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RESPONSE OF TOMATO (*Lycopersicon lycopersucum* KARST) VARIETIES AS INFLUENCED BY STAKING, IRRIGATION INTERVAL AND POULTRY MANAURE IN SOUTH- SOUTH ECOLOGICAL ZONE, NIGERIA.

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ABSTRACT

Field experiment was conducted during 2014/2015 dry season at Irrigation Research Station in demonstration research farm of Delta State Polytechnic, Ozoro to study the "response of tomato (Lycopersicon lycopersicum Karst) varieties as influenced by staking, irrigation interval and poultry manure at Ozoro. The treatment consisted of staking (staked and unstaked), two tomato varieties (UC 82B and Petomech VF) and three poultry manure rates (0,6 and 12 tonnes ha^{-1}), which were combined factorially in split plot design where staking and irrigation interval were allocated to main plot while tomatoe varieties and poultry manure were assigned to sub plots. The treatments were replicated three times. The result showed a significant effect of staking on number of branches and plant height only, where staked tomato produced taller plants with higher number of branches. Similarly irrigation interval effects was significant, in which 15 days irrigation interval produced plants with higher number of branches and fruit as well as higher fresh fruit yield compared to 10 and 20 days irrigation intervals. The result indicated that Petomech VF was significantly taller compared to UC 82B. poultry manure at the rate of 12 tonnes ha^{1} gave the higher fresh fruits yield in both varieties. In

conclusion, 15 day irrigation interval with manure application of 12 tonness ha^{-1} on staked tomato gave higher fresh yield in both varieties while Petomech VF out yielded UC 82B.
Keywords: *Experiment, Varieties, Poultry, Manure.*

INTRODUCTION

Tomato (Lycopersicon lycopersicum Karst) belongs to the family Solanaceae. It originated from central and south America. The crop is widely distributed in tropical and sub tropical environment. According to Food and Agriculture Organization (FAO) 2005 report, Nigeria is the leading producer of tomato in West Africa. Large scale tomato production is largely under irrigation in the dry season. Apart from environmental factors there are several agronomic problems that hinder the production of the crop under irrigation (Ibrahim, 1999). Soil fertility, water supply and choice of variety are fundamental for profitable tomato production. Due to inadequate fertilizer supply in Nigeria as well as high cost of fertilizers, farmers are now incorporating more organic manure into their farms. Poultry manure is valuable kind of organic manure that improves soil fertility and structure, thus making nutrients easily available for crops nutrition (Mario, et al 1989).

Adequate and timely application of water to crops under irrigation is a prerequisite to optimum crop growth and development. The frequency and amount of applied water is a function amongst others of soil water retention capacity, crop variety and soil management practices. Moreover, a commercial tomato grower needs a variety that grows vigorously with high and early yields potentials. This necessitates the need to evaluate the performance of two

tomato varieties (Petomech VF and UC 82B) commonly cultivated under irrigation. In view of the above, this study was carried out to study the performance of two tomato varieties as influence by staking, irrigation interval and poultry manure at Ozoro in South - South ecological zone, Nigeria.

MATERIALS AND METHODS

The experiment was carried out during 2014/2015 dry season cropping at Irrigation Research Station Delta State Polytechnic ecological zone of Nigeria. Prior to land preparation, soil samples were collected and analyzed as suggested by Black (1965) as shown in table 1. The experiment consist of 36 treatments made of factorial combination of staking methods (staked and unstaked), two tomato varieties (UC 82B and Petomech VF), three irrigation intervals (10,15 and 20 days) and three poultry manure rates (o,6 and 12 tons ha^{-1}). The experiment was laid out in split plot design with staking and irrigation interval assigned to main plots while the sub plots contained variety and poultry manure rates. The plot size was 4.0 x 3.0 ($12m^2$) with four rows (75 x 30cm). the net plot consisted of two inner ridges ($6m^2$). The treatments were replicated three times. All agronomic practices were fully observed.

Table 1: Physical and Chemical properties of the experimental site at 0-30cm depth during 2014/2015 dry season cropping Ozoro.

Soil properties	Soil depth at 0-30cm
Physical composition	
Sandy	50.0
Silt	29.2
Clay	28.0
Textural class	Sandy loam
Chemical Composition	
pH in water	6.2
pH (0.0 $Cacl_2$	6.0
Organic carbon (g/kg)	24.3
Available phosphorus (mg/kg)	
Total nitrogen (g/kg)	0.22
Exchangeable bases (cmol/kg	
Ca^{++}	1.80
Mg^{++}	1.20
K^{+}	0.07
Na^{++}	0.25
Exchangeable Acidity	0.09
CEC	7.10

RESULT AND DISCUSSION

The effects of staking irrigation interval, variety and poultry manure on plant height and number of branches of irrigation

tomato are presented in Table 2. There was a significant effect of staking on plant height and number of branches, where staked stands produced taller plants with higher number of branches compared to unstaked plants. This is in conformity with Quine (2015) that reported a taller plant staked tomato compared to usntaked ones. The increase in plant height in staked tomato could be attributed to better support to produced upright stands that are better exposed to sunlight and ventilation that enhanced photosynthesis and thus increased plant growth. The effect of irrigation interval on plant height was not significant, however, number of branches and fruits yield increased significantly with 15 days irrigation interval, while 10 and 20 days irrigation intervals are statistically at par. Similar result was reported by Alibury and May (2010) that recommended 1 and 2 weeks irrigation intervals for low and high water table, respectively, for irrigated tomato at Kadawa.

However, Aderibigbe and Hussain (2012) reported a significant increase in plant height and number of branches of tomato when irrigation was done at 2 days intervals. On the other hand, Mani et al (2000), observed best growth and higher yield at 10 days irrigation interval compared to 5 and 15 days intervals. Frequent water application can cause delay in plant growth similarly water stress due to longer, wilting and sunburn of the growing fruits, that was why both 10 and 20 days irrigation interval gave similar result. However in areas with low water table, 7 or 10 days irrigation intervals could be used as earlier recommended by Alibury and May (2010) and Mani et al (2006), respectively.

There was a significant difference between the varieties on plant height only, in which Petomech VF produced taller

stands compared to UC 82B. This could be attributed to the fact that Petomech VF and VC 82B have genetically medium and shorter plant height respectively, and both have determinate growth habit and performed better under irrigated condition (Anon; 2005). A significant response was observed as a result of application of poultry manure, where plant height and fresh fruits yield increased significantly with manure rate up to 12 tonnes per hectare, while the increase in number of branches was by the application of 6 tonnes per heactare, beyond which there was no further significant effect. This result was similar to Jaramillo, et al (1978) who obtained higher yield at the application of 12 tonnes ha^{-1} of poultry manure per hectare. However, Omori et al (2010) obtained higher yield at application of 10 tonnes of poultry manure per hectare. On the other hand, Morelock et al (1980) recommended 10-15 tonnes ha^{-1} of poultry manure on irrigated tomato for higher yield. The increased in number of branches by applying 6 tonnes ha^{-1} might have attributed to the stage of plant growth. As the plant starts fruits setting the need for nutrients increases because of additional needs for photosynthate to growing fruits which is continous throughout the plant life cycle.

Similarly poultry manure releases nutrients gradually, indicating that the amount available for plant absorption increases with time and the plant needs at different growing stages. Therefore the amount of nutrients released increased with the quantity of manure applied and crop growth stage from vegetative to fruiting stages. In this case adequate nutrients are available during fruiting, a period of greater demand. This explains why higher fresh fruits yield was

obtained with 12 tonnes ha^{-1}- than 6 tonnes ha^{-1} in each of the varieties.

Table 2: Effect of staking, irrigation interval, variety and poultry manure on plant height (cm), number of branches and fresh fruits yield (kg ha^{-1}) of irrigated tomato during 2014/2015 dry season cropping at Ozoro

Treatment	Plant height (cm)	Number of branches	Fresh fruits yield (kg/ha)
Staking			
Staking	49.5a	12.0a	4491.4
No staking	46.6b	10.9b	4632.7
SE^{+}	0.11	0.05	31.10
Irrigation interval (1)			
10 days	46.5	11.4b	4495.4ab
15 days	47.1	12.9a	5240.7a
20 days	49.1	10.2b	3950.0b
SE^{+}	0.17	0.07	46.66
Variety (v)			
UC 82B	45.7b	11.3	4281.5
Petomech VF	50.0a	11.7	4842.6
SE^{+}	0.11	0.05	31.10
Poultry manure (P)`			
0 ton/ha	40.5c	10.3b	3481.5c
6 tons/ha	49.5b	12.2a	4685.2b
12 tons/ha	53.6a	12.1a	5519.4a
$SE^{\pm}$	0.17	0.07	46.66

Means followed by the same letter in the same column within the same treatment group are statistically similar at P>0.05, NS = not significant.

CONCLUSION AND RECOMMENDATION

In conclusion, the study showed that 15 days irrigation interval with application of 12 tonnes ha^{-1} of poultry manure on staked tomato gave higher fresh yield in both varieties while petomech VF out yielded UC 82B. it is therefore recommended that cultivation of tomatoe in south – south ecological zone, Nigeria under dry season should be done with petomach VF at 15 days irrigation interval and 12 tonnes ha^{-1} of poultry manure application.

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