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EFFECT OF ORGANIC AND INORGANIC FERTILIZERS ON SOME GROWTH PARAMETERS OF DIFFERENT MAIZE VARIETIES

SARKIN FULANI M.,¹ BALA U. M.,² KAKA A. A.,³ AND HARUNA Y.⁴

1 and 2 –Department of Crop Science, Kano University of Science and Technology Wudil,

3– Agric. Department, Saadatu Rimi College of Education Kano and

4–Department of Crop Science, Federal University Dutse

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Correspondence author:

e-mail:

Phone:

ABSTRACT

Field trials were conducted during the 2011 rainy season at BUK Research Farm and Bagauda Agricultural Research Station, Ministry of Agriculture both in Kano State, to determine the performance of two maize varieties grown at different levels of Organic and Inorganic fertilizers. The experiment consisted of 24 treatments which comprised of two types of maize varieties treated with three sources of fertilizers (organic, inorganic and combination of both) each at four levels. The treatments were laid out in a randomized complete block design and replicated three times. The soils at the experimental sites were sandy clay loam and loamy sand for BUK and Bagauda respectively with low levels of total N, available P and organic Carbon. Results indicated that some growth characters including plant height, leaf area and leaf area index were influenced by fertilizer application levels. Both varieties did significantly better with inorganic fertilizer levels of 600 kg NPK ha⁻¹ and 750 kg NPK ha⁻¹ as well as combination of organic and inorganic fertilizer levels of 700 kg NOF ha⁻¹ + 300 kg NPK ha⁻¹ and 700 kg NOF ha⁻¹ + 450 kg NPK ha⁻¹. EVDT maize variety performed significantly better in terms of growth characters at all fertilizer levels than Sweet corn variety. Location wise, BUK site produced better result than Bagauda in almost all parameters observed.

INTRODUCTION

Maize (*Zea mays* L.) is one of the most important staple food crop in West and Central Africa. The Savanna of West and Central Africa have one of the greatest potentials for maize production because of their relatively higher incidence of solar radiation and lower incidence of pests and diseases during the cropping season

(Badu-Apraku et al., 2006). In 2013/14, the World production was estimated to be 973.9 million metric tons, 89.3 million metric tons for Africa and 7.7 million metric tons for Nigeria (USDA, 2014). Maize production has expanded dramatically in the Northern Guinea Savanna of West Africa where it has

replaced many traditional cereal crops and serves as both food and cash crop.

The Northern Guinea Savanna alone took about 92% of total area grown to maize in Nigeria. Maize is also widely believed to have the greatest potentials among food crops for attaining the technological breakthrough that will improve food production in the region (Kamara and Sanginga, 2001). In Nigeria, maize production which was traditionally in the more humid forest and the Guinea Savannas (Carsky and Iwuafor, 1999), has in the past three decades spread to the drier Sudan and Sahel Savannas with the development of early and extra-early varieties (Kamara *et al.*, 2009; Badu-Apraku *et al.*, 2009). There are numerous varieties of open-pollinated and hybrid grain maize varieties grown across Nigeria. Some of the varieties were specifically developed to adapt to the low and erratic rainfall in the Sudan Savanna and other abiotic stresses including low soil N and P (Badu-Apraku *et al.*, 2009).

Sweet corn (*Zea mays L. saccharata* Sturt.) also known as vegetable maize or green maize is a hybridized variety of maize specifically for higher sugar contents. It is a new potential crop for temperate climates but requires additional agronomic improvements (Fekonja *et al.*, 2011) and development due to climatic changes (Genc *et al.*, 2013). It is mostly grown in the United States, East Asia and some European countries and now has become popular among the elites in African countries (Badu-Apraku and Fakorede, 2006). The total area of Sweet maize in the European warmer climates is 73600 ha (Westen van der, 2008). Hungary and France represent the largest European producers with 31000 and 25600 ha, respectively. Of the total 350 000 ha production area of sweet corn worldwide, only 20% is in the EU (Anonymous, 2009), produced mainly in non-organic cultivation

It is distinguished from other maize varieties by its delicious taste, high sugar content when in the milk or immature state and by its wrinkled, translucent kernels when dry. Sweet maize is usually eaten in the immature state as a fresh vegetable, boiled, steamed or roasted. When cut from the cob, it can be used in a wide variety of vegetable mixtures, soups or stew and for Canning purposes. At optimum market maturity stage, Sweet maize contains 5 – 6% sugar, 10 – 11% starch, 3% water soluble polysaccharides, 70% water, and moderate amount of protein, vitamins A and K (Oktem A.G. and Oktem A. 2006).

Maize in general alongside other Agricultural products in Nigeria contributed 36.5% to the GDP in 2009 (NAEO, 2009). Maize is used for food, feeding livestock as well as for industrial purposes. It is eaten as boiled or roasted and used in the preparation of pap. The stalk and leaves are used in silage or hay. The stalk also is used for fencing. The shell, cob and stalk are used as fuel source.

JUSTIFICATION FOR THE STUDY

As a result of high nutrient demand by maize, its production requires high inputs of fertilizer. However, because of the high cost, unavailability and low levels of soil organic matter, alternative organic sources of nutrients particularly N, P and K needs to be included in maize production. The use of organic manure is needed to ensure an efficient nutrient management in the maize-based cropping systems in the Northern Guinea Savanna of Nigeria. The productivity of maize largely depends on its nutrient requirements and management particularly that of nitrogen, phosphorus and potassium (Arunkumar, 2007). Research conducted in Northern Guinea Savanna and elsewhere had shown great improvement in the yield of maize

crop as a result of improvement in organic matter content of the soil (Boateng et al., 2006).

increased infiltration rate and increased soil water holding capacity (Van Averbeke and Yoganathan, 1997). Since inorganic fertilizers such as NPK are not usually available and are always expensive for the resource-poor farmers, farmyard manure is used as an alternative or complements the use of inorganic fertilizers. It releases nutrients slowly and steadily over a longer period of time and also improves the soil fertility status by activating microbial biomass of the soil (Pullman and Wash, 2010).

Organic fertilizer is however, required rather in large quantities to meet up with the crop nutrient requirement. It is rarely available to small-scale farmers in the required large quantities (Aphane et al., 2003).

AIMS AND OBJECTIVES

To determine the influence of organic, inorganic and combination of the two fertilizers on the growth of two maize varieties.

MATERIALS AND METHODS

Field experiments were conducted during the 2011 rainy season at two different locations, namely, the research Farm of the Faculty of Agriculture, Bayero University Kano (Latitude 11° 58' N; 8° 26' E; 460m above sea level) and Bagauda Agricultural Research Station, Ministry of Agriculture Kano located in the Sudan Savannah ecological Zone of Nigeria (Latitude 11° 40' N; Longitude 08° 30' E; and 500m above sea level). Soils of the experimental sites were collected at 0 – 30cm and analysed for physico – chemical properties using standard procedures as described by Black (1965). Important meteorological data as rainfall,

The application of organic manures such as farmyard manure sustain cropping systems through better nutrient recycling, improved soil structure,

temperature and relative humidity from the two sites were recorded.

Field Plot technique

Seeds of Sweet corn and EVDT maize varieties were obtained from Plant Science Department, ABU Zaria and IITA Regional office Kano, respectively. The seeds were sown on 21st July, 2011 at BUK and 23rd July 2011 at Bagauda at the rate of two seeds per hole and spacing was 75cm between rows and 25cm within rows, later thinned to one stand per hole at 2 WAS.

The experiment consisted of 24 treatments comprising of 2 varieties of maize with 3 sources of fertilizers (organic, inorganic and combination of organic and inorganic fertilizers) each at 4 levels. The treatments include; 300 kg NPK ha⁻¹, 450 kg NPK ha⁻¹, 600 kg NPK ha⁻¹ and 750 kg NPK ha⁻¹ repeated 2 times making up to 8 levels with both varieties, 600 kg NOF ha⁻¹, 700 kg NOF ha⁻¹, 800 kg NOF ha⁻¹ and 900 kg NOF ha⁻¹ repeated 2 times making up to 8 levels with both varieties and 600 kg NOF ha⁻¹ plus 300 kg NPK ha⁻¹, 600 kg NOF ha⁻¹ plus 450 kg NPK ha⁻¹, 700 kg NOF ha⁻¹ plus 300 kg NPK ha⁻¹ and 700 kg NOF ha⁻¹ plus 450 kg NPK ha⁻¹ repeated 2 times with both varieties. The treatments were laid out in a randomized complete block design and replicated three times.

Fertilizers were applied in two split doses at 2 and 4 WAS. Four levels of organic fertilizer; 600, 700, 800 and 900 kg NOF ha⁻¹ sourced from EXCEL Standards Limited Bompai Kano as Nomau Organic Fertilizer (NOF) were used, four levels of inorganic fertilizer; 300, 450, 600 and 750 kg NPK ha⁻¹ in the form of 15:15:15 NPK mineral fertilizer and four levels of combined organic + inorganic fertilizers; 600 + 300, 600 + 450, 700 + 300 and 700 + 450 kg ha⁻¹

were applied as the first dose. Urea mineral fertilizer was used as top dressing at 4 WAS. The fertilizers were all applied by basal drilling at 2 WAS except for the second dosage of urea which was applied as top dressing at 4 WAS.

Statistical analysis

All the data obtained were subjected to statistical analysis of variance using GLM procedure to test for the significance of treatment effects. Where the F test was significant, treatment means were compared using Duncan multiple range test. Duncan (1995)

RESULTS

Plant height

The result shown in Table 1 indicated that NOF, NPK and combination of NOF + NPK has significantly affected all varieties at 6 and 10 WAS at BUK and Bagauda respectively. However, these were statistically at par with 750kgNPKha⁻¹ on Sweet corn and 700kgNOFha⁻¹ + 450kgNPKha⁻¹ on EVDT. The shortest plants were observed on Sweet corn treated with 600kgNOFha⁻¹, 700kgNOFha⁻¹ and 800kgNOFha⁻¹. At 10 WAS at BUK, application of 750kgNPKha⁻¹ to Sweet corn had resulted in the tallest plants, while the same variety and EVDT had the shortest plants in treatment with any of the NOF rate.

Number of leaves per plant

Table 2 shows the effect of NOF, NPK and combination of NOF + NPK fertilizers and rates of application on number of leaves per plant at 6 and 10 WAS at BUK and Bagauda. Significant response was recorded at 6 WAS at BUK to applied NPK, NOF and NOF + NPK by Sweet corn and EVDT on number of leaves per plant.

Leaf area per plant

Significant increase in leaf area was realized on Sweet corn and EVDT treated with NOF fertilizer rates. However, EVDT

Weeds were controlled manually using hand hoes. Three weeding at 2, 4 and 6 WAS kept the plot weed free.

Observation of some parameters such as plant height, leaf area per plant and leaf area index were made and measured for all the varieties.

had wider leaf area at all rates compared to Sweet corn where 900kgNOFha⁻¹ on EVDT which was statistically at par with the same rate on Sweet corn resulted in the highest leaf area. Application of combined NOF + NPK on both varieties indicated significant increase in leaf area with increased rate. (Table 2)

Leaf Area Index

In Table 3 it was observed that EVDT supplied with 750kgNPKha⁻¹ produced the highest leaf area index, however, this was statistically at par with 600kgNPKha⁻¹ on the same variety.

DISCUSSION

Significant variations in growth parameters of Sweet corn and EVDT as a result of the use of different fertilizer sources and rates were observed at BUK and Bagauda. The vegetative parameters including plant height, number of leaves, leaf area, leaf area index and dry matter responded positively and significantly to NPK 15:15:15 compound fertilizer, NOF, and combinations of both independent of maize type. The parameters increased with increasing rate of fertilizer sources up to the highest rate of 750 kg NPK ha⁻¹, 900 kg NOF ha⁻¹ and 700 kg NOF ha⁻¹ + 450 kg NPK ha⁻¹ used in the study. This is in agreement with the results obtained by Ayub *et al.*, (2002) who observed that growth parameters were influenced by application of higher doses of nitrogen. In another agreement Oad *et al.*, (2004) remarked that application of 3000 kg FYM ha⁻¹ was much effective in recording maximum plant height, thicker stems and more number of leaves per plant. The

marked variation in growth parameters such as plant height, leaf area and leaf area index to different fertilizer containing different N concentrations led to an increase in photosynthetic activities This result is in agreement with those of Jagtap and Abamu, (2003) and Kamara *et al.*, (2005), which reported that application of

N fertilizer increased the assimilatory leaf area and photosynthetic productivity. The EVDT responded more to the fertilizer treatments and consequently out performed sweet corn in most of the growth components which include, plant height, number of leaves per plant, leaf area per plant,

leaf area index, crop growth rate, dry matter at both locations. This could be due to varietal morphological differences or variations that could naturally exist among diverse crop varieties and maize cannot be an exception (Babalola 2006; Ojo *et al.*, 2007). EVDT exhibits taller plants with wider leaf area and hence, higher leaf area index compared to sweet corn variety. It is also known fact that varieties differ in their canopy architecture, (Dowsell *et al.*, 1996). The fact that EVDT variety had wider leaf area, entailed more light interception and hence higher photosynthetic activities which led to more chlorophyll production which was translated to more food production for onward distribution to other plant parts for rapid growth and development. Another reason for variation in varietal performance was reported by Sharifai (2004), where he attributed the superiority of some varieties in terms of plant height to more responsiveness to fertilizer sources and genetic makeup. However, similarities between the two varieties was observed in terms of some growth parameters which could be due to equal fertilizer use efficiency, genetic makeup and the environment which results in equal physiological activities and hence similar growth characters. This is in

REFERENCES

Anonymous. 2009. The maize market and economy: Sweet corn. [accessed 0904 2013]

Aphane, J., Chadha M.L. and Oluoch M.O. (2003). Increasing the consumption of micronutrient rich food through production of indigenous foods. AVRDC Publication number 03-561: 1-77.

line with Gana and Ogunremi (2008) who reported that the response of crops to fertilizer is governed by source of the nutrients, location, timing of application, the variety in question, spacing and the cropping method.

Variations in growth characters between locations as well as variation of crop response to fertilizer could be attributed to differences in the soil types and rainfall pattern. The soil at BUK which was sandy-clay loam in nature was more fertile with higher water retention capacity because of higher clay content. High clay fractions in soil promotes water and nutrient retention thereby resulting in proper growth and development of crops (Mengel and Kirkby, 2007), compared to the soil at Bagauda which was loamy-sand having lower water retention capacity because of very low clay content. Plant height, leaf area and leaf area index, were all enhanced with increase in rates of fertilizer sources at both locations.

CONCLUSION

In conclusion, the results of the experiment indicated that sources and rates of organic and inorganic were observed to have significantly increased the performance of maize varieties in terms of growth attributes.

Arunkumar, A. (2007). Effects of different levels of NPK on growth and yield parameters of Sweet corn. *Karnataka J. Agric. Sci.*, 20(1): 41-43.

Ayub, M. Nadeen, M.A. Sharar, M.S. and Mahmood (2002). Response of maize (*Zea mays L.*) fodder to different levels of nitrogen and phosphorus. *Asian Journal of Plant Science*. 1(4) 352-354

- Babalola, O.A. (2006). Comparative study of Ogun Phosphate rock and Single Superphosphate on three varieties of cowpea and maize and their effect on soil. *Nigeria Journal of Soil Science*, 16:1
- Badu-Apraku B and Fakorede M.A.B. (2006). (*Zea mays* L.) Wageningen, Netherlands Backhuys Publishers, Leiden, Netherlands/CTA, Wageningen, Netherlands 229-237.
- Badu-Apraku, B., Menkir, A., Fakorede, M.A.B., Fontenlum, A. and K. Obeng-Antwi (2006). Multivariate analysis of the genetic diversity of forty-seven *Striga* resistant Tropical early maturing maize inbred lines. *Maydica* 51:551-559.
- Badu-Apraku, B., M. A. B. Fakorede, A. F. Lum, and R. Akinwale. (2009). Improvement of yield and other traits of extra-early maize under stress and non-stress environments. *Agronomy Journal*. 101: 381-389.
- Black, C. A. (1965). Methods of Soil Analysis In. Chemical and Microbiological Properties. American Society of Agronomy, Madison Wisconsin 1972.
- Boateng, S. A., J. Zickermann and M. Kornaharens, 2006. Effect of poultry manure on growth and yield of maize. *West African Journal of Applied Ecology*, 9: 1-11.
- Carsky, R. J. and E. N. O. Iwuafor. 1999. Contribution of soil fertility research and maintenance to improve maize production and productivity in Sub-Saharan Africa.
- Dowswell, C.R. Pahiwa, R.L. and Cantrall R.P. (1996). Maize in the third World. West view pressinc. A division of Harper Collins Publisher, Inc. 268pp.
- Duncan, B.D. (1995). Multiple range and Multiple "F" test Biometrics. 11, Pp. 1-42.
- Feconja, M., Bavec F., Grobelnik-Mlakar S., Turinek M., Jacob M., Bavec M. 2011. Growth performance of Sweet maize under non-typical maize growing conditions. *Biological Agriculture and Horticulture*, 27: 147-164.
- Gana, A. K. and Ogunremi L. T. (2008). Comparative effect of chemical fertilization and manure on the grain yield of hybrid maize in the forest zone of Nigeria. *African Journal of General Agriculture*. Vol. 5 No. 1 Nigeria.
- Genc I., Inalpulat M., Kizil U., Mirik M., Smith S.E. and mendes M. 2013. Determination of water stress with spectral reflectance on Sweet corn using classification tree (CT) analysis. *Zemdirbyste – Agriculture*, 100(1): 81-90
- Jagtap, S.S. and F.J. Abamu, (2003). Marching improved maize production technologies to resource-base of farmers in a moist Savanna. *Agricultural Systems*, 76: 1067-1084.

- Kamara, A.Y. and Sanginga, N. (2001). Balance nutrient management for intensified maize-based systems in the Northern Guinea Savanna of West Africa. In: Proceeding of the
- Kamara A.Y., A. Menkir, S.O. Ajala and I. Kureh (2005). Performance of diverse maize genotypes under nitrogen deficiency stress in the Northern Guinea Savanna of Nigeria. *Experimental Agriculture* 41: 199-212.
- Kamara, A. Y., F. Ekeleme, D. Chikoye and L. O. Omoigui. (2009). Planting date and cultivar effects on grain yield in dryland corn production. *Agronomy journal*. 101(1): 91-98.
- Mengel, K. and E.A. Kirkby (2007). Principles of Plant Nutrition. Revised edition. *International Potash Institute, Bern Switzerland.*
- Nigeria-Africa Economic Outlook (NAEO). 2009. Nigeria Overview.
- Oad, F.C., Buriro U.A. and Agha S.K. (2004). Effect of organic and inorganic fertilizer application on maize fodder production. *Asian Network for Scientific Information*.
- Ojo, D.K., S.A. Ogunbayo, E.O. Idehen, A.F. Akinwale and O. Oduwaye, (2007). Genetic evaluation of phosphorus utilization in tropical cowpea (*Vigna unguiculata* L.). *Journal American Science*, 3(1): 77-83.
- Oktem A.G. and Oktem A (2006). *Asian J. Plant Sci.* 4:361-364.
- Pullman and Wash, (2010). www.twanside.org.sq, www.biosafety-info.net.
- Sharifai, a.I. (2004). Response of early maturing maize (*Zea mays* L.) varieties to NPK fertilizer rates. Unpublished M.Sc. thesis submitted to Postgraduate school, Ahmadu Bello University Zaria – Nigeria, 75pp.
- United States Department of Agriculture (USDA), 2014. *World corn production, 2013/14.*
- Van Averbek, W. and Yoganathan, S. (1997). Using Kraal manure as a fertilizer.
- Western Vander D. 2008. Hungary and France are the largest producers, German Sweet corn acreage increases with 60% in two years time. www.freshplaza.com/news/detail.RSP?id=35118[accessed 1403 2013].

Table 1: Effect of rates of organic and inorganic fertilizers on Plant Height (cm) of two maize varieties At BUK and Bagauda during 2011 rainy season.

Treatment	BUK		Bagauda	
	6WAS	10WAS	6WAS	10WAS
Kgha ⁻¹				
NPK + Sweet corn				
300	135.5fg	174.6d-g	118.5ef	145.9ghi
450	139.9ef	180.9cde	128.1abc	151.2fg
600	148.5bcd	190.1bc	126.9bcd	165.8bc
750	152.1ab	207.7a	130.2ab	170.4b
NPK + EVDT				
300	133.9g	171.9efg	122.8cde	146.5ghi
450	144.2de	184.9bcd	127.7abc	154.9ef
600	148.6bcd	192.3b	129.1ab	178.7a
750	149.3bcd	193.1b	133.1a	177.1a
NOF + Sweet corn				
600	76.8k	145.3l	102.7j	128.9m
700	79.7k	147.4kl	107.9hi	133.6klm
800	86.7j	151.4jkl	110.7h	134.7klm
900	127.0h	161.2hij	116.1fg	137.5jk
NOF + EVDT				
600	113.6i	146.8kl	103.1ij	129.5lm
700	114.7i	149.5kl	112.5gh	133.1klm
800	131.2gh	151.9jkl	118.2ef	135.1kl
900	133.7g	156.1jkl	118.3ef	140.8ij
NOF + NPK + Sweet corn				
600+300	144.7cde	167.1fgh	108.9h	141.6ij
600+450	147.5bcd	173.1efg	117.9ef	148.6gh
700+600	145.0cde	180.0cde	119.4ef	157.6de
700+750	156.6a	187.4bc	126.0bcd	160.9cd
NOF + NPK + EVDT				
600+300	141.0e	165.2ghi	109.8h	144.4hi
600+450	157.3a	176.3def	122.1de	151.1fg
700+600	150.5bc	176.3def	128.4ab	170.3b
700+750	151.8ab	183.8bcd	130.2ab	181.5a
SE+ ₁	1.821	3.267	1.730	1.846

Means followed by the same letter(s) along a column are not significantly different at 5% probability

Table 2: Effect of rates of organic and inorganic fertilizers on leaf area per plant (cm²) of two maize varieties at BUK and Bagauda during 2011 rainy season.

Treatment	BUK		Bagauda	
	6WAS	10WAS	6WAS	10WAS
Kgha ⁻¹				
NPK + Sweet corn				
300	497.7hi	967.9de	375.4fgh	821.9c-h
450	548.9gh	983.7de	414.3def	770.7f-j
600	589.0efg	1083.9bc	454.3a-d	938.7a-e
750	633.8cde	1198.0a	498.8ab	1022.4ab
NPK + EVDT				
300	555.0fgh	944.6ef	380.8e-h	819.2d-h
450	573.9fgh	1001.6de	402.5d-g	941.4a-e
600	699.2ab	1093.2b	480.2abc	970.7a-d
750	726.1a	1188.2a	506.6a	1081.9a
NOF + Sweet corn				
600	403.0l	664.6k	283.2i	655.9ij
700	408.1l	731.6ij	304.5i	635.4j
800	420.9kl	856.5g	331.9hi	715.9g-j
900	480.2ijk	876.4g	324.7hi	670.1hij
NOF + EVDT				
600	428.1jkl	752.3ij	306.9i	640.6j
700	425.1jkl	718.4jk	321.5hi	700.0g-j
800	480.6ijk	839.6gh	341.4ghi	763.7f-j
900	484.4ij	888.6fg	324.4hi	757.6f-j
NOF + NPK + Sweet corn				
600+300	504.3hi	747.7ij	320.6hi	784.7e-j
600+450	573.6efg	791.1hi	401.9d-g	837.2c-g
700+300	624.5de	962.2de	457.4a-d	892.3b-f
700+450	658.0bcd	1003.9de	442.6b-e	974.4a-d
NOF + NPK + EVDT				
600+300	603.7d-g	788.1hi	383.4e-h	807.1e-i
600+450	616.0def	897.2fg	426.7c-f	913.3b-f
700+300	691.0abc	1028.0cd	504.1ab	978.8abc
700+450	734.1a	1081.3bc	514.5a	1075.3a
SE+ ₁	19.496	20.503	19.626	47.348

Means followed by the same letter(s) along a column are not significantly different at 5% probability

Table 3: Effect of rates of organic and inorganic fertilizers on leaf area index of two maize varieties at BUK and Bagauda during 2011 rainy season.

Treatment	BUK		Bagauda	
	6WAS	10WAS	6WAS	10WAS
Kg ^{ha} ⁻¹				
NPK + Sweet corn				
300	2.4c	4.5cd	1.9d	4.7bc
450	2.7c	5.1c	2.0cd	4.4cd
600	3.2b	5.9b	2.2bc	5.5ab
750	3.3b	6.3b	2.4a	6.5a
NPK + EVDT				
300	2.6c	4.0d	1.8d	4.7bc
450	3.1b	5.0c	2.0d	4.8bc
600	3.5ab	6.2b	2.4ab	5.3ab
750	3.8a	7.0a	2.6a	6.8a
NOF + Sweet corn				
600	1.8d	3.0d	1.2b	2.3c
700	1.7d	3.4cd	1.3ab	2.4c
800	1.8d	4.1ab	1.3ab	2.7abc
900	2.2bc	4.5a	1.4ab	2.8abc
NOF + EVDT				
600	2.0cd	3.4cd	1.4ab	2.5bc
700	1.9d	3.6bc	1.4ab	2.7abc
800	2.6a	4.1ab	1.5a	3.2ab
900	2.4ab	4.2a	1.4ab	3.4a
NOF + NPK + Sweet corn				
600+300	2.4e	3.6e	1.4d	3.3e
600+450	2.7de	4.3d	1.8c	3.5de
700+300	3.2bc	5.5b	2.1b	4.2c
700+450	3.6ab	5.6b	2.1b	4.0b
NOF + NPK + EVDT				
600+300	2.9cd	4.0d	1.8c	3.2e
600+450	3.0cd	4.7c	2.0bc	3.8cd
700+300	3.6ab	5.8ab	2.5a	5.1b
700+450	4.0a	6.1a	2.7a	5.3a
SE ₊	0.12	0.18	0.08	0.21

Means followed by the same letter(s) along a column are not significantly different at 5% probability