

SCLEROTINIA SCLEROTIORUM (Lib.) de Bary :
A Study of Fungicides to Control Attacks on Sunflower Floral Buds.

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Summary :

In a period of rainy and warm spring, *Sclerotinia sclerotiorum* can bring about serious damage on the sunflower floral bud. The present study highlights results from 8 experiments with fungicides carried out in the greenhouse and in the open field in 1989, 1990 and 1991.

It appeared quite clearly that the sooner the treatments, the better the results. The highest levels of efficacy were obtained by preventive treatments, but early curative treatments on very young symptoms can also lead to some results. Used products showed significant efficacies which were rather equivalent (vinchlozolin + carbendazim - flusilazole + carbendazim - carbendazim - difenoconazole + carbendazim).

1. INTRODUCTION

Attacks of *Sclerotinia sclerotiorum* on the terminal bud can be highly dangerous according to earliness of infection. Studies carried out by CETIOM (PERES et. al., 1989) showed that the contamination by spores of young apical leaves surrounding the terminal bud was very early from the stage '6 leaves'.

Recent observations (1991) tended to show that a highly sensitive variety could even be contaminated before this stage. The small soft leaf lesions which followed developed very rapidly towards the basis of the terminal bud and brought about its destruction when the weather remained warm and wet. An early attack of aphids (*Brachycaudus helichrysi*) can increase risks of infection.

The present study will account for studies of fungicides carried out for the last 4 years in the greenhouse and in the open field.

2. MATERIAL AND METHODS

a. Methods of contamination

An artificial contamination was carried out in the greenhouse with a deposit on the terminal part of the young plant at the stage '6 leaves', -the contaminating suspension titrating 50,000 spores/ml of water. For the six following days, the plant was bagged and received sprayings of fog-sequences.

In the field, a semi-artificial contamination was carried out at the beginning of the crop-development, - sclerotia induced by carpogenesis being laid out directly on the soil (15 to 20 sclerotia/plot). At the stage '6 leaves', short periods of irrigation were repeated for 6 running days, and then 1 to 2 irrigations each week, when necessary, until the stage '12 leaves'.

b. Treatments

Treatments were applied with a back-sprayer, with 300 to 500 l/ha of mixture according to three modes :

- either with a strict preventive application 24 hours before contamination (see Graph 1),
- or with an early curative application after contamination and before the development of symptoms (see Graphs 1 and 3),
- or with a curative application as soon as the very early symptoms developed (see Table 1 and Graphs 1 and 2).

Experimental devices were blocks or split-plots with 4 replications in the field, and with 8 to 12 replications in the greenhouse. Plots in the field extended over 24 m².

c. Products and doses

- * vinchlorzolin + carbendazim (250 g/l + 165 g/l) : 375 g + 248 g/ha or 500 g + 330 g/ha
- * flusilazole + carbendazim (250 g/l + 125 g/l) : 200 g + 100 g/ha
- * difenoconazole + carbendazim (62,5 g/l + 125 g/l) : 125 g + 250 g/ha
- * carbendazim (500 g/l) : 500 g/ha

d. Observations

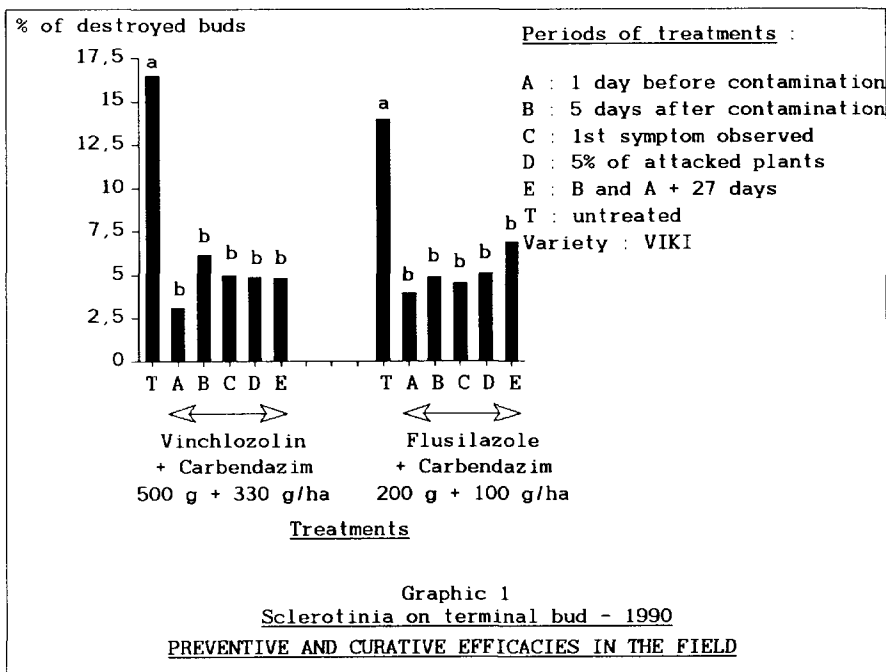
The efficacy of treatments was measured on a sample of 100 plants/plot (attacked young terminal leaves and buds destroyed by the disease).

Treatments	Sclerotinia: % of destroyed buds	% of efficacy
Untreated	66,67	
4 days after contamination	0,00	100
5 days after contamination and first symptoms (10%)	0,00	100
8 days after contamination (very young symptoms on 38% of plants)	25,00	62,5
11 days after contamination (deep symptoms on 43% of plants)	58,33	12,5

Variety : MIRASOL

Table 1
STUDY IN GREENHOUSE OF VINCHLOZOLIN + CARBENDAZIM

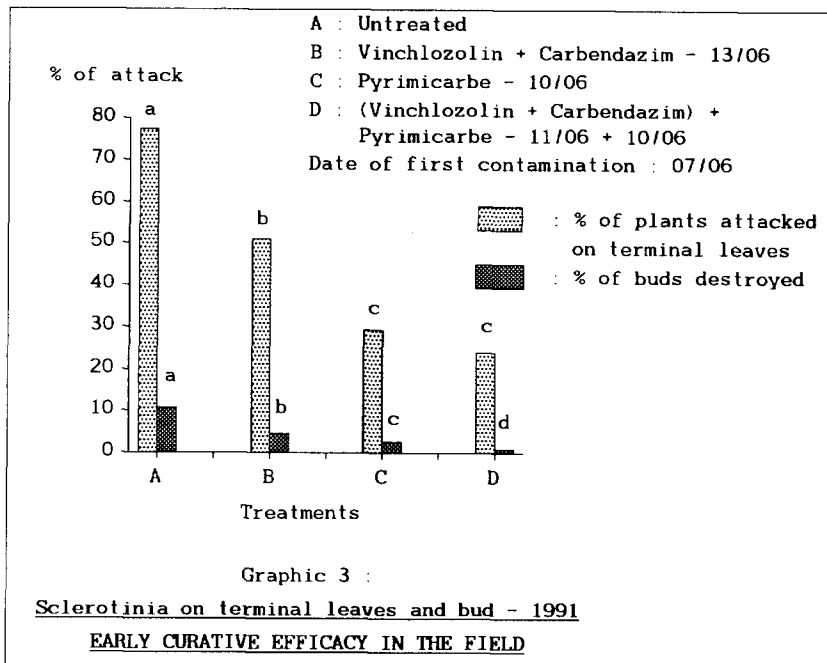
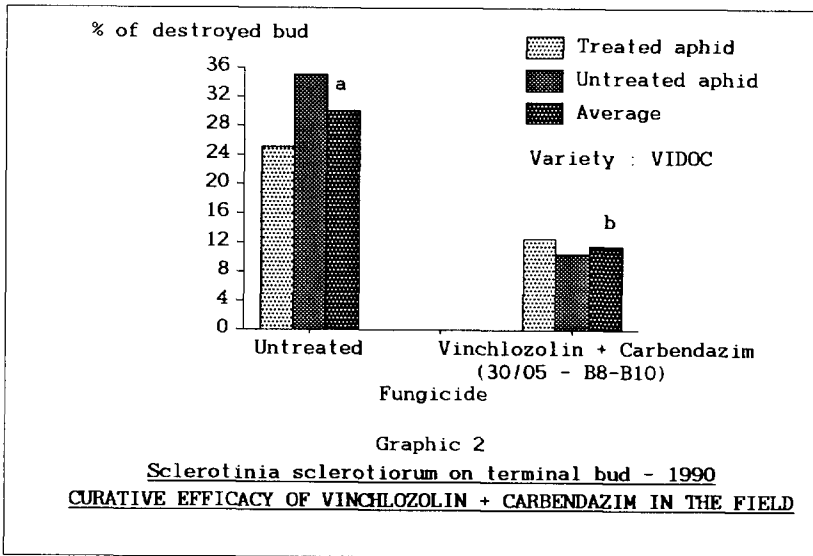
500 g + 330 g/ha (1990)



TREATMENTS			%	%	YIELD	DIFFERENCE
N	DATE	FUNGICIDES	DESTROYED BUDS	EFFICACY	q /ha	YIELD /UNTREATED
1		Untreated	26,36 a		22,97	
2	D1	Carbendazim	23,14 ab	12,2	23,26	+ 0,29
3	(10/6)	Vinchlozolin + Carbendazim	16,48 b	37,5	24,74	+ 1,77
4	D2	Carbendazim	23,84 ab	9,6	23,62	+ 0,65
5	(18/6)	Vinchlozolin + Carbendazim	24,54 ab	6,9	24,74	+ 1,77
6	D1+D2	Carbendazim	17,37 b	34,1	25,60	+ 2,63
7		Vinchlozolin + Carbendazim	17,26 b	34,5	26,62	+ 3,65
8	D3	Carbendazim	24,82 ab	5,8	24,17	+ 1,20
9	(20/6)	Vinchlozolin + Carbendazim	23,59 ab	10,5	24,46	+ 1,49
10	D1+D2	Difenoconazole + Carbendazim	15,55 b	41,0	26,05	+ 3,08
Factor treatment			HS		LS	
Factor place			HS		HS	
Interaction treat x place			NS		NS	
CV			18,6		7,1	

Table 2 Variety : VIDOC

SCLEROTINIA ON TERMINAL BUD : 1991
REGROUPED RESULTS OF 4 EXPERIMENTS IN THE FIELD



3. RESULTS

All these studies showed that the early the treatment, the better the result of the fungicidal control.

Thus, preventive treatments before contamination or after contamination, but before the apparition of symptoms, gave significant efficacies up to 60 - 100 % (Table 1 - Graph 1).

On the other hand, the efficacy of early curative treatments was more risky, for highly dependent on weather conditions and the depth of lesions at the time of treatments. Thus, in a slightly rainy context, the meaningful efficacy of treatments reached 62% in the field (Graph 2) and 62,5% in the greenhouse (Table 1). On the contrary, in the framework of 4 experiments carried out in the field under very rainy conditions and with very strong attacks, the best recorded efficacies, although meaningful, only reached 34 to 41 % (Table 2).

Lastly, in the greenhouse as well as in the field, later curative treatments were inefficient (5,8 to 12,5% of efficacy - Tables 1 and 2).

Note : a study carried out in the field with strong attacks of aphids (Graph 3) stressed out a very obvious positive effect of the aphicid treatment on the control of the level of attacks with *Sclerotinia sclerotiorum* (aphids favouring the development of the disease through bites, secretions of honey-dews and leaf-shrivellings).

4. CONCLUSION AND DISCUSSION

Following these studies, it appeared very clearly that the earlier fungicidal treatments, the better the efficacy of treatments against *Sclerotinia sclerotiorum* of the sunflower bud. Thus, the most constant and highest levels of efficacy were obtained by preventive treatments, whereas the efficacy of curative treatments, even early, was more variable, for highly dependent on weather conditions and the attack-degree.

The four tested products showed nearly equivalent efficacies, but the only product authorized for sale in France today is vinchlozoline + carbendazim at 375 g + 248 g/ha, - applied preferably with a preventive treatment .

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