Egypt. J. Agric. Res., 79 (4), 2001.

EFFECT OF THE PRECEDING WINTER CROP AND NITROGEN FERTILIZATION ON YIELD AND YIELD COMPONENETS OF MAIZE AND SUNFLOWER

FARGHLY, B.S.

Field Crops Research Institute, Agric. Res. Center, Giza, Egypt.

(Manuscript received 30 December 2001)

Abstract

Two field experiments were conducted at Shandaweel Agric. Res. Station in 1998 and 1999, summer seasons in a split-plot design with four replicates. Winter crops were in main plots and N rates in the sub plots. N rates were 90, 105 and 120 kg N/fed for maize and 45, 60 and 75 kg N/fed for sunflower.

Highly significant differences due to the preceding winter crop were obtained in plant growth characters and yield of maize and sunflower. Values were maximum after faba bean and minimum after wheat. Seed yield/fed. of maize and sunflower grown after faba bean were 15.2 and 17.72 higher than those grown after wheat, respectively.

All growth characters of maize and sunflower were increased by increasing N levels up to 120 kg N/fed for maize and 75 kg N/fed. for sunflower. The increments in grain yield of maize as affected by adding 120 kg N/fed. over 105 and 90; g N/fed. were 7.2 and 14.5 %, respectively. Seed yield of sunflower fertilized with 75 kg N/fed. was 6.3 and 13.3, respectively, higher than yields obtained with 60 and 45 kg N/fed. Yields of maize and sunflower grown after faba bean and fertilized with 90 kg N/fed. for maize and 45 kg N/fed for sunflower were similar to yields obtained after wheat and fertilized with 120 kg N/fed. for maize and 75 kg N/fed. for sunflower.

INTRODUCTION

Yields of field crops, such as maize and sunflower, are positively affected by factors including the cropping system, preceding crop, fertilizer level and soil fertility. Results of Geith (1973) show that grain yield of maize is much higher when the rotation include legume crops. Shafshak *et al.* (1992), Wetch (1985), Remstw and Patile (1987), Durst *et al.* (1988) and Peterson and Varval (1989) noted that cereal crops produced greater yield followed by legumes than monoculture or followed by cereal crops. Crookston and Karle (1989) reported that the greatest relative increases in corn and soybean yields were due to rotation over continuous monoculture. Aly *et al.* (1993) found that yields of maize after faba bean were superior to those grown after berseem or wheat. El-Howary *et al.* (1994) reported that soil micro- and macro-

nutrients were affected by the preceding crops and consequently affected yield of the following crop and its components. Porter *et al.* (1997) found that corn yield was most suppressed by a previous corn crop in relatively low-yielding years. Abou Kresha *et al.* (1998) found that grain yields of maize grown after faba bean or berseem were higher than those grown after wheat.

Nitrogen fertilization is essential for the production of high yield of grain maize in Egypt (Abdella Hussein, 1980; Sorour and Attia, 1988; Zeiton, 1992; Ali, 1993 and Mohamed, 1993; Chen *et al.* 1994; Shafshak *et al.* 1994; Abdel Gawad and El-Batal, 1996). For sunflower, application of N significantly increased plant height, head diameter, seed index, seed husk percent and seed yield (Zeiton, 1992, Ali, 1993 and Mohamed, 1993). Maize ear length and diameter, number and weight of grains/ear, number of ears/plant and shelling % increased as N levels were increased. (El-Sheikh, 1993; Salwa, 1993; Shafshak *et al.* 1994, Hammam, 1995, Chen *et al.* 1994, Sangoi and Almeide 1994 and Moshtohry *et al.* 1995). Abdel Gawad and El-Batal (1996) found that increasing N fertilization rates progressively increased maize plant height, ear height, number of kernels/row, 1000-kernel weight, kernel weight/plant and kernels yield/fed. Sorour and Attia (1988) indicated that nitrogen was most effective in increasing sunflower plant height, head diameter, seed index, seed yield/plant, seed yield/fed. Ashoub (1985), Zeiton (1992), Aly (1993), Mohamed (1993), Shalaby, (1995) reported that N increased plant height, head diameter, seed yield/plant and seed yield per fed. In sunflower. Abdel Wahed (1996) found that 60 kg N/fed. of sunflower. resulted in the maximum plant height, head diameter, seed yield/plant, weight of 100 seeds, seed husk percent and seed yield/fed.

The main objective of this investigation was to study the effect of preceding crops and N fertilization rates on the yield of maize and sunflower.

MATERIALS AND METHODS

Experiments were conducted in the Summers of 1998 and 1999 at Shandaweel Agric. Res. Station, ARC where the soil is clay loam with total soluble N of 0.083%. One experiment designed as split-plot with three replications was conducted for each of maize and sunflower each season. The preceding winter crops; faba bean, sugar beet and wheat, were the main plots while the sub-plot were devoted to three fertilizer N levels viz., 90, 105 and 120 kg N/fed for maize and 45, 60 and 75 kg N/fed for sunflower. The proper cultivar of the preceding crop was used and the recommended cultural practices for its production were applied. Maize (cv. Single cross 10) and sunflow-

er (cv. Hybrid Viddoc) were sown at rates of 15 kg/fed for maize and 5 kg/fed. for sunflower on 11 and 15 of June in the first and second season, respectively. Sub plots were 4.2 x 5 m and included 6 ridges 70 cm wide with single plant spaced 30 cm apart for maize and 60 cm wide with 25 cm apart for sunflower. Superphosphate was applied at the rate of 30 kg P2O5/fed. during soil preparation. N was divided into two equal doses with the first and second irrigation. Plants were harvested on 18th and 15th of Oct. in the first and second season, respectively. Ten plants were chosen at random within each sub-plot to measure the following characters:

Maize: Plant height, ear height, ear diameter, ear length, number of rows/ear, number of kernels/row, weight/ear, weight of kernels/ear and shelling percentage. Grain yield of maize was obtained from the whole sub-plot area and expressed in ardab/fed.

Sunflower: Plant height, head diameter, head weight, seed yield/plant and 100-seed weight were recorded. Seed yield of sunflower was obtained from the whole sub-plot and expressed in kg/fed.

Data were statistically analyzed according to Snedecor and Cochran (1988) using MSTAT computer Ver. 4 (1986). L.S.D test at 0.05 level was used to compare treatment means.

RESULTS AND DISCUSSION

1. The effect of the preceding crop:

1.1. Maize:

Data in Table (1) show that there are significant effects for faba bean, sugar beet and wheat on plant characters and yield of maize except ear diameter, number of rows/ear and shelling % in both seasons and ear length and number of kernels/row in the second season only. However, the highest values were observed for maize grown after faba bean in the first and the second seasons. The lowest values were observed for maize grown after wheat in the first and the second seasons. Grain yield of maize grown after faba bean was higher than after sugar beet and wheat by 4.5 and 15.12 % and 0.65 and 15.25 in the first and the second season, respectively.

Table 1. Effect of preceding winter crop on plant characteristics, yield and yield components of maize during 1998 and 1999 seasons.

Preceding winter crop	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/.row	Weight of ear (g)	Weight of kernel/ear (g)	Shelling %	Grain yield /fed.
1998 season										
Faba bean	244.33	120.22	19.64	4.47	12.48	46.58	259.11	228.88	0.883	22.63
Sugar beet	239.77	119.22	19.81	4.46	12.22	47.26	247.55	209.55	0.846	21.66
Wheat	223.44	109.11	18.12	4.36	12.00	44.27	220.22	197.22	0.888	19.66
L.S.D. at 0.05	17.12	8.17	0.39	NS	NS	2.44	20.90	25.09	NS	1.05
1999 Season										
Faba bean	259.11	151.33	19.63	4.51	12.22	46.55	260.77	225.11	0.863	23.08
Sugar beet	257.11	140.22	19.35	4.47	12.20	46.22	253.88	221.11	0.873	22.93
Wheat	253.88	137.55	18.92	4.36	12.06	43.77	235.66	202.33	0.858	20.02
L.S.D. at 0.05	2.34	6.00	NS	NS	NS	NS	7.40	19.70	NS	0.61

1.2. Sunflower:

Data presented in Table (2) show significant differences in studied yield components of sunflower as affected by the preceding winter crop in both seasons. The highest values were observed for sunflower grown after faba bean except seed yield/plant and 100-seed weight, which were highest when grown after sugar beet in booth seasons. The lowest values of the studied characters were observed when sunflower was grown after wheat in both seasons. Seed yield /fed of sunflower grown after faba bean was significantly higher than that grown after sugar beet and wheat by 1.47 and 18.33 %, 2.25 and 17.12 % in the first and second seasons, respectively.

These results could be attributed to the effect of faba bean as a legume crop in enriching the soil with nitrogen and organic matter and the effect of its residues in improving the physical, chemical and biological characters of the soil. These induced better growth of the following maize and sunflower. These results are in agreement with those obtained by Shafshak *et al.* (1982), Remstw and Patile (1987), Aly *et al.* (1992), Dornescu *et al.* (1994), Porter *et al.* (1997) ad Abou-Kreshe (1998).

2. The effect of nitrogen fertilizer:

2.1. Maize:

Data in Table (3) show that all studied characters (growth, yield and yield components) were significantly increased by increasing N levels up to 120 kg N/fed in both seasons except number of rows/ear and shelling %. The highest increment in all characters resulted from 120 kg N/fed followed by 105 kg N/fed. in both seasons. The increments in grain yield as affected by adding 120 kg N/fed over 105 and 90 kg N/fed were 7.8, and 15.2, 4.5 and 18.6 % in the first and second season, respectively.

2.2. Sunflower:

As shown in Table (4), results indicate that increasing N levels up to 75 kg N/fed significantly increased all the studied characters of sunflower in both seasons. Maximum plant height, head diameter, head weight, seed yield/plant and 100-seed weight were observed with adding 75 kg N/fed. Fertilization with 75 kg N/fed. resulted in seed yield 6.6 and 13.3 % and 6.1 and 14.2 % more seed yields in first and second seasons, respectively.

These results reflect the well-known effect of N fertilizer on vegetative growth and interception of light energy through photosynthesis (product accumulation and

Table 2. Effect of the preceding winter crop on plant characteristics, yield and yield components of sunflower during in 1998 and 1999 seasons.

Preceding winter crop	Plant height (cm)	Head diameter (cm)	Head weight (g)	Seed yield/plant (g)	100-seed weight (g)	Seed yield/fed.
Season 1998						
Faba bean	174.66	15.84	104.11	52.70	8.71	819.51
Sugar beet	172.13	15.20	94.33	55.78	8.86	807.61
Wheat	162.91	13.45	86.77	43.88	8.68	692.56
L.S.D. at 0.05	2.35	1.47	5.03	5.17	0.13	4.93
Season 1999						
Faba bean	178.11	19.08	100.05	61.68	9.00	839.88
Sugar beet	175.22	18.47	110.88	65.16	9.09	821.33
Wheat	170.22	15.86	92.11	59.94	8.74	717.11
L.S.D. at 0.05	5.00	1.49	3.50	2.83	0.12	12.04

Table 3. Effect of nitrogen rate on plant characteristics, yield and yield components of maize in 1998 and 1999 seasons.

N rate Kg/fed.	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/row	Weight of ear (g)	Weight of kernel/ear (g)	Shelling %	Grain yield/fed. ard.
1998 season										
90	227.66	111.61	18.66	4.37	12.20	44.53	228.33	200.00	0.875	19.85
105	236.00	116.55	19.20	4.42	12.28	45.70	243.55	211.22	0.867	21.22
120	243.88	120.33	20.40	4.50	12.22	47.90	255.00	224.44	0.880	22.88
L.S.D. at 0.05	3.57	2.59	0.30	NS	NS	0.83	5.08	12.80	NS	0.41
1999 Season										
90	250.66	136.77	18.53	4.37	11.93	44.22	240.77	203.00	0.860	20.18
105	256.77	144.22	19.17	4.43	12.04	45.46	248.66	218.55	0.874	22.90
120	262.66	148.11	20.20	4.54	12.01	46.88	260.88	227.00	0.868	23.95
L.S.D. at 0.05	3.96	1.85	0.36	0.03	NS	0.82	3.67	4.70	NS	0.36

Table 4. Effect of nitrogen rate on plant characteristics, yield and yield components of sunflower during in 1998 and 1999 seasons.

Nitrogen rate Kg/fed.	Plant height (cm)	Head diameter (cm)	Head weight (g)	Seed yield/plant (g)	100-seed weight (g)	Seed yield/fed. kg
Season 1998						
45	164.11	14.18	80.50	45.85	8.57	725.44
60	171.24	14.96	92.82	51.03	8.75	771.66
75	174.35	15.34	110.55	55.48	8.93	822.57
L.S.D. at 0.05	2.93	0.418	4.24	2.59	0.04	4.39
Season 1999						
45	169.77	17.26	85.88	55.30	8.69	739.22
60	173.88	17.83	98.94	63.42	8.96	795.11
75	179.88	18.04	118.22	68.05	9.19	843.99
L.S.D. at 0.05	3.86	2.32	0.62	1.76	0.03	8.35

source/sink relation). Similar results were reported by Sorour and Attia (1988), Zeiton (1992), Shafshak *et al.* (1994), Shalaby (1995), Hammam (1995), Chen *et al.* (1994), Abdel Gawad and El-Batal (1996) and Abdel Wahed (1996).

3. Interaction effcets:

3.1. Maize:

Data presented in Table (5) show that grain yield of maize was not significantly affected by the interaction between the preceding winter crop and the rate of N applied to maize in 1998 and 1999. However, plant height, ear height, ear diameter, number of kernels/ear and weight/ear in the first season and ear height and weight/ear in the second season were significantly affected by the interaction. Results also show that maize grown after faba bean and receiving 120 kg N/fed showed maximum ear height, ear diameter, ear weight and weight of kernel/ear in both seasons. The lowest values for growth, yield and yield components were obtained when maize was grown after wheat and fertilized with 90 kg N/fed in both seasons. The highest grain yield was achieved from maize fertilized with 120 kg N/fed grown after faba bean in both seasons. Maize grown after faba bean with 105 kg N/fed produced greater yield than when grown after wheat with 120 kg N/fed in both seasons.

3.2. sunflower:

Results in Table (6) show a significant effect on head weight and seed yield/fed in the first season; and head diameter, 100-seed weight and seed yield per fed in the second season. Sunflower grown after faba bean and fertilized with 75 kg N/fed gave maximum values for most of studied characters in both seasons. The lowest values were observed when sunflower was grown after wheat and fertilized with 45 kg n/fed. Seed yield of sunflower grown after faba bean and fertilized with 45 kg N/fed was higher than when grown after wheat and fertilized with 75 kg N/fed.

Finally, from data in tables 5 and 6 observed that maize and sunflower followed faba bean a beneficial effect equal to 20-30 kg N/fed.

Table 5. Effect of the interaction between the preceding winter crop and rate of N applied on plant characteristics, yield and yield components of the following maize crop in 1998 and 1999 seasons.

Preceding winter crop	N rate	Plant height (cm)	Ear height (cm)	Ear length (cm)	Ear diameter (cm)	No. of rows/ear	No. of kernels/row	Weight of ear (g)	Weight of kernel/ear (g)	Shelling %	Grain yield/fed. ard
Season 1998											
Faba bean	90	239.3	114.0	19.03	4.41	12.33	45.26	240.0	214.66	0.894	20.98
	105	244.0	120.6	19.26	4.46	12.53	46.20	262.0	229.33	0.875	22.53
	120	249.6	126.0	20.63	4.55	12.60	48.30	275.3	242.66	0.881	24.38
Sugar beet	90	228.0	115.2	19.00	4.41	12.20	45.33	234.7	199.33	0.849	20.33
	105	239.3	120.0	19.80	4.44	12.26	46.73	248.7	208.66	0.839	21.55
	120	252.0	122.5	20.63	4.54	12.20	49.73	259.3	220.66	0.851	23.10
Wheat	90	215.6	105.7	17.50	4.30	12.07	43.00	210.3	186.00	0.888	18.25
	105	224.6	109.0	17.90	4.38	12.06	44.16	220.0	195.66	0.885	19.58
	120	230.0	112.7	18.96	4.41	11.86	45.66	230.3	210.00	0.893	21.15
L.S.D. at 0.05		4.07	2.96	NS	0.13	NS	0.94	5.79	NS	NS	NS
Season 1999											
Faba bean	90	252.66	140.66	18.76	4.43	12.00	45.33	250.66	212.00	0.845	21.26
	105	260.33	155.00	19.63	4.51	12.13	46.00	260.33	227.33	0.872	22.95
	120	264.33	158.00	20.50	4.60	12.13	48.33	271.33	236.00	0.869	25.05
Sugar beet	90	251.33	136.33	18.63	4.37	12.00	44.66	247.33	205.66	0.831	21.16
	105	255.66	140.33	19.20	4.44	12.00	46.33	251.66	225.00	0.884	22.88
	120	264.33	144.00	22.33	4.60	12.10	47.66	262.66	232.66	0.886	24.75
Wheat	90	248.00	133.33	18.20	4.30	11.80	42.66	224.33	191.33	0.854	18.11
	105	254.33	137.00	18.70	4.35	12.00	44.16	236.00	203.33	0.861	19.87
	120	259.33	142.33	19.86	4.43	11.90	44.66	248.66	212.33	0.856	22.05
L.S.D. at 0.05		NS	2.08	NS	NS	NS	NS	4.19	NS	NS	NS

Table 6. Effect of the interaction between the preceding winter crop and rate of N applied on plant characteristics, yield and yield components of the following sunflower crop in 1998 and 1999 seasons.

Preceding winter crop (A)	N rate	Plant height (cm)	Head diameter (cm)	Head weight (gm)	Seed yield/plant (gm)	100-seed weight (gm)	Seed yield/fad. (kg)
Season 1998							
Faba bean	45	169.00	15.26	83.50	47.90	8.52	776.33
	60	175.33	15.80	102.16	52.06	8.72	812.16
	75	179.66	16.46	126.66	58.13	8.89	870.03
Sugar beet	45	167.16	14.43	80.16	50.50	8.67	765.66
	60	173.53	15.60	91.16	56.53	8.87	799.50
	75	175.70	15.56	111.66	60.33	9.06	857.66
Wheat	45	156.16	12.86	77.83	39.16	8.53	634.33
	60	164.86	13.35	85.16	44.50	8.66	703.33
	75	167.70	14.00	97.33	48.00	8.85	740.03
L.S.D. at 0.05		NS	NS	4.84	NS	NS	7.608
Season 1999							
Faba bean	45	173.33	18.53	94.50	53.43	8.74	785.00
	60	176.33	19.20	109.00	62.46	9.05	843.00
	75	184.66	19.53	126.66	69.16	9.22	891.66
Sugar beet	45	169.66	17.20	95.50	56.66	8.81	752.33
	60	175.66	18.26	107.66	67.16	9.12	821.66
	75	180.33	19.96	129.50	71.66	9.34	890.00
Wheat	45	166.33	15.33	67.66	55.83	8.52	680.33
	60	169.66	15.93	80.16	60.66	8.70	720.66
	75	174.66	16.33	98.50	63.33	9.01	750.33
L.S.D. at 0.05		NS	2.65	NS	NS	0.05	14.46

REFERENCES

1. Abdallah Hussein, M., A.H. El-Hattab and A.K. Ahmed. 1980. Effect of plant spacing and nitrogen levels on morphological characters, seed yield and quality in sunflower. Z. Acher und Pflanzenbua (J. Agronomy & Crop Science)

2. Abdel Gawad, A. and M.A. El-Batal. 1996. Response of maize productivity to the growth retardant uniconazole under high nitrogen fertilization and plant density. Ann. Agric. Sci., Moshtohor, vol. 34 (2): 429-440.

3. Abd El-Wahed, A.E. 1996. Response of sunflower to phosphorus and potassium fertilization under different levels of nitrogen. Proc. 7 th Conf. Agron. Vol. (1): 429-437 9-10 Sept.

4. Abou-Kresha, M.A., A.A. Zohary and M.A. Haikal. 1998. Maize and soybean yield as affected by preceding crops and crop rotation. J. Agric. Sci. Mansoura Univ., 23 (11): 4721-4728.

5. Ali, A.A. 1993. Effect of plant density, nitrogen and phosphorus fertilization on growth and yield of sunflower (*H.annuus* L.). Menofiya J. Agric. Res. 18 (2): 967-979.

6. Ali, A.M., S.K. Badr and M.N. Sherif. 1993. Studies on crop rotation systems. II. Effect of crop rotation and preceding winter crops on growth, yield and yield components of maize. Egypt. J. Appl. Sci. 8 (12): 1165-1178.

7. Ashoub, M.A. 1985. Response of sunflower (*H. annuus* L.) to some cultural treatments. Annals Agric. Sci. Fac. Agric., Ain Shams Univ. Egypt 30 (2): 1123-1144.

8. Chen, H.Y., J.H. Zhang, X.L. Jing and Y.H. He. 1994. Effects of nitrogen on yield and leaf structure in pop corn. J. Shanghai Agric. College 12 (4): 253-256. (C.F. Field Crop Abstracts 48 (9) 6486-1995).

9. Crookston, R.R. and J.E. Kurle. 1989. Corn residue effect on the yield of corn and soybean grown in rotation. Agron. J. 81: 229-232.

10. Durst, L., G. Kahut and E. Kabler. 1988. Effects of preceding break crops on winter wheat and influence of cultural practices. J. Agron.& Crop Sci. 16 (14): 239-249.

11. El-Hawary, N.A., A.R. Ahmed and I.O.E. Metwally. 1994. Effect of preceding winter crops and foliar application on the succeeding summer soybean crops. J. Agric. Sci. Mansoura Univ. 19 (3): 863-873.

12. El-Sheikh, F.T.Z.M. 1993. Response of maize (*Zea mays* L.) to nitrogen fertilizer and foliar application with zinc. Annals of Agric. Sci. Moshtohor, Egypt 31 (4): 1999-2009.

13. Geith, E.M. 1973. Studies of some crop sequences on yield and yield components of maize. M. Sc. Thesis. Fac. Agric. Cairo Univ.

14. Hammam, G.Y. 1995. Effect of nitrification on inhibitor "Nitropyrin' and nitrogen level on growth and yield of maize (*Zea mays* L.). Annals of Agric. Sci., Moshtohor, Egypt 33(2): 495-506.

15. Mohamed, A.A.E. 1993. Effects of nitrogen and magnesium levels on sunflower yield and qualities under different irrigation treatments. Ph.D. Thesis, Univ. Agric. Vienna, Austria.

16. Moshtohory, M.R., M.A. Burhoma, M.W. Habib and Z.R. Yehia. 1995. The influence of interaction between weed control methods and N fertilization levels on maize (*Zea mays* L.). Annals of Agric. Sci., Moshtohor, Egypt. 33 (2): 579-587.

17. MSTAT. 1986. A micro computer program of the design management and analysis of agronomic research experiments, Michigan State Univ, USA.

18. Peterson, T.A. and G.E. Varvel. 1989. Crop yield as affected by rotation and nitrogen rate. III. Corn. Agron. J. 81:735-738.

19. Porter, P.M., J.G. Lauer, W.E. Lueschen, J.H. Ford, T.R. Hoverstad, E.S. oplinger and R.K. Crookston. 1997. Environment effects the corn and soybean rotation effect. Agron. J. 89: 441-448.

20. Remstw, D.G. and B.R. Patile. 1987. Effect of preceding crops on yield and nitrogen requirments of wheat. J. Moharachava Agric. Univ. 12 (2): 184-188 (C.F. Field Crops Abst. 1988, 32-38)

21. Salwa, M.I.M. 1993. Influence of source and rates of nitrogen fertilizers on yield and yield components of maize. Annals of Agric. Sci. Moshtohor, Egypt. 31 (4): 1797-1812.

22. Sangoy, L. and M.L. De Almeidda. 1994. Rates and dates of nitrogen fertilizer application to maize on a soil with high organic matter content. Pesquisa Agropecuaria Brasileira 29 (1): 13-24 (C.F. Field Crops Abst. 48 (5): 3154, 1995).

23. Shafshak, S.E., A.S. El-Debaby, M.S. salem and G.Y. Gelilah. 1982. Crop rotation studies in Egypt. III. Growth and yield of maize as affected by crop rotation and fertilization residues. Res. Bull. 209 P. 1-38 Fac. Agric. Ain Shams Univ., Shoubra El-Kheima, Cairo.

24. Shafshak, S.E., G.Y. Hammam, Samia M. Amer and Fatma, A.E. Nofal. 1994. Differential growth and yield response of some maize genotypes to nitrogen fertilization. Annals of Agric. Sci. Moshtohor, Egypt. 32 (3): 1265-1278.

25. Shalaby, M.H. 1995. Sunflower yield and nutrients uptake as influenced by plant type and interaction between phosphorus and other nutrients. Menofiya. J. Agric. Res. 20 (3): 1277-1295.

26. Sorour, S.Gh.P. and S.A.M. Attia. 1988. Response of sunflower to some planting patterns and nitrogen levels, Proc. 3 rd Conf. Agron. Vol: 11 : 315-323.

27. Snedecor, G.W. and W.C. Cochran. 1980. Statistical methods 7 th Edition Iowa State Univ. press Ames. Iowa, U.S.A.

28. Wetch, L.E. 1985. Rotational benefits of soybean and following crops . P. 1054-1060 In: R. Shibles (ed.). World Soybean Research Conference III. Proceeding West View Press Boulder Co.

29. Zeiton, O.A.A. 1992. Response of sunflower (*H.annuus* L.) to planting density and levels of N-fertilization. Zagazig J. Agric. Res. 19 (4): 1535-1546.

تأثير المحصول الشتوى السابق والتسميد الأزوتى على المحصول ومكوناته فى الذرة الشامية وعباد الشمس

بدر سعد فرغلى

معهد بحوث المحاصيل الحقلية – مركز البحوث الزراعية – الجيزة – مصر.

أقيمت تجربتان حقليتان بمحطة البحوث الزراعية بشندويل (مصر العليا) خلال موسمى ١٩٩٨، ١٩٩٩ لدراسة تأثير المحصول السابق (فول بلدى – بنجر سكر – قمح) ومعدلات التسميد الأزوتي للذرة الشامية وعباد الشمس اللاحقين. وكان التصميم هو القطع المنشقة مرة واحدة فى أربعة مكررات حيث كانت المحاصيل السابقة هى القطع الرئيسية بينما اشتملت القطع المنشقة على معدلات التسميد الأزوتي ٩٠، ١٠٥، ١٢٠ كجم/فدان للذرة الشامية، ٤٥، ٦٠، ٧٥ كجم/فدان لعباد الشمس. وتتلخص أهم النتائج المتحصل عليها فيما يلى:

١- ظهرت اختلافات عالية المعنوية فى تأثير المحصول السابق على معظم الصفات المدروسة للذرة الشامية وعباد الشمس اللاحقين حيث أعطت الذرة الشامية او عباد الشمس المنزرعة بعد فول بلدى قياسات أكبر بالمقارنة بالزراعة عقب قمح. كما أوضحت النتائج ان محصول الفدان من الذرة الشامية وعباد الشمس المنزرعة بعد فول بلدى كان أعلى بالمقارنة بالمنزرع عقب قمح بحوالى ١٥,٢، ١٧,٧ ٪ على التوالى.

٢- أوضحت النتائج ان كل الصفات المدروسة للذرة الشامية وعباد الشمس زادت مع زيادة معدلات التسميد الأزوتي المضافة حتى ١٢٠ كجم/فدان فى الذرة الشامية و٧٥ كجم/فدان فى عباد الشمس. كما أظهرت النتائج ان محصول الفدان من الذرة الشامية المضاف له ١٢٠ كجم أزوت زاد عن معدل ١٠٥، ٩٠ كجم أزوت/فدان بنسبة ٦,١٤٪، ١٦,٩٪ على التوالى. كذلك محصول الفدان من عباد الشمس المضاف له ٧٥ كجم أزوت زاد بحوالى ٦,٣٧ ٪ و١٣,٨ ٪ عن المضاف له ٦٠، ٤٥ كجم أزوت على التوالي.

٣- أظهرت النتائج أن محصول الذرة الشامية او عباد الشمس المنزرعة عقب فول بلدى والمسمدة بالمعدل المنخفض (٩٠ كجم أزوت للفدان و ٤٥ كجم أزوت لعباد الشمس) تساوت تقريبا مع المنزرع عقب قمح والمسمد بالمعدل المرتفع (١٢٠ كجم أزوت للفدان للذرة الشامية و ٧٥ كجم أزوت للفدان لعباد الشمس)