

**A COMPARISON BETWEEN ARGENTINE AND FRENCH SUNFLOWER HYBRID VARIETIES FOR THEIR RESISTANCE TO HEAD ROT CAUSED BY SCLEROTINIA SCLEROTIORUM (LIB.) DE BARY.**

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**SUMMARY**

The objective of this report was to evaluate the relative resistance levels of Argentine and French hybrids under similar environmental and methodological conditions. To do this, 8 french hybrids previously cited for their low sensitivity in France were compared for their resistance levels to head rot with 2 groups of 4 argentine hybrids chosen for their bad and good performance utilizing the ascospore test. A randomized complete block design with 3 replications of 20 plants each in 3 sowing dates was used. The percentage of disease plants at 20 and 35 days after inoculation was determined. Significant differences for sowing dates and hybrids were detected and also for the interaction between hybrids and sowing dates. In each of the environments tested the better French hybrids did not exceed the resistance levels of the better Argentine hybrids. On the other hand, the damage levels of several French hybrids showed no differences from those Argentine hybrids with high sensitivity to the head rot.

**INTRODUCTION**

Sunflower head rot caused by Sclerotinia sclerotiorum (Lib.) Bary ascospore infection is a severe disease in Argentina (1). No specific genetic breeding work for resistance to this disease was carried out until 1987. Nevertheless great differences in the performance of commercial hybrid varieties during the strong attack in the summer of 1987/88 were

detected (1). Therefore, intensive research was initiated by using artificial inoculation methods to evaluate varieties and to identify new sources of resistance. Among these methods, the "ascospore test" (2) was applied with considerable success in several studies (3,4,5,6,7).

According to the information published, commercial varieties from Argentina and France are the only ones characterized for their performance against capitulum ascosporic infections (6,8). The aim of this work was to compare previously evaluated commercial varieties from Argentina and France by their behaviour to the head rot, under similar environmental and methodological conditions.

#### **MATERIALS AND METHODS**

Field trials during 1990 were carried out at the Balcarce Agricultural Station (Argentina) as a complete randomized block design with three replications and three sowing dates. The materials employed were eight French hybrids previously cited for their low sensitivity in France when tested under semi-controlled conditions (9) : Albena, Odil, Phoebus, Euroflor, Pardisol, IBH-166, Flambo, Sem-52 (8), and eight Argentine ones, 4 of bad and the others of good performance when tested with the "ascospore test" (2): Dekalb G 100, Sungro 380, IS 7115, ACA 882 and Norkin Punta, Contiflor 9, Contiflor 3 and P 81, respectively (6,7). Field plots were planted in three rows 10 m in length with 0.7 m spacing between rows and plants 0.3 m apart within rows.

Plants were inoculated at the beginning of the flowering stage (three flower rays in anthesis). Floral surfaces were sprayed with an ascospore suspension (5000 ascospore / ml, 5 ml / capitulum). Twenty plants were inoculated in each replication. Capitula were covered with paper bags which were removed at the first evaluation date. The percentage of capitula with lesions at 20 and 35 days after inoculation was determined.

Data were transformed using the function  $\arcsin \sqrt{y}$ , where  $y$  is the data expressed as decimal functions. Transformed data were analyzed through a conventional analysis of variance (10).

## RESULTS AND DISCUSSION

Combined analysis of variance showed the existence of highly significant differences among times of evaluation, sowing dates and hybrids (Table 1) (1). Furthermore, the interactions between evaluation time and hybrids, sowing dates and hybrids and among the three factors were also significant ( $P < 0.01$ ).

The significant interaction between evaluation times and hybrids indicates that the relative susceptibility levels of the hybrids differs according to the date of evaluation (i.e. 20 days after inoculation or physiological maturity). These results would indicate that there exist genotypic differences for the incubation time.

Mean susceptibility level comparisons of the hybrid were carried out for each sowing date and evaluation time. Ranking of hybrid performances in each of the 3 sowing date evaluated at physiological maturity are presented in Table 2. In all cases, the means of argentine hybrids previously cited for

Table 1.- Combined analysis of variance for the % of capitula with lesions in two evaluation times, three sowing dates and 16 hybrids.

SOURCE	FD	MS	F
Evaluation time (E)	1	38168.7	**
Sowing date (S)	2	15578.1	**
Replication	6	97.2	NS
Hybrid varieties (H)	15	2038.7	**
E x H	15	268.2	**
S x H	30	694.7	**
E x S	2	4.7	NS
E x S x H	30	233.8	**
ERROR	186	109.3	
TOTAL	287		

their good performance were lower than those of argentine hybrids considered as very susceptible. There was only one exception to this pattern: the hybrid Contiflor 3 in the second sowing date which showed a high sensitivity.

Of the French hybrids which had low sensitivity and similar performance in the catalogue (8), Pardisol and Phoebus showed a performance similar to the less susceptible argentine hybrids. Other hybrids of the same group, S-52 and Euroflor, did not differ in their performance from the most susceptible argentine hybrids.

Table 2.- Hybrid performance within each sowing date, ordered from lower to higher % of affected plants.

(F+)=French hybrid varieties of low sensitivity.

(AR+)=Argentin hybrid varieties of low sensitivity.

(AR-)=Argentine hybrid varieties of high sensitivity.

**SOWING DATE NO1**

HYBRID	F+	AR+	AR-	AFFECTED PLANTS
Contiflor 9	*			12 % F
Pardisol	*			25 % EF
Contiflor 3		*		25 % EF
Phoebus	*			26 % EF
P-81		*		32 % DEF
Flambo	*			42 % DEF
Odil	*			45 % DE
Norkin Punta		*		54 % CDE
ACA 882			*	59 % CD
Euroflor	*			60 % BCD
IBH-166	*			61 % BCD
IS-7115			*	60 % BCD
Sungro 380			*	77 % ABC
Albena	*			83 % ABC
Sem 52	*			90 % AB
Dekalb G 100			*	96 % A

**SOWING DATE N92**

HYBRID	F+	AR+	AR-	AFFECTED PLANTS
Contiflor 9		*		18 % H
Albena	*			26 % GH
Norkin Punta		*		32 % FGH
IBH-166	*			39 % FGH
P-81		*		41 % FGH
Pardisol	*			49 % EFG
Flambo	*			51 % EFG
Phoebus	*			55 % DEFG
Sem 52	*			57 % DEF
IS-7115			*	59 % DEF
Odil	*			76 % CDE
Sungro 380			*	77 % CDE
Dekalb G 100			*	80 % CD
Euroflor	*			87 % BC
Contiflor 3		*		98 % AB
ACA 882			*	100 % A

**SOWING DATE N93**

HYBRID	F+	AR+	AR-	AFFECTED PLANTS
Phoebus	*			2 % G
P-81		*		5 % FG
Contiflor 3		*		10 % EFG
Pardisol	*			10 % EFG
Contiflor 9		*		13 % EF
Norkin Punta		*		15 % DEF
IBH-166	*			17 % CDEF
Albena	*			17 % CDEF
IS-7115			*	27 % BCDE
Odil	*			28 % BCDE
Flambo	*			34 % ABCD
Euroflor	*			36 % ABCD
Sem 52	*			38 % ABC
Dekalb G 100			*	40 % AB
ACA 882			*	53 % A
Sungro 380			*	59 % A

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