Effects of Pesticide Treatments and Sowing Dates on Growth Parameters and Yield of Onion Plant (*Allium Cepa* L.)

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ABSTRACT

Two field trials were conducted at the newly reclaimed sandy clay loam soil at El-Nubaria region – Alexandria Governorate, A.R.E. in the two successive growing seasons 2008/2009 and 2009/2010 to investigate the effect of three pesticides: insecticide (pirimiphos-methyl), fungicide (metalaxyl) and the herbicide (pendimethalin) combined with two sowing dates, early, mid-Nov. and late date 5th Feb. on some growth characters: i.e., plant height, number of leaves/plant, fresh weight of leaves/plant, dry weight of leaves/plant, average weight of bulb and total yield of onion plant (*Allium cepa* L.) c.v. Giza 20. The recommended rates of these pesticides were individually applied.

The obtained results showed that all the studied parameters were significantly increased with the three pesticides, and pendimethalin was highly effective followed by metalaxyl while pirimiphos-methyl was the least effective. Total yield mean values were 22.40 and 22.68 ton/fed for pendimethalin and 18.96 and 19.14 ton/fed for metalaxyl and 10.06 and 10.70 ton/fed for pirimiphos-methyl compared with the control 8.32 and 8.64 ton/fed in the first and second seasons respectively.

All the studied parameters were increased in early sowing date, mid-Nov. compared with the late sowing date, 5th Feb. in the two seasons.

The interactions between the three pesticides and the sowing date had a significant effect on: number of leaves/plant in the first season, fresh weight of leaves, dry weight of leaves, average weight of blub in the two seasons and total yield in the first season.

The highest values of all these parameters occurred on pendimethalin at early sowing date, mid-Nov.

Key words : hormesis – shikimate levels – growth stimulus – onion – responductive vegetative – blackgram.

INTRODUCTION

Onion (*Allium cepa* L.) is one of the important vegetable crops in Egypt for export and local consumption. Bulbs of the variety "Giza 20" are acceptable overseas but will receive more acceptance when their maturity and shipments are earlier (Abd El-Rehim *et al*., 1997).

The population explosion has put tremendous pressures on farmers to grow more food and increase its quality. Therefore, farmers are resorting to more use of pesticides to increase production of food crops and to ensure the protection of harvest against diseases and pests. On the other hand, the great expansion of the use of pesticides resulted in pollution of the environment and creating adverse conditions for the life of mankind and his food. Therefore, it is essential to monitor pesticide residues in crops, especially vegetable crops, food and environment (Edrisha, 1982) and to study the bioprocesses that occurred in the plant in order to avoid the side effects and potential hazards of pesticides (Salem, 2004). Karungi *et al*. (2010) reported that carbofuran increase yield of pepper. Also, Vieira *et al*. (2010) indicated that fluazinon increase yield of common bean in Brazil. In addition, Fayed *et al*. (2002) demonstrated that pesticide and mechanical weed control treatments increased significantly the height, leaf area index (LAI), top and root fresh weight of sugar beet.

At present, effective control techniques other than insecticide application against the pests are not available. The crops growers use various insecticides to control the pests. Insecticidal control is not only expensive but also its residues on the sprayed surface of the crops or in the soil have become a matter of concern and environmental pollution (Prodhan *et al*., 2008). The indiscriminate use of pesticides causes phytotoxicity and destruction of beneficial organisms such as predators, parasitoids, microorganisms and pollinators (Luckman and Metcalf, 1978 and Hussain, 1984). Under these circumstances it becomes necessary to find out some eco-friendly alternative methods for insect pest's managemeat which include the manipulation of the cultural practices like deviating the date of sowing, mulching, intercropping, screening of genotypes in formulating the integrated pest management approach (Prodhan *et al*., 2008).

Sowing date factor is a reliable practical expression for the effect of climatic conditions on crop growth and productivity (Fayed *et al*., 2002). In this respect, Ali *et al*.(2009) demonstrated that early sowing of cotton plant showed the highest crop growth rate (CGR) and relative growth rate (RGR), and the reproductive vegetative ratio (RVR) on seed and large number of cotton bolls. Moreover, Prodhan *et al*. (2008) reported that the highest yield of blackgram was obtained from Aug.7 followed by Aug.14 and Aug.21, while Sept.4 and Sept.11 had the lowest effect. Also, Riad *et al*. (2002) showed that plant height, leaf area (LA), leaf area index

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Received April 2, 2012, Accepted April 26,, 2012

(LAI), leaf fresh and dry weight/plant were appreciably increased on early planting (May) as compared with late planting (June) of pigeon pea plant. The use of agricultural manipulation (agricultural practicies, i.e. sowing date … etc) along with pesticide might help in reducing the level of pest infestation and subsequantly increase plant yield (Fayed *et al*., 2002; Omar *et al*., 1994 and El-Shami *et al*., 1993).

The present work aimed to determine some growth parameters (i.e. plant height, numbers of leaves, fresh and dry weight, average weight of bulb) and total yield of onion sown in 2008/2009 and 2009/2010 seasons under different pesticide regimes and sowing dates in reclaimed agricultural soil at El-Nubaria region – Alexandria Governorate, ARE.

MATERIALS AND METHODS

Pesticides used:

1- Insecticide

Pirimiphos–methyl (Actellic) 50% EC: 0-2-diethylamino – 6 – methylpyrimidin – 4 - yl-0,0-dimethylphosphorothioate

Introduced by ICI Agrochemicals.

2- Fungicide

Metalaxyl (Ridomil plus) 50% WP : N (2,6 – dimethylphenyl) – N- (methoxyacetyl) – alanine methylester

Origin : Ciba – Giegy crop.

3- Herbicide

Pendimethalin (Stomp) 50% EC : N- (1-ethylpropyl)- 3,4- dimethyl - 2,6-dintrobenzenamine

Introduced by American Cyanamid Co.

Field experiment:

Onion plant (*Allium cepa* L.), c.v. Giza 20 was used in this experiment, transplanting dates were either early (15th November) or late (5th February) during 2008/2009 season and the experiment was repeated during 2009/2010 season. The fungicide was sprayed after 45 days after planting according to the recommended rate 250 g/fed. with 100 L. water. For insecticide, 40 days after planting the plants were sprayed with the insecticide according to the recommended rate 500 cm^3/fed with 100 L. water. The herbicide was sprayed before transplanting on the prepared soil, the herbicide was incorporated into the soil, then the soil were irrigated and seeds were sown after soil was dried, the herbicide was applied at its recommended rate 1.7 L./fed. The pesticides were applied using a knapsack sprayer equipped with one nozzle. The treatments were designed in complete randomized plots with three replicates, each of 1/100 of feddan. The experiments were conducted at the reclaimed agriculture soil at El-Nubaria – region, Alexandria Governorate, A.R.E. Soil was sandy clay loam [sand 53.47%, silt 17.12%, clay 29.40%, pH 8.2, $CaCo_3$ 26.15% (Page *et al*., 1982)]. Normal agricultural practices were followed.

Average monthly meteorological data for Nubaria region Alexandria Governorate during seasons 2008/2009 and 2009/2010 were tabulated in table (1).

Plant samples:

After 100 days from transplanting, samples of onion plant were taken to evaluate: plant height, number of leaves, fresh and dry weight of leaves.

Harvest took place at the end of the season after 150 days from transplanting, total yield (ton/fed.) and average weight (gram) of bulb was measured.

Statistical analysis:

The obtained data were statistically analyzed according to Steel and Torrie (1980).

Table 1. Average monthly meteorological data for El-Nubaria region, Alexandria Governorate, A.R.E.

Item	Season 2008/2009				Season 2009/2010			
	Nov.	Dec.	Jan.	Feb.	Nov.	Dec.	Jan.	Feb.
Mean max. temp. (C^o)	23.1	19.0	19.2	17.2	21.9	19.9	20.2	19.7
Mean min. temp. (C^o)	18.0	14.4	13.6	11.7	17.5	15.0	14.5	13.3
Mean max. RH * %	76.2	76.7	73.9	67.1	76.4	73.7	77.1	68.3
Mean min. RH %	52.5	55.4	50.8	43.2	54.8	51.2	54.0	44.5
AVG. W.S. (m/s)**	7.3	8.0	8.5	9.3	6.8	9.1	8.7	8.4
AVG Soil temp. (10 cm)	21.4	17.5	16.8	14.9	19.9	17.7	17.7	16.9

* RH = Relative humidity.

** AVG. W.S. (m/s) = Average weed speed (meter/second).

Source: (1) Ministry of Agriculture – Agricultural Research Center – Centeral Laboratory for Agricultural Climate.

(2) Ministry of Agriculture – Agricultural Research Center – Centeral Adminstration of Agricultural Extension.

RESULTS AND DISCUSSION

Effect of pesticide treatments and sowing dates and their interactions on growth parameters and yield of onion plant:

I- Effect of pesticide treatments

Results in tables (2 to 4) showed that all applied pesticide treatments increased significantly plant height, number of leaves, fresh and dry weight of leaves, average weight of bulb as well as total yield than the control in the two seasons. Comparing the results between the pesticide treatments indicated that pendimethalin was highly effective followed by metalaxyl while pirimiphos-methyl was the least effective (tables 2 to 4) in this respect. For plant height mean values were 80.00 and 81.50 cm for pirimiphos-methyl; and 86.50 and 88.00 cm for metalaxyl; and 92.50 and 93.50 cm for pendimethalin compared with the control 72.50 and 73.50 cm for the first and second season, respectively (table 2). Similary, Karungi *et al*. (2010) reported that carbofuran increase yield of pepper. Also, Vieira *et al*. (2010) indicated that fluazinon increase the yield of common bean in Brazil. In addition, Obonyo *et al*. (2008) showed that sorghum yield increase through the mainpulation management practices such as genotype, selection, fertilizer and insecticide application. Also, Fayed *et al*. (2002) demonstrated that pesticide and mechanical weed control treatments increased significantly the height, leaf area index (LAI), top and root fresh weight of sugar beet. Moreover, Abdel Razik *et al*. (1991) showed that butralin, pendimethalin and dinitramine had stimulating effect on plant height, fresh weight and yield of spinach.

These results may be due to insecticide lowered population of insect on crop to varying extents and increased yield (Karungi *et al*., 2010). These results may be attributed to that the pesticide stimulate the growth of a range of plant species, as measured in several plant organs. This hormesis effect is likely to be related to the molecular of pesticide, science the effect was not seen in pesticide – resistant plants, and shikimate level were enhanced in plants with stimulated growth (Velini *et al*., 2008). These results may be attribated to the increase in number of healthy plants, in addition pesticides have been useful in many situation in obtaining significantly higher yield through the control of plant pests and diseases (Sinclair, 1979 and Omar & Rahhol, 1993). This may be due to the absence of weeds competition with the host plants (Blackshow *et al*., 1981; Nelson & Thoreson, 1981; Nelson & Giles, 1989; Habib *et al*., 1989 and Sabra *et al*., 1999).

2- Effect of sowing dates

Data revealed higher values of early sowing date, mid-Nov. planting for plant height, number of leaves, fresh and dry weight of leaves, average weight of bulb and total yield compared with 5th Feb. (tables 2 to 4). For plant height, general means in table (2) for pirimiphos-methyl, metalaxyl and pendimethalin in the first season were 84.50 and 81.25 cm for early and late sowing date, respectively; and in the second season were 85.75 and 82.50 cm for early and late sowing date, respectively. For total yield, general means in table (4) for pirimiphos-methyl, metalaxyl and pendimethalin in the first season were 15.73 and 14.13 ton/fed for early and late date, respectively; and in the second season were 16.17 and 14.50 ton/fed for early and late date, respectively. Similar results were obtained by Harrison *et al*. (2011), who showed that early sowing date increased growth and yield of maize. Also, Ibrahim and Adesiyun (2009) found that *Thrips tabaci* is the major insect pest of onion in sokota state (in Nigeria) as reported world wide and that the pest can be effectively managed by early planting / transplanting with bulb yields of up to 48 t/ha in the early transplanting (November), while delayed planting (February) 5.5 t/ha and (March) 1.5 t/ha. In addition, Ali *et al*. (2009) demonstrated that early sowing of cotton plant showed the highest crop growth rate (CGR) and relative growth rate (RGR), and the reproductive vegetative ratio (RVR) on seed and large number of cotton bolls. Moreover, Prodhan *et al*. (2008) reported that the highest yield of blackgram was obtained from Aug.7 followed by Aug.14 and Aug.21, while Sept.4 and Sept.11 had the lowest. Also, Riad *et al*. (2002) showed that plant height, leaf area (LA), leaf area index (LAI), leaf fresh and dry weight/plant were appreciably increased on early planting (May) as compared with late planting (June) of pigeon pea plant.

Also, Ibrahim (1982) studied the effects of four transplanting dates in Egypt during (October, November, December and January) on vegetative growth characters of lettuce plants, using the two cultivars Dark Green and Balady. The obtained results illustrated clearly that the nine characters of plant fresh weight, leaves fresh weight, plant diameter, leaf area, plant height, stem length, plant dry weight, leaves dry weight and total yield were increased significantly by transplanting on December 22; compared with January 16. On the other hand, late transplanting (on January 16) increased the two characters stems fresh weight and stem/leaves percentages. The number of leaves per plant was insignificantly affected by the transplanting dates of December 22 and January 16. Finally, the effects of

four treatments of air temperature (10, 14, 18 and 22°C) on relative growth rates of six different lettuce cultivars were studied by Scaife (1973). The results illustrated that the relative growth rate and dry – matter content were increased with increasing the air temperature between 10 and 18°C. The relationship between the logarithm of the relative growth rate and air temperature was almost exactly linear. Whereas, behyond 18°C the increase in relative growth rate was more gradual. The optimum temperature was propably above the highest used degree (22°C) in the experiment.

This finding showed that the promotive influence of early sowing date might have been due to the prevailling climatic conditions (table 1) during early planting that favored the production of healthy tall plants having greater number and larges leaves and consequently led to higher assemilation and larger fresh and dry weight of plant and increased total yield compared with late planting.

Meteorological data in table (1) showed that during January and February, soil temperature decreased to reach its average (14.9°C) in February 2008/2009. The relative humidity (RH%) reach its maximum (77.1%) in January 2009/2010. Such cooler and humidity weather conditions favor the germination and establishment of many new flushes of weed and in turn increased the weed infestation of onion field. Unfortunately, this time coincided with the emergence and seedling development of lately planting date (5th February planting). Herein, a severe competition anticipated between the lately planting onion and their analogeous emerged weed flush plants. This exactly exegetics the correlation between the late planting date, increases in weed abundance and final reduction in onion yield. Confirmid results in this respect were reported by Harrison *et al*. (2011) who demonstrated that early season temperature increases have caused the maize reproductive period to start earlier and increased growth and yield of maize. Also, Ibrahim and Adesiyun (2009) reported that the peak of thrips incidence in the various transplanting of onion plant were as follows: November at 15 (week after transplanting) WAT (120), December at 12.5 WAT (234), January at 9.5 WAT (373), February at 8.5 WAT (217), March at 6 WAT (41.2) and April at 5 WAT (20). Onion bulb yields were also found to differ in descending order as follows: November (48 t/ha), December (42 t/ha), January (13.5 t/ha), February (5.5 t/ha) and March (1.5 t/ha). These results also may attributed to early sowing date resulted in higher translocation and mobilization of photosynthates which were utilized in production high yield of plant (Ali *et al*., 2009). These also may be due to that early planting gave lower infestation of major insect pests and late plantings showed higher infestation (except thrips). Crop under early plantings received more rainfall than late plantings. Insect movement and egg deposition probably hampered due to rainfall. For this reason infestations were lower at earlier plants compared to late plantings (Prodhan *et al*., 2008). These results are in conformly with those of Nderitu *et al*. (1990) and Prodhan (2007). Nderitu *et al*. (1990) reported that the numbers of leaf punctures, eggs, larvae and puparia of stemfly were higher in late than early planted of bean crop and the crop planted date in the second was severely damaged due to generally higher population levels which had been building up in the course of the season. Prodhan (2007) showed that early planting (up to 21 August) gave lower infestation of stemfly than late planting of blackgram plant which known as mashkalai, urdbean or blackbean belongs to the family leguminosae which is the fourth most important pulses in Bangladesh. In addition Fayed *et al*. (2002) indicated that cooler and humid weather conditions on lately planting date (5th planting) favor the germination and establishment of many new flushes of weeds and in turn increased infestation of sugar beet field. These also may be due to the unconvenient environment conditions in particulary the low temperature and/or the day length throughout the vegetative growth stage which in turn affect the reproductive growth and yield crop (El-Deeb *et al*., 1994). Also, Wanger and Spira (1994) showed that weed seedling emergence was stimulated followed the first substantial autumn rains.

3- Effect of interaction

Data in the interaction between the main factors under study were divided into significant and insignificant effects. In this respect, it has to be mentioned that the insignificant interactions were excluded and this implies that each factor acts independently. The significant interactions will only be discussed.

Pesticide treatment X sowing date interactions had a significant effect on certain growth characters and total yield under study. Such effect was true in the first season, other was in the second one and other in the two seasons. The interaction between the three pesticide treatments and sowing date had a significant effect on number of leaves and total yield in the first season only (tables 2 and 4). The interaction between the three pesticide treatments and sowing dates did not affect the plant height in the two seasons.

Results of the interaction had a significant effect of the three pesticides on fresh weight of leaves, dry weight of leaves and average weight of bulb in the two seasons (tables 3 and 4). A speculative view to results of the

Table 2. Effect of pesticide treatments and sowing dates on plant height (cm) and number of leaves/plant on onion plant sowing in 2008/2009 and 2009/2010 seasons

Treatments	Season 2008/2009				Season 2009/2010			
	Plant height (cm)		Number of leaves/plant		Plant height (cm)		Number of leaves/plant	
	Sowing dates							
	15th Nov.	5th Feb.	15th Nov.	5th Feb.	15th Nov.	5th Feb.	15th Nov.	5th Feb.
Control	74.00	71.00	5.00	2.60	75.00	72.00	5.00	3.66
Mean	72.50 [a]		3.83 [a]		73.50 [a]		4.33 [a]	
Pirimiphos-methyl	82.00	78.00	7.00	6.00	84.00	79.00	7.33	6.00
Mean	80.00 [b]		6.50 [b]		81.50 [b]		6.67 [b]	
Metalaxyl	88.00	85.00	9.00	8.00	89.00	87.00	10.00	9.33
Mean	86.50 [c]		8.50 [c]		88.00 [c]		9.67 [c]	
Pendimethalin	94.00	91.00	11.00	10.00	95.00	92.00	12.33	11.00
Mean	92.50 [d]		10.50 [d]		93.50 [d]		11.66 [d]	
Mean	84.50 [b]	81.25 [a]	8.00 [b]	6.66 [a]	85.75 [b]	82.50 [a]	8.67 [b]	7.33 [a]
L.S.D.0.05 between pesticides (A)	1.727598083		0.2527655352		1.6793765203		0.8162632937	
L.S.D. 0.05 between sowing dates (B)	1.2215963199		0.178732224		1.1874985257		0.5771853102	
L.S.D. 0.05 between (AB)	N.S		0.3575		N.S		N.S	

N.S = Not significant

Table 3. Effect of pesticide treatments and sowing dates on fresh weight of leaves (g/plant) and dry weight of leaves (g/plant) of onion plant sowing in 2008/2009 and 2009/2010 seasons

Treatments	Season 2008/2009				Season 2009/2010			
	Fresh weight of leaves (g/plant)		Dry weight of leaves (g/plant)		Fresh weight of leaves (g/plant)		Dry weight of leaves (g/plant)	
	Sowing dates							
	15th Nov.	5th Feb.	15th Nov.	5th Feb.	15th Nov.	5th Feb.	15th Nov.	5th Feb.
Control	8.83	6.946	0.990	0.909	9.57	7.80	1.274	1.072
Mean	7.89 [a]		0.9496 [a]		8.683 [a]		1.173 [a]	
Pirimiphos-methyl	18.80	15.076	1.933	1.490	19.33	15.36	1.990	1.580
Mean	16.93 [b]		1.71116 [b]		17.345 [b]		1.785 [b]	
Metalaxyl	38.15	35.046	3.448	3.238	38.366	35.48	3.547	3.317
Mean	36.598 [c]		3.343 [c]		36.925 [c]		3.4320 [c]	
Pendimethalin	46.88	42.76	3.827	3.605	47.88	43.16	3.902	3.682
Mean	44.82 [d]		3.715166 [d]		45.2216 [d]		3.792 [d]	
Mean	28.16 [b]	24.958 [a]	2.5495 [b]	2.3101 [a]	28.6125 [b]	25.4525 [a]	2.678 [b]	2.41275 [a]
L.S.D.0.05 between pesticides (A)	0.7047342206		0.0545893307		0.622667919		0.0305786607	
L.S.D. 0.05 between sowing dates (B)	0.4983223463		0.0386004859		0.4402927079		0.00066098096	
L.S.D. 0.05 between (AB)	0.996747		0.077206		0.880614		0.043249	

N.S = Not significant

Table 4. Effect of pesticide treatments and sowing dates on average weight of bulb (g) and total yield (ton/feddan) of onion plant sowing in 2008/2009 and 2009/2010 seasons

Treatments	Season 2008/2009				Season 2009/2010			
	Average weight of bulb (g)		Total yield T/F		Average weight of bulb (g)		Total yield T/F	
	Sowing dates							
	15th Nov.	5th Feb.	15th Nov.	5th Feb.	15th Nov.	5th Feb.	15th Nov.	5th Feb.
Control	29.74	27.50	8.88	7.76	30.78	28.88	9.75	7.95
Mean	28.62 [a]		8.32 [a]		29.83 [a]		8.64 [a]	
Pirimiphos-methyl	34.99	32.31	10.58	9.54	36.94	34.06	11.30	10.10
Mean	33.65 [b]		10.06 [b]		35.500 [b]		10.70 [b]	
Metalaxyl	72.21	68.71	19.88	18.05	73.30	70.260	19.90	18.38
Mean	70.46 [c]		18.965 [c]		71.78 [c]		19.14 [c]	
Pendimethalin	77.30	76.46	23.60	21.20	78.18	76.38	23.78	21.58
Mean	76.88 [d]		22.40 [d]		77.28 [d]		22.68 [d]	
Mean	53.56 [b]	51.245 [a]	15.735 [b]	14.1375 [a]	54.800 [b]	52.395 [a]	16.177 [b]	14.502 [a]
L.S.D.0.05 between pesticides (A)	0.4067124594		0.2882524687		0.2251965228		0.4339992336	
L.S.D. 0.05 between sowing dates (B)	0.287589138		0.2038252753		0.1592379884		0.3068838011	
L.S.D. 0.05 between (AB)	0.575235		0.407691		0.318508		N.S	

N.S = Not significant.

interaction deduce that significant increases in all growth parameters and yield were occurred on pendimethalin treatment and early sowing date mid-Nov. Otherwise, the lowest values were obtained from untreated plants at the late date 5th Feb.

The efficency of pesticide treatments which was influenced by the date of planting might be due to the effect of prevailing temperatures (table 1) on the absorption and translocation of the pesticide in plants (Edgington and Peterson, 1977 and El-Shami *et al*., 1993).

From the collective data, it is obviously clear that pendimethalin was the highly effective pesticide followed by metalaxyl, while pirimiphos-methyl were the lowest one and early sowing date mid-Nov., was more effective than late sowing date 5th Feb. on increasing growth parameters and yield of onion plant.

Accordingly, it can be concluded that planting onion plants on early sowing date (mid-Nov.) with pendimethalin treated may be recommended for the best growth and yield under environmental canditions of El-Nubaria region Alexandria Governorate.

In conclusion, the use of chemical control and/or agricultural practicies, i.e., sowing date were maximized to increase growth characters and yield of crops in attempt to minimize chemical control pesticides hazards, while maintaining increased yield production.

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الملخص العربي

تأثيرات معاملات المبيدات ومواعيد الزراعة على النمو والإنتاج لمحصول البصل (*Allium cepa* L.)

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أجريت تجربتان حقليتان بالأراضى الرملية الطينية اللومية بمنطقة النوبارية بمحافظة الإسكندرية خلال موسمىً الزراعة ٢٠٠٨/٢٠٠٩ و٢٠٠٩/٢٠١٠ لمعرفة تأثير ثلاثة مبيدات الأول من المبيدات الحشرية بيريمفوس-ميثيل والثانى من المبيدات الفطرية ميتالاكسيل رشاً على الأوراق والمبيد الثالث من مبيدات الحشائش بنديمثالين رشاً على سطح التربة ثم الدمج مع التربة ثم رى التربة قبل الزراعة ثم الزراعة بعد جفاف التربة، وموعدين للزراعة هما موعد مبكر (١٥ نوفمبر) وموعد متأخر (٥ فبراير) على بعض قياسات النمو مثل طول النبات وعدد الأوراق والوزن الطازج للأوراق والوزن الجاف للأوراق ومتوسط وزن البصيلة والأنتاج الكلى وقد أستخدمت التركيزات الموصى با وهى ٥٠٠ سم^{3}، ٢٥٠ جرام و ١,٧ لتر/فدان للثلاثة مبيدات السابقة بالترتيب، وقد أستخدم تصميم القطاعات العشوائية الكاملة

Randamized Complete Block Design (RCBD)

من ثلاثة مكررات.

وقد أوضحت النتائج أن كل القياسات السابقة قد زادت معنوياً بإستخدام الثلاثة مبيدات السابقة مقارنة بالكنترول وكان أكثرهم تأثيراً هو مبيد الحشائش بينديمثالين يليه المبيد الفطرى ميتالاكسيل بينما المبيد الحشرى بيريمفوس-ميثيل أقلهم تأثيراً فى كل من الموسمين المشار إليهما فقد زاد بينديمثالين الإنتاج إلى ٢٢,٤٠ و٢٢,٦٨ طن/فدان بينما زاد ميتالاكسيل الإنتاج إلى ١٨,٩٦ و١٩,١٤ طن/فدان بينما بيريمفوس-ميثيل زاد الإنتاج إلى ١٠,٠٦ و١٠,٧٠ طن/فدان مقارنة بالكنترول ٨,٣٢ و ٨,٦٤ طن/فدان فى كل من الموسمين الأول والثانى على الترتيب.

كما أدى التبكير فى الزراعة إلى زيادة كل القياسات تحت الدراسة فى كل من الموسمين المشار إليهما، كان التفاعل بين الثلاثة مبيدات وميعادىً الزراعة معنوياً فى الصفات الآتية: عدد الأوراق لكل نبات فى الموسم الأول والوزن الطازج للأوراق والوزن الجاف للأوراق فى الموسم الأول والثانى ومتوسط وزن البصيلة فى الموسم الأول والثانى والإنتاج الكلى فى الموسم الأول. وإن أعلى قيمة لهذه القياسات قد تحققت بإستخدام البنديمثالين فى الزراعة المبكرة.

وتوصى الدراسة بإستخدام المعاملة بمبيد الديمثالين مع التبكير فى زراعة البصل للحصول على أعلى نمو وأعلى محصول طبقاً للظروف المتاحة فى منطقة الدراسة.

ومن هذا يتضح أن إستخدام العمليات الزراعية أو إستخدامها مع المكافحة الكيماوية مما يعزى إليه زيادة صفات النمو والإنتاج فى محاولة للحد من الإستخدام الواسع للمبيدات للتقليل من خطورتها مع الحفاظ على زيادة الإنتاج.