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Effects of N:P:K (15:15:15) Compound Fertilizer and
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Application on the Growth and Yield of
Eggplant (*Solanum melongena*)

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EFFECTS OF N: P: K (15:15:15) COMPOUND FERTILIZER AND GARLIC (*ALLIUM SATIUM*) EXTRACT INSECTICIDES SPRAY APPLICATION ON THE GROWTH AND YIELD OF EGGPLANT (*SALANUM MELOGENA*)

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ABSTRACT: The field study was conducted to investigate the effects of NPK (15:15:15) compound fertilizer and Garlic (*Allium Sativum*) extracts insecticide spray on the growth and yield of eggplant (*Solanum Melongena*) in FRIN experimental plot located in Agbede, Etsako West Local Government Area, Edo State, Nigeria. Four rates of NPK compound fertilizer application and four regimes of Garlic extract insecticide spray were factorially combined and laid out in a completely randomized block design (RCBD) within three replications. It also reviews that neither fertilizer application nor insecticide spray significantly affect ($P > 0.05$) periods of flowering and podding. NPK compound fertilizer application significantly ($p < 0.05$) increased the yield while the Garlic extracts insecticide spray significantly ($P < 0.05$) increased the length of the leaf Area, thereby increased the pod production and yield. From the different rate of application, 200kg/ha NPK was optimum and thus recommended for eggplant production. Twice Garlic extracts insecticide spray regime was recommended for eggplant.

Key words: NPK, Garlic extracts, growth, yield and eggplant.

1. INTRODUCTION

The major factors that limit the growth and yield of eggplant production are poor cultural practices and insect pests (Ezueh 1978, Venotola 2015). Prota (2008) also reported that artificial fertilization is one of the major recommended cultural practices that increased yield of eggplant. The response of eggplant to (N) Nitrogen fertilizer has been implicated in increasing the fruit sizes and seed yield. The N content of the soil should not be excessive, to avoid the young eggplant developing excessive foliage to

the detriment of fruit production Remison (1997) and Prota (2008).

Insects pest is one of the major setback in eggplant production in Nigeria. Numerous insect pest attack eggplant under tropical condition. The leaves of eggplant are eaten up by insects thereby reducing the yield production (Kranz, 1997; Ezueh, 1978 and Messiean, 1992).

Though eggplant cultivation is a component of subsistence agriculture in Edo State and its environs that is best suited for the production of the crop, short

supply is still abound due to the insect pest. The need to integrate insect pest management methods using plants extract which have natural pest repellent properties that is not harmful to human and environment.

Alicin, which is a compound derived from garlic is effective against many types of fungi and can also be used as an insecticide and repellent to insect pests, (Tancho 2013). The study was therefore embarked upon to determine the effects of Garlic extracts as insecticide spray and NPK 15:15:15 compound fertilizer on the growth and yield of eggplant.

2. MATERIALS AND METHODS

The study was carried out in Forestry Research Institute of Nigeria (FRIN), Moist Forest Research station experimental plot at Agbede in Etsako West Local Govt. Area of Edo State, which is located between latitude $6^{\circ}45^1$ North and longitude $6^{\circ} 8^1$ East with a hot humid tropical climate.

The common fruit of eggplant found in Jattu and Uchi Market in Etsako West and its environs is the Green colour fruits was use for the study.

The site was normally prepared by clearing with a cutlass and immediately packed. The seeds were sown to nursery bed for a period of 2 – 3 weeks. The seedlings were kept in the nursery bed till they have developed 5 – 7 leaves before it was transplanted. Spacing was 50cm between plants and 1m between rows. Supply of missing stands was done and thinning to one plant per stand was carried out. Two hoe weeding were carried out at 2 and 5 WAP (Weeks after Planting).

Each experiment consisted of four fertilizer rates and four regimes of Garlic extracts spray designated N_1 N_2 N_3 and G_0 G_1 G_2 G_3 respectively in a 4x4 factorial scheme fitted into a randomized complete block design with three replications. Each fertilizer treatment was applied at 3 WAP by ring method application at the rates of 100, 200 and 300kg/ha. Garlic extract insecticides was sprayed at the rate of 75ml at 4,5,6 WAP using a knapsack sprayer.

Data were collected on growth characters as from 4 WAP on plant height, leave Area, Number of days to 50% flowering and podding. Yield was determined by harvesting the fruits (pods) per row were packed in a jute bag and weighed with a pocket spring

balance. All parameters were subjected to Analysis of variance while significant means were separated by LSD at 0.05 level.

3. RESULTS AND DISCUSSION

From the study, the mean height of the eggplant is the control plots was slightly shorter as shown in Table 1, was comparable with the height of plants fertilizer at 200 kg/ha and 300kg/ha (LSD 0.05). Increased in fertilizer application can also cause increase in plant height. The finding agrees with the earlier report made by Prota (2008) that significantly taller plants manifest as a result of excessive N. Increased in leaf Area in the study as shown in table 2, revealed that N – application play a major role in the vegetative phase of the eggplant. The finding confirms with Remison (1998) that fertilizer application boost growth and yield of crops.

Flowering and podding started about 4WAP and 6WAP respectively and were neither significantly affected by fertilizer application nor by insecticides (plant material) spray as shown in table 3 and 4. Fertilization and insecticide treatment slightly increased the plant height and leaf Area of the eggplant, subsequently delaying the onset of the reproduction phase in the study. This agrees with the findings of Okaka and Remison (1998) who observed that many arable crops, fertilizer have tendency of increasing vegetative growth phase and many therefore have direct influence on flowering and podding. Anon (1982) reported that for a good canopy spread, a minimum application of 200 kg/ha NPK 15:15:15 compound fertilizer should be made to eggplant/melon plant on the field.

Garlic extracts insecticide spray significantly increased the eggplant leaf Area. LSD at 0.05 indicated that there was a better advantage of three-time spray regime than either one or twice spray on the leaf Area (table 3). The results show that Garlic extracts insecticide spray is effective against the insect pest on eggplant. This results confirmed with the report made by Tancho (2013) that garlic is effective against many crop plants and can also be used as insecticide and repellent as it inhibits insects feeding.

The significant interaction between NPK fertilizer applications and Garlic extracts insecticide spray on this character is a strong indication that both are

among the key factors than compliment for enhancing vegetable growth of eggplant.

The highest increase of yield as a result of NPK 15:15:15 compound fertilizer application relative to the control of unfertilized treatment was associated with 200kg/ha NPK rate. A similar increasing response to fertilization when 100kg/ha and 200kg/ha were used, followed by an increase production when the rate is further increased to 300kg/ha as shown in table 5. Garlic extract insecticide spray significantly increased the yield of the eggplant which destroy the insect pest that attack the leaves. This confirm with

the reports of (Kranz 1977; Ezueh, 1978. Messican, 1992). Senanayake, 20006, and Sivira *et al.*, (2011) that insect pest is one of the major setbacks of eggplant production. The leaves of eggplant are eaten up thereby reducing the yield production.

The findings in this study shows that eggplant yield can be substantially improved by applying 200kg/ha NPK 15:15:15 compound fertilizer. Insects pest of eggplant were effectively controlled by Garlic extracts insecticide spray thereby improving vegetative growth and yield production.

Table 1: Effects of NPK (15:15:15) compound fertilizer and Garlic extracts insecticide spray on eggplant

Spray Regime	Rate of fertilizer application (kg/ha)				means	SE +
	0	100	200	300		
0	23.0	35.8	42.2	45.2	37.3 ^b	0.42
1	24.1	39.2	46.4	46.1	39.0	
2	29.9	40.0	43.5	43.5	37.1 ^b	
3	25.2	37.5	46.2	46.2	37.3 ^b	
Means	23.6 ^d	38.1 ^c	45.2 ^a	42.2 ^b		
SE+	0.42					

Table 2: Effects of NPK (15:15:15) compound fertilizer and Garlic extracts insecticide spray on eggplant.

Spray regime	Rate of fertilizer application (kg/ha)				means	SE+
	(Leaf Area cm ²)					
	0	100	200	300		
0	140.3	158.7	168.0	158.4	120.6 ^d	59.06
1	162.1	178.8	215.2	190.2	186.6 ^a	
2	158.4	163.2	186.3	173.3	170.3 ^b	
3	166.2	165.4	176.2	156.2	166.0 ^c	
Means	154.8 ^c	166.5 ^b	186.4 ^a	169.5 ^b		
SE+	69.60					

Table 3: Effects of NPK (15:15:15) compound fertilizer and Garlic extracts insecticide spray in eggplant.

Spray	Rate of fertilizer application (kg/ha)				mea	SE+
	0	100	200	300		
0	26.0	26.0	27.0	28.0	26.8 ^a	1.52
1	26.0	28.0	26.0	28.0	27.0 ^a	
2	25.0	29.0	27.0	27.0	26.8 ^a	
3	26.0	26.0	26.0	26.0	26.0 ^a	
Means	25.8 ^a	27.3 ^a	26.5 ^a	27.3 ^a		
SE+	1.52					

Table 4: Effects of NPK (15:15:15) compound fertilizer and Garlic extracts insecticide spray in eggplant.

Spray regime	Pod Number Plant (fruit)				means	SE+
	0	100	200	300		
0	21.0	21.0	32.4	26.4	25.2 ^b	4.01
1	16.2	29.0	29.3	15.2	22.4 ^{ab}	
2	16.7	31.2	19.2	15.0	20.5 ^a	
3	15.2	18.4	26.7	22.4	20.7 ^{ab}	
Means	17.3 ^a	24.9 ^{bc}	26.9 ^c	19.8 ^b		
SE+	4.01					

Table 5: Effects of NPK (15:15:15) compound fertilizer and Garlic extracts insecticides spray on yield (kg/ha) of eggplant.

Spray Regime	Rate of fertilizer application (kg/ha)				means	SE+
	0	100	200	300		
0	65.3	106.1	91.2	118.4	95.3 ^a	32.6
1	90.1	119.2	118.8	113.4	110.2 ^b	
2	75.2	100.2	119.4	107.8	100.5 ^a	
3	80.0	113.0	115.2	92.5	100.2 ^a	
Means	77.7 ^c	109.6 ^{ab}	111.2 ^a	108.0 ^{ab}		
SE+	32.6					

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