumari (2003) also found that vermicompost alone and in mixture with farm manure, organic fertiliser and NPK fertilizers

were more effective in upscalini variety and yield parameters of pepper. Alabi (2006) also stated that the application of organic compost manufactured from farm waste and poultry waste could double the yield of pepper considerably quite higher in comparison to the phosphorus fertilizers. According to Sauyma and Giraddi (2007) chilli crop was obtained considerably higher with vermicompost and organic fertilizer application as compared to inorganic fertilizers.

Vitakar *et al.* (2007) found that on treatment with vermicompost and organic fertilizers, produced the best plant height, variety of primary branches, variety of fruits per plant, fruit weight, fruit length, fruit diameter and total yield were measured as compared to application of fertilizers in chilli crop.

In green house experiments, composted sludge was found to improve leaf, shoot, and root dry matter and fruit yield in capsicum plant (Pascual *et al.*, 2010).

In the experimental fields treatment with poultry manure was also recommended for cultivation of chilli (Soreng and Kerketta, 2017).

In a pot experiment conducted to study the impact of varied sources of organic manure on the expansion and yield of sweet pepper were studied. The treatments were Chemical plant food, Vermi-compost, Poultry manure, Farm yard manure, Goat manure and industrial plant food. Impact of various treatments on growth and yield of sweet pepper was affected considerably and observed higher growth and yield. (Adhikari *et al.*, 2016). As a result of the study, organic worm fertilization practices that are more known as vermi-compost are shown to extend P and K contents in the soil in which pepper plants were grown (Bellitürk *et al.*, 2017). Yadav *et al.*, (2013) reviewed impact of organic manure on production increasement strategies applied for a variety of crops and concluded that organic manures obtained from any substrate are more impactful on crop yield and quality. Singh *et al.*, (1997) studied the response of chilli to vermicompost and determined that the application of vermicompost increased activity of friendly microorganisms. A positive impact of vermi-compost was also observed on the performance of yield of chilli crops.

Similarly, In a different study, it was observed that different combinations of biofertilizers with Azospirillum and Phosphotica have differential positive result on the overall plant growth of capsicum (Singh *et al.*, 2016). Yadav and Vijayakumari (2003) found that vermi-

compost based mixture of field manure, organic fertiliser and chemical fertilizers effectively increased quality of fruit as well as the yield. Similarly, Hangarge *et al.*, (2004) observed that in chilli-spinach cropping system, organic sources of nutrients from vermi-compost are alone have positive result on plant growth and development. It was also observed in an experiment that application of field yard manure can improve quality of chilli by enhancing antioxidant content in its fruit (Malawadi, 2003). The result of organic and inorganic plant feed on growth, yield and organic parameters of Chilli were studied and results showed considerably higher growth in plant height, variety of leaves, variety of branches, variety of flower, variety of fruit, contemporary weight and dry weight per plant in treatment with organic manure compared to alternative treatments (Koshale *et al.*, 2018).

3. Conclusion

The unrepressed use of inorganic fertilizers for the growth and development of trees and crops for obtaining higher yields has deteriorated the soil quality, hence organic farming is now being promoted for increasing the sustainability of the soil and to prevent environmental deterioration. Organic farming has now become popular as it is eco-friendly and is of plant and animal origin which release vital nutrients to the plant for its development. This review has demonstrated the use of organic waste in promoting growth of *Capsicum annuum* L. by enhancing soil fertility, higher crop yields and productivity. In this context, it is felt that organic nutrition is a remedy to manage the hazardous effects of chemical farming so as to manage soil health for sustaining the soil productivity and quality of crop.

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