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RESPONSE OF MAIZE GROWTH TO ORGANIC AND FOLIAR FERTILIZATION UNDER NITROGEN FERTILIZER LEVELS

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ABSTRACT

Two field experiments were carried out at El-Orman Village, El-Sinbelaween Station, Dakahlia Governorate, during the two successive summer seasons of 2010 and 2011. The main objectives of this study were to determine the effect of organic fertilization (without, farmyard manure {FYM} and compost) and foliar fertilization (without, spraying with water, Crystal Nasr and Melagrow) under nitrogen fertilizer levels (50, 75 and 100 kg N/fed) on growth characters of maize (*Zea mays* L.) hybrid TWC 324. Each organic fertilization treatment was performed in separate experiment. Every experiment of organic fertilization treatment was carried out in split plot design with four replications.

The obvious results of this investigation can be summarized as follows:

- All studied growth characters were exerted significant effect as a result of applying organic fertilization treatments in both seasons, except specific leaf area at 50 days from sowing in the first season. The treatment from organic fertilization which gave the highest values of these characters was applying the compost as compared with other treatments in both seasons.
- Foliar application with Melagrow as a natural growth promoter significantly recorded the highest values of studied growth, exclusion specific leaf area at 50 and 70 days from sowing in both seasons. Whilst, application of Crystal Nasr came in the second rank in this respect in both seasons. On the other hand, the lowest values of all growth characters were resulted from the control treatment (without foliar application) in both seasons.
- Application nitrogen fertilization at the level of 100 kg N/fed significantly exceeded other levels (50 and 75 kg N/fed) of studied growth parameters in both seasons.

Finally, the preferable growth characters of maize hybrid TWC 324 can be achieved through organic fertilizing with compost, foliar application with Melagrow and mineral fertilizing with 100 kg N/fed under the environmental conditions of El-Sinbelaween Center, Dakahlia Governorate.

Keywords: Maize, *Zea mays* L., Organic fertilization, FYM, Compost, Foliar fertilization, Foliar fertilizers, N-levels.

INTRODUCTION

The importance of cereal grains to the nutrition of millions of people around the world is widely recognized. After the wheat and rice, maize is the most important cereal grain in the world, providing nutrients for humans and animals. In industrialized countries, a larger proportion of the grain is used as livestock feed and as industrial raw material for food and nonfood uses. In developing countries is used mainly as human food, although its use as animal feed is increasing. Therefore, a great attention should be paid to raise maize productivity by maximizing yield per unit area in order to reduce the gab between its production and consumption. Whereas, maize is well known for its high demand for nutrients and other production inputs. Thereby, among factors that enhance maize productivity such as organic (farmyard and compost) and foliar fertilization as well as nitrogen fertilizer levels.

Organic manure increases soil fertility. In the short-term manure stimulates microbial activity that improves soil structure and in the long-term supplies NO_3 and NH_4 to aid crop production (Edwards and Someshwar, 2000). Farmyard manure (FYM) is most important as it contains all the nutrients needed for crop growth including trace elements, albeit in small quantities. Compost is organic matter that has been decomposed and recycled as a fertilizer and soil amendment. The compost itself is beneficial for the land in many ways, including as a soil conditioner, a fertilizer, addition of vital humus or humic acids, and as a natural pesticide for soil. There are many investigations with respect to the effect of organic fertilization on maize growth. In this concern; Nofal, Fatma *et al.* (2005) noticed that applying 10 m^3/fed of chicken manure or rice straw compost increased maize growth as compared with the control treatment (without organic manure). This increment may be attributed to organic manure contains of microorganisms which fix and release phytohormones, which stimulate plant growth. Mohamed (2006) showed that un-mineral fertilizers detected significant changes in plant height, ELA, LA/plant, LAI, biomass/plant and first ear height. The highest values of these characters were resulted from application organic fertilizer (compost) at a rate of 2 t/fed. Hati *et al.* (2007) indicated that modest improvements in the nitrogen availability in organic fertilizers could be a result in a major cost saving for the farmer by reducing the requirement for mineral nitrogen fertilizer and reduce the risk of environmental pollution. Adejumo *et al.* (2010) observed that compost application significantly increased the vegetative growth of maize and performed better than inorganic fertilizer ($P<0.05$). Higher dose (40 t/ha) of Mexican sunflower compost gave the highest plant height, dry matter yield and leaf area as compared with Cassava waste compost.

Foliar fertilization is widely used practice to correct nutritional deficiencies in plants caused by improper supply of nutrients to roots. The main benefits of foliar spraying is that it can have up to a 90% efficiency rate of uptake as opposed to a 10% efficiency from soil applications. Also it becomes immediately available in the plant because they are 100% water soluble. Many researchers studied the effect of foliar fertilization on maize growth for example; Ling and Silberbush (2002) concluded that foliar fertilization may partially compensate for insufficient uptake by the roots, but requires sufficient leaf area to become effective. Mohamed (2006) studied the effect of Delfan as foliar fertilizer on growth and photosynthates partitioning parameters of two maize hybrids. He indicated that Dlefan fertilizers gave considerable increases in plant height, ear leaf area, LA/plant, LAI and biomass/plant when compared with the general check. Attia *et al.* (2011) found that foliar application with Melagrow as a natural growth promoter twice after 30 and 70 days from sowing significantly recorded the highest values of studied growth characters of safflower, exclusion leaves/stem and branches ratio, CRG, RGR and NAR in both seasons. Shahzad *et al.* (2012) evaluated the response of growth attributes as a result of boron foliar, soil and soil +

foliar applications in maize crop. They concluded that the boron certain levels was effective as a foliar application to enhance growth in maize crop and accelerated growth.

Nitrogen is the component of protoplasm, proteins, nucleic acids, chlorophyll and plays a vital role both in vegetative and reproductive phase of crop growth. Maize has been recognized as a heavy feeder and uses more of nitrogen than any other nutrient element. Many reports indicated that nitrogen is considered as one among the most affective factors in increasing growth of maize crop (Abd-Alla, 2005 ; Abd El-Lattief and Fakkar, 2006 ; Mohamed, 2006 ; Seadh and El-Zehery, 2007 ; Abd El-Maksoud and Sarhan, 2008 ; Hassan *et al.*, 2008 ; Akmal *et al.*, 2010 and Soliman and Gharib, 2011). However, Wopereis *et al.* (2006) concluded that nitrogen was the major limiting yield nutrient in this study. In spite of excess application of nitrogen fertilizer could be accumulated in plant tissues in freely manner, this also affects human health and crop quality. However, judicious use of mineral nitrogen fertilizer should be promoted on improvement maize productivity..

Consequently, this investigation was undertaken to appoint the effect of organic and foliar fertilization under nitrogen fertilizer levels on growth of maize (*Zea mays* L.) hybrid TWC 324 under the environmental conditions of El-Sinbelaween Center, Dakahlia Governorate.

MATERIALS AND METHODS

Two field experiments were carried out at El-Orman Village, El-Sinbelaween Station, Dakahlia Governorate, during the two successive summer seasons of 2010 and 2011. The main objectives of this study were to determine the effect of organic and foliar fertilization under nitrogen fertilizer levels on growth of maize (*Zea mays* L.) hybrid TWC 324 and to minimize the pollution by nitrate in water and soil, as well.

Each organic fertilization treatment was performed in separate experiment. Every experiment of organic fertilization treatment was carried out in split plot design with four replications. The studied organic fertilization treatments were as follows:

1- Without organic fertilization (control treatment).
2- Farmyard manure (FYM) at the rate of 20 m^3/fed.
3- Compost at the rate of 4 t/fed.

Farmyard manure (FYM) was added in the experiment area before soil preparation. Whereas, compost was added after plowing and leveling and before ridging. Chemical analysis of farmyard manure and compost used in both seasons is presented in Table 1.

Table 1: Chemical analysis of farmyard manure and compost used in both seasons.

Properties	Farmyard manure	Compost
Moisture (%)	12.96	18.80
OM (%)	19.16	34.10
C/N ratio	11 / 12	14 / 1
N (%)	0.65	1.41
P (%)	0.45	0.20
K (%)	1.40	0.65
pH	8.68	6.61
EC m.mohs/cm	8.38	9.33
Fe (ppm)	650.0	950.0
Mn (ppm)	780.0	150.7
Zn (ppm)	312.0	111.0

The main plots were occupied with the following four foliar fertilization treatments in each experiment:

1- Without (control treatment).
2- Foliar spraying with water.
3- Foliar spraying with Crystal Nasr at the rate of 1 kg/200 liter water/fed.
4- Foliar spraying with Melagrow at the rate of 50 ppm (10 g Melagrow/200 liter water/fed).

Foliar fertilization treatments were carried out twice at the aforementioned rates after 25 and 45 days from sowing (DFS). The chemical composition of commercial foliar fertilizer Crystal Nasr used in this experiment is presented in Table 2.

Melagrow is natural growth promoter extracted from pollen of cabbage flowers. It has great effectiveness of many field crops. Melagrow is combined effects of oxen, cytokines, gibberellins, ethylene and hydrogen cyanamid. The chemical composition of Melagrow is 20 % phosphorus, 10 % potassium, 3 % boron and 0.2 % brassinolide. Natural brassinolides (0.2%) is natural plant growth promoter for all crops, which promotes growth, increases yield and improves quality.

Table 2: Chemical composition of Crystal Nasr foliar fertilizer.

Chemical composition	Value
N %	20
P %	20
K %	20
Zn ppm	120
Fe ppm	700
Mn ppm	420
Cu ppm	160
Mo ppm	140
B ppm	220

For each experiment, the sub-plots were assigned to three nitrogen fertilizer levels (50, 75 and 100 kg N/fed). Nitrogen fertilizer in the form of ammonium nitrate (33.5 % N) was added at the formerly mentioned levels in two equal parts, one half after thinning (before the first irrigation) and the other half before the second irrigation.

Each experimental basic unit (sub – plot) included five ridges, each of 60 cm width and 3.5 m length, resulted an area of 10.5 m^2 (1/400 fed). The preceding winter crop was Egyptian clover (*Trifolium alexandrinum* L.) in the first and second seasons. The soil of the experimental site was clay loam in texture with an electrical conductivity (EC) of 2.78 dS/m and a pH of 7.85.

The experimental field well prepared through two ploughing, adding organic fertilizers, leveling, compaction, ridging and then divided into the experimental units (10.5 m^2). Calcium superphosphate (15.5 % P_2O_5) was applied during soil preparation at the rate of 150 kg/fed. Potassium sulphate (48 % K_2O) at the rate of 50 kg/fed was applied with the first dose of nitrogen fertilizer.

Maize grains were hand sown in hills 25 cm apart at the rate of 2 – 3 grains/hill using dry sowing method (Afir) on one side of the ridge during the second week of May in 2010 and 2011 seasons. The plants were thinned to one plant per hill before the first irrigation. The first irrigation was applied after 21 days from sowing and the following irrigations were applied at 15 days intervals during the growing seasons. The other agricultural practices were kept the same as normally practiced in maize fields according to the recommendations of Ministry of Agriculture and Land Reclamation, except for the factors under study.

Studied Characters:

1- Number of days from sowing to 50 % tasseling:

This character was determined as the number of days from planting to 50 % tasseling of each sub – plot plants.

Two samples were taken during the growth period (50 and 70 days from sowing), where five guarded plants were chosen at random from outer ridges of each sub-plot. The following growth attributes was determined:

2- Average dry weight of plant (g). 3- Average dry weight of leaves (g).

To determine dry weight of plant and leaves, all plant fractions and leaves were air-dried, then oven dried at 70^0C till constant weight obtained.

4- Leaf area index (LAI): It was measured as described by Watson (1958) and then the following equation was used.

$$LAI = \frac{\text{Leaf area per plant (cm}^2\text{)}}{\text{Plant ground area (cm}^2\text{)}}$$

5- Specific leaf area (SLA) [cm^2/g]: It was measured according to Watson (1958).

$$SLA = \frac{\text{Leaf area per plant (cm)}}{\text{Dry weight of leaves (g)}}$$

6- Crop growth rate (CGR) in g/day: It was determined according to Radford (1967), where: W_1 and W_2 refer to dry weight of plant at sampling time T_1 (50 DFS) and T_2 (70 DFS), respectively.

$$CGR = \frac{W_2 - W_1}{T_2 - T_1}$$

7- Relative growth rate (RGR) in g/g/day: It was determined according to Watson (1958).

$$RGR = \frac{\log_e W_2 - \log_e W_1}{T_2 - T_1}$$

8- Net assimilation rate (NAR) in g/cm^2/day: It was determined according to Radford (1967), where: W_1, A_1 and W_2, A_2, respectively refer to dry weight and leaf area of plant at sampling time T_1 and T_2, respectively.

$$NAR = \frac{(W_2 - W_1)(\log_e A_2 - \log_e A_1)}{(T_2 - T_1)(A_2 - A_1)}$$

At harvest time (after 120 days from planting) random samples of five guarded plants were taken at random from each sub – plot to determine the following characters:

9- Plant height (cm); it was measured in cm from the soil surface up to the top of tassel.

10- Ear height (cm); it was measured in cm from the soil surface up to the shank of ear.

11- Ear leaf area (cm^2); it was calculated by the following formula according to Gardner *et al.* (1985):

All obtained data were statistically analyzed according to the technique of analysis of variance (ANOVA) for the split – plot design to each experiment (organic fertilization treatments), then combined analysis was done between organic fertilization treatments as published by Gomez and Gomez (1984) by using “MSTAT-C ” computer software package. New Least Significant of Difference (NLSD) method was used to test the differences between treatment means at 5 % level of probability as described by Waller and Duncan (1969).

RESULTS AND DISCUSSION

I- Effect of organic fertilization:

Data presented in Tables 3, 4 and 5 illustrate that, the effect of organic fertilization treatments on number of days from sowing to 50 % tasseling, dry weight of plant and leaves, LAI, SLA at 50 and 70 DFS, CGR, RGR, NAR, plant and ear height and ELA of maize was significant in both seasons of this investigation with exception SLA at 50 DFS in the first season only. There were substantial differences in all studied characters among various studied organic fertilization treatments (without, FYM and compost) in both seasons. Since, organic fertilizing maize plants with compost at a rate of

4t/fed produced the highest values of the previously mentioned characters, excluding SLA at 50 and 70 DFS in both seasons. On the other wise, control treatment (without organic fertilization) gave the lowest values of these characters, except SLA at 50 and 70 DFS in both seasons. However, organic fertilizing maize plants with FYM at a rate of 20 m^3/fed came in the second rank after compost treatment in both seasons. Such superiority of fertilizing maize by compost in increasing growth characters may be due to the improving action of organic matter on physical, biological and chemical properties of soil. Also, the use of compost improved soil organic matter, nitrogen content, P_2O_5 concentration and exchangeable cations consequently enhanced photosynthesis and the other bio-chemical processes inside maize plants which is responsible much for such increase in plant growth. Similar results were reported by several researchers such as Edwards and Someshwar (2000), Nofal, Fatma *et al.* (2005), Mohamed (2006) and Hati *et al.* (2007).

II- Effect of foliar fertilization:

The effect of foliar fertilization treatments on maize growth characteristics *i.e.* number of days from sowing to 50 % tasseling, dry weight of plant and leaves, LAI, SLA at 50 and 70 DFS, CGR, RGR, NAR, plant and ear height and ELA was significant in both seasons, except SLA at 50 DFS in the first season and NAR in the second season as shown in Tables 3, 4 and 5. From obtained results, it could be recommend that foliar spraying maize plants with Melagrow as a natural growth promoter significantly surpassed other foliar fertilization treatments (spraying with water or Crystal Nasr) and produced the highest values of all studied characters, except SLA at 50 and 70 DFS in both seasons under the environmental conditions of this study. Whereas, spraying maize plants with Crystal Nasr gave the best values of all studied characters after aforementioned treatment, the spraying with water in the two growing seasons. On the other wise, control treatment (without foliar fertilization) resulted in the lowest values of these characters, exclusion SLA at 50 and 70 DFS in both seasons. The increases in maize growth by foliar application with Melagrow that contains phosphorus, potassium, boron and brassinolide may be due to the role of macro and micronutrients in activating physiological and biochemical processes as well as the role of brassinolides in improvement growth reflecting increases in growth characteristics. Confirming this conclusion by Ling and Silberbush (2002), Attia *et al.* (2011) and Shahzad *et al.* (2012).

III- Effect of nitrogen fertilizer levels:

The data revealed in Tables 3, 4 and 5 show that the effect of nitrogen fertilizer levels on all studied characters was significant in the two growing seasons, except SLA at 50 DFS in the first season only. It can be stated that all studied growth characters significantly increased as a result of increasing nitrogen fertilizer levels from 50 up to 100 kg N/fed and the differences between them were obvious in both seasons. Application the highest level of nitrogen fertilizer (100 kg N/fed) produced the highest values of growth parameter in both seasons. Fertilizing maize plants with 75 kg N/fed came in the second rank after fertilizing with 100 kg N/fed with respect to these characters in both seasons. The lowest values of maize growth characters were resulted from fertilizing plants with the lowest nitrogen fertilizer level (50 kg N/fed) in both seasons. The increases in growth characters of maize crop as a result of increasing nitrogen fertilizer level up to 100 kg N/fed can be ascribed to the role of N element in monitoring of many basic physiological processes in maize plants such as pholosynthetic rate and the accumulation of more metabolites partitioned to plant organs, reflecting therefore better growth of both maize. Also, the positive response of maize plants and in turn the studied characters to the N levels applied could be attributed to the reduction of the organic matter and available N in the experimental soils of this study. Similar results were in coincidence with those stated by Wopereis *et al.* (2006), Hassan *et al.* (2008), Akmal *et al.* (2010) and Soliman and Gharib (2011).

It can be concluded that fertilizing maize plants hybrid TWC 324 by compost at a rate of 4t/fed and foliar spraying with Melagrow twice after 25 and 45 days from sowing in addition mineral fertilizing with 100 kg N/fed in order to maximizing its growth characters under the environmental conditions of El-Sinbelaween Center, Dakahlia Governorate.

Table 3: Number of days from sowing to 50 % tasseling and dry weight of plant and leaves at 50 and 70 DFS of maize as affected by organic and foliar fertilization under nitrogen fertilizer levels during 2010 and 2011 seasons.

Characters / Treatments	No. of days from sowing to 50 % tasseling		Dry weight of plant (g)				Dry weight of leaves (g)			
			50 DFS		50 DFS		50 DFS		50 DFS	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
A- Organic fertilization:										
Control	60.91	61.98	163.8	181.4	413.3	428.2	36.55	48.19	99.62	98.45
FYM	61.68	62.88	190.4	203.2	428.9	458.6	40.48	49.06	102.48	117.77
Compost	62.75	63.03	202.8	214.8	446.9	496.3	45.54	54.31	119.47	122.58
F. test	*	*	*	*	*	*	*	*	*	*
NLSD 5 %	0.18	0.15	0.7	0.4	1.2	2.3	0.53	1.45	1.44	1.34
B-Foliar fertilization:										
Control	60.71	61.40	135.6	143.38	332.7	355.8	30.52	38.00	86.84	96.82
Water	61.44	62.24	173.4	184.17	398.7	439.4	36.10	49.64	102.06	111.61
Crystal Nasr	62.10	63.16	206.7	222.44	460.9	504.2	43.68	54.56	115.96	118.17
Melagrow	62.87	63.73	227.1	249.46	526.6	544.8	53.13	59.88	123.90	125.13
F. test	*	*	*	*	*	*	*	*	*	*
NLSD 5 %	0.21	0.17	0.8	0.4	1.4	2.6	0.61	1.99	1.66	1.55
C- Nitrogen fertilizer levels:										
50 kg N/fed	61.45	62.30	174.9	188.8	408.7	440.7	38.18	49.38	102.92	108.17
75 kg N/fed	61.73	62.61	186.3	199.7	430.7	461.9	40.79	49.87	107.19	113.63
100 kg N/fed	62.16	62.99	195.9	211.0	449.8	480.6	43.60	52.31	111.46	117.00
F. test	*	*	*	*	*	*	*	*	*	*
NLSD 5 %	0.17	0.09	0.7	0.3	1.1	1.9	0.22	1.42	1.31	0.74

Table 4: Leaf area index (LAI), specific leaf area (SLA) and Crop growth rate (CGR) of maize at 50 and 70 DFS as affected by organic and foliar fertilization under nitrogen fertilizer levels during 2010 and 2011 seasons.

Characters / Treatments	LAI				SLA (cm^2/g)				CGR (g/day)	
	50 DFS		50 DFS		50 DFS		50 DFS			
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
A- Organic fertilization:										
Control	1.59	1.65	2.34	2.53	68.30	56.33	35.85	38.75	11.92	12.34
FYM	1.66	1.69	2.42	2.80	63.94	53.89	35.44	36.80	12.20	12.77
Compost	1.70	1.92	2.82	2.99	58.65	52.14	35.33	35.97	12.47	14.07
F. test	*	*	*	*	*	*	NS	*	*	*
NLSD 5 %	0.02	0.01	0.05	0.01	1.05	1.66	-	0.97	0.06	0.07
B-Foliar fertilization:										
Control	1.59	1.68	2.02	2.53	78.84	67.19	36.22	39.42	9.85	10.62
Water	1.63	1.73	2.45	2.72	68.40	54.34	35.33	36.87	11.26	12.76
Crystal Nasr	1.68	1.78	2.70	2.87	58.54	48.95	35.53	36.70	12.71	14.09
Melagrow	1.71	1.83	2.93	2.97	48.74	46.00	35.08	35.71	14.97	14.77
F. test	*	*	*	*	*	*	NS	*	*	*
NLSD 5 %	0.03	0.01	0.06	0.04	1.22	1.92	-	1.12	0.07	0.11
C- Nitrogen fertilizer levels:										
50 kg N/fed	1.63	1.74	2.41	2.71	66.96	56.40	35.64	38.06	11.68	12.59
75 kg N/fed	1.65	1.76	2.53	2.78	63.55	54.17	35.66	36.94	12.22	13.11
100 kg N/fed	1.67	1.77	2.64	2.83	60.37	51.79	35.32	36.52	12.69	13.48
F. test	*	*	*	*	*	*	NS	*	*	*
NLSD 5 %	0.01	0.01	0.02	0.02	0.78	1.60	-	0.51	0.06	0.09

Table 5: Relative growth rate (RGR), net assimilation rate (NAR), plant and ear height and ear leaf area (ELA) of maize as affected by organic and foliar fertilization under nitrogen fertilizer levels during 2010 and 2011 seasons.

Characters / Treatments	RGR (g/g/day)		NAR ($g/cm^2/day$)		Plant height (cm)		Ear height (cm)		ELA (cm^2)	
	2010	2011	2010	2011	2010	2011	2010	2011	2010	2011
A- Organic fertilization:										
Control	0.118	0.119	2.47	2.48	260.2	262.8	146.8	150.9	477.5	583.6
FYM	0.119	0.120	3.29	2.81	277.0	273.7	151.3	156.6	574.6	610.5
Compost	0.120	0.122	3.36	3.18	282.3	277.3	159.5	165.4	584.4	660.9
F. test	*	*	*	*	*	*	*	*	*	*
NLSD 5 %	0.001	0.001	0.23	0.27	0.8	1.4	0.4	0.5	3.0	5.6
B-Foliar fertilization:										
Control	0.115	0.116	2.68	2.77	237.9	230.5	135.8	139.2	395.5	455.5
Water	0.118	0.120	2.70	2.78	264.7	255.9	147.1	148.3	509.7	576.4
Crystal Nasr	0.120	0.123	3.03	2.80	283.8	283.0	158.7	162.6	595.2	668.2
Melagrow	0.124	0.124	3.76	2.95	306.3	315.6	168.6	180.3	681.5	773.4
F. test	*	*	*	NS	*	*	*	*	*	*
NLSD 5 %	0.001	0.001	0.27	-	0.9	1.6	0.5	0.6	3.5	6.5
C- Nitrogen fertilizer levels:										
50 kg N/fed	0.118	0.119	2.96	2.75	264.8	262.3	148.9	153.2	511.6	588.2
75 kg N/fed	0.119	0.120	3.06	2.80	273.8	271.3	152.4	157.6	545.9	612.9
100 kg N/fed	0.120	0.121	3.10	2.92	281.0	280.2	156.3	162.2	578.9	653.9
F. test	*	*	*	*	*	*	*	*	*	*
NLSD 5 %	0.001	0.001	0.10	0.11	0.7	0.6	0.3	0.4	2.3	5.9

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إستجابة نمو الذرة الشامية للتسميد العضوى والورقى تحت مستويات السماد النيتروجينى

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أقيمت التجارب الحقلية بمزرعة بقرية الأورمان – مركز السنبلاوين - محافظة الدقهلية خلال موسمى ٢٠١٠ و ٢٠١١ لدراسة تأثير التسميد العضوى (بدون ، سماد بلدى وكمبوست) والورقى (بدون ، رش بالماء ، السماد الورقى كريستال نصر ومنشط النمو الطبيعى ميلاجرو) تحت مستويات السماد النيتروجينى (٥٠ ، ٧٥ ، ١٠٠ كجم نيتروجين/فدان) على صفات النمو لمحصول الذرة الشامية هجين ثلاثى ٣٢٤. ونفذت التجارب فى تصميم القطع المنشقة مرة واحدة ذو أربع مكررات لكل معاملة سماد عضوى ثم أجرى التحليل التجميعى لمعاملات التسميد العضوى. ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلى:

أظهرت جميع صفات النمو تحت الدراسة تأثراً معنوياً بمعاملات التسميد العضوى عند كلا فترتى النمو فى كلا الموسمين بإستثناء المساحة النوعية للأوراق بعد ٥٠ يوم من الزراعة فى

الموسم الأول فقط. أدى تسميد محصول الذرة الشامية بالكمبوست للحصول على أعلى القيم لجميع الصفات تحت الدراسة مقارنةً بمعاملات التسميد العضوى الأخرى فى كلا موسمى الدراسة.

أدى رش نباتات الذرة الشامية بمنشط النمو الطبيعى "ميلاجرو" للحصول على أعلى القيم لجميع صفات النمو تحت الدراسة بعد ٥٠ و٧٠ يوم الزراعة فى كلا الموسمين ، بإستثناء المساحة النوعية للأوراق بعد ٥٠ يوم من الزراعة فى الموسم الأول وكفاءة التمثيل الضوئى فى الموسم الثانى فقط. أتى الرش بالسماد الورقى كريستال نصر فى المرتبة الثانية بالنسبة لجميع صفات النمو تحت الدراسة فى كلا موسمى الدراسة. فى حين أن أقل القيم لجميع الصفات تحت الدراسة نتجت من معاملة المقارنة (بدون رش ورقى) فى كلا موسمى الدراسة.

أدى تسميد محصول الذرة الشامية بـ ١٠٠ كجم نيتروجين/فدان إلى تفوق معنوى على مستويات التسميد النيتروجينى الأخرى (٥٠ و ٧٥ كجم نيتروجين/فدان) كما نتج عنها أعلى القيم لكل من صفات النمو خلال موسمى الدراسة.

توصى الدراسة بالتسميد العضوى للذرة الشامية صنف هجين ثلاثى ٣٢٤ بالكمبوست مع الرش الورقى بمنشط النمو ميرجرو بالإضافة إلى التسميد النيتروجينى بمعدل ١٠٠ كجم نيتروجين/فدان للحصول على أعلى نمو تحت ظروف مركز السنبلاوين - محافظة الدقهلية.

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