

Original Research Article

Enhancement of Growth and Yield Performances of Tomato (*Lycopersicon esculentum* Mill) Through Foliar Nutrient Supplement Application Of A Nutrient Supplement

ABSTRACT

A field study was conducted at the Federal University of Agriculture, Abeokuta, to examine the growth and yield performances of indeterminate (Ibadan Local) and determinate (UC 82-B) tomato varieties as influenced by a nutrient supplement (Megagreen®) applied as foliar spray at different rates of (1.0, 2.0, 3.0kg/ha with and control). The experiment was laid out in a split plot design with three replications. Tomato varieties were allotted to main treatments plot and rates of application were the sub plot treatments. Plant growth and yield variables were observed and Analysis of Variance (ANOVA) was done for all parameters measured. Mean separation was done using Least Significant Difference (LSD). Results showed that the two tomato varieties were significantly different in growth and yield parameters except for leaf area at 8 WAT and unit fruit weight. Rate of application significantly influenced plant height tomato height (except at 2 and 8 WAT), number of leaves (except at 6 WAT), number of branches per plant at 2 WAT, leaf area, days to flower, days to maturity, number of flowers and fruit yield. Application of Megagreen® at the rate of 3.0 kg/ha is recommended for fruit yield enhancement in tomato.

Insert some data and also reflect interaction effects in the abstract.

Keywords: Nutrients supplements, fruit yield, foliar application, application rate, tomato.

1. INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill) belongs to the family *Solanaceae*. It is one of the most important commercial fruit vegetables grown in the tropics and could be grown in green houses and outdoor fields. It is also considered the most widely grown vegetable crop in the world because of its economic impact on the growers and its nutritional quality by way of its richness in vitamins (A and C) and minerals (Villareal, 1980).

One of the reasons for the increased production worldwide is the fact that the knowledge of improved management practices, and an ever-increasing economic importance of the crop,

has resulted in ~~tomato-it~~ cultivation ~~now~~ being extended to places and seasons that are ordinarily unsuitable for its productivity (Bodunde et. al. 1993).

More than 90% of the vitamin C in human diets is supplied by fruits and vegetables (of which tomato is the most important) (Vallejo et al., 2002). Tomato fruits contain high amount of ascorbic acid and lycopene (Tindall, 1983).

The tomato is classified as a functional food, for having good levels of vitamins, minerals, and especially lycopene, a carotenoid pigment that provides red color and has antioxidant qualities (Alvarenga, ~~M.A.R.~~ 2004).

Research has revealed that a low calcium level in the root is rarely a limiting factor for the vegetative growth of tomato (d(PNUNG)el Amor and Marcelis, 2006). Nevertheless, the calcium nutrition of tomato demands special attention because this nutrients is intimately involved in the occurrence of the physiological disorder, bottom and end rot (BER), which may considerably reduce fruit quality and market acceptability (Ho et al. 1993; Grattan and Grieve 1999). The BER is caused by a local deficiency of Ca in the distal part of the fruit, which results in a disruption of tissue structure in that area (Adams, 2002).

In attempt to address this, — **MEGAGREEN®**

Megagreen® ~~is,~~ an activated Calcite ~~with of a worldwide~~ unique granularity ~~and an~~. ~~It is an~~ ecologically friendly -foil fertilizer with a strong impact on plant resistance has potential to check this problem. - Megagreen® can improves the fertility and health of plants resulting in an improvement of yield and plant quality (source ?). This is so because

Megagreen® is a purely mineral, non-toxic and non-polluting agent. ~~It~~ and consists of activated calcite micro particles ranging from 0.1 to 0.2 ~~u~~ µ m in size allowing them to permeate directly into the leaf. Due to the continuous process of disintegration of calcite, the atmosphere inside the leaf is enriched with carbon dioxide replicating the conditions of a CO₂ enriched greenhouse. Furthermore, an improved resistance against fungal diseases and certain **varmint**s was observed. Due to the increased calcium level, better organoleptic qualities of fruits and vegetables as well as prolonged storage periods were noted. Megagreen® is often applied in solution (as a foliar application) and ~~it~~ the principal constituents ~~of Megagreen®~~ are given as shown in Table 1.

Table 1. Elemental Composition of Megagreen®

CONSTITUENT	QUANTITY
CaCO ₃ (Calcium carbonate)	95 %
SiO ₂ (Siliceous dioxide)	2 %
MgO (Magnesium oxide)	1.5 %
Fe (Iron)	8783 mg/kg
Mn (Manganese)	156 mg/kg
Selenium	0.24 mg/kg

Source: Gmbh(2004). www. Megamin-gmbh.de,

2. MATERIALS AND METHODS

The experiment was carried out on the field at the University of Agriculture, Abeokuta, Ogun State, Nigeria (Longitude 30°25'E, Latitude 70°25' N altitude? What about climatic characteristics ?). Two varieties of tomato, one indeterminate (Ibadan local)

and the other determinate (UC 82-B) were used. The two tomato varieties were raised in the screen house of the Department of Horticulture, University of Agriculture, Abeokuta, Ogun State, Nigeria for a period of four weeks. The land bush was cleared, ploughed and harrowed. Beds for planting were manually prepared on the field. The experiment was laid out in a split plots design and treatments were replicated three times. The tomato varieties were: Ibadan Local, and UC 82-B were allotted to the main plot and rates of application of Megagreen®: 1.0kg/ha, 2.0kg/ha, 3.0kg/ha and no Megagreen (control) were the sub plot treatments. Transplanting was done to the field when seedlings were four weeks old, at a spacing of 0.5m by 0.5m intra and inter row spacing, plot size was 1.0m by 2.0m. Foliar spraying of Megagreen® solution commenced two weeks after transplanting at the specified rates using a Knapsack sprayer after calibration thus:

— Calibration Procedure

1. Determine the quantity of water the knapsack will discharge in one minute.
2. Assume that each plant will use that quantity of water
3. Measure the plant swort i.e. the plant canopy width
4. Calculate the quantity of water that will be required for 1 hectare (10000m²)
5. Determine the quantity of water required by a plot and multiply by the number of plots for each rate.

Basal fertilizer application was done using NPK (15-15-15) at the rate of 125 kg/ha at one week after transplanting. This was followed by top-dressing using NPK (15-15-15) at the rate of 125kg/ha at four weeks after transplanting to the field. Weeding was done manually as the need arose. Five plants per plot were randomly tagged for observations in each plot. Data collection started at two weeks after transplanting. Stand count per plot was taken at the commencement of harvest to aid in estimating the yield per plant. Were your data analyzed? If yes, with what?

Soil sample was taken from the experimental site before planting for laboratory analysis and the result is as shown on Table 2.

Table 2: Some Soil Analysis Properties of the Experimental Site before Planting.

Parameters	Value
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K	4.62_mg/kg
Na	5.21_mg/kg
p ^H	5.58
Total Phosphate	[PNUN20]4.3_ppm
Total Nitrogen	3.64_mg/kg
Organic matter	10.43_%[PNUN21]
Organic Carbon	5.99_%[PNUN22]
Exchangeable anion	[PNUN23]0.2_mg/kg
Sand	90_%
Clay	7_%
Silt	3_%

3. RESULTS AND DISCUSSION

Application of Megagreen® could increase tomato plant height although not significantly [PNUN24] (Table 3). The two tomato varieties responded differently to Megagreen® application [PNUN25] which can be attributed to the genetic differences of the two varieties. The rate of Megagreen® application influenced the height the two tomato varieties with 3.0kg/ha rate in producing significantly taller plants as produced at application than other rates. rate of 3.0kg/ha. The positive effect of Megagreen® on tomato plant height suggests that Megagreen® has constituents [PNUN26] that can affect the parameters.

It is evident from results indicated that obtained that application of Megagreen® will significantly increase the number of leaves of tomato plant. Just as in plant height, the number of leaves per plant differed significantly between the two tomato varieties (Table 4). responded differently in the production of leaves and this is could equally be attributable attributed to inherent differences in the varieties. With the observation that Rates of Megagreen® application influenced leaf production in tomato with higher number of leaves were produced where Megagreen® was applied at 3.0kg/ha [PNUN27] rate of 3.0kg/ha. This suggests that Megagreen® application at the rate of 3.0kg/ha rate will influence increase the number of leaves of tomato plants for both determinate and indeterminate [PNUN28] varieties. Thus, Megagreen® application at an appropriate

rate it may result in a ~~more efficient and~~ higher photosynthesis efficiency and for dry matter production in tomato.

~~Just like the other two vegetative parameters, the~~ The two tomato varieties also responded differently ~~to in~~ the number production of branches as influenced by Megagreen® application [PNUN29] (Table 5). This confirms the inherent differences between the two varieties in vegetative growth. Rate of Megagreen® application seems to be relevant in terms of number of branches as there was no difference between the different numbers of application. [PNUN30] Application of Megagreen® at the rate of 2.0kg/ha seems to be sufficient for tomato in terms of number of branches [PNUN31].

The observed higher leaf area [PNUN32] of the indeterminate variety shows that it could be more efficient in photosynthesis. Response of leaf area to Megagreen® application rate at the peak of the vegetative growth (8WAT) indicates that three times application, at the rate of 2.0kg/ha, would be enough for a high leaf area value. [PNUN33]

~~Almost following the superiority observed in the vegetative traits of the~~ The indeterminate variety (Ibadan local), it ~~also~~ attained first [PNUN34] and 50% flowering as well as maturity earlier than the determinate variety (UC 82-B). ~~The results~~ Results obtained in this study indicated that Megagreen® could induce earliness to flowering and fruit maturity in tomato ~~particularly, for this purpose it however has to be applied at the rate of 3.0kg/ha rate, to induce earliness to fruit maturity.~~

Considering the flowering responses to rate of applications, it appears that the rate of application would determine total number of flowers per plant as Megagreen® applied at the rate of 3.0kg/ha gave a high number of flowers relative to other rates.

Megagreen® application influenced ~~on the~~ number of flowers [PNUN35] ~~made it to be important in and thus contributed to~~ the overall fruit? yield production. Ibadan Local variety had a high fruit yield although the unit fruit weight [PNUN36] was not different from that of UC 82-B. I this is probably due to the overall high number of fruits [PNUN37] produced by Ibadan Local. Megagreen® applied at the rate of 3.0kg/ha would be required for enhanced fruit yield.

N/B: You have completely failed to present (interaction Tables or information) and discuss same in this study and thus remain a major defect. Your discussion is not scientific enough e.g. no citation to back up your views. These need to be addressed to improve the quality of the paper. More importantly is the fact that findings from this work appear to be a year's study and as such conclusions and recommendations may not be dependable.

4. CONCLUSION

Application of Megagreen® significantly affected the two tomato varieties differently in ~~terms of~~ vegetative characters, yield and yield characters. ~~For~~ Considering all the vegetative parameters, Ibadan Local responded better than UC 82-B except for the number of branches per plant at 2_WAT and the leaf area at 8WAT^[PNUN38]. Ibadan Local also responded better to Megagreen® application than UC 82-B in ~~terms of~~ total fruit yield, Ibadan Local attained days to first flowering, days to 50% flowering ~~days to maturity~~ and days to maturity ~~Days to 50% flowering~~ earlier than UC 82-B and therefore had a higher fruit yield. ~~For~~ In ~~both~~ tomato varieties, fruit yield was highest when Megagreen® was applied at the rate of 3.0kg/ha and such ~~For high fruit yield, megagreen® at the rate of 3.0kg/ha~~ is recommended.

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78. [PNUN40]

Table 3: ~~Plant~~ Height of tomato at 2 ~~— 8 weeks after transplanting~~ as influenced by variety and rates of Nutrient supplement ~~Megagreen~~ application.

Tomato Height				
	2 WAT	4 WAT	6 WAT	8 WAT
Weeks after transplanting				
Variety				
Ibadan Local	16.4	24.76	51.37	74.67
UC82B	13.39	19.67	34.63	52.96
LSD (0.05)	1.87	3.24	7.15	7.27
Rates of Application (Kg/ha)				
1.0 kg/ha	14.78	21.05	42.19	66.23
2.0 kg/ha	14.91	22.02	38.72	63.11
3.0 kg/ha	16.01	23.95	49.98	65.95
Control	14.52	21.84	41.09	59.97
LSD (0.05)	1.55	2.82	6.54	NS

Table 4.÷ Number of leaves of tomato per plant?? at 2—8 weeks after transplanting as influenced by variety and rates of Nutrient supplement Megagreen application _.

Variety	Number of leaves of tomato plant ⁻¹			
	2	4	6	8
	Weeks after transplanting			
	2 WAT	4 WAT	6 WAT	8 WAT
Ibadan Local	4.20	9.59	34.65	62.56
UC82B	3.39	5.23	10.68	27.56
LSD (0.05)	0.50	2.01	6.25	8.79
<u>Rates of Application Rate (Kg/ha)</u>				
1.0 <u>kg/ha</u>	52.61	3.86	6.70	20.86
2.0 <u>kg/ha</u>	38.50	3.86	7.10	22.46
3.0 <u>kg/ha</u>	49.94	3.69	7.98	26.26
Control	3.77	7.88	21.02	39.17
LSD (0.05)	NS	NS	NS	NS

Table 5.÷ Number of tomato branches per plant?? of tomato at 2 – 8 weeks after transplanting as influenced by variety and rates of Nutrient supplement Megagreen application.

Variety	Number of branches of tomato plant ⁻¹			
	2	4	6	8
	Weeks after transplanting			
	2 WAT	4 WAT	6 WAT	8 WAT
Ibadan Local	0.42	2.49	6.07	8.33
UC82B	0.23	0.47	2.08	3.83
LSD (0.05)	0.20	0.76	1.11	1.17

Rates of Application		Rate (Kg/ha)			
1.0 kg/ha	5.44	0.06	1.46	3.32	
2.0 kg/ha	6.42	0.36	1.44	4.43	
3.0 kg/ha		0.25	1.39	4.54	6.31
Control		0.22	1.63	4.01	6.17
LSD (0.05)		0.20	NS	NS	NS

Table 6: Number of days to first and 50% flowering, maturity, unit fruit weight and fruit yield of tomato as influenced by variety and Nutrient supplement rates of Megagreen application.

	Days to — 1 st flower	Days to [PNUN46] 50% flowering	Days to Maturity	Maturity
[PNUN47] Fruit Yield (t/ha)				
Variety				
Ibadan Local	38.39	42.17	63.36	17.39
UC82B	42.00	46.06	80.81	5.28
LSD (0.05)	2.60	2.23	- 5.58	4.34
Rates of Application Rate (Kg/ha)				
1.0 kg/ha		40.22	41.67	77.28
7.56				
2.0 kg/ha	41.00	43.44	73.61	8.06
3.0 kg/ha	37.11	43.11	66.22	16.28
Control	42.44	48.22	71.22	13.28

LSD (0.05)	—	2.15	-1.69	—	6.00	4.36
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