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Role of organic nutrients on growth and yield of okra

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Abstract
Farmer society, to obtain higher yield in a very short period use chemical fertilizers without realizing the harmful effect it. Chemical fertilizers or artificial fertilizers had a negative impact on the health of humans as well as on the environment. It not only hinder the nutrient of the soil but also cause great harm to the produce. Studies have shown that excessive use of chemical fertilizers has an adverse effect on soil health and may sooner lead to great depletion of all the natural nutrients present in it. To counter this detrimental effect of proper nutrient management is required which mainly includes the use of organic fertilizers or manures. Organic manure not only restores the soil health but also presents the soil from the depletion of the essential nutrients and allows the beneficial micro-organism to play their role properly and efficiently which ultimately leads to proper growth and higher yield of the produce. This paper aims to review the role of organic nutrients on the growth and yield of okra.

Keywords: organic nutrients, growth, yield, okra

Introduction
The majority of the population of India relies on agriculture as their livelihood. It is believed that organic farming has a deep root in India from ancient times. Ancient Indian farmers were known to have evolved farming systems that are nature-friendly. It includes farming systems such as mixed farming, mixed cropping, and crop rotation. But after the development of chemical fertilizers, farmers shifted their organic approach to chemical farming as the results were quick and application was easy as compared to organic farming methods. Several studies have shown that the use of excess chemical fertilizer may lead to various problems, such as loss of nutrients, contamination of surface water as well as groundwater, soil acidification or basification, reductions of beneficial microorganisms (Chen, 2006) [5]. Keeping in view the ever-increasing negative impacts on human health and the environment due to chemical or synthetic fertilizers researchers and policymakers are forced to find out an alternative way of cultivation i.e. organic farming (Ramanjaneyulu *et al*., 2013) [11]. According to IFOAM, organic agriculture is a production system that sustains the health of soils, ecosystems, and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. It combines tradition, innovation, and science to benefit the shared environment and promote fair relationships and good quality of life for all involved (IFOAM General Assembly, 2008). This paper primarily focuses on the cultivation of okra through organic manure. Okra *[Abelmoschus esculentus* (L.) Moench] is one of the important vegetable crops of India belongs to family Malvaceae family. It is also called Lady's finger (English), gumbo (French), quimgombosource (Spanish), and bhindi (Hindi). It is grown from tropical to sub-tropical and warmer parts of the temperate zone of the country (Singh *et al*., 2014) [12]. It is usually consumed for its green tender fruits as a vegetable. Okra is a rich source of Vitamins, calcium, potassium, and other minerals. Seeds of mature okra are a good source of oil and protein. Oil extracted from seed oil is rich in unsaturated fatty acids such as linoleic acid, which are essential nutrients for human health (Kochlar, 1986) [6]. Therefore the objective of this paper is to throw some light on the organic cultivation of okra and how organic manure plays an important role in the yield and growth of okra plants.

Role of organic nutrients on
1. Seed germination and vegetative growth
Baliah *et al*., (2017) [4]. reported that the application of vermicompost significantly increases the rate of seed germination and the rate germination index in the okra plants treatment followed by farmyard manure. Soil application with organic manure such as vermicompost had a positive effect on the shoot and root growth.
Akinmutimi and Amaechi (2015) [2] experimented to evaluate the comparative effects of poultry manure, piggery manure, and NPK fertilizer on the growth, yield, and nutrient content of Okra (*Abelmoschus esculentus*) var. Ivra v 21 in Nigeria. They concluded that growth parameters such as plant height, stem girth, and the number of leaves of Okra were significantly increased when treated with 10 tons/ha Piggery manure. However, at harvest, poultry manure (10 tons/ha) and poultry manure (10 tons/ha) + 100 kg/ha NPK (15:15:15) fertilizer gave the highest values of fresh fruit weight and fruit number respectively. It is also observed that the application of poultry droppings gave okra

plants the maximum plant height, leaf area, and fresh weight, while cow dung application gave the greatest dry weight as compared to control (Uka *et al*., 2013) [14]. Poultry manure increased okra plant height by 39.4% and the number of leaves by 37.8% compared to control treatments. The weight of the fresh pod was significantly increased by 34.6% with poultry manure. Therefore it could be deduced that poultry manure seems to promote higher growth and yield of okra (Tiamiyu *et al*., 2012) [13].

2. Reproductive Growth

It was observed that there is an increase in the number of flower buds (31.17) when the okra plants were subjected to the application of RDF + Vermicompost when compared to control i.e. 16.33. Early 50% flowering was recorded when applied with RDF + Vermicompost and late 50% flowering was recorded in case of control (Meena *et al*., 2019) [7]. Shows the effect of some organic fertilizers on the number of flowers of the okra plant. Aluko *et al*. (2020) [3] reported that the application of poultry manure produced a higher number of flowers which is significantly higher than control as well as organic manure. Muhammad *et al*. (2020) [9]. Investigated to observe the influence of NPK fertilizers and poultry manure in okra var. Clemson spineless Clemson spineless. The data revealed that poultry manure significantly reduces the days to 50 % flowering which increases the yield of the okra plant.

3. Yield

Ofosu-Anim *et al*., (2006) [10] observed that the application of poultry manure resulted in a significant increase in yield components such as the number of okra pods compared to the control. The pods produced by the application of poultry manure treatment were almost double in number than in the control. They also concluded that poultry manure produced the longest pod (6.5cm) with the increase in pod diameter as well as the fresh weight of pod per plant. According to Mishra *et al*., (2019) [8], application of RDF (75%) + (25%) N through neem oil cake produced maximum fruit length (11.96cm) as well as a higher number of fruits per plant (14.42). They also concluded that there is an increase in yield per plot (13.29kg) ultimately results in a higher yield per ha. (9.49 ton) where RDF was 110:50:80 NPK kg/ha. The research was carried out to evaluate the effect of different sources of nutrients on the growth and yield of okra. It was concluded that maximum yield was recorded in poultry manure (14.91 ton/ha) which was statistically at par with chemical (12.78 ton/ha) and goat manure (12.74 ton/ha) whereas the minimum yield was recorded in the case of plants with no fertilizers (7.03 ton/ha) (Adhikari and Piya, 2020) [1].

4. Flowering and Leave

Due to the application of organic manure flowering on the okra plant takes about 34 days in compare to inorganic manure it takes 36 days. (Thadchanamoorthy Sekaran, 2016). Effect of manure on leaves of the plant okra enhancing vegetative growth. All the nutrients supplied by different manure. Number of leaves per plant also can be increased with the application of organic manure (Fagwalawa, 2016).

Overview

Plant tallness is hereditarily determined IAR (1995) in okra. The tallness of the okra contemplated is probably a larger quantity of hereditary than associate ecological quality. The constructive outcome of natural plant food on plant stature might be as a result of the commitment created by excretory product to fruitfulness standing of the dirt's because the dirt's were low inorganic carbon content. Compost once decayed increments each full scale and miniature supplements even as improves the physio-substance properties of the dirt. This might need prompted its high vegetative development. The non-critical distinction saw within the medicines supplied with sheep and cow excretory product with management treatment might be either there have been range of|some|many} supplements effectively gift within the dirt or the plants want was pleased with that number of supplements gift within the dirt. Okra developed on poultry compost performed higher as way because the tallness of the plant than completely different wellsprings of natural plant food. This shows that poultry plant food was promptly accessible and within the best structure for straightforward retention by the plant roots, henceforward there was a carry within the morphological development of the plant. The aftereffects of this examination likewise supported the finding of Ajari et al., (2003) in okra creation during which they proclaimed that natural plant food, significantly poultry excretory product may build plant tallness of harvests once contrasted and completely different wellsprings of composts. The increment in range of leaves per plant with natural manure application targeted on its significance throughout the vegetative development of yield plants (Tindall, 1992).

Every one of the supplements provided by the distinctive compost sources could are redirected to vegetative development. This may well be as a result of their massiveness and better live of supplements effectively gift within the dirt could raise this marvel. The increment in new natural product weight of okra as a result of poultry plant food application might be attributable to easy solubilization impact of delivered plant supplement prompting improve supplement standing and water holding limit of the dirt. The outcomes noninheritable were in concurrence with the discoveries of Sanwal et al., in turmeric (Curcuma longa) Premsekhar and Rajashree in okra in 2009 (A. esculentus) during which they proclaimed that higher come reaction of yields as a result of natural compost application might be ascribed to improved physical and organic properties of the dirt conveyance regarding higher inventory of supplements to the plants.

Conclusion

Though there has been much research on the subject "Role of organic nutrients on growth and yield of okra", it is clear that okra reacted well to the use of organic manure. The use of compost fundamentally affected vegetative growth such as plant height, number of leaves per plant and stem weight of okra. Organic manure also significantly influence the reproductive phase of okra plants which ultimately result in proper yield of the produce. Use of organic fertlizers will improve soil health which result in desirable yield similarly maintain the soil structure. Therefore, it is recommended to farmers to use different organic manure and follow organic farming techniques which is a sustainable approach.

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