

## GROWTH VARIATION BETWEEN F1 HYBRID OKRA (MOH) SEEDS AND CONVENTIONAL SEEDS USING ORGANIC FERTILIZER, BIO-FERTILIZER AND CHEMICAL FERTILIZER

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### ABSTRACT

The repeated usage of fertilizers in soil leads to reduced crop yield, increased soil acidity and nutrient imbalance. A combination of organic materials along with mineral fertilizer is better way of management for the soil. The application of each fertilizer has significant effect on the growth and biochemical performance of Okra (*Abelmoschus esculentus*). The growth response such as seed germination, shoot length, root length and leaf length were significantly increased with plants amended with Biofertilizers. The response of the plants varied with respect to fertilizers. The Biofertilizers amendment greatly influenced all the growth characters of okra compared to other fertilizers. Likewise, the biochemical characters such as crop yield, soil acidity and nutrient imbalance were significantly increased in the plants amended with organic and biofertilizers. A combination of organic materials and mineral (i.e.) Biofertilizer is better for the management of these conventional seed plants whereas for growth of hybrid seeds, it is better with the chemical fertilizers which are readily available.

### KEYWORDS

*Abelmoschus esculentus*, biofertilizer, organic manure, DAP, five leaf extract

### INTRODUCTION

Okra is a summer vegetable, which is rich in calcium, potassium and minerals which comes under the family Malvaceae<sup>1</sup>. It is an upright annual herbaceous plant. The duration for the cultivation of okra is 90-100 days. Okra is cultivated in irrigated area<sup>2-5</sup>. It is affected due to local varieties, sub-optimal and unsuitable manure doses in organic fertilizer. Their leaves are lobed and hairy and grow up to 12inch in length. Organic fertilizer increases soil fertility and water holding capacity<sup>6,7</sup>. Seed rate for varieties is 8 - 10 kg/ha and for hybrids 8 kg/ha for female plants and 4 kg/ha for male plants.

Okra seeds contain variety of antioxidant compounds which includes phenolic compounds and flavonoid derivatives such as, catechins and quercetin<sup>8</sup>. The effect of biofertilizers on the growth and yield of okra and other vegetable crops has been investigated earlier<sup>9, 10</sup>. This research work was framed to evaluate the growth and yield of okra under different combination of organic fertilizer, biofertilizer and chemical fertilizers.

## **MATERIALS AND METHODS**

The present study was carried out to investigate the effect of different types of fertilizers on the growth of okra under field conditions.

### **Site Description**

The experiment was started on January 27, 2020 in our agricultural land which was located at Tambaram, Chennai. The annual rainfall of the area varies from 1500mm to about 2500mm, the temperature of the area varied from 25°C to 33°C while the relative humidity is from 70% to over 90%.

### **Soil Analysis**

Soil analysis of the experimental site prior to planting was based on the composite samples taken randomly at the two different blocks of the experimental field unit with the use of 10cm auger deep. The composite samples were dried under the sun at the soil science laboratory at Agricultural office at Kattankulathur, Chengalpattu. The soil in the experimental area was classified as clay soil which was most suitable for vegetable production.

### **Field Preparation**

The experimental area measuring 5 cents was cleared and ploughed by using tractor for 3 times. Now the land was cleared and divided into 6 different blocks using pegs and line. The space between each variety of plant block was about 160cm. The division has 60cm pathway and has an equal spacing measurement of ridges and furrows at a distance of 40cm row gap.

### **Experimental Design**

The seeds were sown in the farm following randomization sequence of the plots for the six different varieties at a spacing of 30cm per plant (Fig 1).

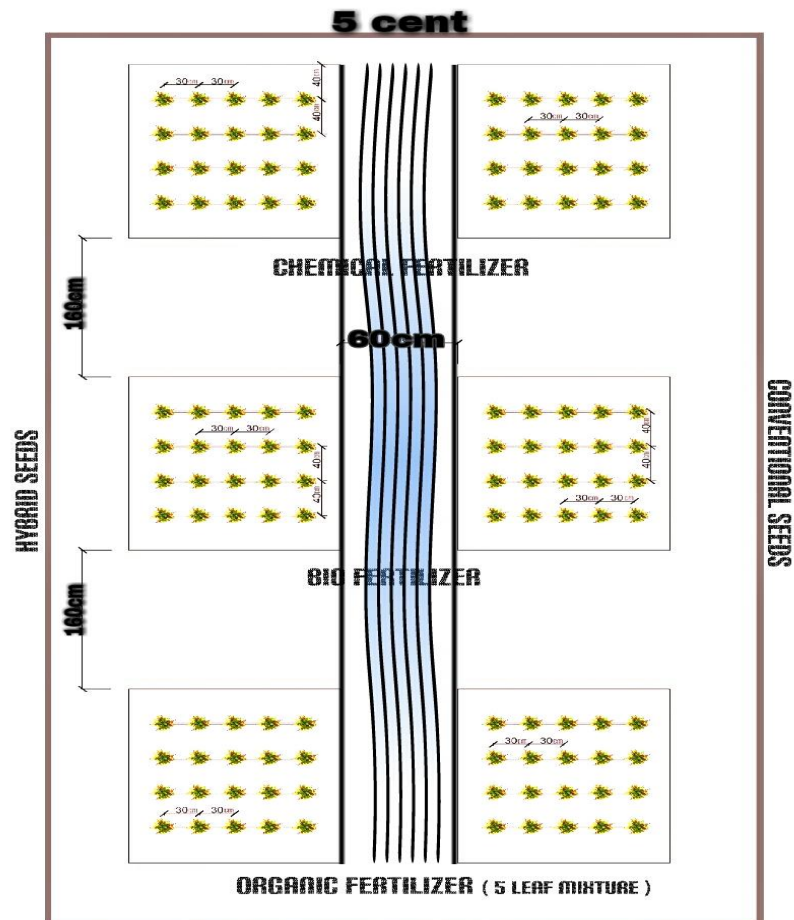


Fig 1 Layout of the plot used for okra

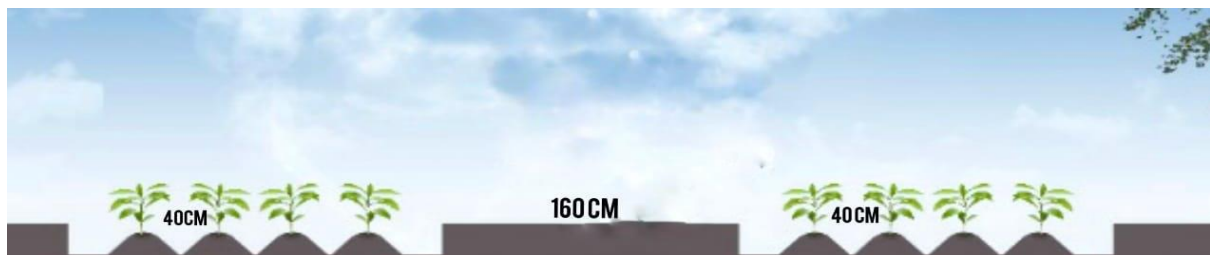


Fig 2 Cross section view of okra planting

### Obtaining and sowing of Seeds

Two types of seeds were selected for the sowing process such as F1 hybrid seed (MOH variety) and conventional seed from a local variety of Kanchipuram district. The okra seeds were soaked in the clean water for 3 hours to test the viability of the seeds after which the floating seeds were discarded and the remaining were taken to the farm. The seeds were sown on 28<sup>th</sup> Jan, 2020. 3 seeds per hole at ½ inch depth having a planting density of 5 plants per row (i.e.) 20 plants per plot. A sum of 120 plants stands in the total experimental area (Fig 2).

## **Fertilizer application**

Organic manure, chemical fertilizer and biofertilizer were applied for all those 6 plots after the completion of 2 weeks at an interval of 15 days. 5kg of organic manure, 5kg of chemical fertilizer and 5kg of biofertilizer were taken.

### **ORGANIC FERTILIZER**

For organic fertilizer cow dung compost with a concoction of five leaves of plants named “five leaf mixture extract” was prepared, by using 200 g each of five different kinds of leaves namely, *Vitex negundo*, *Azadirachta indica*, *Calotropis gigantea*, *Jatropha curcas* and *Morinda tinctoria*. The leaves were cut into small pieces and added with a liter of cow urine until leaves are fully covered. The “five leaf mixture extract” was used as pesticide. This pesticide is stored in a closed vessel for 8 days. They are mixed with once a day and again kept fully covered. After the completion of 8 days, it was purified and for 1 l of pesticide, 10 l of water was added. Using foliar application, it was sprayed all over the plants. Cow dung compost was added to plants at an interval of 15 day alternatively.

### **CHEMICAL FERTILIZER**

For chemical fertilizer, DAP (diammonium phosphate) was used. DAP is an excellent source of P and N essential for plants. It was given at an interval of 15 days, at the rate of 20 g per plant and it helps to maintain pH of soil.

### **BIOFERTILIZER**

For biofertilizer, Bio-DAP was applied. It was applied on the crop at an interval of 15 days, at the rate of 20 g per plant for the better growth of the plant. Bio-DAP is used as a multi micronutrient fertilizer in the production of plants for providing basic nutrients like zinc, manganese, iron & copper in soil applications. It is known for 100% purity, less side-effects and long shelf life, and it is economical.

## **RESULT AND DISCUSSION**

The soil amended with organic manures such as cow dung and wood ash had a positive impact in crop response such as growth as well as biochemical attributes. The results revealed that the Bio organic fertilizers significantly increased crop response with reference to growth and biochemical attributes. Diseases were noticed on the crop such as yellow vein mosaic virus which was spotted at the earlier stage itself and neem oil was sprayed @2ml/l of

water. Dry wood ash was also used to treat plants from aphids at an interval of 15 days. The results of the present investigations regarding growth, flowering observations, yield and quality of fruits as influenced by various treatments are presented in Table 1.

Table 1 Effect of fertilizers on the growth characters of okra

Conventional seeds - (C), Hybrid seeds – (H)

S. No	Treatment	Germination rate %		Shoot length (cm) @day 30		Root length (cm) @day 30		Leaf length (cm) @day 30		Flowering %	
		C	H	C	H	C	H	C	H	C	H
1	Organic fertilizer	90%	85%	102	98	13	9	16	13	92.5%	85%
2	Biofertilizer (Bio DAP)	95%	90%	105	103	10	11	16	17	93%	90%
3	Chemical fertilizer (DAP)	85%	95%	100	110	10	14	14	17	90%	95%

Table 2 indicates the yield of conventional and hybrid okra after using organic fertilizer, Bio-DAP and DAP. Conventional seeds performed well when five leaf extract when compared to Bio-DAP and DAP. However, hybrid plants treated with Bio-DAP performed well when compared to DAP and organic fertilizer.

Table2 Yield of okra

SEEDS	Conventional seed (Yield per kg)			Hybrid seed (Yield per kg)		
	Organic Fertilizer	Bio Fertilizer	Chemical fertilizer	Organic Fertilizer	Bio Fertilizer	Chemical Fertilizer
Stage-1 Day-1	1.8kg	1kg	1kg	1.3kg	2kg	1kg
Stage-2 Day-3	1.5kg	0.7kg	0.9kg	1kg	1.8kg	0.8kg
Stage-3 Day-6	2kg	1kg	1.3kg	1.5kg	2kg	1kg
Stage-4 Day-8	1.8kg	0.8kg	1kg	1.4kg	1.9kg	1.1kg
Stage-5 Day-10	1.5kg	0.5kg	0.5kg	1kg	2kg	1kg

### Field growth conditions of okra

The growth conditions of the conventional and hybrid okra in the field using various treatments are shown in Figures 3 to 8.



Fig3 DAY -1



Fig4 DAY-10



Fig5 DAY-20



Fig6 DAY-30



Fig 7 Yield of okra



Fig 8 Okra on the standing crop

## CONCLUSION

Three different fertilizers are used for okra growth. Among the studied organic amendments, the use of organic fertilizer and bio fertilizer could be a better option to achieve enhanced growth of Okra for conventional seed varieties. For the hybrid variety, the growth of okra species is better with the bio fertilizers and chemical fertilizers.

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