

EFFECT OF SOME TRIAZOL FUNGICIDES GROUP ON GARLIC WHITE ROT DISEASE CONTROL AND ITS YIELD

Felaifel, M.S.A. ; S.M. Abd El-Momen ; M.N.A. Khaleifa and M.S. Al-Ashaal

Plant pathology Res . Ins. , Agric. Res. Center, Giza, Egypt

ABSTRACT

Some triazole fungicides as well as Sumisclex and Follicur as standard fungicides showed significant effects on the linear growth and sclerotial formation of *Sclerotium cepivorum* Berk *in vitro* . The highest effect was obtained from Caramba , followed by Punch and Follicur while the lowest effect was observed from Premis .

In greenhouse , dipping garlic cloves in the preparation of any of the tested triazole compound or the standard fungicides decreased *S. cepivorum* infection and increased bulb yield (gm./ pot) compared to the control . Sumi-8 and Caramba at 1000 ppm gave the lowest infection compared with the other treatments .

Under field conditions , the same fungicides which previously used in lab. and greenhouse were tested . These experiments were carried out in El-Dakhlia and Sohag governorates during 2001 / 2002 and 2002 / 2003 , garlic growing seasons . Dipping garlic cloves before planting in Sumi-8 , Follicur and Rubigan gave the best control, while Victra and Premis were the least in 2001 / 2002 and 2002 / 2003 seasons in both Dakahlia and Sohag governorates. Data obtained indicated that dipping garlic cloves in the rate of 1000 ppm was more effective in reducing disease incidence . Also, it gave significant increase in garlic yield (ton/ fed.) compared to untreated . Rubigan , Premis, Eminint and Punch gave the highest increase of garlic yield (ton/ fed.) . A similar trend was observed in decreasing white rot disease when fungicides were used as (dipping + spraying) treatment in both seasons in Sohag governorate. The highest significant increase in garlic yield (ton/fed.) was observed when Sumi-8 was used . The treatment of dipping + spraying at 1000 ppm was more efficient in decreasing white rot disease incidence and increasing total garlic yield (ton/fed.) than dipping treatment only .

INTRODUCTION

Garlic (*Allium sativum* L.) is an important crop for exportation and local consumption in Egypt. Intensive garlic cultivation for exportation is concentrated in Qena , Sohage , Assiut , Menia , Beni-Suef , Fayioum and Qalubia governorates .

Garlic is attacked by several diseases at all stages of growth, but white rot disease caused by *Sclerotium cepivorum* Berk , is the most destructive one . This disease causes tremendous quantitative and qualitative losses specially in heavily infested fields . The pathogen was a poor competitor with soil saprophytes and survives in soil as small black sclerotia that produced in large numbers on infected plants (Colly – Smith, 1959). Possibility to control white rot disease by fungicides was reported by many investigators . Some fungicides reduced white rot disease under greenhouse and field conditions in many countries (Tamietti , 1979 ; Chiba *et. al.*, 1980 ; Utkhede and Rahe, 1982 ; Fullerton and Stewart, 1991 and Stewart and Fullerton , 1991 ; including Egypt (Sirry *et. al.*, 1974 , Georgy, 1977 ; El-Said *et. al.*, 1982 and

Mousa *et. al.*, 1987). In this respect, Marie Thanaa ,(1988) mentioned that the mycelial growth of *Sclerotium cepivorum* was completely inhibited at 2.5 ppm of Sumisclex and 5 ppm of Ronilan . Sumisclex was the superior for disease control in greenhouse and field conditions . The same trend was observed by (Hanifi , Awaref, 1989 and Ali *et. al.*, 1994) . Felaifel *et.al.*, (2002) found that dipping onion transplants , just befor transplanting , in seven triazole fungicides caused a significant reduction of infection caused by *S. cepivorum* Berk . Additionally, both Rubigan and Sumi-8 gave the highest disease reduction and highest bulb yield . This research was planned to determine the efficiency of some triazole fungicides in controlling white rot of garlic compared to the recommended fungicides.

MATERIALS AND METHODS

1- Laboratory experiments :-

Effect of fungicides on linear growth and sclerotial formation :-

The effect of ten fungicides (Table 1) i.e. Sumisclex and Folicur as standard fungicides as well as triazole fungicides group (Sumi-8 , Eminint , Premis , Caramba , Punch , Vectra , Rubigan and Topas) with seven concentrations i.e. 0.0, 0.25, 0.50 , 1.0, 2.5, 5.0 and 10.0 ppm on the linear growth and sclerotial production of *S. cepivorum* were tested.

Table (1) : Trade, Common and chemical name of the ten tested fungicides.

Trade name	Active Ingredient % a.i	Common name	Chemical name
Sumi-8	5%EC	Diniconazole-M	(E)-(RS)-1-(2,4 dichlorophenyl) 4, 4 dimethyl -2-(1H-1,2,4-triazol-1-y)-pent-1-en-3-01(IUPAC)
Caramba	6% SL	Metaconazole	((1R,5RS:1RS,55R)-5-(4-chlorobenzyl)-2,2-dimethyl-1-UH-1,2,4triazol-1-ylmethyl)cyclopentanol (IUPAC)
Topas	20% EC	Penconazole	1-[2,4-dichlorophenyl]Pentyl]-1H-1,2,4-triazol (Cas)
Eminint	12.5%EC	Tetraconazole	(±)-2-(2,4dichlorophenyl)-3-(1H-1,2,4-triazole-1-y1)propyl 1,1,2-2 tetrdfluoro-ethyl ether (IUPAC).
Rubigan	10%EC	Fenarimol	a-(2-dhlorophenyl)-a-(4-chlorophenyl)-5-Pyrimidine methanol (CAS)
Permis	2.5%Fs	Tetraconazole	(±)-2 (2,4-dichlorophenyl)-3-(1H-1,2,4-triazole-1-yl)- Propyl-1,1, Permis 2,2-tetrafluoro ethyl ether(IUPAC).
Punch	40%EC	Fiusilazole	1-[[bis(4-fluorophenyl)methylsilyl]methyl]-1H-1,2,4-trazole .
Vectra	10%SC	Bromuconazole	(a-(2-4-dichlorophenyl)-ethyle)-a-(1,1-dimethyl Ethyl)-1H-1,2,4-triazole-1-ethano
Sumisclex	25%DFL	Procymidone	N-(3,5-dichlorophenyl) -1,2- dimethylcyclopropane -1, 2dicarboximide
Folicure	25%EC	Tebuconazole	H-1,2,4-triazole-ethanol ∞ -[2-(4-chlorophenyl) - ethyl] ∞ -(1,1-dimethylethyl)- ± (CAS)

The required concentration of each fungicide was added to sterilized Richard's agar medium according to Sharvelle (1961) , and mixed thoroughly to the medium just before solidification, then poured into petri dishes 9 cm. (10 ml. Medium in each) . Plates were inoculated as usual, then incubated at 20 C°. Linear growth was measured daily, and the experiment was terminated when each plate of any treatment was filled with mycelial growth . Number of sclerotia was counted in 0.5-cm discs after 21 days of incubation at 20 C° . Average of the four discs which used as replicates was calculated .

11- Greenhouse experiments :-.

Effect of dipping garlic cloves in certain fungicides on the incidence of white rot and bulb yield :-

Garlic cloves were soaked in each of the tested fungicides at 1000 ppm for 10 minutes just before sowing, in greenhouse . This experiment was conducted in order to determine the incidence of white rot in 2000/2001 and 2001/2002 seasons . Pots

(50-cm-diam) were filled with sterilized clay loam soil (10 kg/pot) previously infested with the fungal propagules of the causal pathogen *S. cepivorum* at 20 g / kg. soil (W/W) .Pots were sown with treated cloves (5 cloves/ pot) . Each treatment was replicated four times and four pots were sown with untreated five cloves acted

as control . Percentage of white rot infection was recorded after two and four months from sowing as follow :-

$$\text{White rot infection \% after four months} = \frac{\text{No. of diseased plants after two months}}{\text{No. of total sown cloves}} \times 100$$

$$\text{White rot infection \% after four months} = \frac{\text{No. of diseased plants after two months} + \text{No. of diseased plants after four months}}{\text{No. of total sown cloves}} \times 100$$

Bulb yield as gm./pot was weighted after harvesting .

111- Field experiments :-

1- Effect of dipping garlic cloves in some fungicides on white rot incidence and garlic yield .

The same triazole group fungicides as well as Sumisclex and Folicur that previously used in lab and greenhouse were tested in the field . Cloves were dipped in 500 and 1000 ppm of each fungicide before sowing to study their effect on the incidence of white rot of garlic and its yield . These experiments were carried out in heavily naturally infested fields with *S. cepivorum* in Dakhalia and Sohag governorates in 2001/2002 and 2002/2003 . The complete block experimental design was used in plots (3.0 x 3.5 m.) each planted with 300 cloves . Four replicates were used for each treatment and four replicates without any fungicide served as control . All experiments were sown on the first and 15th September in Dakhalia and Sohag governorates , respectively in the two seasons .

Disease assessment was recorded as percentage of white –rot infection (either that dead or showed typical symptoms of white-rot infection) per each plot . At the end of experiment garlic bulb yield was weighted . Results were recorded then statistically analyzed (Snedecor , 1967) .

2- Effect of different applications of certain fungicides on garlic white rot incidence and yield .

The previously mentioned fungicides were applied as cloves dipping before sowing or dipping + spraying with the same fungicides six and twelve weeks later . Each treatment received two sprays at 1000 ppm ,while the other half left without spraying until the harvest time . This experiment was carried out in Sohag govern. only in 2002/2003 and 2003/2004 seasons . Disease assessment and garlic yield were recorded as mentioned before .

RESULTS AND DISCUSSION

1-Laboratory experiment :-

Data presented in Table (2) showed the effect of some fungicides on the linear growth and the formation of sclerotia of *S. cepivorum* . Data show that , all the tested fungicides caused significant reduction of linear growth and sclerotial formation compared with the control treatment . Carmba, Punch and Folicur completely inhibited the fungal growth and sclerotia formation at the lowest concentration (0.25 ppm) , followed by Topas, Eminint, Sumi-8 , Sumisclex and Vectra , respectively . However, Premis and Rubigan were the least fungicides showed linear growth reduction . In the respect of sclerotial formation , five of all ten tested fungicides i.e. Sumi-8 , Eminint, Caramba, Punch and Folicur completely inhibited the formation of sclerotia at the lowest concentration (0.25 ppm) , whereas Topas followed by Vectra , Sumisclex and Premis respectively were the least effective fungicides in this respect. The linear growth and sclerotial formation reduction was increased when the concentrations of the fungicides increased . These results are agree to some extent with those by Maerei (Thanaa), 1988 ; Hanafie (Awaref), 1989 and Ali *et.al.*; 1994 . Ronilan (0.25 ppm) and Sumisclex (0.5 ppm) completely inhibited fungal linear growth and formation of sclerotia of *S. cepivorum* .

The mechanism of action of triazole fungicides group was demonstrated with several workers (Buchenuer, 1975 , 1976; Kraus , 1979 , and Scheinpflug and Paul, 1977) they reported that , the triazole fungicides interfere with the biosynthesis of fungal steroids and inhibited ergosterol biosynthesis . In many fungi , ergosterol is essential to the structure of cell wall . If ergosterol is wanting , irreparable damage is caused to the cell wall, and the fungus is no longer viable .

Table (2):- Effect of ten fungicides with different concentrations on linear growth and sclerotial production of *Sclerotium cepivorum* in *Vitro*.

Concentration ppm Fungicides	Mean of linear growth (mm.)										Mean of number of Sclerotia						
	0.0	0.25	0.50	1.0	2.5	5.0	10.0	Mean	0.0	0.25	0.50	1.0	2.5	5.0	10.0	Mean	
Sumi-8	85.0	8.0	6.2	5.3	4.8	3.2	0.0	16.1	21.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	
Eminint	85.0	4.3	3.8	3.2	1.8	0.0	0.0	14.0	21.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	
Bremis	85.0	48.8	43.8	0.0	0.0	0.0	0.0	25.4	21.0	13.7	7.0	0.0	0.0	0.0	0.0	6.0	
Caramba	85.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1	21.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	
Bunch	85.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1	21.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	
Vectra	85.0	27.2	0.0	0.0	0.0	0.0	0.0	16.0	21.0	37.7	0.0	0.0	0.0	0.0	0.0	8.4	
Rubigan	85.0	28.7	23.7	19.8	0.0	0.0	0.0	22.5	21.0	1.3	1.0	0.0	0.0	0.0	0.0	3.3	
Topas	85.0	4.0	0.0	0.0	0.0	0.0	0.0	12.7	21.0	49.0	0.0	0.0	0.0	0.0	0.0	10.0	
Sumisclex	85.0	20.0	7.8	0.0	0.0	0.0	0.0	16.1	21.0	16.3	13.7	0.0	0.0	0.0	0.0	7.3	
Folicur	85.0	0.0	0.0	0.0	0.0	0.0	0.0	12.1	21.0	0.0	0.0	0.0	0.0	0.0	0.0	3.0	
Mean	85.0	14.1	8.5	2.8	0.7	0.3	0.0		21.0	11.8	2.2	0.0	0.0	0.0	0.0		

L.S.D. 5 % For :
 Fungicides (F) = 0.38
 Concentrations (C) = 0.32
 FxC = 1.01
 0.36
 0.30
 0.94

11- Greenhouse experiment :-

Data presented in Table (3) show that soaking garlic cloves in the tested fungicides significantly reduced the infection by *S. cepivorum*. Sumi-8 and Caramba were the most effective fungicides, in both two successive seasons after 2 and 4 months of sowing. Whereas Rubigan and Topas followed by Premis, Punch and Vectra were the least effective fungicides in this respect, compared with untreated treatment.

On the other hand, the same trend was observed of bulb garlic yield (gm./ pot). In this respect, the highest bulb garlic yield was produced when both Sumi-8 and Caramba were used, followed by using of Eminint and Vectra, respectively. However, the dipping treatment with Folicur gave the lowest bulb yield in both two seasons, compared with untreated treatment.

These results were in agreement with those obtained by Felaifel *et.al.*, (2002) they found that, dipping onion transplants, just before transplanting in the tested triazole group fungicides caused a significant reduction of white rot infection, accompanied with a significant increase of bulb yield.

Table (3) : Effect of some triazole and recommended fungicides as dipping treatment on white rot disease % and yield gram / pot of garlic plants under greenhouse conditions .

Fungicides	white rot infection%				weight gm. / pot	
	2000/2001		2001/2002		2000/2001	2001/2002
	2 months	4 months	2 months	4 months		
Sumi-8	5.0	25.0	5.0	20.0	190.0	186.25
Eminint	10.0	30.0	15.0	35.0	153.5	175.25
Premis	15.0	30.0	15.0	40.0	173.0	185.75
Caramba	5.0	30.0	5.0	25.0	186.0	185.95
Punch	15.0	35.0	10.0	35.0	155.0	160.25
Vectra	30.0	30.0	20.0	40.0	176.0	180.0
Rubigan	15.0	35.0	15.0	40.0	165.0	160.25
Topas	10.0	35.0	10.0	40.0	165.0	170.0
*Sumisclex	10.0	30.0	10.0	35.0	158.25	160.25
*Folicur	10.0	30.0	10.0	30.0	128.50	130.0
Control	45.0	85.0	40.0	75.0	41.75	65.25
L.S.D. 5%	14.70	15.70	14.61	15.04	9.99	12.68

111- Field experiments :-

1- Effect of dipping garlic cloves in certain fungicides on white rot disease incidence and garlic yield .

Data in Tables (4&5) show that, all tested fungicides at each concentration (500 or 1000 ppm) for triazole group as well as Sumisclex and Folicur caused a significant reduction to the natural infection of white rot and a significant increase to bulb yield compared with the control in Dakahlia and Sohag in 2001/2002 and 2002/2003 growing seasons.

Among the tested fungicides , Sumi-8 was the best fungicide caused the least infection with the white rot pathogen followed by Folicur , Eminent, Caramba and Rubigan , respectively , in both the two governorates in the two successive seasons . However, Vectra and Premis were the least effective fungicides respectively in this regard compared with the control treatment .

Regarding to bulb yield (ton/fed.) Punch , Rubigan and Victra as well as Rubigan , Premis and Punch gave the highest bulb yield at Dakahlia in 2001/ 2002 and 2002 / 2003, respectively . Also, Premis , Rubigan, Vectra and Sumi-8 as well as Topas and Vectra gave the highest bulb yield at Sohag in 2001 and 2002 , respectively , while Folicur gave the lowest bulb yield in the two governorates in 2001 and 2002 , compared with the control .

As for application rates, the same data (Table 4&5) show that , 1000 ppm was more effective in decreasing white rot incidence and increasing bulb yield of garlic, than 500 ppm. . The same results were confirmed with Marei (Thanaa), Hanafie(Awaref) 1989 ; Ali *et.al.*, 1994 and Felaifel *et.al.*, 2002 .

2-Effect of application methods of some triazole fungicides on white rot incidence and bulb yield .

Data in Table (6) show that , all the tested fungicides caused significant decrease in white rot disease incidence and increase in bulb yield , compared with the non-treated control when applied as dipping or dipping + spraying . In general , the dipping + spraying treatments were more effective in decreasing white rot incidence and increasing bulb yield compared to dipping treatment only .

As for fungicides Sumi-8 followed by Topas, Rubigan and Eminent as well as Sumi-8 followed by Rubigan , Topas , Sumisclex and Eminent were the best fungicides that caused the highest reduction of white rot at Sohag in seasons 2003 and 2004 , respectively . However, Vectra , Sumisclex , Punch and Folicur , as well as Folicur , Victra, Punch , Premis and Caramba were the least effective fungicides in this respect in 2003 and 2004 , respectively, compared to control treatment .

According to bulb yield, the same data (Table 6) showed that , the highest increase of bulb yield was observed form Rubigan followed by Caramba in 2003, whereas Caramba followed by Sumi-8 were the best in this respect in 2004 . However, Folicur treatment gave the lowest bulb yield in both two seasons , compared to control treatment . Felaifel *et.al.*, (2002) indicated that , using dipping + spraying treatments were more efficient in reducing white rot and gave higher bulb yield compared with dipping only . The fluctuation in the effectiveness of the tested fungicides in the greenhouse and field experiments might be to the variability in the environment conditions and / or soil status (sterilization, amount of irrigation water, soil texture, Balady manure ...etc) .

Table (4) : Effect of some triazol and recommended fungicides used as dipping treatment on white rot disease incidence of garlic in Dakahlia and Sohag in 2001/ 2002 and 2002/ 2003 under field conditions .

Rate of Application with ppm	white rot infection (%)												
	Dakahlia						Sohag						
	2001 / 2002		2002 / 2003		Mean		2001 / 2002		2002 / 2003		Mean		
Fungicides	500 ppm	1000 ppm	500 ppm	1000 ppm	500 ppm	1000 ppm	500 ppm	1000 ppm	500 ppm	1000 ppm	500 ppm	1000 ppm	Mean
Sumi-8	28.75	23.25	26.00	17.75	23.25	17.75	20.50	22.00	18.75	26.00	21.75	23.88	
Emimit	39.00	28.75	33.88	25.75	23.25	25.75	24.50	30.75	22.25	37.75	29.00	33.38	
Bremis	42.75	40.00	41.38	32.75	38.25	32.75	35.50	34.25	31.75	45.00	39.75	42.38	
Caramba	40.00	27.75	33.88	21.25	30.00	21.25	25.63	32.00	20.75	33.25	30.75	32.00	
Bunch	42.00	32.00	37.00	27.75	36.00	27.75	31.90	35.00	24.50	38.75	31.25	35.00	
Vectra	50.00	39.75	44.88	35.75	43.25	35.75	39.50	40.75	32.25	46.25	39.75	43.00	
Rubigan	34.25	29.75	32.00	22.75	30.00	22.75	26.38	26.25	24.75	38.00	29.75	33.88	
Topase	32.25	33.75	33.00	25.00	29.25	25.00	27.13	27.75	26.50	35.00	28.25	31.63	
Sumisclex	39.75	29.25	34.50	27.75	36.00	27.75	31.90	30.25	21.75	39.50	34.25	36.88	
Follicur	32.25	28.00	30.13	21.25	30.75	21.25	26.00	27.00	20.50	35.75	26.25	31.00	
Control (without fungicide)	69.25	69.25	69.25	61.00	61.00	61.00	61.00	62.00	62.00	68.50	68.50	68.50	
Mean	40.93	34.68	-	28.98	34.64	28.98	-	33.46	27.80	40.34	34.48	-	

* Recommended fungicides

L.S.D. 5 % For:

Fungicide (F) = 4.38

Rate of application (R) = 1.86

FXR = 6.18

4.44

1.89

N.S

4.78

2.04

N.S

5.85

2.50

N.S

Table (5) : Effect of some triazol and recommended fungicides used as dipping treatment on yield (ton/feddan) of garlic under field conditions in Dakahlia and Sohag in 2001 / 2002 and 2002 / 2003.

Rate of Application with ppm	yield (ton / Faddaen)											
	Dakahlia						Sohag					
	2001 / 2002		2002 / 2003		2001 / 2002		2002 / 2003		2001 / 2002		2002 / 2003	
Fungicides	500 ppm	1000 ppm	Mean	500 ppm	1000 ppm	Mean	500 ppm	1000 ppm	Mean	500 ppm	1000 ppm	Mean
Sumi- 6	9.03	9.67	9.35	11.18	10.92	11.05	10.25	10.42	10.34	11.54	11.32	11.43
Eminint	9.06	9.82	9.44	11.16	12.04	11.60	9.83	9.75	9.79	12.06	13.00	12.53
Bremis	8.98	9.64	9.31	11.80	12.46	12.13	10.92	10.73	10.83	12.14	12.83	12.49
Caramba	9.18	8.46	8.82	11.06	12.10	11.58	10.00	10.33	10.17	10.96	10.49	11.23
Bunch	10.16	9.28	9.72	12.36	11.80	12.08	9.83	10.33	10.08	12.43	12.61	12.52
Vectra	9.42	10.13	9.78	11.62	12.18	11.90	10.25	10.82	10.54	13.02	13.16	13.09
Rubigan	9.18	10.26	9.72	11.96	12.34	12.15	10.80	10.50	10.65	12.16	12.42	12.29
Topase	6.75	9.64	9.20	11.62	10.64	11.23	9.55	10.58	10.07	11.20	13.16	13.09
* Sumisclex	9.26	9.58	9.42	11.54	11.73	11.64	9.17	9.46	9.32	11.02	11.36	11.19
* Folicur	8.64	8.18	8.41	9.06	8.68	8.87	8.26	8.92	8.59	9.63	8.47	9.05
Control (without fungicide)	7.08	7.08	7.08	8.13	8.13	8.13	7.62	7.62	7.62	8.42	8.42	8.42
Mean	8.98	9.25	-	11.04	11.20	-	9.68	9.95	-	11.33	11.55	-

* Recommended fungicides

L.S.D. 5% For :-

Fungicide (F) = 0.82

Rate of application (R) = 0.12

FXR = 0.40

0.34

0.14

N.S

0.31

0.13

0.44

Table (6) : Effect of some triazol and recommended fungicides used as dipping and spray treatment on white rot disease incidence and yield (ton / feddan) of garlic under field conditions in two seasons in Sohag governorat.

Fungicides	Method of application	White rot infection %						yield (ton / feddaen)					
		2002 /2003			2003 / 2004			2002 /2003			2003 / 2004		
		dipp at 1000 ppm	dipp + spray at 1000 ppm	Mean	dipp at 1000 ppm	dipp + spray at 1000 ppm	Mean	dipp at 1000 ppm	dipp + spray at 1000 ppm	Mean	dipp at 1000 ppm	dipp + spray at 1000 ppm	Mean
Sumi- 8		20.16	17.36	18.76	23.34	20.16	21.75	12.42	13.11	12.77	12.63	13.58	13.05
Eminint		27.42	21.88	24.65	33.46	30.16	31.81	11.46	12.18	11.82	11.85	11.98	11.82
Bremia		30.16	27.65	28.91	36.19	32.12	34.16	11.34	11.76	11.55	10.84	11.16	11.00
Caramba		28.36	25.04	26.70	36.12	30.40	33.26	12.06	13.43	12.75	12.83	13.61	13.22
Bunch		33.98	31.46	32.72	37.23	32.86	35.05	10.90	11.18	11.04	10.37	10.93	10.65
Vectra		63.84	32.16	34.50	37.07	33.46	35.27	11.12	11.83	11.48	10.42	10.89	10.66
Rubigan		24.96	22.18	23.57	28.32	26.13	27.23	12.06	13.62	12.84	11.82	12.74	12.28
Topase		24.76	20.08	22.42	30.16	29.86	30.01	11.12	12.21	11.67	10.87	11.71	11.29
Sumisclex		34.92	31.17	33.05	32.82	29.16	30.99	11.36	12.04	11.70	10.94	11.25	11.10
Follicur		32.19	30.40	31.30	36.32	35.18	35.75	8.98	8.43	8.71	9.92	9.06	9.49
Control(without fungicide)		70.16	70.16	70.16	65.44	65.44	65.44	8.28	8.28	8.28	8.56	8.56	8.56
Mean		33.08	29.96	-	36.04	33.18	-	11.01	11.64	-	10.99	11.42	-

* Recommended fungicides

L.S.D. 5% For :

Fungicide (F)

Method of application (M)

FXM

= 3.27

= 1.40

= N.S

2.79

1.19

N.S

0.22

0.10

0.32

0.17

0.07

0.25

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تأثير استخدام بعض مبيدات مجموعة التريازول علي مقاومة مرض العفن الأبيض في الثوم ومحصوله
محمد صلاح الدين فليفل- صلاح محمد عبد المؤمن - ممدوح محمد عبد الفتاح خليفه -
محمد صديق الأشعل
معهد بحوث أمراض النبات - مركز البحوث الزراعية - الجيزة .

أثرت مجموعة مبيدات التريازول معنويا تحت ظروف المعمل بالإضافة الي مبيد السمكلكس والفوليكور كمبيدات قياسية علي النمو الفطري وتكوين الأجسام الحجرية للفطر سكلروشم سيبيفورم .
تناقص كل من النمو الفطري وتكوين الأجسام الحجرية عموما بزيادة التركيز وكان أفضل المبيدات لتوقف النمو وتكوين الأجسام الحجرية هي مبيدات الكاربا والبانش والفولكيور ، بينما البريميس أقلها تأثيرا في هذا الصدد .
في تجارب الصوبة أدي غمر فصوص الثوم في المبيدات السابقة عموما الي نقص معنوي في شدة الإصابة مقارنة بالكنترول (الغير معامل) وأيضا محصول الأصيل / للأصيص ، وكانت مبيدات السومي إيت و الكاربا يليها البريميس أفضل المبيدات المستخدمة في مقاومة المرض مقارنة بالمعاملات الأخرى و الكنترول .
تحت ظروف الحقل كان مبيد السومي إيت والروبجان والفولكيور والتوباز على الترتيب أفضل المبيدات المستخدمة في مقاومة المرض ، بينما كان مبيد الفيكتر والبريميس أقلها تأثيرا خلال الموسم وفي منطقتي الاختبار وعلي التركيزين المختبرين .
أخذت النتائج نفس الاتجاه السابق وكان أكثر وضوحا في حالة الغمر + الرش مرتين بنفس المبيد بعد الزراعة بـ 6 و ٢١ أسبوع .
بالنسبة للمحصول بالطن / فدان فقد كانت معاملات الغمر + الرش أفضل من الغمر وكانت أكثر المبيدات المستخدمة تأثيرا علي زيادة المحصول السومي إيت وإيمنت والبانش والتوباز علي الترتيب بينما كان أقلهم بصفة عامة هو مبيد الفولكيور .