Egyptian J. Desert Res., 56, No.1, 95-106 (2006)

EFFECT OF PLANT POPULATION AND WEEDCIDES ON CORN (*Zea mays* L.) PRODUCTION UNDER CALCAREOUS SOIL CONDITIONS

El-Afandy KH. T. ; M. A. Mohamed* and A. G. El-Rahman*

Plant Production Dept., Desert Research Center, El Matareya, Cairo, Egypt.

* Plant Protection Dept., Desert Research Center, El Matareya, Cairo, Egypt.

Two field experiments were carried out at the Maryout Research Station, Desert Research Center during 2001 and 2002 seasons to study the effect of plant population (20, 24 and 28 thousand plants/fed.) and weed control (control, Hoeing twice, Gesaprim, Lasso and Lasso / atrazine) and their interaction on maize (CV.S.C. 10) and weed growth as well as yield of maize. Statistical analysis of split plot design with four replications over the two seasons was done. The main results were as follows:

1-Plant height was increased significantly by increasing plant population from 20 to 28 thousand plants / fed.

2-Ear height (cm.) and grain yield per fed. increased significantly by increasing plant population from 20 to 28 thousand plant / fed. While, ear length (cm.), ear diameter (cm.), ear weight (gm.), number of rows/ear, number of kernels/row, 100 kernel weight (gm.) and grain yield / plant (gm.) were decreased significantly by increasing plant population.

3-Herbicidal treatments significantly increased plant height. Regarding to ear characters, it seems that application of herbicides tended to increase significantly ear length and diameter, kernels number / row, number/ear, ear weight (gm.), 100-kernel weight (gm.) and grain yield (ardab / fed.), in both seasons. The highest grain yield was recorded by Gesaprium in both seasons.

4-The effect of interaction between plant population and weed control was significant, for all parameters studied except the ear length (cm.) and number kernels/row in both seasons. Gesaprium or lasso/atrazine under 28000 plant/fed. gave the highest value compared with other treatments. While Lasso gave moderate effect, hews

with 20000 plant/fed. treatment gave the least effect in this respect.

5-Herbicidal activity of the tested compounds was estimated as percent of reduction in both fresh and dry weights of weeds compared with unweeded check.

Gesaprium and Lasso / atrazine were the most effective herbicides during the two seasons while lasso have a moderate effect, but hoeing twice was the least effective. Such results indicate that choosing the most suitable herbicides Gesaprium or lasso/atrazine with 28000 or 24000 plants per fed. can maximize the grain yield of maize.

Keywords: Corn, *Zea mays*, plant population, hand hoeing weed, Gesaprium, Lasso, Atrazine, maize growth and yield.

Maize grain yield can be increased by raising plant population, but this relationship is parabolic. At low populations, yield is limited by the number of plants. While at high population, yield is limited by the number of barren plants. Intra-row spacing and competition for water as well as light and nutrients determine optimum plant densities for each growth environment (Karlen and Camp, 1985). Ray and Biswas (1992) found that the dry weight per cob, number of grain / cob and weight of 1000 – grain increased with decreasing plant density from 66600 to 33300 plants / ha, while the number of cobs / m^2 increased with increasing plant density. Ahmadi *et al.* (1993) found that yield of maize increased as population increased, while, kernel weight/plant decreased. Tollenuar *et al.* (1994 a) found that increasing plant density could enhance the competitiveness of maize with weeds.

Chemical weed control is one of the important cultural practices in corn because it helps for minimizing the cost of production. Pre-emergence application of atrazine, alachlor, lasso / atrazine, cyanazine and pendimethalin were effective for controlling weeds (Rizk *et al.*, 1975; Sary *et al.*, 1975; Gill *et al.*, 1977 and Abd El – Raouf and Fayed, 1978). Chemical weed control plays a role for improving the growth of maize and the productivity of unit area as a result of its activity against weeds associated with maize at fields. Many researches have noticed the paramount effect of pre – emergence application of atrazine and cyanazine in controlling wide range of grasses and broad leafed weeds and improving the growth of maize (Mostafa, 1980; Kamel *et al.*, 1984; Yehia, 1984 and El – Maghraby *et al.*, 1986). Majudmar and Gautma (1968) showed that maize treated with atrazine caused an improve in growth, grain and straw yields as compared with the control. El – Shandidy (1971) indicated that the plant height and the number of ears / plant were decreased in the unweeded

treatment than that obtained by atrazine treatment at rate of 2 pound / fed. Hassanien (1974) stated that atrazine caused a significant increase in the number of kernels per ear, grain and ear yields / fed., while the 1000 – grain weight and ear length were not affected by the atrazine application.

MATERIALS AND METHODS

Two field experiments were carried out at Maryout Research Station, Desert Research Center during summer seasons of 2001 and 2002 to study the effect of plant population, chemical weed control and their interaction on maize and common weed growth as well as yield of maize.

Three plant population i.e. 20000, 24000 and 28000 plant per fed. obtained from sowing at 30, 25 and 20cm. Inter - plant distance on ridges 70 cm. Weed treatments were studied as following:

1. Gesaprim 80 w.p. (Atrazine): (2-chloro-4-ethylamino–6-isopropyl amino–s- triazine) was applied at rate of 0.75 kg/fed.
2. Lasso 48% E.C. (Alachlor): (2-chloro-2, 6-diethyl N-methoxy methyl acetanilide), was applied at rate of 2 L. / fed.
3. Lasso / atrazine E.C. at the rate of mixture 3 L. / fed.
4. Hand-hoeing: twice at 21 and 35 days after planting.
5. Unweeded (control) treatment.

The tested herbicides were sprayed with knapsack sprayer equipped with one nozzle boom and water volume 200 L./fed. The herbicidal treatments were applied as pre-emergence, before the planting and irrigation.

The experimental design was a split-plot design with three replicates in both seasons. The weed control and plant population treatments were arranged as main and sub-plot. The size of each sub-plot was 3 x 3.5 = 10.5 m^2, including 5 ridges with 3 m long and 70cm apart. Soil sandy clay loam with pH value of 7.85 and organic matter was 0.95%. Soil samples were taken before planting to measure the chemical and physical soil properties as presented in tables (1 and 2).

TABLE (1). Soil mechanical and physical properties of the experimental site.

Texture	Depth	Clay (%)	Silt (%)	Sand (%)	pH	O.M. (%)	WHC (%)
Sandy clay loam	15-30cm	22.50	13.10	64.40	7.85	0.95	30.75

O.M. = Organic matter WHC = Water hold capacity

Grain maize (*Zea mays* L.) was sown on17th and 15th of May in 2001 and 2002 seasons, respectively, in hills s.c. 10 (single cross 10). Seeding rate was 15kg maize seeds/fed. The plots were irrigated immediately after sowing. After 21 days from sowing, plant were thinned to plant per hill.

Organic manure and calcium super phosphate fertilizers (15.5% P_2O_5 were added during soil preparation at rates of 20 m^3 and 30 kg P_2O_5 / fed.,. Potassium in the form of potassium sulfate (48% K_2O) was applied before the third irrigation. Nitrogen fertilizers (ammonium sulfate, 20.6% N) at the rate of 120 kg / fed. Nitrogen fertilizer was applied in three equal portions after 20, 35 and 50 days from sowing. Other cultural practices of growing maize plants were done as recommended.

TABLE (2). Soil chemical analysis of the experimental site.

Location	$CaCO_3$	Soluble cations (msq/100 g.)				Soluble anions (msq/100 g.)			
		Na^+	K^+	Ca^{++}	Mg^{++}	Cl^-	SO_4^-	CO_3^-	HCO_3^-
Maryout	40 55	3 15	1 02	13.50	8.75	32 78	178 25	-	1 32

Measurement of growth characters, yield and its components of maize

In both seasons at silking stage measurements were taken on five plants in order to determine plant height (cm.). The three middle ridges for each sub plot were harvesting to estimate grain yield per unit area. At harvest, (after 120 days from sowing) ten guarded plants were taken from each plot to determine plant and ear height (cm.), ear length and diameter (cm.), no. of rows / ear, no. of kernels / row, ear weight (gm.), 100-kernel weight(gm),grain yield / plant (gm) and grain yield / fed.(ardab=140kgseed).

Survey of weeds

In both seasons, a survey of different weed species was made by collecting all species of weeds in one m^2 from each plot after 30 and 60 days from all treatments and estimate the fresh weight (gm.) for every species of weeds. These weeds were dried at 105°C to estimate the dry weight (gm.). Data were statistically analyzed of variance (ANOVA) and least significant difference (LSD) at 5%, method was used to least the differences between the treatment means as published by Gomez and Gomez (1984).

RESTULS AND DISCUSSION

1- Growth Character

1-1 Effect of plant populations

Data in table (3) show that increasing plant population from 20 to 28 thousand plant/fed increased plant height significantly. Dense sown plants are always forced to elongate due to simulative effect caused by invisible short and long radiation under such conditions and due to inter as well as intra plant competition for light and plant nutrients. These results are in agreement with those obtained by Karlen and Camp (1985).

1-2 Effect of hew and chemical weed control

Results of weed control by Hew and herbicides were increased significantly as compared by unweeded control (Table 4). Maximum values were obtained by adding lasso or lasso/atrazine. These results were in agreement with those obtained by El-Sayed (1973), they suggested that early

elimination of weeds by herbicides prevent the competition between weeds and maize plant for nutrients and water, thus enhanced plant growth.

1-3 Effect of Interaction

The differences in growth plants height due to the interaction between plant population and weed control were significant. Gesaprim or lasso / atrazine mixture with 28000 plant/fed treatments gave the highest values compared with other treatments (Table 5).

2- Growth of Weeds

2-1- Effect of plant populations

The results of fresh and dry weights indicated that the growth of predominant weeds was significantly affected by population densities except *Convolvulus arvensis* (Table 6). Results indicate that density of 28000 plants/fed. was the most suitable density with respect to reduction of weed infestation. Plant density of 28000 plant/fed. was highly efficient on fresh and dry weight for all weeds, followed by 24000 plant/fed, and 20000 plant in gm / m^2, respectively. These results agreed with the findings of Tollenuar *et al.* (1994), which reported that, the competitive ness of maize with weeds can be enhanced by increasing plant density.

TABLE (3). Effect of plant population on growth, yield and yield components of maize in 2001 and 2002 seasons.

Plant population (plant / fed.)	Plant height (cm.)	Ear length (cm.)	Ear height (cm.)	Ear diameter (cm.)	no. of row / ear	No. of kernels / row	Ear weight (gm.)	100 – kernels weight (gm.)	Grain yield / plant (gm.)	Grain yield ardab / fed.
Mean 2001 and 2002 seasons										
20 000	210 8	22 0	118 3	4 64	13 2	45 7	198 6	29 7	178 0	11 35
24 000	218 1	20 9	126 8	4 33	12 2	44 5	183 8	28 5	168 9	12 52
28 000	222 7	19 5	132 9	4 17	11 0	41 0	160 2	26 6	155 5	13 39
L S D	0 5241	0 1892	0 09752	0 08850	0 1496	0 4922	1 109	0 2758	0 8025	0 1533

TABLE (4). Effect of chemical weed control on yield and its components of maize in 2001 and 2002 seasons.

Chemical weed control	Plant height (cm.)	Ear Length (cm.)	Ear height (cm.)	Ear diameter (cm.)	No. of row / ear	No. of kernels / row	Ear weight (gm.)	100 – kernels weight (gm.)	Grain yield / plant (gm.)	Grain yield ardab / fed.
Mean 2001 and 2002 seasons										
Control	191 8	18 9	116 4	4 08	10 6	41 6	157 0	25 8	140 8	8 27
Hand hoeing twice	212 5	20 0	119 3	4 24	11 8	42 6	170 9	26 8	154 1	11 30
Gesaprim 80%	219 9	22 7	133 0	4 84	13 2	46 0	207 8	31 2	189 7	15 20
Lasso 48 %	233 2	20 7	120 8	4 46	12 2	43 8	177 9	28 0	171 0	13 27
Lasso / Atrazine	228 8	21 7	140 4	4 66	12 8	44 8	190 8	29 4	181 8	14 03
L S D	0 6766	0 2443	0 1259	0 1143	0 1931	0 6354	1 431	0 3561	1 036	0 1979

TABLE (5). Effect of chemical weed control and plant population on yield and its components of maize in 2001 and 2002 seasons.

Chemical weed control	Plant population (plant / fed.)	Plant height (cm.)	Ear length (cm.)	Ear height (cm.)	Ear diameter (cm.)	No. of row / ear	No. of kernels / row	Ear weight (gm.)	100 – kernels weight (gm.)	Grain yield / plant (gm.)	Grain yield ardab / fed.
Mean 2001 and 2002 seasons											
Control	20 000	188 0	20 0	104 0	4 48	11 2	44 0	173 3	27 4	148 8	7 72
	24 000	192 1	18 9	118 8	3 97	10 9	42 1	160 9	26 5	142 6	8 45
	28 000	195 2	17 9	126 3	3 81	9 8	38 5	136 9	23 7	131 0	8 64
Hand hoeing twice	20 000	200 7	21 3	109 3	4 58	12 9	44 7	186 1	28 0	163 6	10 25
	24 000	215 0	20 0	120 1	4 11	11 7	43 6	172 7	27 3	157 1	11 19
	28 000	221 9	18 7	128 3	4 04	10 8	39 5	153 9	25 1	141 6	12 45
Gesaprim 80%	20 000	211 0	23 9	129 4	5 32	14 4	47 8	222 7	33 0	202 1	14 60
	24 000	220 7	22 9	133 4	4 73	13 2	47 0	212 3	30 8	188 8	15 63
	28 000	228 0	21 3	136 3	4 48	11 9	43 3	188 4	29 8	177 8	16 08
Lasso 48 %	20 000	229 7	21 8	112 0	4 86	13 4	45 6	197 8	29 4	181 1	11 85
	24 000	232 6	20 9	121 3	4 34	12 3	44 5	180 6	28 1	173 9	13 26
	28 000	237 1	19 4	129 1	4 18	11 0	41 4	155 3	26 5	158 2	17 70
Lasso / Atrazine	20 000	224 5	22 8	136 7	5 12	14 0	46 6	213 3	30 5	194 1	12 96
	24 000	230 3	21 9	140 2	4 51	12 7	45 5	192 7	29 6	182 2	14 05
	28 000	231 4	20 4	141 3	4 36	11 7	42 2	166 5	28 2	169 1	15 08
L S D		1 172	NS	0 2181	0 1979	0 3345	NS	2 479	0 6168	1 794	0 3428

NS = non significant

TABLE (6). Effect of plant population on fresh and dry weight (gm. /m^2) of weeds in 20001and 2002seasons.

Chemical weed control	Plant population (plant/fed.)	Weeds							
		Plypogon monspeliensis		Portulaca oleraceae		Eleusine indica		Convolvulus arvensis	
		Mean 30,60 days from sowing and 2001,2002 seasons							
		Fresh weight	Dry weight	Fresh weight	Dry w eight	Fresh weight	Dry weight	Fresh weight	Dry weight
Control	20 00	813 7	214 0	501 8	63 8	61 3	14 7	135 3	33 5
	24 00	541 8	142 4	220 3	28 1	24 0	5 8	31 7	7 8
	28 00	362 2	59 4	73 0	25 0	7 2	1 8	9 7	2 4
Hand hoeing twice	20 00	608 7	159 5	383 0	48 6	37 7	9 0	32 8	8 2
	24 00	428 7	113 5	96 5	12 2	14 0	3 4	17 5	4 4
	28 00	286 7	75 3	32 8	4 2	8 3	2 0	7 0	1 7
Gesaprim 80	20 00	382 7	100 6	62 8	8 0	5 8	1 5	13 0	3 3
	24 00	265 5	69 8	16 8	2 2	3 0	0 8	5 2	1 3
	28 00	58 3	15 2	10 5	1 3	0 7	0 2	3 3	0 9
Lasso 48%	20 00	566 5	148 9	444 2	56 6	20 8	5 0	21 3	5 3
	24 00	421 2	110 8	169 8	21 7	9 7	2 3	13 5	3 4
	28 00	161 7	42 6	52 0	6 6	3 7	0 8	3 3	0 9
Lasso / atrazine	20 00	390 0	102 5	145 7	18 6	15 3	3 7	18 0	4 5
	24 00	287 7	75 6	87 0	10 8	7 8	1 9	7 8	2 0
	28 00	155 7	41 0	31 2	4 0	2 8	0 7	4 0	1 1

TABLE (7). Effect of chemical weed control on fresh and dry weight (gm/m^2) and % reduction of weeds in 2001 and 2002 seasons.

Weeds	Character	Chemical weed control				
		Control	Hand hoeing twice	Gesaprim 80%	Lasso 48%	Lasso / atrazine
		Mean 30, 60 days from sowing and 2001,2002 seasons				
Plypogon monspeliesis	Fresh weight	1657 8 a	1326.4 ab	706.5 b	1149.4 ab	833.4 b
	F W Reduction%	0 0	20 0	57 4	30 7	49 7
	Dry weight	415 8 a	384 3 ab	185 6 b	302 3 ab	219 1 b
	D W Reduction%	0 0	16 2	55 4	27 3	47 3
Portulaca oleraceae	Fresh weight	795 1 a	512 3 ab	90 1 b	666 0 ab	263 9 ab
	F W. Reduction%	0 0	35 6	88 7	16.2	66 8
	Dry weight	116 9 a	65 0 ab	11 5 b	84 9 ab	33 4 ab
	D W Reduction%	0 0	44 4	90 2	27 4	71 4
Eleusine indica	Fresh weight	92 5 a	60 0 ab	9 5 b	34 2 b	25 9 b
	F W Reduction%	0 0	35 1	89 0	63 0	72 0
	Dry weight	22 3 a	14 4 ab	2 5 b	8 1 b	6 3 b
	D W Reduction%	0 0	35 4	88 8	63 7	71 7
Convolvulus arvensis	Fresh weight	176 7 a	61 7 a	21 5 a	38 1 a	29 8 a
	F W Reduction%	0 0	67 1	87 8	78 4	83 1
	Dry weight	43 7 a	14 3 a	5 5 a	9 6 a	7 6 a
	D W Reduction%	0 0	67 3	87 4	78 0	82 6

F.W. = Fresh weight D. W. = Dry weight

2-2. Effect of hews and chemical weed control

Two times hew and herbicidal activity of the tested compounds were estimated as percent of reduction in both fresh and dry weights of broad and narrow weeds compared with the unweeded control. The most predominant weed species in maize fields (broad leaves) were purslane (*Portulaca oleracea* L.). and Bindweed (*Convolvulus arvensis*) while narrow leaves

weed were Rabbit's foot grass (*Polypogon monspeliesis* L.) and Goose grass (*Elusine indica* L.).

Data in table (7) clearly indicate that Gesaprim and lasso/ atrazine were the effective herbicides during the two seasons. The percent reduction in weed for Gesaprim were 57.4 and 55.4% (*Polypogon monspeliesis* L.), 88.7 and 90.2% (*Portulaca oleracea* L.), 89.7 and 88.8 % (*Elusine indica* L.), and 87.8 & 87.4 % (*Convolvulus arvensis*) in fresh and dry weight, respectively. These results agreed with the finding of Baart *et al.* (1974), Abd El- Raouf and Fayed (1978), Mostafa *et al.* (1980), Yehia (1984) and Yaduraju (1993). Reduction in weeds of lasso/ atrazine mixture were 49.7 and 47.3% (*Polypogon monspeliesis* L.), 66.8 and 71.4% (*Portulaca oleracea* L.), 72.0 and 71.7 % (*Elusine indica* L.), and 83.1 and 82.6% (*Convolvulus arvensis*) in fresh and dry weight, respectively. Two times Heo was the least effective treatment, since it did not achieve good control for most of weeds. The reduction of weeds were 20.0 and 16.2% (*Polypogon monspeliesis* L.), 35.6 and 44.4% (*Portulaca oleracea* L.), 35.1 and 35.4 % (*Elusine indica* L.), and 67.1 and 67.3 % (*Convolvulus arvensis*) in fresh and dry weight, respectively. These results agreed with the finding of Baart *et al.* (1974), Abd El- Raouf and Fayed (1978), Mostafa *et al.* (1980), Yehia (1984) and Yaduraju (1993). Results of table (5) also, revealed that laso have a moderate effect during the control of predominant weeds with percent reduction of 30.7 and 27.3 % (*Polypogon monspeliesis* L.), 16.2 and 27.4 % (*Portulaca oleracea* L.), 63.0 and 63.7 % (*Elusine indica* L.), and 78.4 & 78.0 % (*Convolvulus arvensis*) in fresh and dry weight, respectively. This result agreed with the results of Buhler *et al.* (1994).

2-3. Effect of interaction

The results in table (4) indicated that the interaction between plant population and chemical weed control on fresh and dry weight of weeds (gm /m^2) was significant. The obtained results verified that Gesaprim or lasso/ atrazine mixture with 28000 plants/fed were highly efficient compared with the other treatments, while lasso gave moderate effect, whereas two times Hew with 20000 plant/fed. treatment gave the least effect in this respect . Yaduraju and Ahiga (1993) in agreement with those obtained these results.

3-Yield and its Components

3-1. Effect of plant populations

Data in table (3) show that plant height (cm.), ear height (cm.) and grain yield (ardab / fed.) were increased significantly by increasing plant population, while ear length, ear diameter, rows number per ear, ear weight, No. of kernels/row, 100-kernel weight (gm.) and grain yield / plant (gm.) were decreased significantly by increasing plant population. These results might be attributed to the fact that plants grown at a high population suffers remarkable competition for light, water and minerals than plants grown at lower population. Consequently, plants grown from higher population

became less vigorous than those from lower one. It might accent for the reduction of these parameters in dense planting. Similar results were mentioned by Esechie (1992), Hashemi-Dezfouli and Herbert (1992) who reported that competition among corn plants for interception of photo synthetically active radiation at high plant density can result in a reduction in kernel number per ear and complete ear barrenness and reduced weight per kernel and the number of kernel rows per ear. Table (3) also shows that there was a significant increase in grain yield / fed. with increasing plant population these results agreed with the finding of Larson and Hanway (1977) and Ahmadi *et al.* (1993).

3-2. Effect of chemical weed control

Herbicidal treatments increased significantly plant height (cm.), ear length (cm.), ear diameter (cm.), ear weight (gm.), kernels number / row, rows number / ear, 100 – kernel weight (gm.), ear weight (gm.) and grain yield / plant (gm) (Table 4). Gresaprim followed by lasso/atrazine recorded the highest grain yield. The superiority of Gresaprim in production high grain yield might be due to its high efficiency in controlling of weeds without damage to maize plants. This reduced the competitive effect of weeds to the grain in grain yield. Hassanien (1974) and Mueller (1993) reported the effective herbicides on maize grain yield.

3-3- Effect of interaction

The differences in yield and its components due to the interaction between plant population and weed control treatments, which were significant in all characters except ear length and kernels number/row. This indicates that the response of maize yield to the plant populations and weed control treatments was dependent.

REFERENCES

Abd El-Raouf, M. S. and M. T. Fayed (1978). Influence of some herbicides on maize yield, yield components and common associated weeds. *Res. Bull., No. 808, Fac. Agric., Ain Shams Univ.*, Cairo, Egypt.

Ahmadi, M.; W. J. Wiebold; J. E. Beveriein; D. J. Eckert and J. Schope (1993). Agronomic practices affect corn kernel characteristics. *Agron. J.*, 85: 615-619.

Baart, E.A.D.; R. Sijtsma and G. H. Haan (1974). Chemical weed control in maize in the Netherlands. *Mede delingen Fakultei land – bouwetens chappen Gent*, 39 (2): 555-570. (c.f. *Weed Abst.*, 24:2203).

Bell, N.M.G. (1970). "Blandex" a multi – crop, broad spectrum herbicide. *Proceedings 7th International Congress of Plant Protection, Paris*, p. 12 (c.f. *Weed Abst.*, 1972, 21:11).

Buhler, D.D.; J.D. Doll; R.T. Proost and M.R. Visocky (1994). Interrow cultivation to reduce herbicide use in corn following alfalfa without tillage. *Agron. J.*, 86: 66-72.

El-Maghraby, M.I.A.; S.E. El-Shandidy; K.G. Salem and S.M. Hassan (1986). The interaction effect of nitrogen fertilizer and two trizine herbicides on corn. *Proceedings 2nd Conf. Agron., Alex. Univ., Egypt.*, Vol. 1: 375-389.

El-Sayed, A. M. (1973). Studies on maize mechanization. 1- Effect of planting and weeding methods and plant population on maize production. *M.Sc. thesis*, Fac. Agric., Alex. Univ., Egypt.

El-Shandidy, S.E. (1971). Studies on weed control in maize. *M.Sc. thesis*, Fac. Agric., Alex., Univ., Egypt.

Esechie, H.A. (1992). Effect of planting density on growth and yield of irrigated maize (Zea mays) in the Batinah Coast region of Oman. *J. Agric. Sci.*, 119 (2): 165-169.

Gill, H. S.; I. S. Barar and U. S. Walia (1977). Effect of some herbicidal and cultivar treatments on weed intensity and grain yield of maize. *Indian J. Agric. Sci.*, 47 (2): 89-95.

Gomez, K. A. and A. A. Gomez (1984). In "*Statistical Procedures for Agricultural Research*", 2nd ed., John Wiley and Sons.

Hashemi-Dezfouli, A. and S. J. Herbert (1992). Intensifying plant density response of corn with artificial shade. *Agron. J.*, 84: 547-551.

Hassanien, E.E. (1974). Study of the effect of depth of sowing, cultivation and nitrogen fertilizer placement on the growth and yield of Zea mays, L. *M.Sc. thesis*, Fac. Agric., Ain Shames Univ., Cairo, Egypt.

Kamel, M.S.; A.H. El-Hattab; E.A.Mohamoud: O.O.Nogouly and S.M.Amer (1984). Effect of certain herbicides on growth and yield of maize and succeeding winter crop. *Proceedings 2nd General Conf. of Agriculture Research Center*, p. 48 (Abst.).

Karlen, D.L. and C.R. Camp (1985). Row spacing plant population and water management effects on crop in the Atlantic Costal Prain. *Agron. J.*, 77: 393-398.

Majudmar, J.C. and O.P. Gautma (1968). Weed control studies in hybrid maize. II. Effect of maize and on the following wheat crop. Z. PAK rankh. PAP at h PAS chutz (1968), 75(9): 543-551. (c.f. Weed Abst., 18(3): 1053, 1969).

Mostafa, M.T.; M.T. Fayed; and F.T. El-Bastawesy (1980). Response of maize yields, its components and associated weed to some herbicides. *Proceedings 1st Conf. Plant Prot. Res. Inst. Cairo, Egypt*, p. 244-270.

Mueller, J.P.; W.M. Lewis; T.T. Grren and J.C. Burns (1993). Yield and quality of silage corn as altered by Johnson grass infestation. *Agron. J.*, 85: 49.

Rizk, T. Y.; M. A. Moursi and E. E. Hassannien (1975). Effect of atrazine under varying cultural factors in growth and yield of maize and associated weeds. *Proceedings 1st Arab Weed Control Conf., Egypt*, part 2: 180-196.

Ray, S.K. and P.K. Biswas (1992). Effect of plant density and detopping following silking on cob growth, fodder and grain yield of maize (*Zea mays*). *J. Agric. Sci.*, 119(3): 297-301.

Sary, H. A.; T. Y. Rizk; S. E. Shfshak and A. S. El-Debaby (1975). Future studies on the use pre-emergence herbicides on maize crop. *Proceedings 1st Arab Weed Control Conf. Section* 4: 12 (Abst.).

Tollenuar, M.; A. A. Dibo; A. Aguilera; S.F. Weise and C. J. Swanton (1994). Effect of crop density on weed interference in maize. *Agron. J.*, 86: 591-595.

Tollenaar, M.; P. Nissanka; S. F. Weise and C. J. Swanton (1994). Effect of weed interference and soil nitrogen on four maize hybrids. *Agron. J.*, 86: 596-601.

Yaduraju, N.T. and K. N. Ahuga (1993). Performance of some herbicides for weed control in winter maize. *Ann. Plant Protection Sciences*, 1 (2): 117-119.

Yehia, Z.R. (1984). Chemical weed control in maize (*Zea mays* L.). *Ph. D. thesis*, Fac. Agric., Al-Azhar Univ., Egypt.

Received: 15/06/2005
Accepted: 17/02/2006

تأثير الكثافة النباتية والمقاومة الكيماوية للحشائش علي إنتاجية الذرة الشامية تحت ظروف الأراضي الجيرية

خالد طه حسن الأفندي، محمد عبد الفتاح محمد *، عبد الرحمن جمال الدين عبد الرحمن*
قسم الإنتاج النباتي – مركز بحوث الصحراء – المطرية– القاهرة – مصر
* قسم وقاية النبات – مركز بحوث الصحراء – المطرية – القاهرة – مصر

أجريت تجربتان حقليتان بمزرعة محطة بحوث مريوط – مركز بحوث الصحراء خلال الصيف في موسمي ٢٠٠١، ٢٠٠٢ لدراسة تأثير الكثافة النباتية (٢٠،٢٤،٢٨ ألف نبات للفدان) ومقاومة الحشائش (مقارنة، عزقتين، جيسابريم، لاسو، لاسو/ أترازين) والتفاعل بينهما علي نمو الذرة الشامية (هجين فردي ١٠) والحشائش المصاحبة له وأيضا علي محصول الذرة ومكوناته وكان تصميم التجربة قطاعات كاملة العشوائية. ويمكن تلخيص أهم النتائج المتحصل عليها فيما يلي:

١- أدت زيادة الكثافة النباتية من ٢٠ إلى ٢٨ ألف نبات للفدان إلي زيادة معنوية في ارتفاع النبات.
٢- زيادة الكثافة النباتية من ٢٠الي٢٨ ألف نبات للفدان أدت إلى زيادة معنوية لكل من ارتفاع الكوز (سم) ومحصول الحبوب / فدان بينما حدث نقص في المعنوية لكل من طول الكوز (سم)، قطر الكوز (سم)، عدد الصفوف / كوز، عدد الحبوب / صف، وزن الكوز (جم)، وزن المائة حبة (جم) ومحصول الحبوب (جم) / نبات.
٣- استخدام طرق مقاومة الحشائش المختلفة مقارنة بالكنترول (بدون معاملة) أدي إلى زيادة معنوية في أرتفاع النباتات (سم) وغير معنوية في ارتفاع الكوز (سم). كما تأثرت صفات الكوز بالمعاملات المختلفة وقد زاد معنويا طول وقطر الكوز (سم)، عدد الصفوف/ كوز، وزن الكوز (جم)، وزن المائة حبة (جم) ومحصول الحبوب للفدان (اردب) وزيادة غير معنوية في عدد الحبوب / صف في كلا الموسمين وأمكن الوصول إلى أعلي محصول من الحبوب باستخدام الجيسابريم لكلا الموسمين.
٤- كان التفاعل بين الكثافة النباتية والمعاملات المختلفة لطرق مقاومة الحشائش معنوية في كل الصفات.
٥- قدرت كفاءة معاملات مقاومة الحشائش بكمية خفضها للوزن الأخضر والجاف للحشائش مقارنة بالكنترول وأعطت المعاملة بالجيسابريم أو مخلوط لاسو/أترازين أفضل النتائج بينما كان اللاسو متوسط التأثير أما المعاملة بالعزيق فكانت أقلهم تأثيرا.

تشير النتائج المتحصل عليها أن أفضل معاملة كانت بمبيد الجيسابريم أو لاسو /أترازين عند كثافة نباتية ٢٨ أو ٢٤ ألف نبات للفدان والتي زادت من محصول الذرة.