(ISSN) 1110-1571

EGYPTIAN JOURNAL OF APPLIED SCIENCE

Vol. (8), No. (2)
Feburary
1993

EDITED AND PUBLISHED BY THE EGYPTIAN SOCIETY OF APPLIED SCIENCE IN COLLABORATION WITH ZAGAZIG UNIVERSITY

Egypt. J. Appl. Sci., 8 (2) 1993 572 - 592

PLANT VEGETATIVE GROWTH, YIELD AND INCIDENCE OF MILDEW DISEASES OF CUCUMBER AS AFFECTED BY FERTILIZATION AND FUNGICIDAL APPLICATION

By

El-Fiki, A.I.I.*; Eid, S.M. and Abo-Sedera, F.A.****

* Agric. Bot. Dept. and ** Hort. Dept., Fac. of Agric. Moshtohor, Zagazig Univ., Egypt.

ABSTRACT

Effect of phosphorus fertilizer soil application at 30 Kg P_2O_5 combined with three levels of nitrogen, i.e. 0 Kg N ($P\ N_0$), 40 Kg N ($P\ N_1$) and 80 Kg N ($P\ N_2$)/ feddan (1.038 acre), together with applying five fungicides namely Benlate, Bavistin, Bayleton-25, Tri-Miltox Forte and Elemintary Sulphur on growth, yield and its components of Beit-Alpha and Amira-2 cucmber cultivars were studied. Infection severity of powdery and downy mildew diseases as affected by the above mentioned factors was also assesed.

Obtained results indicated that most studied growth parameters, yield and its components as well as % of infection with both mildew diseases were much increased when $P\ N_2$ fertilization level was applied compared with $P\ N_0$ one.

Amira-2 cv., produced higher no. of leaves, branches, fresh weight/plant as well as no. of fruits and yield/plant but lower percentage of dry weight and average fruit weight than Beit-Alpha one. The latter cv. was more susceptible to infection with powdery and downy mildew diseases particularly 35 days after sowing than the first one. At 55 days after sowing, both cvs. were equally and severily affected by downy mildew infection.

The interactive effect between N-fertilization level and cucumber cultivar reached to level of significancy only in case of no. of leaves/plant. Its highest figure was obtained in Amira-2 plots received the 3rd ($P\ N_2$) fertilization level.

Beit-Alpha cv. sprayed with Bavistin had the highest values of stem length, no. of branches and dry weight/plant, however, Amira-2 cv. sprayed with the same fungicide produced the highest no. of leaves/ plant. While, dusting Sulphur caused great reduction in dry weight/plant of both tested cvs., that received $P\ N_0$ fertilization level.

Number of plants which still survived/plot seemed to be significantly affected by fungicides but not fertilization treatments. The highest number of plants/plot, consequently the best yield/plot were in plots sprayed with Benlate received P N_2 fertilization level, however, Tri-Miltox gave the highest yield at level of individual plant of both tested cultivars.

Development of infection with powdery and downy mildews was greater on control plants (without fungicides) that received the highest fertilization level (P N_2). However, regardless type of mildew disease, all tested fungicides could supress average of disease severity and increase growth and fruit production of cucumber plants at all tested levels of fertilization. Tri-Miltox at 0.25% applied four times at 10 days intervals starting at appearance of first disease symptoms considered the best fungicidal treatment for controlling both powdery downy mildews infection on cucumber plants under field conditions.

INTRODUCTION

Cucumber, Cucumis sativus L., is one of the most popular cucu-bitacious crops. It is planted for its fruits which are locally consumed or exported to increased national income. Cucumber plants are attacked by several serious diseases (Bedlan, 1986). However, powdery mildew caused by Erysiphe cichoracearum and Sphaerothica fuliginea and downy mildew caused by Pseudoperonospora cubensis are the most destructive diseases because their considerable damage on the obtained yield and its quality (Sumner & Phatak, 1987). Resistant cultivars in combination with effective fungicides and/or suitable agricultural practices should be used for controlling such serious diseases (Palti & Cohen, 1980; Varady & Ducrot, 1985; Sumner & Phatak, 1987).

Development of powdery mildew (S. fuliginea) appeared to be favoured by night/day temp. regimes of 15/21°C rather than one of 21/27°C. (Munger, 1979), however, outbreak of downy mildew (P. cubensis) was occurred under high humidity and warm night conditions (Forsberg, 1986). Formerly, Cohen and Eyal (1980) recorded that the optimum temperature for downy mildew infection on cucumber in darkness at 2 & 4 hrs of wet period was 25 & 15°C, respectively. They attributed the high incidence of this disease in dry seasons in semi-aried areas due to dew which is the major source of free leaf moisture.

Fertilizers added to the soil particularly, that containing N in sufficient amounts, is very important

for improving plant growth and elevating crop production (El-Beheidi et al., 1978; Abo-Sedera, 1990). It is known, however, that high levels of nitrogen predispose host plant toward disease. The vigourous vegetaive growth of the host rendered it, in general, more susceptible, particulary, to obligate parasites such as rusts and mildew diseases and favourable to disease development (Sirry et al., 1970; Tomesh & Strukmeyer, 1979; Aly et al., 1987).

Fungicides also, are differed in their efficacy and several of them were used in different schedules and rates for controlling infection with powdery and/or downy mildews of cucumber and other cucurbits (Abolwafa et al., 1976; Makram et al., 1983; Varady and Ducrot, 1985; Sumner and Phatak, 1987).

The present work was done to study the individual effect of fertilization, cucumber cultivar variation and fungicidal application as well as their interactive effects on vegetative growth, yield and its components and infection with powdery mildew on two cucumber cvs. Incidence of downy mildew disease as affected by these three factors and interaction between them was also investigated.

MATERIALS AND METHODS

Cucumber seeds of two cultivars namely Beit-Alpha and Amira-2 were planted on June 7th, 1990 and June 1st, 1991 at the Exp. Farm of Fac. of Agric., Moshtohor, Zagazig Univ., on one side of ridges 3.5 m long and 0.8 m wide at hills 30 cm apart. The exprimental plot was consisted of three ridges with an area of about 1/500 fed. (8.4 m^2). Two plants were left per each hill at thining time.

For fertilization, calcium superphosphate (15% P_2O_5) and ammonium nitrate (33.5% N) were used as sources of phosphorus (P) and nitrogen (N), respectively. Three levels of fertilization were suggested as follow: the 1st level is phosphatic fertilizer alone at a rate of 30 Kg P_2O_5/feddan ($P\ N_0$), however, the 2nd ($P\ N_1$) and the 3rd ones were as the 1st but containing N fertilizer at rates of 40 and 80 Kg N/feddan, respectively. Required amounts of P were added to the soil at sowing time whereas those of N were divided into two equal portions and added at 20 and 30 days after sowing, in respective.

The used fungicides were Benlate 50% WP (Benomyl), Bavistin 50% WP (carbendazim), Bayleton 25% WP (triadimefon), Tri-Miltox forte 47.5% WP and Elemintary Sulphur at rates of 0.03, 0.03, 0.025 and 0.25% for

the first four fungicides in order listed, however, the last one (Sulphur) was applied twice at rates of 25 and 40 Kg/feddan. Additional treatment without fungicides was served as control.

The experiments were conducted in split-split plot design with three replicates, in which the fertilization levels were arranged in the main plots, while, cucumber cvs. and fungicides including control were introduced in sub-plots and sub-sub-plots (exp. plots), respectively. The tested fungicides except Sulphur, were sprayed four times at 10 days intervals starting as soon as first symptoms of powdery mildew disease was appeared. However, Sulphur was dusted twice, i.e. the first timed as above and the 2nd one was 20 days after. at 40 days after sowing (during flowering stage), five plants were randomly choosen, taken off as a representative sample from each experimental plot and used to measure vegetative growth characters which were expressed as stem length (cm), number of leaves and branches, fresh and dry weights (g) per plant. Dry matter percentage for each particular treatment was also calculated. At harvesting time, number of plants/plot was counted, fruits were picked at 2-3 days intervals, then counted and weighed. Finally, number of fruits and its weight (Kg)/plot and average of fruit weight were estimated. Number of fruits and yield (g)/plant were also calculated.

Disease assessment:

The following disease rating scale was prepared to facilitate disease assessment on cucumber plants infected with powdery and/or downy mildew diseases under field conditions. Characterstic symptoms of each mildew disease as described by Pandey (1982) and shown in Fig. (1) were taken into consideration:

0 = No infection.
1 = Very weak infection (few matured leaves had up to 10 whitish or yellowish brown spots/leaf).
2 = Weak infection (most of the matured leaves had up to 10 whitish or yellowish brown spots/leaf).
3 = Moderate infection (all matured leaves infected, whitish or brownish spots covered up to 25% of leaf area.
4 = Severe infection (25% up to 50% of leaf area of most matured leaves covered with whitish or brownish spots.
5 = Very severe infection (more than 50% of leaf area of most matured leaves covered with whitish or brownish spots, some leaves dried and defoliated, the youngest leaves only still green.

Fig.(1): Symptoms of mixed infection with powdery and downy mildews diseases on leaves of Beit-Alpha cucumber cv. (above), and severe infection with downy mildew on the same cv. (down) at 55 days after sowing.

Table (1): Day and night temperatures as well as percentage of relative humidities (RH) during June and July of 1990 & 1991 in the region surrounding the experiment.

Year		June				July			
		RH	Temperature		Average	RH	Temperature		Average
		%	Day	Night	°C	%	Day	Night	°C
1990	Maximum	96.0	37.6	21.4	29.50	98.0	36.4	22.5	29.45
	Minimum	22.0	26.9	12.5	19.70	22.0	31.4	17.3	24.35
	Mean	59.0	32.3	16.9	-	60.0	33.9	19.9	-
1991	Maximum	90.0	38.6	21.7	30.15	98.0	35.4	21.9	28.65
	Minimum	20.0	30.8	13.5	22.15	29.0	30.6	17.5	24.05
	Mean	55.0	34.7	17.6	-	63.5	33.0	19.7	-

Disease index was assessed twice, i.e. 35 and 55 days from sowing, respectively. Infection with mildew diseases was evaluated on twenty plants/plot randomly choosen for each time. Each plant given a rating, as described above. The ratings were converted to indices for each particular mildew disease using the equation suggested by Horsfall and Heuberger (1942).

All obtained data were subjected to statistical analysis according to Thomas and Hills (1975).

RESULTS AND DISCUSSION

Vegetative Growth:

Data presented in Table (2) show clearly that the tested cucumber cvs. were significantly varied in their vegetative growth. Amira-2 cv. plant had higher number of leaves, branches and fresh weight/plant and lower values of stem length and percentage of dry weight than Beit-Alpha cv. ones. No significant differences were detected between these two cvs. in case of dry weight/plant.

The obtained results decleared, regardless cucumber cv., that most of the measured vegetative growth parameters were significantly affected by the tested fertilization levels. In this regard, stem length, number of leaves and fresh weight/plant were significantly increased by using either the 2nd or the 3rd fertilization levels in comparison with the 1st one. However, increments in number of branches and dry weight/plant reached limits of significancy in case of applying the 2nd level of fertilization,

Table (2): Effect of fertilization level, fungicides, and cultivar and their combinations on vegetative growth parameters of cucumber cultivars (Average of 1990 and 1991 seasons).

Treatments Fungicides	Fertilization levels *	Stem length (cm)			No. of leaves/plant			No. of branches/plant		
		Beit-Alpha	Amira -2	Mean	Beit-Alpha	Amira -2	Mean	Beit-Alpha	Amira -2	Mean
Control	P N0	69.7	74.4	72.1	21.5	19.7	20.6	2.0	3.0	2.5
Benlate	P N0	86.3	76.0	81.2	25.7	27.1	26.4	2.3	3.0	2.7
Bavistin	P N0	102.3	85.6	94.0	28.7	28.5	28.6	2.0	3.0	2.5
Bayleton	P N0	70.7	75.7	73.2	22.7	20.3	21.5	2.0	3.3	2.7
Tri-Miltox	P N0	92.0	79.3	85.7	31.1	27.4	29.3	2.3	3.3	2.8
Sulphur	P N0	84.7	79.0	81.9	24.8	24.5	24.7	2.0	3.0	2.5
Control	P N1	85.7	82.0	83.9	24.6	28.0	26.3	2.3	4.3	3.3
Benlate	P N1	88.3	88.3	88.3	29.0	30.7	29.9	2.7	4.3	3.5
Bavistin	P N1	104.0	91.0	97.5	31.8	41.7	36.8	3.7	4.0	3.8
Bayleton	P N1	85.7	83.1	84.4	32.0	34.7	33.4	2.7	4.3	3.5
Tri-Miltox	P N1	93.7	82.5	88.1	32.5	31.0	31.8	2.7	3.3	3.0
Sulphur	P N1	86.1	82.3	84.2	26.7	30.0	28.4	2.7	4.3	3.5
Control	P N2	94.0	85.3	89.7	25.8	31.3	28.6	2.7	4.0	3.4
Benlate	P N2	100.3	88.4	94.4	28.2	36.3	32.3	3.0	4.3	3.7
Bavistin	P N2	109.0	96.3	102.7	33.5	43.7	38.6	4.0	4.7	4.4
Bayleton	P N2	99.0	86.9	93.0	37.2	40.0	38.6	4.0	4.7	4.4
Tri-Miltox	P N2	98.0	86.4	92.2	31.7	36.6	34.2	3.0	4.3	3.7
Sulphur	P N2	89.3	87.1	88.2	27.9	32.1	30.0	2.7	4.0	3.4
	P N0	84.3	78.3	81.3	25.8	24.6	25.2	2.1	3.1	2.6
	P N1	90.6	84.9	87.8	29.4	32.7	31.1	2.8	4.2	3.5
	P N2	98.3	88.4	93.4	30.7	36.7	33.7	3.2	4.3	3.8
Control		83.1	80.6	81.9	24.0	26.3	25.2	2.3	3.8	3.1
Benlate		91.6	84.2	87.9	27.6	31.4	29.5	2.7	3.9	3.3
Bavistin		105.1	91.0	98.1	31.3	38.0	34.7	3.2	3.9	3.6
Bayleton		85.1	81.9	83.5	30.6	31.7	31.2	2.9	4.1	3.5
Tri-Miltox		94.6	82.7	88.7	31.8	31.7	31.8	2.7	3.6	3.2
Sulphur		86.7	82.8	84.8	26.5	28.9	27.7	2.5	3.8	3.2
Mean for cvs.		91.0	83.9	-	28.6	31.3	-	2.7	3.9	-

* P = 30 Kg P_2O_5, N1 = 40 Kg N, N2 = 80 Kg N/feddan, respectively.

L.S.D. at 0.05 level				
Cultivars	"C"	2.38	1.27	0.23
Fertilization level	"N"	2.26	1.29	0.35
Fungicides	"F"	5.14	2.77	n.s.
C x N		n.s.	3.06	n.s.
C x F		7.27	3.92	0.86
N x F		n.s.	4.80	n.s.
C x N x F		n.s.	n.s.	n.s.

Table (2): Continue

Treatments: Fungicides	Fertilization levels *	Fresh weight/plant (g): Beit-Alpha	Fresh weight/plant (g): Amira -2	Fresh weight/plant (g): Mean	Dry weight/plant (g): Beit-Alpha	Dry weight/plant (g): Amira -2	Dry weight/plant (g): Mean	Dry weight %: Beit-Alpha	Dry weight %: Amira -2	Dry weight %: Mean
Control	P N0	110.2	129.1	119.7	11.38	11.92	11.65	10.27	9.23	9.75
Benlate	P N0	130.0	134.2	132.1	13.65	12.73	13.19	10.57	9.47	10.02
Bavistin	P N0	159.0	170.1	164.6	17.43	14.58	16.01	10.93	8.57	9.75
Bayleton	P N0	145.1	153.8	149.5	14.08	14.68	14.38	9.70	9.53	9.62
Tri-Miltox	P N0	140.3	142.0	141.2	15.09	12.88	13.99	10.73	9.07	9.90
Sulphur	P N0	134.2	140.5	137.4	13.43	11.66	12.55	10.00	8.30	9.15
Control	P N1	140.0	147.6	143.8	14.76	14.08	14.42	10.53	9.53	10.03
Benlate	P N1	146.7	153.9	150.3	16.26	14.87	15.57	11.10	9.65	10.38
Bavistin	P N1	190.0	198.8	194.4	19.86	19.88	19.87	10.40	10.00	10.20
Bayleton	P N1	158.6	178.3	168.5	15.43	15.87	15.65	9.73	8.90	9.32
Tri-Miltox	P N1	161.6	179.7	170.7	16.69	17.26	16.98	10.30	9.60	9.95
Sulphur	P N1	152.1	157.2	154.7	16.02	14.08	15.05	10.53	8.97	9.75
Control	P N2	149.4	155.6	152.5	15.53	14.27	14.90	10.40	9.17	9.79
Benlate	P N2	153.2	158.6	155.9	16.91	14.59	15.75	11.07	9.20	10.14
Bavistin	P N2	211.0	229.9	220.5	21.97	21.39	21.59	10.33	9.30	9.82
Bayleton	P N2	167.9	199.8	183.9	16.06	18.50	17.28	9.53	9.30	9.42
Tri-Miltox	P N2	167.9	189.0	178.5	16.09	18.08	17.09	9.57	9.57	9.57
Sulphur	P N2	151.7	161.0	156.4	14.81	13.62	14.22	9.77	8.47	9.12
	P N0	136.5	145.0	140.7	14.18	13.07	13.63	10.37	9.03	9.70
	P N1	158.2	169.3	163.7	16.50	16.01	16.26	10.43	9.44	9.94
	P N2	166.9	182.3	174.6	16.70	16.74	16.72	10.11	9.17	9.64
Control		133.2	144.1	138.7	13.89	13.42	13.60	10.40	9.31	9.86
Benlate		143.3	148.9	146.1	15.61	14.06	14.84	10.91	9.44	10.18
Bavistin		186.7	199.6	193.2	19.69	18.62	19.16	10.55	9.29	9.92
Bayleton		157.2	177.3	167.3	14.86	16.25	15.56	9.65	9.24	9.45
Tri-Miltox		156.6	170.2	163.4	15.96	16.07	16.02	10.49	9.41	9.95
Sulphur		146.0	152.9	149.5	14.75	13.12	13.94	10.10	8.58	9.34
Mean for cvs.		153.8	165.5	—	15.79	15.27	—	10.30	9.21	—

* P = 30 Kg P_2O_5, N1 = 40 Kg N, N2 = 80 Kg N/feddan, respectively.

L.S.D. at 0.05 level.

Cultivars	"C"	3.92	n.s.	0.27
Fertilization level	"N"	6.00	1.18	n.s.
Fungicides	"F"	6.71	1.10	n.s.
C x N		n.s.	n.s.	n.s.
C x F		n.s.	1.56	0.78
N x F		11.63	n.s.	n.s.
C x N x F		n.s.	n.s.	n.s.

as the differences between the 2nd and 3rd levels, in this respect, were not significant. On contrast, percentage of dry weight was the only growth parameter which seems to be unaffected by fertilization level which may depends primarily upon the genetic components of the tested cultivars. The favourable effect of fertilization on growth of cucumber plants which stated herein are, generally in agreement with El-Beheidi et al. (1978) and Abo-Sedera (1990).

All studied characters, except number of branches and percentage of dry weight, were significantly affected by fungicidal treatments. Cucumber plants sprayed with Bavistin showed the highest values of stem length, number of leaves, fresh and dry weight/plant, while those dusted with Sulphur as well as control ones (without fungicide) produced the lowest number of leaves and dry weight/plant without significant differences between them. Bayleton treatment, however, resulted in the lowest increment of stem length although, it caused significant increases in other studied vegetative growth parameters. The enhancement occurred in plant growth after fungicidal application, in general, was expected, mainly because of its efficiency in controlling mildew diseases (Table, 4). Moreover, some fungicides like Bavistin and Benlate proved side benificial growth regulating effects on cucumbers as mentioned by Nene and Thapliyal (1979). On the other hand, depressive effect of fungicides on stem length was observed also by Paulus et al. (1980). Phytotoxicity due to Sulphur treatment was not detected during this work, but plants treated with such fungicide could not grow well. Growth characters of Sulphur-treated plants were, in general, lower than their correspondings in other tested fungicidal treatments. Dusted Sulphur might reduce photosynthesis process carried out by treated green leaves.

Regarding effect of combination between cultivar and fertilization level, the same data in Table (2) showed that number of leaves/plant was significantly affected. In this respect, number of leaves/plant of Amira-2 cv. responded positively and significantly by using the 2nd and 3rd fertilization levels, however, differences between such two levels were not significant in case of Beit-Alpha cv. In fact, the amount of N-fertilizers required for optimum vegetative growth of different cvs. may be varied.

All measured parameters of vegetative growth (except dry weight/plant) were significantly affected by the interaction between cultivar and fungicide treatment. In this regard, Beit-Alpha cv. sprayed

with Bavistin produced the longest stem length, highest number of branches and dry weight/plant, moreover, Amira-2 cv. sprayed with the same fungicide resulted in the best number of leaves/plant. The highest percentage of dry weight, however, was givin by Beit-Alpha cv. sprayed with Benlate. On the other side, Amira-2 cv. treated with Bayleton and Sulphur gave the shortest stem length and lowest dry weight/plant, in respective. It is interest to state here that there was no significant differences between controls (without fungicide) of both tested cvs. in their stem length, number of leaves or dry weight/plant.

The interactive effect between fertilization and fungicide reached the level of significancy in case of number of leaves and fresh weight per plant. In this point, cucumber plants received the 3rd level of fertilization, sprayed with Bavistin or Bayleton produced the best fresh weight and highest number of leaves/plant, respectively. The tabulated data (Table, 2) showed also that reaction of plant growth against Bayleton treatment seems to be stimulated by increasing level of N-fertilization.

Yield Production and Severity Infection with Powdery and Downy Mildew Diseases:

The obtained results show clearly that the tested cucumber cvs. were significantly varied in their yield and disease reaction. Data in Table (3) illustrated that yield/plant was in general higher in Amira-2 cv. than Beit-Alpha one, but number of fruits and its weight/plot were significantly higher for Amira-2 cv. than the corresponding values of Beit-Alpha cv. On contrast, the average fruit weight was significantly larger in Beit-Alpha cv. than in Amira-2 cv. one.

Regarding reaction against mildew diseases, data in Table (4) illustrated that although infection with powdery mildew was increased by time, but it was more pronounced at 35 days after sowing than infection with downy one. The latter disease became much more severe at 35 days after sowing than the first one. These results could be attributed to vigorous growth of cucumber plants by ageing and/or suitable wheater conditions as shown in Table (1) which were more favourable for development of downy mildew infection than the powdery mildew one. Such results are supported by those of Munger (1979) who stated that powdery mildew of cucumber is favoured by 15/21°C rather than 21/27°C temperatures. On the other side, Ullasa and Amin (1988) found that day temperature of 25-30°C, night temperature of 15-21°C and RH more than 75% favoured the infection of *Luffa acutangula* by *P. cubensis*. The same data in Table (4) proved that powdery mildew

Table (3): Effect of fertilization level, fungicide, and cultivar and their combinations on number of survived plants/plot, yield and its components of cucumbers (Average of 1990 and 1991 seasons).

Treatments Fungicides	Fertilization levels *	No. of survived plant/plot			No. of / fruits/plant			Fruit weight (g) average		
		Beit-Alpha	Amira -2	Mean	Beit-Alpha	Amira -2	Mean	Beit-Alpha	Amira -2	Mean
Control	P N0	39.7	42.3	41.0	0.93	1.14	1.04	73.2	71.2	72.2
Benlate	P N0	43.3	44.3	43.8	1.22	1.35	1.29	75.9	74.4	75.2
Bavistin	P N0	42.7	42.3	42.5	1.23	1.26	1.25	75.3	73.6	74.5
Bayleton	P N0	41.3	43.7	42.5	1.19	1.28	1.24	73.8	72.0	72.9
Tri-Miltox	P N0	40.0	42.7	41.4	1.28	1.40	1.34	75.8	74.3	75.1
Sulphur	P N0	40.3	43.0	41.7	1.28	1.30	1.29	74.0	73.1	73.6
Control	P N1	38.7	41.0	39.9	1.34	1.38	1.36	82.7	80.8	81.8
Benlate	P N1	44.3	43.7	44.0	1.45	1.57	1.51	90.3	88.2	89.3
Bavistin	P N1	41.7	41.0	41.4	1.44	1.46	1.45	88.1	86.1	87.1
Bayleton	P N1	41.3	41.3	41.3	1.38	1.53	1.46	87.6	86.4	87.0
Tri-Miltox	P N1	39.7	41.7	40.7	1.56	1.69	1.63	90.4	87.9	89.2
Sulphur	P N1	41.0	42.3	41.7	1.46	1.50	1.48	84.2	82.9	83.6
Control	P N2	37.3	39.7	38.5	1.45	1.55	1.50	86.6	85.6	86.1
Benlate	P N2	42.7	43.0	42.9	1.68	1.68	1.68	90.0	89.5	89.8
Bavistin	P N2	40.7	39.7	40.2	1.60	1.70	1.65	89.3	86.9	88.1
Bayleton	P N2	40.3	40.0	40.2	1.55	1.72	1.64	91.9	87.4	89.7
Tri-Miltox	P N2	39.3	41.0	40.2	1.70	1.79	1.75	91.0	88.2	89.6
Sulphur	P N2	39.7	42.0	40.9	1.52	1.60	1.56	87.2	87.0	87.1
	P N0	41.2	43.1	42.2	1.19	1.29	1.24	74.7	73.1	73.9
	P N1	41.1	41.8	41.5	1.44	1.52	1.48	87.2	85.4	86.3
	P N2	40.0	40.9	40.5	1.58	1.67	1.63	89.3	87.4	88.4
Control		38.6	41.0	39.8	1.24	1.36	1.30	80.8	79.2	80.0
Benlate		43.4	43.7	43.6	1.45	1.53	1.49	85.4	84.0	84.7
Bavistin		41.7	41.0	41.4	1.42	1.47	1.45	84.2	82.2	83.2
Bayleton		41.0	41.7	41.4	1.37	1.51	1.54	84.4	81.9	83.2
Tri-Miltox		39.7	41.8	40.8	1.51	1.63	1.57	85.7	83.5	84.6
Sulphur		40.3	42.4	41.4	1.42	1.47	1.44	81.8	81.0	81.4
Mean for cvs.		40.8	41.9	—	1.40	1.49	—	83.7	82.0	—

* P = 30 Kg P_2O_5, N1 = 40 Kg N, N2 = 80 Kg N/feddan, respectively.

L.S.D. at 0.05 level				
Cultivars	"C"	0.99	n.s.	1.1
Fertilization level	"N"	n.s.	0.05	2.7
Fungicides	"F"	1.17	0.06	2.7
C x N		n.s.	n.s.	n.s.
C x F		n.s.	n.s.	n.s.
N x F		n.s.	n.s.	n.s.
C x N x F		n.s.	n.s.	n.s.

Table (3): Continue.

Treatments Fungicides	Fertilization levels *	Yield/plant (g) Beit-Alpha	Yield/plant (g) Amira -2	Yield/plant (g) Mean	No. of fruits/plot Beit-Alpha	No. of fruits/plot Amira -2	No. of fruits/plot Mean	Yield/plot (Kg) Beit-Alpha	Yield/plot (Kg) Amira -2	Yield/plot (Kg) Mean
Control	P N0	68.2	81.3	74.8	37.0	48.3	42.7	2.71	3.44	3.08
Benlate	P N0	92.9	100.3	96.6	53.0	59.7	56.4	4.02	4.44	4.23
Bavistin	P N0	92.9	92.7	92.8	52.7	53.3	53.0	3.97	3.92	3.95
Bayleton	P N0	88.1	92.3	90.2	49.3	56.0	52.7	3.64	4.03	3.84
Tri-Miltox	P N0	97.2	103.9	100.6	51.3	59.7	55.5	3.89	4.44	4.17
Sulphur	P N0	94.9	95.2	95.1	51.7	56.0	53.9	3.83	4.09	3.96
Control	P N1	111.1	111.7	111.4	52.0	56.7	54.4	4.30	4.58	4.44
Benlate	P N1	131.1	138.7	134.9	64.3	68.7	66.5	5.81	6.06	5.94
Bavistin	P N1	126.8	126.0	126.4	60.0	60.0	60.0	5.29	5.17	5.23
Bayleton	P N1	121.5	131.7	126.6	57.3	63.0	60.2	5.02	5.44	5.23
Tri-Miltox	P N1	141.2	148.2	144.7	62.0	70.3	66.2	5.60	6.18	5.89
Sulphur	P N1	123.2	124.1	123.6	60.0	63.3	61.7	5.05	5.25	5.15
Control	P N2	125.4	133.0	129.2	54.0	61.7	57.9	4.68	5.28	4.98
Benlate	P N2	151.1	150.5	150.8	71.7	72.3	72.0	6.45	6.47	6.46
Bavistin	P N2	142.6	147.3	145.0	65.0	67.3	66.2	5.80	5.85	5.83
Bayleton	P N2	142.2	150.0	146.1	62.3	68.7	65.5	5.73	6.00	5.87
Tri-Miltox	P N2	154.5	157.7	156.1	66.7	73.3	70.0	6.07	6.47	6.27
Sulphur	P N2	132.5	139.4	135.9	60.3	67.3	63.8	5.26	5.86	5.56
	P N0	89.0	94.3	91.7	49.2	55.5	52.3	3.68	4.06	3.87
	P N1	125.8	130.1	128.0	59.3	63.7	61.5	5.18	5.45	5.31
	P N2	141.4	146.3	143.9	63.3	68.4	65.9	5.67	5.99	5.83
Control		101.6	108.7	105.1	47.7	55.6	51.6	3.90	4.43	4.17
Benlate		125.0	129.8	127.4	63.0	66.9	65.0	5.43	5.66	5.54
Bavistin		120.8	122.0	121.4	59.2	60.2	59.7	5.02	4.98	5.00
Bayleton		117.3	124.6	121.0	56.3	62.6	59.4	4.80	5.16	4.98
Tri-Miltox		131.0	136.6	133.8	60.0	67.8	63.9	5.19	5.70	5.44
Sulphur		116.9	119.6	118.2	57.3	62.2	59.8	4.71	5.07	4.89
Mean for cvs.		118.7	124.6	—	57.3	63.5	—	4.84	5.17	—

* P = 30 Kg P_2O_5, N1 = 40 Kg N, N2 = 80 Kg N/feddan, respectively.

L.S.D. at 0.05 level				
Cultivars	"C"	n.s.	3.34	0.25
Fertilization level	"N"	7.26	2.15	0.08
Fungicides	"F"	6.31	2.13	0.28
C x N		n.s.	n.s.	n.s.
C x F		n.s.	3.01	n.s.
N x F		n.s.	n.s.	n.s.
C x N x F		n.s.	5.21	n.s.

infection was significantly lower on Amira-2 cv. than Beit-Alpha one either at 35 or 55 days after sowing. Regarding downy mildew, the same trend was observed at 35 but not 55 days after sowing where the differences between the two cvs. were not significant. This indicated that resistance of Amira-2 cv. against downy mildew infection may be declined by plant ageing. The obtained results are in confirmity with those reported by Dexon (1981) who stated that resistance in some cvs. is apparent in the early stages of growth, however, it becomes uneffective as fruits approaches maturity. Similar results were also stated by Amin et al. (1982) who found that most of muskmelon varieties under natural conditions, were resistant against powdery mildew, but all lacked resistance to downy mildew (P. cubensis). The more susceptable Beit-Alpha cv. tested herein, had higher dry weight/plant than the less susceptible Amira-2 cv. one (Table, 2), but without significant differences between them. The increment in dry weight/plant of Beit-Alpha cv. could be attributed to accumulation of metabolic products in their infected leaves as well as to the rapid growth and sporulation of the invading mildew pathogens. In fact, the number of spores produced by these pathogenes could be reached to astronomical levels. In point, Tomesh and Struckmeyer (1979) recorded similar findings where cucumber cv., susceptible to powdery mildew contained higher nutrient elements than the resistant one when grown at same nutritional conditions.

Regarding effect of fertilization level on yield characters, data in Table (3) show that number of fruits and yield per plant or per plot were significantly increased by increasing fertilization up to the 3rd used level. Similar trend was also shown for downy mildew infection at 35 days and powdery mildew one at 55 days after sowing (Table, 4). However, increases in average fruit weight (Table, 3) and percentage infection with powdery mildew at 35 days after sowing reached levels of significancy in case of applying the 2nd level of fertilization. In this respect, the differences between the 2nd and 3rd levels were not significant. Increments in infection with mildews associated with raising fertilization level could be attributed to the resultant vigorous plant growth (Table, 2) as well as environmental conditions prevailed (Table, 1) which predisposed plants towards disease infection. These findings could be supported by Palti and Cohen (1980) who reported that progress of downy mildew is determined by leaf wetness, rate of foliage growth, physiological age of the host plant and others. Moreover, the present results are in confirmity with those of Aly et al. (1987) who found

that barely plants were grow more vigorously when treated with N fertilizer than with P or K ones. They added that N-fertilization increased plant susceptibility against mildew infection in contrast to P or K-fertilizers. The improved yield and its components associated with elevating fertilization levels which stated berein are, generaly in agreement with Prabhakar et al. (1985) on muskmelon, Abo-Sedera (1990) on cucumber and Shafshak et al. (1990) on squash, all found that plant growth and its yield production were positively affected by increasing level of N and/or P-fertilizers.

With respect to fungicidal effects on yield characters, data in Table (3) show that plots sprayed with Benlate followed by those with Tri-miltox produced the highest number of fruits and yield (Kg)/plot. Moreover, the latter fungicide, regarding number of fruits and yield (g)/plant, was the best of all tested ones. Average fruit weight was significantly higher in case of Benlate, Tri-Miltox, Bavistin and Bayleton treatments than Sulphur and control ones. The same data show also that number of plants/plot, at time of harvesting, seemes to be significantly affected by fungicides rather than by fertilization. Among tested fungicides, Benlate gave the highest number of plants/plot compared with other ones. Benlate when sprayed on leaves, seems to be translocated down towards roots, consequently protecting them against root-pathogens that affected plant survivals. Similar effect was reported by Jalali and Domsch (1975) on endomicorrhiza in roots of wheat sprayed with Benlate or TBZ and Buchenauer and Erwin (1972) who found also, that spraying with Benlate controlled Verticillium-wilt of stem and/or root inoculated cotton plants. The highest yield/plot in Benlate-treatments was partially due to such side effect and also due to its efficiency on controlling powdery mildew infection (Table, 4). On contrast, because the highest effectivity of Tri-Miltox against mildew diseases particularly the downy one (Table, 4), it gives the highest yield/plant, and consequently yield/plot, although it produced the lowest number of plants/plot. However, Sulphur and Bayleton were quite and equally effective against both mildew diseases (Table, 4), moreover, Sulphur-treatment resulted in the lowest average fruit weight, number of fruits and yield (g)/plant. The latter fungicide may negatively affected setting and development of cucumber fruits. Similar effect was reported by McDaniles and Furr (1930) who found that Sulphur placed on the Stigma of apple blossms inhibits pollen germination and hence reduces setting of the fruit.

Table (4): Effect of fertilization level, fungicide, cultivar and their combinations on incidence of powdery and downy mildew diseases at 35 and 55 days after sowing on cucumbers (Average of 1990 and 1991 seasons).

Treatments		Powdery mildew			Downy mildew			Average		
Fungicides	Fertilization levels *	Beit-Alpha	Amira -2	Mean	Beit-Alpha	Amira -2	Mean	Beit-Alpha	Amira -2	Mean
		% Disease index, 35 days from sowing								
Control	P N0	6.67	4.22	5.45	1.33	0.89	1.11	4.00	2.56	3.28
Benlate	P N0	0.89	0.44	0.67	1.11	0.89	1.00	1.00	0.67	0.84
Bavistin	P N0	1.56	1.11	1.34	1.11	1.11	1.11	1.34	1.11	1.23
Bayleton	P N0	2.00	0.96	1.48	0.89	0.89	0.89	1.45	0.93	1.19
Tri-Miltox	P N0	2.67	1.78	2.23	0.00	0.00	0.00	1.34	0.89	1.12
Sulphur	P N0	2.00	1.11	1.56	0.89	0.67	0.78	1.45	0.89	1.17
Control	P N1	6.44	3.78	5.11	1.55	1.33	1.44	4.00	2.56	3.28
Benlate	P N1	1.78	0.89	1.34	1.33	1.11	1.22	1.56	1.00	1.28
Bavistin	P N1	2.22	2.00	2.11	1.56	1.33	1.45	1.89	1.67	1.78
Bayleton	P N1	2.22	2.00	2.11	1.11	1.11	1.11	1.67	1.56	1.61
Tri-Miltox	P N1	2.89	2.22	2.56	0.22	0.00	0.11	1.56	1.11	1.34
Sulphur	P N1	2.22	1.33	1.78	1.33	0.89	1.11	1.78	1.11	1.45
Control	P N2	6.22	4.00	5.11	1.78	1.56	1.67	4.00	2.78	3.39
Benlate	P N2	1.56	0.89	1.23	1.55	1.33	1.44	1.56	1.11	1.34
Bavistin	P N2	2.22	1.56	1.89	1.78	1.55	1.67	2.00	1.56	1.78
Bayleton	P N2	2.89	1.33	2.11	1.33	1.33	1.33	2.11	1.33	1.72
Tri-Miltox	P N2	3.33	1.56	2.45	0.45	0.45	0.45	1.89	1.01	1.45
Sulphur	P N2	2.44	1.78	2.11	1.33	1.11	1.22	1.89	1.45	1.67
	P N0	2.63	1.60	2.12	0.89	0.74	0.82	1.76	1.17	1.47
	P N1	2.96	2.04	2.50	1.18	0.96	1.07	2.07	1.50	1.79
	P N2	3.11	1.85	2.48	1.37	1.22	1.30	2.24	1.54	1.89
Control		6.44	4.00	5.22	1.55	1.26	1.41	4.00	2.63	3.32
Benlate		1.41	0.74	1.08	1.33	1.11	1.22	1.37	0.93	1.15
Bavistin		2.00	1.56	1.78	1.48	1.33	1.41	1.74	1.45	1.60
Bayleton		2.37	1.43	1.90	1.11	1.11	1.11	1.74	1.27	1.51
Tri-Miltox		2.96	1.85	2.41	0.22	0.15	0.19	1.59	1.00	1.30
Sulphur		2.22	1.41	1.81	1.18	0.89	1.04	1.70	1.15	1.43
Mean for cvs.		2.90	1.83	—	1.15	0.97	—	2.03	1.40	—

* P = 30 Kg P_2O_5, N1 = 40 Kg N, N2 = 80 Kg N/feddan, respectively.

L.S.D. at 0.05 level

Cultivars	"C"	0.17	0.07
Fertilization level	"N"	0.25	0.15
Fungicides	"F"	0.31	0.42
C x N		n.s.	n.s.
C x F		0.44	n.s.
N x F		n.s.	n.s.
C x N x F		n.s.	n.s.

Table (4): Continue.

Treatments Fungicides	Fertilization levels *	Powdery mildew Beit-Alpha	Powdery mildew Amira -2	Powdery mildew Mean	Downy mildew Beit-Alpha	Downy mildew Amira -2	Downy mildew Mean	Average Beit-Alpha	Average Amira -2	Average Mean
		% Disease index, 55 days from sowing								
Control	P N0	7.78	5.78	6.78	11.78	12.44	12.11	9.78	9.11	9.45
Benlate	P N0	2.22	1.33	1.78	9.11	9.55	9.33	5.67	5.44	5.56
Bavistin	P N0	3.11	2.22	2.67	9.55	9.33	9.44	6.33	5.78	6.06
Bayleton	P N0	4.22	3.33	3.78	8.89	7.11	7.00	5.56	5.22	5.39
Tri-Miltox	P N0	4.89	3.33	4.11	5.11	5.78	5.45	5.00	4.56	4.78
Sulphur	P N0	4.22	3.55	3.89	7.11	7.56	7.34	5.67	5.56	5.62
Control	P N1	8.22	5.78	7.00	13.11	14.67	13.89	10.67	10.23	10.45
Benlate	P N1	1.56	1.56	1.56	10.67	9.55	10.11	6.12	5.56	5.84
Bavistin	P N1	2.89	2.67	2.78	11.11	9.33	10.22	7.00	6.00	6.50
Bayleton	P N1	4.00	4.00	4.00	7.56	8.22	7.89	5.78	6.11	5.95
Tri-Miltox	P N1	4.89	4.44	4.67	5.78	6.00	5.89	5.34	5.22	5.28
Sulphur	P N1	4.45	3.34	3.90	7.33	8.00	7.67	5.89	5.67	5.79
Control	P N2	8.67	6.67	7.67	17.11	14.89	16.00	12.89	10.78	11.84
Benlate	P N2	2.00	1.78	1.89	12.89	12.00	12.45	7.45	6.89	7.17
Bavistin	P N2	2.66	3.11	2.89	13.55	12.22	12.89	8.11	7.67	7.89
Bayleton	P N2	4.67	3.56	4.12	8.89	10.00	9.45	6.78	6.78	6.78
Tri-Miltox	P N2	5.11	4.66	4.89	6.22	7.11	6.67	5.67	5.89	5.78
Sulphur	P N2	4.00	3.78	3.89	8.22	8.67	8.45	6.11	6.23	6.17
	P N0	4.41	3.26	3.89	8.26	8.63	8.45	6.34	5.95	6.04
	P N1	4.34	3.63	3.98	9.26	9.30	9.28	6.80	6.47	6.63
	P N2	4.52	3.93	4.22	11.15	10.81	10.98	7.84	7.37	7.60
Control		8.22	6.08	7.15	14.00	14.00	14.00	11.11	10.04	10.58
Benlate		1.93	1.56	1.75	10.89	10.37	10.63	6.41	5.97	6.19
Bavistin		2.89	2.67	2.78	11.40	10.29	10.85	7.15	6.48	6.82
Bayleton		4.30	3.63	3.97	7.78	8.44	8.11	6.04	6.04	6.04
Tri-Miltox		4.96	4.14	4.55	5.70	6.30	6.00	5.33	5.22	5.28
Sulphur		4.22	3.56	3.89	7.55	8.08	7.82	5.89	5.82	5.86
Mean for cvs.		4.42	3.61	—	9.50	9.58	—	6.99	6.60	—

* P = 30 Kg P_2O_5, N1 = 40 Kg N, N2 = 80 Kg N/feddan, respectively.

L.S.D. at 0.05 level		Powdery mildew	Downy mildew
Cultivars	"C"	0.33	n.s.
Fertilization level	"N"	0.11	0.35
Fungicides	"F"	0.63	0.56
C x N		n.s.	n.s.
C x F		0.90	0.79
N x F		n.s.	0.97
C x N x F		n.s.	n.s.

In general, all tested fungicides were highly effective in controlling powdery mildew of cucumber, but all, except Tri-Miltox, were ineffective against infection with downy mildew particularly when used up to 35 days after sowing. In this respect, Benlate and Bavistin were the lowest effective. Similar conclusion was reported by Nene and Thapliyal (1979). According to superiority of the used fungicides in controlling complex infection with both mildew diseases (average), they could be arranged as Tri-Miltox, Sulphur, Bayleton, Benlate and Bavistin, respectively. Although, both Tri-Miltox and Benlate treatments resulted in highest yield and its components as discussed before.

All yield characters as well as severity infection with both mildew diseases were unaffected by the interaction between cultivar and fertilization level. However, number of fruits/plot (Table, 3) as well as incidence of mildew diseases, particularly, at 55 days after sowing (Table, 4) were significantly affected by the interaction between cultivar and fungicide treatment. In this respect, Amira-2 cv. sprayed with Tri-Miltox and Beit-Alpha cv. sprayed with Bayleton produced the highest and lowest number of fruits/plot, respectively. These results seemed to be positively correlated with number of fruits/plant (Table, 3). As for disease incidence, the used fungicides were more effective in controlling powdery mildew on Amira-2 cv. than Beit-Alpha cv., particularly at 35 days from sowing. Regarding downy mildew infection, Beit-Alpha cv. treated with Bavistin and Tri-Miltox had the highest and lowest values, respectively.

The interactive effect between fertilization level and fungicide reached the level of significancy in case of downy mildew infection at 55 days after sowing. The highest infection with such disease was found on plants of control plots (without fungicide) receving the 3rd level of fertilization while those sprayed with Tri-Miltox and fertilized with phosphorus only (the 1st level) resulted in the lowest infection with such mildew disease. For any fertilization level, applying fungicides in general, improved downy mildew disease control.

Downy mildew infection which became more severe at 55 days after sowing seems to be caused little effect on yield and its components. In point, Palti and Cohen (1980) stated that losses in yield production depends on growth stage at infection, rate of foliage growth and pathogen development.

The data in Table (3) showed that number of fruits/plot was the only character which affected significantly by the compound interactive effect between fertilization level, cucumber cv., and fungicide. It could be noticed that Amira-2 cv. sprayed with Tri-Miltox and received the 3rd level of fertilization yielded the highest number of fruits/plot. On the other hand, Beit-Alpha cv. without fungicide (control) or even sprayed with Bayleton and receiving the 1st level of fertilization produced the lowest number of fruits/plot.

Finally, It could be concluded that Benlate at 0.03% as foliar spraying was the most effective fungicide in controlling powdery mildew disease on cucumber, however, Tri-Miltox forte at 0.25% was the best one against downy mildew infection as well as compound infection with both mildew diseases. Application should be started as soon as appearance of the first symptoms of a given mildew disease and reported four times at 10 days interval. Moreover, cucumber plants sprayed with any of these fungicides at suggested rates and schedule were developed better and produced the highest yield of cucumber fruits especially when received the 3rd level of fertilization which contained 30 Kg P (P_2O_5) plus 80 Kg N/feddan (1.038 acre).

REFERENCES

Abol-Wafa, M.T.; Farag, S.A.; Kamara, A.M. and Shehata, M.R. (1976). Fungicidal control of cucumber powdery mildew. Egypt. J. Phytopathol., 8:47-54.

Abo-Seders, F.A. (1990). The response of cucumber plants to planting date and nitrogen fertilization. Annals of Agric. Sci., Moshtohor, Zagazig Univ., A.R.E., 28(1):601-617.

Aly, A.Z.; Arafa, M.A.; Abd-El-Kader, D.A.; Mostafa, E.E. (1987). Effect of metheorological factors and fertilization on barely powdery mildew infection. Agric. Res. Rev., 65(2): 233-242.

Amin, K.S.; Ullasa, B.A. and Sohi, H.S. (1982). Quantitative determination of resistance to powdery and downy mildews in muskmelon. Indian J. of Agric. Sci., 52(9):601-604 (Rev. Plant Pathol., 62:788).

Bedlan, G. (1986). The most important fungal diseases of cucumber. Pflanzenschutz, 9:8-11 (Hort. Abst., 57:5503).

Buchenauer, H. and Erwin, D.C. (1972). Control of Verticillium-wilt of cotton by spraying with acidic solutions of benomyl, methyl 2-benzimidazole-carbamate, and thiabendazole Phytopath. Z., 75:124-139.

Cohen, Y. and Eyal, H. (1980). Effect of light during infection on the incidence of downy mildew (Pseudoperonospora cubensis) on cucumber. Physiol. Plant Pathol., 17(1):53-62.

Dexon, G.R. (1981). "Vegetable Crop Diseases". The Avi Publish II VG, American Ed. pp. 310.

El-Beheidi, M.F.; El-Mansi, A.A.; Abd-Alla, I.M. and Hewedy, A.M. (1978). Effect of nitrogen fertilizer and ethrel spray on growth, sex-expression, seed yield and quality of cucumber. Res. Bull. 908 Fac. Agric., Ain-Shams Univ. A.R.E.

Forsberg, A.S. (1986). Downy mildew Pseudoperonospora cubensis in Swedish cucumber fields in 1985. Vaxtskydsnotiser 50(1):17-19 (Rev. Plant Pathol., 66(2):759).

Horsfall, J.G. and Heuberger, J.W. (1942). Measuring magnitude of a defoliation disease of tomatoes. Phytopathology, 32:226-232.

Jalali, B.L. and Domsch, K.H. (1975). Effect of systemic fungitoxicants on the development of endotrophic mycorrhiza. In "Endomycorrhizas" (Sanders, F.E.; Mosse, B.; Tinker, P.B.; eds.), Acad. Press. Inc. (London), pp. 619-626).

Makram, M.W.; Hanna, M.J. and El-Hares, A.A. (1983). Control of powdery mildew of squash caused by Erysiphe cichoracearum. Egypt. Soc. of Appl. Microbiol. Proc. V. Conf. Microbiol. Cairo, 21-23 May 1983, pp. 335-344.

McDaniels, L.H. and Furr, J.R. (1930). The effect of dusting sulphur upon the germination of pollen and the set of fruit of apple. Cornell Agric. Exp. Bull. 499:13. In "Fungicides in Plant Disease Control" by Nene, Y.L. and Thapliyal, P.N. (2nd ed.), pp. 35-41.

Munger, H.M. (1979). The influence of temperature on powdery mildew resistance in cucumber. Report, Cucurbit. Genetics Cooperative (1979) No. 2:9-10. (Plant Breeding Abst., 50:10919).

Nene, Y.L. and Thapliyal, P.N. (1979). Systemic fungicides. In: "Fungicides in Plant Disease Control". (2nd ed.), Oxford & IBH Publish. Co., pp. 212-349.

Palti, J. and Cohen, Y. (1980). Downy mildew of cucurbits (Pseudoperonospora cubensis): The fungus and its hosts, distribution, epidemiology and control. Phytoparasitica 8(2):109-147.

Pandey, B.P. (1982). Epidemiology and forecasting of plant diseases. In: "A test book of plant pathology, pathogen and plant disease". Published by S. Chand & Co. Ltd., Ram Nagar, New Delhi, pp. 43-49.

Paulus, A.O.; Nelson, J.; Besemer, S.; Brendler, B. and Hall, B. (1980). New systemic fungicides for control of ornamental and vegetable, diseases. Rijksunversiteit Gent., 45, 2, I, 245-252. (Rev. Plant Pathol., 60(6): 2961).

Prabhakar, B.S.; Srinivas, K. and Shukia, V. (1985). Yield and quality of muskmelon (cv. Hara Madhu) in relation to spacing and fertilization. Progressive Hort. 17(1):51-55.

Shafashak, N.S.; Abo-Sedera, F.A. and Badr, A.E. (1990) Effect of planting date and fertilization level on I- Growth, yield, Chemical composition and percentage of virus infection of squash (Cucurbita pepo L.). Annals of Agric., Moshotohor, Zagazig Univ., A.R.E., 28(1): 645-657.

Sirry, A.R.; Hosni, A.M.; Ashour, W.E. and Mohamed, A. A. (1970). Fertilizers and stages of plant growth in relation to rust reaction and grain yield of wheat. U.A.R. J. Phytopathol., 2:25-34.

Sumner, D.R. and Phatak, S.C. (1987). Control of foliar disease of cucumber with resistant cultivars and fungicides. Appl. Agric. Res., 2(5):324-329.

Thomas, M.L. and Hills, F.J. (1975). Statistical methods in agricultural research. (2nd ed.), pp. 75-84.

Tomesh, R.J. and Strukmeyer, B.E. (1979). Effect of nutrient stress on elemental concentrations and powdery mildew growth with cucumber. J. of the American Soc. for Hort. Sci., 104(1):70-74.

Ullasa, B.A. and Amin, K.S. (1988). Ridgegourd downy mildew epidemics in relation to fungicidal sprayes and yield loss. Mysori J. of Agric. Sci., 22(1):62-67. (Rev. Plant Pathol., 70(4):2343).

Varady, C. and Ducrot, V. (1985). Downy mildew of cucumber. Revue Suisse de Viticulture d' Arboriculture et d' Horticulture 17(2): 103-106. (Hort Abst., 55:7700).

تأثير مستوى التسميد النتروجينى والرش ببعض المبيدات الفطرية على النمو والمحصول والاصابة بأمراض البياض على نباتات الخيار

عبد المنعم ابراهيم اسماعيل الفقى * ، سعيد معوض عيد * * ، فتحى ابو النصر ابوسديره **
* قسم النبات الزراعى ـ كلية الزراعه بمشتهـر ـ جامعة الزقازيـق
** قسم البساتين ـكلية الزراعه بمشتهـر ـ جامعة الزقازيـــق

أجرى هـذا البحث تحت ظروف الحقل بمزرعة كلية الزراعة بمشتهر أثناء العروه الصيفيه المتأخرة لموسمى ١٩٩٠ ، ١٩٩١م بهدف دراسة تأثير ثلاث مستويات سمادية من الاسمده النتروجينية هى صفر ، ٤٠ ، ٨٠كجم ن/فدان وقد اضيف لكل منها ٣٠كجم٢٥ /فدان وصنفين من الخيار(بيتا الفا ، أميره ـ٢) مع خمسة مبيدات فطرية مختلفه (بنليت ، بافستين ، بايلتون ، ترای ميلتوكس ـ فورت ، كبريت تعفير بالاضافه الى معاملة المقارنه بدون مبيد) وكذلك دراسة التأثير المشترك بين هذه العوامل على صفات النمو الخضرى ، المحصول ومكوناتة والنسبة المئوية لشده الاصابة بأمراض البياض الدقيقى والزغبى لنباتات الخيار .

وقد أوضحت النتائج وجود زياده واضحه فى معظم قياسات النمو الخضرى وكذلك صفات المحصول ومكوناتة وشده الاصابة بالبياض الدقيقى والزغبى مع كل زياده فى مستوى التسميد النيتروجينى حتى المستوى الثالث . كما تميز الصنف أميره ـ٢ بزياده معنوية فى عدد الاوراق ، الافرع ، الوزن الطازج/ نبات وكذلك كمية المحصول للنبات الواحد أو على مستوى القطعة التجريبيه مع نقص معنوى فى النسبة المئويـة للوزن الجاف ومتوسط وزن الثمرة وذلك عند مقارنتة بالصنف بيتا الفا . كما كان الصنف الاخير الاكثر قابلية للاصابة بكل من البياض الدقيقى والزغبى خاصه بعد ٣٥يوما من الزراعه بينما لم يكن هناك فرقا معنويا بين الصنفين من ناحيه شده الاصابة بالبياض الزغبى بعد ٥٥ يوما من الزراعه .

أبرزت النتائج ايضا تحسن صفات النمو الخضرى وكذلك المحصول ومكوناتة مع اعاقة واضحه لتقدم الاصابة بأمراض البياض الدقيقى والزغبى نتيجة استخدام المبيدات تحت الدراسة .

أما من ناحية المحصول وعلاقتة بالمرض فقد كان للمبيد بنليت تأثيرا واضحا فى مقاومة البياض الدقيقى وكذلك زياده كبيرة فى عدد النباتات / قطعة ومن ثم زياده معنوية فى المحصول /قطعه . بينما تفوق المبيد ترای ملتوكس فى مقاومة البياض الزغبى بالاضافه الى مقاومتة الفعاله للبياض الدقيقى ومن ثم زاد المحصول الناتج/ نبات زياده كبيرة عادلت المتحصل عليه فى المبيد السابق بالرغم من نقص عدد النباتات /قطعه فى حالة المبيد ترای ملتوكس .

وبناءا على نتائج تلك الدراسة يمكن النصح باستخدام المبيد ترای ملتوكس رشا على النباتات بمعدل ٢٥ر٠٪ مع اضافة السماد بمعدل ٣٠كجم نو٢ أ٥ + ٨٠كجم أزوت /فدان للحصول على محصول عالى مع مقاومة فعالة لكل من البياض الدقيقى والزغبى على نباتات الخيار تحت ظروف الحقل على أن يبدأ الرش بمجرد ملاحظـة أول اعراض للاصابة بالبياض الدقيقى ثم تكرارة كل عشرة أيام أربع مرات . هذا ويمكن استبدال هذا المبيد فى الرشتين الاولى والثانية بمبيد بنليت بمعدل ٥٠ر٠٪ لاعطاء مزيد من المقاومـة للبياض الدقيقـــى .