

13th INTERNATIONAL SUNFLOWER CONFERENCE ITALY 1992*SLEROTINIA SCLEROTIUM* (Lib.) de Bary :
Effect of five agronomic factors on the intensity of sunflower attacks.

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SUMMARY

Studies carried out in the framework of genetic breeding and chemical control have not led yet to a sufficient control of *Sclerotinia sclerotiorum* against sunflower, which makes up the most serious epidemic threat in France.

It is a fact that progress made by chemical controls has been meaningful for the last four years, but it seems to be important to cut down risks and levels of attacks to a maximum by applying simple agronomic rules defined from the underlining and the measure of factors favouring the disease to be avoided.

This study carried out in 1988, 1989 and 1990 stressed out a meaningful effect of irrigation, variety (by its leaf index), nitrogen and row spacing on the attack-level of *Sclerotinia sclerotiorum* on leaves, floral buds, stems and heads.

Thus, a high frequency of waterings multiplied the attack-level of *Sclerotinia* on stems by 2 and on heads by 20 to 50. The variety Mirasol with a normal leaf index was four times more attacked than the variety IBH 166 with a low leaf index. A high nitrogen dosis (100 u/ha) brought about a doubling of the attack-level of *Sclerotinia* on leaves, stems and heads in comparison with a normal dosis (40 u/ha).

Lastly, a row spacing of 50 cm increased by 72% the attack-level by *Sclerotinia* on floral buds and by 112% on sunflower heads in comparison with a row spacing of 80 cm.

1. INTRODUCTION

Sclerotinia sclerotiorum remains the major preoccupation for sunflower growers in France. At the same time with studies of genetic and chemical studies, it will be appropriate to develop a technical pathway with less risks, dealing with the study of the effect of the main agronomic factors on the release and development of an attack by *Sclerotinia sclerotiorum* (1988 to 1991).

2. MATERIAL AND METHODSa. Studied agronomic factors.

Five agronomic factors were taken into account : the irrigation system, the variety, the population, the row-spacing and nitrogeneous fertilization at sowing.

*** irrigation systems

We compared two irrigation systems :

- the system 1 (R1) : high frequency of waterings (20 mm every 8 days) starting 10 days before flowering and ending 10 days after the end of flowering (leading to 5 waterings)

- the system 2 (R2) : low frequency of waterings, i.e. 2 waterings of 40 or 50 mm, the first one 10 days before the beginning of flowering and the second one, 10 days after the end of flowering.

Waterings were carried out by spraying.

*** varieties

Facing attacks on stems and heads, two varieties were compared and chosen because of their different leaf indexes : Mirasol with a normal leaf index, and IBH166 or Pariou with a low leaf index.

In the case of attacks on terminal buds, two other varieties were compared and chosen because of their different behaviours towards the disease on the terminal bud (Viki: sensitive, and Albena: little sensitive).

*** Populations

Two levels of populations were compared : 45 000 plants /ha and 90 000 plants/ha (for a unique row spacing of 60 cm).

*** Row spacings

Two row spacings were studied, 50 and 80 cm (for a unique population of 60 000 plants /ha).

*** Nitrogenous fertilizations

Two levels of nitrogenous fertilizations were applied with a single dosis at sowing in the form of ammonitrate at 33,5% : 40 units/ha and 100 units/ha.

b. Experimental Device

It is of the factorial type with 2 or 3 levels of factors (1989 and 1990: variety x row-spacing - 1988: variety x spacing x nitrogen).

The combination of these different factors led us to the application of 4 treatments (1989 and 1990) or 8 treatments (1988) repeated four times. The whole of 4 or 8 treatments was implanted with 2 sub-devices : with the watering system R1 (sub-device 1) and with the watering system R2 (sub-device 2)

Elementary plots covered an area of 32 m² . A sampling of 100 plants/plot was used to count the number of plants attacked by *Sclerotinia sclerotiorum* on terminal buds, leaves, stems and heads.

3. RESULTS

They are expressed in percents of plants attacked by *Sclerotinia sclerotiorum* on terminal buds, leaves, stems and heads.

a. Effect irrigation (1988-1989).

A high frequency of waterings multiplied by 2 the level of attacks by *Sclerotinia sclerotiorum* on stems (Graph 1) and by 50 on heads (Graph 2).

b. Effect variety (1988-1989).

The variety Mirasol with a normal leaf index was four times more attacked on leaves than the variety IBH 166 with a low leaf index (Table 1). The meaningful difference of attack levels on stems (+ 31%) follows the same tendency (Graph 1). In the case of the attacks on sunflower heads comparing Mirasol and Pariou, a contrary trend was recorded due to the difference in flowering earliness (Pariou was earlier than Mirasol and was contaminated earlier at a time when Mirasol was not yet in bloom, and therefore, was partially sheltered from this contamination - Graph 2).

c. Effect population (1988).

The level of population had no effect on the level of attacks, for the closing up of the leaf cover had already taken place for both populations at the same date (identical micro-climates - Graph 1 and Table 1).

d. Effect row spacing (1989-1990).

A row spacing of 50 cm increases respectively the levels of attacks by *Sclerotinia sclerotiorum* on terminal buds and heads by 72% and 112%, in comparison with a row spacing of 80 cm (Graphs 3 and 2)

Effect nitrogen (1988).

A high nitrogen dosis at sowing (100 u/ha) brought about a doubling of the level attacks on leaves and stems (Table 1 and Graph 1) in comparison with a normal dosis (40 u/ha).

4. DISCUSSION AND CONCLUSION

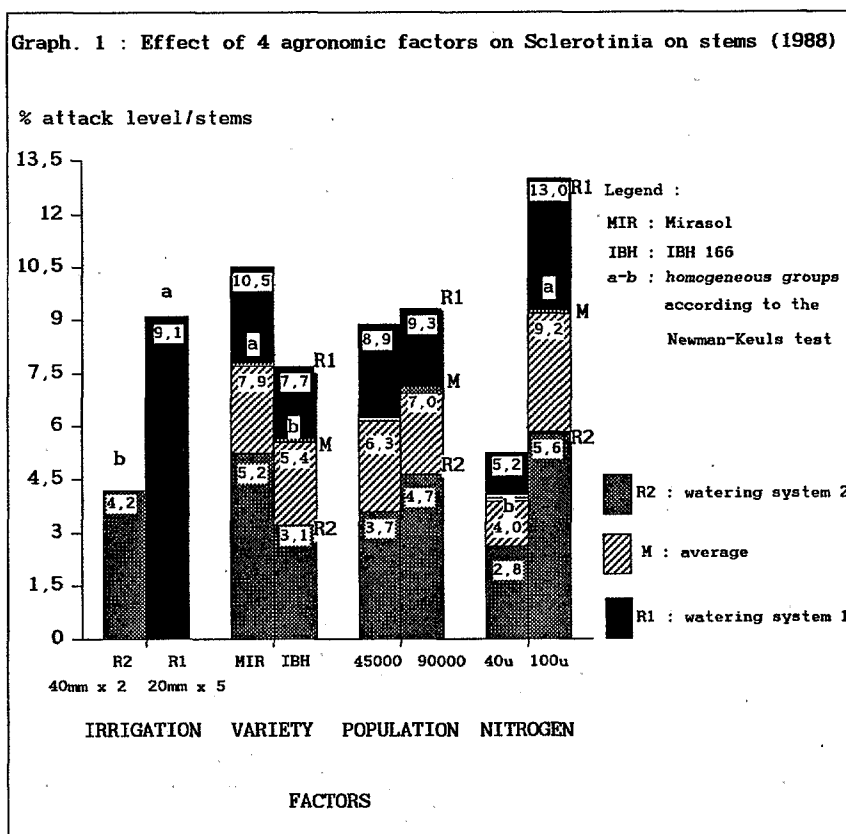
This three-year study stressed out a significative effect of irrigation, varieties, row spacing and nitrogen doses on the attack levels of *Sclerotinia sclerotiorum* on leaves, terminal buds, stems and heads. Therefore, it appeared very clearly that in a field open to risks, it will be necessary to :

- reduce the number of waterings to a maximum during the period of active contaminations and of plant sensitivity to the four forms of attacks mentioned above (June - July). It goes without saying that this reasoning will have to be adapted according to weather conditions.
- apply all measures allowing us to reduce the leaf cover, which makes up a place favourable to contaminations, when it is too dense, and to the quick development of attacks.

Therefore, it will be necessary :

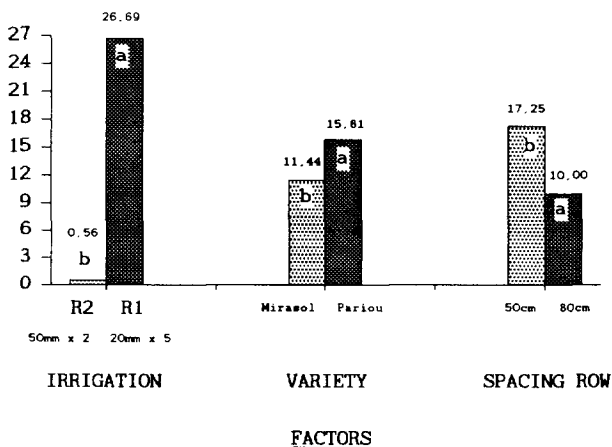
- to avoid nitrogen overdoses,
- to choose varieties with a low leaf index, and
- to give preference to wide row spacings.

The choice of varieties is a priority decision factor which has to be taken into account according to the behaviour vs. the different forms of attacks and leaf indexes. A great study program of the varietal behaviour vs. *Sclerotinia sclerotiorum* has been carried out for several years in France, and from now, it gives us the possibility to classify varieties (attacks on terminal buds and heads).

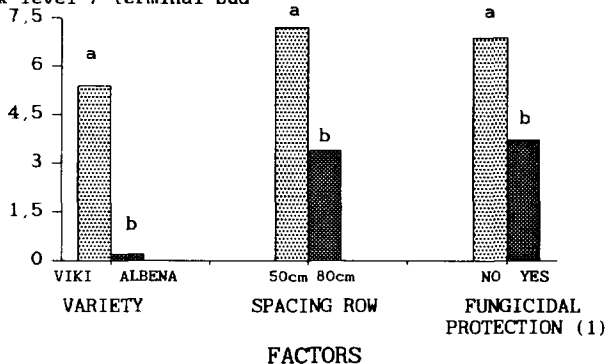


Graph.2 : Effect of 3 agronomic factors
on Sclerotinia on sunflower-heads (1989)

% attack levels/sunflower heads



% attack level / terminal bud



(1) : Vinchlozoline + carbendazime (500g + 330 g/ha)

Graph 3
EFFECT OF 3 AGRONOMIC FACTORS
ON SCLEROTINIA ON SUNFLOWER FLORAL BUD

Agronomic factors	Level of attacked plants on leaves			
	20/06/88		01/07/88	
	%	groups	%	groups
<u>VARIETY</u>				
- Mirasol	24,50	a	30,63	a
- IBH 166	5,91	b	6,91	b
<u>POPULATION</u>				
- 90 000 plants/ha	13,84		16,32	
- 45 000 plants/ha	16,56		21,22	
<u>NITROGEN</u>				
- 100 unities/ha	18,81	a	25,03	a
- 40 unities/ha	11,59	b	12,50	b
CV	12,80		14,00	
Interactions :	Not interaction		Variety x nitrogen : significant	

Table 1
PERCENTAGE OF PLANTS ATTACKED BY SCLEROTINIA
ON LEAVES BEFORE APPLYING THE WATERING PROGRAM (1988)
(Average rates by factor level for all experiments)