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Effectiveness of fungicides and mineral oils against squash powdery and downy mildew

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ABSTRACT

The curative efficacy of five commercially fungicides (Narimol, Penconazole, Pyrazophos, Pyrifenox, and Thiophenate-methyl) and two mineral oils (kabel, KZ) alone and their combination against powdery and downy mildew of winter squash under field condition was carried out. The experiment was conducted in two years 2001 and 2002 winter seasons at the Agricultural Research experimental station of Faculty of Agriculture, Alexandria University, Abbis area. The data were recorded as percentage of infected leaves (IL), disease index (DI), relative disease control (RDC), polyphenol content, and squash yield. The result revealed that use the mineral oils in the combination with fungicides support the use of fungicides against powdery and downy mildew. Pyrazophos by half recommended dose with 1% mineral oil (kabel) gave good curative effort against powdery mildew of squash plant more than its recommended dose alone. While against downy mildew pyrifenox by its half recommended dose with 1% KZ oil was the superior. Polyphenol content of squash plants was affected in the old leaves than in the young one, and the squash yield was enhanced by more than 200%.

INTRODUCTION

Cucurbits powdery and downy mildews, caused by *Erysiphe cichoracearum* and *Pseudoperonospora cubensis*, respectively are serious diseases on Cucurbits grown worldwide (Bettiol, 1999, Yuan *et al.*, 1999 and Kuepper, 2003). Control methods currently available under commercial conditions is use of fungicides, e.g. fenarimol (0.1ml/L) and benomyl (0.1g/L) gave good effect against Zucchini squash powdery mildew (Bettiol, 1999), dimethomorph against downy mildew of cucumbers and melons (Cohen *et al.*,1995), pyrifenox and flusilazole reduced the severity of

powdery mildew of *Prunus mume* (Huang *et al.*, 1995), pyrazophos reduced the disease severity by 83.04% (Ahmed *et al.*,1995), Triademefon as preventive and curative schedule was very good fungicide against powdery mildew of pumpkin (McGrath, 1996a), also, combination of fungicides give the best disease control of squash powdery mildew (RamirezArrendondo, 1995 and McGrath and staniszewska,1996). But the constant use of fungicides, however, can result in the environmental contamination and selection of resistant populations of the pathogen (McGrath, 1996b and McGrath *et al.*, 1996). For these reasons, alternative control measures are warranted

Several alternatives to conventional fungicides have been evaluated for cucurbit powdery mildew and downy mildew. Bettiol (1999) verified that high concentrations of fresh cow's milk were effective against Zucchini squash powdery mildew. JMS stylet oil suppressed the size of area infected in summer squash (McGrath and Schishkoff, 2000) and winter squash, muskmelon and pumpkin (McGrath and Schishkoff, 1999). Neem oil is labeled as a botanical fungicide for control of downy and powdery mildew of Cucurbits (Kuepper and Thomas, 2002 and Kuepper, 2003).

Also, mineral oils could be used to support the use of fungicides against powdery and downy mildew on cucurbitaceae (Cohen *et al.*, 1996, Collina, 1996 and Grove *et al.*, 2000). For this reason, the objective of this study was decrease the dose of five commercial fungicides by mixing them with two type of mineral oils with two concentrations and evaluation of these combinations against powdery and downy mildew of winter squash under field conditions. Since there is a possible relation between the content of phenolic compounds and disease resistance as mentioned by Doll *et al.*, 1994, so phenolic compounds were determined in this study. Also, the yield was determined because it is the main aim of many researches (Ramirez Arrendondo, 1995 and McGrath and Schishkoff, 1999).

MATERIALS AND METHODS

Field experiments were conducted at the Agricultural Research Experimental Station of Faculty of Agriculture, Alexandria University at Abbis area. The soil type was clay loam (clay 41%, silt 22.2% and sand 36.16%).

Winter squash (*Cucurbita pepo*) was directed seeded on 21 August 2001 for the first season and 25 August 2002 for the second one. Each treatment represented by four plots. The experimental plot consisted of three bridges ($21m^2$). Number of plants/plot was approximately thirty plants. The design the experiment was randomized complete block design. Insect pests and weeds managed as needed by supplying insecticide [Cypermethrin (Saprol 10% EC)] and herbicide [Pendimethalin (stomp 50% EC, 1.7L/Fed)]. The field was felterized and irrigated as needed, when the plants reached to two weeks old, fungal inoculation was made by spraying spore suspension of $6x10^6$ spores/ml. When the fist colony of the disease was appeared, treatments were applied. Treatments included: a) Five commercial fungicides (shown in Table 1) with their recommended and half recommended doses. b) Two types of mineral oils (kabel and KZ) with two concentrations for each one (0.5% and 1%). c) Combinations of the used fungicides with their recommended doses and the two mineral oils with the two concentrations. Leaf assessments were made when the disease index reached to 50% and 25% in the untreated treatments (control) for powdery and downy mildew, respectively.

Table (1): Trade, Common, Chemical names, Formulations, and The rate of application of tested fungicides

Trade name	Common name	Chemical name	Formulation	Rate / feddan
TrimidaL	Narimol	α-(2-Chlorophenyl) α-(4-flurophenyl)-5-pyrimidinemethanol.	EC (9%)	20ml
Topaze	Penconazole	1-[2-(2,4-dichlorophenyl)n-pentyl]-1H-1,2,4-triazole	EC (10%)	25ml
Afugan	Pyrazophos	O,O-diethyl-O-(5-methyl-6-ethoxy-carbonyl-pyrazolo-[1-5-]pyrmid-2-yl)-thionophosphate.	EC (30%)	100ml
Dorado	Pyrifenox	2,4-dichloro-2-(3-pyridyl)acetophenone-o-methyloxione	EC (20%)	10ml
Topsin-M	Thiophenate-methyl	Dimethyl[(1,2-phenylene) bis(iminocarbono- thioyl)] bis carbamate.	WP (70%)	60gm

Curative efficacy of the treatments was determined by measuring the disease incidence [Percentage of infected leaves (IL), Disease index (DI), and Relative Disease Control (RDC)] according to James (1971) and Wenzl (1948). Phenolic compounds of young and old leaves were extracted and measured spectrophotometrically at 660 nm according to McGrath *et al.*, (1982) and Sabra (1993) with standard curve of tannic acid. Fruits were harvested and weighed every 2 days and calculate the yield as ton/feddan.

Statistical analysis of data collected were carried-out according to Cohort Software Inc. (1986).

RESULTS AND DISCUSSION

1- Effects of Fungicides alone:

1-1-Effect of fungicides with their field rates

The effect of five systemic fungicides from different organic groups were evaluated by their recommended doses against powdery and downy mildew, polyphenols content, and yield of squash plants under field conditions, and the data were recorded in Tables 2 and 3.

1-1.a. Curative effect against powdery mildew

Percentage of infected leaves (IL) and disease index (DI) were reduced by the use of all the tested fungicides by the same trend in the first and increasement in the values of relative disease control (RDC) in both seasons. Pyrazophos was the most effective fungicide in this respect with a value of 78.7% RDC (The mean of both seasons) and the lowest one was thiophenate-methyl with 69.0% RDC. These results are similar to the finding of Huang *et al.* (1995), Ahmed *et al.*(1995) and Bettiol (1999).

1-1.b. Curative effect against downy mildew

The curative of these fungicides were significantly recorded in both seasons, but the percentages of RDC were less than the curative effect against powdery mildew. The superior in this respect was pyrazophos,

followed by pyrifenox and the lowest curative effect was recorded with narimol. These results are confirmed by Cohen *et al.* (1995).

1-1.c. Effect on polyphenols content of squash leaves

The polyphenol content of squash leaves was high in young leaves than in old one (the average values of both seasons were 30.2 and 21.9 µg/g dry wt., respectively in untreated plants), For this reason, the old leaves are more susceptible to the infection by the pathogens (Doll *et al.*, 1994). All the tested fungicides significantly decreased the phenol concentration and pyrazofos and pyrifenox gave good effect in this trend especially in old leaves.

Table (2): Curative effect of tested fungicides on powdery and downy mildew of Winter squash plants, polyphenols leaves content (µg/g dry wt) and squash yield (ton/feddan) (1st Season,2001).

Fungicides	Powdery mildew			Downy mildew			Polyphenols		Yield
	% IL	DI	RDC	% IL	DI	RDC	YL	OL	
Control	69.52	55.96	0.00	35.06	24.97	0.00	28.25	22.35	1.87
Narimol	38.67	9.67	82.72	30.54	14.64	41.38	22.66	16.05	2.65
Penconazole	47.98	20.07	64.13	24.36	14.75	40.92	30.12	15.47	3.32
Pyrazophos	29.87	9.81	82.46	19.21	8.13	67.45	28.36	17.21	4.50
Pyrifenox	37.87	12.98	76.80	24.84	11.38	54.43	28.18	18.68	2.97
Thiophenate-methyl	40.19	9.98	82.17	15.91	10.53	57.81	24.77	13.03	4.57
$LSD_{0.05}$	6.84	5.59	7.67	9.75	6.25	24.34	1.57	1.65	0.38

%IL: Percentage of infected leaves DI: Disease index RDC: Relative disease control
YL: Young leaves OL: Old leaves

Table (3): Curative effect of tested fungicides on powdery and downy mildew of Winter squash plants, polyphenols leaves content (µg/g dry wt) and squash yield (ton/feddan) (2nd Season,2002).

Fungicides	Powdery mildew			Downy mildew			Polyphenols		Yield
	% IL	DI	RDC	% IL	DI	RDC	YL	OL	
Control	64.34	52.10	0.00	33.51	24.87	0.00	32.13	21.40	1.05
Narimol	50.59	20.93	59.83	24.63	14.57	41.39	21.31	16.54	2.33
Penconazole	32.08	11.10	78.69	16.02	11.09	55.42	29.60	15.69	3.43
Pyrazophos	43.69	13.02	75.01	23.08	9.74	60.83	27.61	17.34	3.41
Pyrifenox	46.05	19.22	63.11	17.84	8.51	65.79	27.52	18.68	2.53
Thiophenate-methyl	48.02	22.99	55.87	15.64	9.44	62.02	24.22	13.09	2.17
$LSD_{0.05}$	16.83	7.29	11.18	8.07	5.13	20.61	2.79	1.45	0.46

1-1.d. Effect on squash yield

As the results of the previous data, squash yield as ton / feddan increased in both seasons 2001 and 2002. These results approved by Ramirez Arrendondo (1995) and McGrath and Schishkoff (1999). The increasing percentage ranged from 106.7 to 200%. The highest yield was recorded with pyrazofos in both seasons, thiophenate-methyl in the first season and penconazole in the second one.

1-2-Effect of fungicides with their half field rates

The curative effectiveness of fungicides with their half field rate against powdery and downy mildew were recorded in Tables 4, 5, 6 and 7.

1-2.a. Curative effect against powdery mildew

All tested fungicides decreased the percentage of infected leaves and decreased disease index, and increased RDC with significant values in the two seasons 2001, and 2002. The superior one was pyrazofos, the second order in the efficacy were pyrifenox and narimol, and the third one were penconazole and thiophenate-methyl, but the values of RDC were less than the values recorded with recommended doses of fungicides.

1-2.b. Curative effect against downy mildew

All tested fungicides with half recommended doses did not gave significant effect on the percentage of infected leaves, except thiophenate-methyl in two seasons. But most of these fungicides significant increased RDC and the highest one in this effect was thiophenate-methyl with values of 50.92% and 55.34% RDC for 1st and 2nd season, respectively.

Table (3): Curative effect of mixture of half recomended doses of fungicides with mineral oils on squash Powdery mildew (1st Season 2001).

Oils / Fungicides	% of Infected leaves					Disease index					Relative disease control				
	Control	Kabel		KZ		Control	Kabel		KZ		Control	Kabel		KZ	
		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%
Control	69.52	61.39	55.84	64.35	59.17	55.96	38.26	32.05	40.11	33.46	0.00	31.63	42.73	28.32	40.22
Narimol	47.25	54.64	47.28	37.05	66.18	13.51	22.77	23.24	16.65	22.63	75.86	59.31	58.47	70.25	59.55
Penconazole	57.50	37.74	54.18	48.89	38.76	27.07	9.99	20.27	20.31	13.73	51.63	82.15	63.78	63.70	75.46
Pyrazophos	36.61	49.77	49.32	45.84	40.17	12.98	13.90	14.53	21.36	12.90	76.81	75.17	74.03	61.83	76.95
Pyrifenox	47.36	60.57	56.34	35.63	54.12	15.42	26.96	23.29	16.84	26.02	72.44	51.83	58.38	69.90	53.50
Thiophenate-methyl	37.14	47.59	49.33	49.71	40.83	11.73	17.59	20.65	24.67	12.64	79.03	68.57	63.10	55.92	77.42
$LSD_{0.05}$	For (fungicide oils interaction) 13.34					For (fungicide oils interaction) 7.52					For (fungicide oils interaction) 13.17				

Table (4): Curative effect of mixture of half recomended doses of fungicides with mineral oils on squash Powdery mildew (2nd Season 2002).

Oils / Fungicides	% of Infected leaves					Disease index					Relative disease control				
	Control	Kabel		KZ		Control	Kabel		KZ		Control	Kabel		KZ	
		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%
Control	64.34	69.53	55.99	56.36	60.93	52.10	41.94	39.16	35.84	39.49	0.00	19.51	24.83	31.22	24.21
Narimol	55.94	38.36	46.08	51.59	44.47	26.59	12.43	14.84	18.85	17.42	48.96	76.15	71.52	63.82	66.57
Penconazole	54.57	50.54	39.82	53.63	42.84	19.86	21.00	9.97	18.59	12.74	61.88	59.68	80.86	64.31	75.54
Pyrazophos	45.26	48.96	20.27	46.35	49.21	14.93	23.13	5.07	15.52	14.47	71.33	55.61	90.27	70.21	72.23
Pyrifenox	54.29	54.57	39.52	51.95	42.42	20.89	11.97	10.55	17.79	10.86	59.90	77.03	79.75	65.85	79.16
Thiophenate-methyl	54.90	45.18	30.83	48.05	55.98	31.98	15.48	8.27	15.67	21.20	38.62	70.28	84.13	69.93	59.31
$LSD_{0.05}$	For (fungicide oils interaction) 15.51					For (fungicide oils interaction) 6.69					For (fungicide oils interaction) 13.08				

Table (3): Curative effect of mixture of half recomended doses of fungicides with mineral oils on squash Downy mildew (1st Season 2001).

Oils / Fungicides	% of Infected leaves					Disease index					Relative disease control				
	Control	Kabel		KZ		Control	Kabel		KZ		Control	Kabel		KZ	
		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%
Control	35.06	12.94	22.53	20.13	20.32	24.97	16.34	6.56	14.03	13.21	0.00	43.75	73.71	43.81	47.10
Narimol	34.15	14.29	27.85	11.88	32.14	18.31	10.21	15.78	8.95	22.93	26.65	59.09	36.81	64.15	8.16
Penconazole	34.38	30.20	25.34	18.46	15.49	16.63	18.37	21.06	10.94	9.11	33.39	26.42	15.66	56.19	63.52
Pyrazophos	33.33	31.18	17.92	19.03	21.99	19.91	18.07	14.98	14.69	11.97	20.25	27.61	40.00	41.16	52.06
Pyrifenox	25.64	17.68	17.41	22.95	13.44	13.19	13.68	13.15	13.06	8.89	47.17	45.21	47.33	47.69	64.38
Thiophenate-methyl	20.18	18.24	30.46	18.90	30.90	12.25	11.52	23.27	10.99	19.05	50.92	53.87	6.80	55.97	23.71
$LSD_{0.05}$	For (fungicide oils interaction) 9.79					For (fungicide oils interaction) 6.22					For (fungicide oils interaction) 24.82				

Table (6): Curative effect of mixture of half recomended doses of fungicides with mineral oils on squash Downy mildew (2nd Season 2002).

Oils / Fungicides	% of Infected leaves					Disease index					Relative disease control				
	Control	Kabel		KZ		Control	Kabel		KZ		Control	Kabel		KZ	
		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%
Control	33.51	21.86	20.98	31.62	22.08	24.87	14.58	14.81	17.56	14.38	0.00	41.38	40.43	29.37	42.16
Narimol	30.39	27.19	18.06	19.90	37.21	15.83	18.41	13.08	16.22	20.86	36.34	25.97	47.41	34.76	16.10
Penconazole	32.89	20.11	22.59	20.00	20.07	20.76	16.39	18.70	14.06	12.26	16.50	34.08	24.79	43.45	50.68
Pyrazophos	27.06	23.30	22.90	17.96	26.72	11.54	15.21	18.42	15.11	15.35	53.59	38.83	25.91	39.25	38.28
Pyrifenox	25.17	19.64	25.89	16.92	18.20	13.20	13.02	19.40	6.07	11.06	46.92	47.64	21.97	75.59	55.54
Thiophenate-methyl	17.48	26.91	18.42	22.18	21.76	11.11	19.63	13.10	12.01	9.79	55.34	21.06	47.33	51.69	60.62
$LSD_{0.05}$	For (fungicide oils interaction) 10.91					For (fungicide oils interaction) 6.30					For (fungicide oils interaction) 25.34				

1-2.c. Effect on polyphenols content of squash leaves

All the tested fungicides decreased the polyphenol content especially in old leaves which decreased with significant values and the less effective one in this respect was thiophenate-methyl for the two seasons (Tables 8 and 9).

Table (8): Effect of mixture of half recomended doses of fungicides with mineral oils on squash leaves polyphenols (µg/g dry wt) (1st Season 2001).

Polyphenols / Fungicides	Young leaves					Old leaves				
	Control	Kabel		KZ		Control	Kabel		KZ	
		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%
Control	28.25	27.15	25.12	26.46	28.80	22.35	18.77	15.84	19.26	18.44
Narimol	26.81	28.86	26.36	29.83	36.55	15.47	20.24	15.96	24.37	14.43
Penconazole	27.09	26.36	29.83	29.30	32.98	20.64	20.18	25.74	16.69	19.11
Pyrazophos	27.04	28.65	32.35	28.56	31.55	15.78	10.21	18.77	15.84	13.36
Pyrifenox	28.21	30.54	26.05	25.18	27.33	14.89	19.45	14.49	19.38	10.82
Thiophenate-methyl	24.41	26.97	30.10	26.07	35.62	16.94	11.80	15.65	12.75	15.35
$LSD_{0.05}$	For (fungicide x oil interaction) 2.66					For (fungicide x oil interaction) 1.78				

Table (9): Effect of mixture of half recomended doses of fungicides with mineral oils on squash leaves polyphenols (µg/g dry wt) (2nd Season 2002).

Polyphenols / Fungicides	Young leaves					Old leaves				
	Control	Kabel		KZ		Control	Kabel		KZ	
		0.5%	1%	0.5%	1%		0.5%	1%	0.5%	1%
Control	32.13	30.79	27.55	28.25	28.44	21.40	17.98	15.20	17.37	18.44
Narimol	25.81	30.30	33.36	25.62	36.60	15.47	18.68	15.96	21.13	14.10
Penconazole	28.40	27.64	28.34	30.17	36.02	19.69	19.05	25.10	16.39	18.28
Pyrazophos	21.83	28.89	32.62	30.03	36.66	15.10	9.88	17.98	15.56	13.36
Pyrifenox	29.08	30.73	27.06	27.40	32.62	14.34	19.45	13.82	18.93	10.82
Thiophenate-methyl	20.97	24.98	28.71	26.57	34.28	17.49	11.25	15.65	12.75	15.35
$LSD_{0.05}$	For (fungicide x oil interaction) 4.15					For (fungicide x oil interaction) 1.17				

1-2.d. Effect on squash yield

the squash yield was increased significantly specially in the second season, the values were less than which in the recommended doses (Tables 10 & 11).

Table (10) Effect of mixture of half recomended doses of fungicides with mineral oils on squash yield (ton/feddan) (1st Season, 2001).

Oils / Fungicides	Control	Kabel		KZ	
		0.5%	1%	0.5%	1%
Control	1.87	2.19	2.70	1.89	1.70
Narimol	2.15	3.00	3.65	2.04	3.84
Penconazole	1.26	5.40	3.43	3.33	1.64
Pyrazophos	2.43	5.60	2.20	3.03	3.55
Pyrifenox	2.3	3.62	3.85	2.12	2.25
Thiophenate-methyl	3.57	2.34	2.17	3.04	2.94
$LSD_{0.05}$	For (fungicide x oil interaction) 0.48				

Table (11) Effect of mixture of half recomended doses of fungicides with mineral oils on squash yield (ton/feddan) (2nd Season, 2002).

Oils / Fungicides	Control	Kabel		KZ	
		0.5%	1%	0.5%	1%
Control	1.05	2.90	2.34	2.07	2.47
Narimol	2.25	3.70	4.20	2.54	2.49
Penconazole	2.65	1.97	2.94	3.95	2.15
Pyrazophos	2.50	2.35	3.55	3.85	2.31
Pyrifenox	2.40	3.94	3.14	1.89	3.70
Thiophenate-methyl	2.03	3.33	2.35	2.96	1.85
$LSD_{0.05}$	For (fungicide x oil interaction) 0.42				

2- Effects of mineral oils alone

The effectiveness of two mineral oils (Kabel & KZ) by two concentrations (0.5 &1%) were recorded against powdery and downy mildew as shown in Tables 4, 5, 6, and 7; Tables 8, 9 for polyphenols content and Tables10, 11 for squash yield.

2-1- Curative effect against powdery mildew

The two mineral oils with their concentrations were significantly increased the RDC values of powdery mildew of squash plants. The highest concentration (1%) in the types of oils was more effective than the lowest concentration (0.5%). Kabel was more significantly effective in both seasons. The effectiveness values for mineral oils were approximately 50% from the values of the half recommended doses of fungicides. These results are confirmed by McGrath and Schishkoff 1999 and McGrath and Schishkoff 2000.

2-2- Curative effect against downy mildew

The values of RDC of downy mildew of squash plants followed the same trend which observed in the powdery mildew.

2-3- Effect on polyphenols content of squash leaves

Polyphenols content of squash young leaves did not significantly affected with two types of mineral oils in the two seasons, except with kabel 1% which significantly reduced it. Concerning to the content in old leaves, all the treatments of the oils alone significantly reduced it. The treatment with kabel at 1% was less effect in this respect.

2-4- Effect on squash yield

Squash yield was increased by these treatments, specially with kabel at 1% for the first season and KZ oil at 1% for the second season.

3- Combination effects of half field rates of fungicides and mineral oils

3-1- Curative effect against powdery mildew

Tables 4, 5 showed that, all the treatments of the combinations decreased the percentage of infected leaves with powdery mildew and also decreased the disease index with a significant effect, as a result of this effect the values of relative disease control (RDC) were significantly increased either of the 1st season or for the second one. The most effective treatment for the first season was thiophenate-methyl + KZ (1%) with a value of 77.42% RDC, and pyrazophos + Kabel (1%) with 90.27% RDC for the second season (this value is more than the value which recorded in the recommended dose in the two seasons, 82.46% and 75.01%). These results agrees with the finding of Cohen *et al.*, 1996, Collina, 1996 and Grove *et al.*, 2000.

3-2- Curative effect against downy mildew

Concerning to the effects on downy mildew of squash plants, all the values of RDC (which are shown in Tables 6, 7) were increased but less than the values of powdery mildew. The most effective fungicide was pyrifenox in both seasons but in the 1st one it mixed with KZ 1% (64.38% RDC) and in 2nd season it mixed with 0.5% KZ (75.59% RDC).

3-3- Effect on polyphenols content of squash leaves

Tables 8, 9 showed that polyphenol content of young leaves did not affect in most treatments of the combinations, while in old leaves the content of polyphenols was significantly decreased with all the treatments except with penconazole + Kabel 1% (1st and 2nd seasons) and narimol + KZ 0.5% (1st season), it was significantly increased.

3-4- Effect on squash yield

Squash yield was increased with all the treatments of the combinations of tested fungicides and oils esspecially in the second season. The most effective treatments were pyrazophos + Kabel 0.5%; penconazole + Kabel 0.5% in the first season, and pyrifenox + Kabel 0.5%; penconazole + KZ 0.5% in the second season. (Tables 10 and 11).

In General mineral oils in the combination with the tested fungicides support the use of fungicides against powdery and downy mildew. Pyrazophos by half recommended dose with 1% mineral oil (kabel) gave good curative effort against powdery mildew of squash plant more than its recommended dose alone. While against downy mildew pyrifenox by its half recommended dose with 1% KZ oil was the superior. Polyphenol content of squash plants was affected in the old leaves than in the young one, and the squash yield was enhanced by more than 200%.

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كفاءة المبيدات الفطرية والزيوت المعدنية ضد مرض البياض الدقيقى والزغبى فى نباتات الكوسة

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تم دراسة التأثير العلاجي لخمسة من المبيدات الفطرية التجارية (ناريمول – بنكونازول – بيرازوفوس – بيريفينوكس و ثيوفينات الميثيل) واثنين من الزيوت المعدنية (كابل و ك- ز) منفردة وفى صورة مخاليط ضد مرض البياض الدقيقى والزغبى فى نباتات الكوسة الشتوية تحت الظروف الحقلية. أجريت الدراسة في موسمين شتويين متتاليين ٢٠٠١ و ٢٠٠٢ بمحطة البحوث والتجارب التابعة لكلية الزراعة جامعة الإسكندرية بمنطقة أبيس. وسجلت النتائج كنسبة مئوية للإصابة في أوراق الكوسة ، المحتوى المرضى، الكفاءة النسبية للمكافحة، محتوى الأوراق من المواد الفينولية وكذلك ناتج محصول الكوسة.

أوضحت النتائج ان استخدام الزيوت المعدنية بالخلط مع المبيدات الفطرية يدعم استخدام المبيدات الفطرية ضد البياض الدقيقى والزغبى. خلط مبيد البيرازوفوس بنصف التركيز الحقلى مع ١% من الزيت المعدني كابل اعطى جهد علاجى ضد مرض البياض الدقيقى اعلى من المبيد بالمعدل الحقلى منفردا. بينما ضد مرض البياض الزغبى كان مبيد البيريفينوكس هو الأكثر كفاءة وخاصة عند خلطه مع الزيت المعدنى ك.ذ. تأثر محتوى الأوراق القديمة من الفينولات الكلية عن الأوراق الحديثة وزاد المحصول بأكثر من ٢٠٠%.