

RELATION BETWEEN SUNFLOWER HYBRID REACTION TO PHOMOPSIS
AND THE HARMFULNESS THRESHOLD OF THIS DISEASEPh. Jouve, P. Teyssier 1992
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SUMMARY

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The economical effects of Phomopsis - Diaporthe helianthii - evaluate greatly with the different variety responses in case of infection. This study compares this response at various infection levels and the hybrid susceptibility described in a nursery with controlled inoculation.

The hybrid performances show a continuous variation according to their tolerance level.

The Phomopsis harmfulness threshold can be very low (around 10 %) for the more susceptible hybrids. Although their potential can be high, this risk is important.

Some intermediate varieties are well performing under safety conditions and also with an average attack of the disease (At least 30 %); due to their stay-green.

The more tolerant varieties show an advantage under strong attacks of Phomopsis, (40 - 50 % and more) but their potential is limited.

INTRODUCTION

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Phomopsis - Diaporthe helianthii - was present in 1991 and 1992 in France on a total acreage of at least 200 000 ha of sunflower crop (Helianthus annuus), mainly in the south-west of the country.

The economical effects of this disease can vary largely from year to year. (Tab. 1)

The responses of varieties in case of infection are very different.

This study compares the agronomic performances of different types of hybrids at various levels of phomopsis infection and the susceptibility of those hybrids as described in a nursery with controlled inoculation.

MATERIAL AND METHODS

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On one hand, the hybrid susceptibility to phomopsis has been measured by the total number of necrotic areas visible on the stalk. This observation was carried out under artificial inoculation and controlled irrigation during three years, and on two replications each year.

Viki was included in the experimental design as a susceptible check, and Athis, as a resistant check. The counting of the spots started when 30 % of the plants of the susceptible check expressed symptoms.

Necrotic areas were counted, and percentage of attacked plants was recorded for every hybrid.

ESTIMATION OF THE PHOMOPSIS ATTACK IN S.W OF FRANCE
FOR PAST EIGHT YEARS (1985-1992)

- 1985 : 15 000 ha concerned. Heavy losses.
- 1986 : Very weak attack
- 1987 : 60 000 ha concerned. Losses about 5-6 q/ha in average, what means 20 % of the yield.
- 1988 : 110 000 ha concerned. About 6-7 q/ha lost, what means 25 % of the yield.
- 1989 : Very weak attack, due to the drought.
- 1990 : 200 000 ha concerned. Very weak attack on 70 000 ha. Light losses on 130 000 ha.
- 1991 : Very weak attack
- 1992 : 200 000 concerned. Heavy and early attack.
Weak reaction of the farmers.
Very few fields sprayed.
Very heavy losses

On the other hand, the agronomic performances under different Phomopsis infection levels were observed in trials.(17 references).

All those trials were located in the South-West of France. They were conducted between 1988 and 1992.

These trials were then grouped into four classes, depending on their average Phomopsis infection level :
From 0 to 10 %, between 10 and 30 %, from 30 to 50 %, and over 50 %.

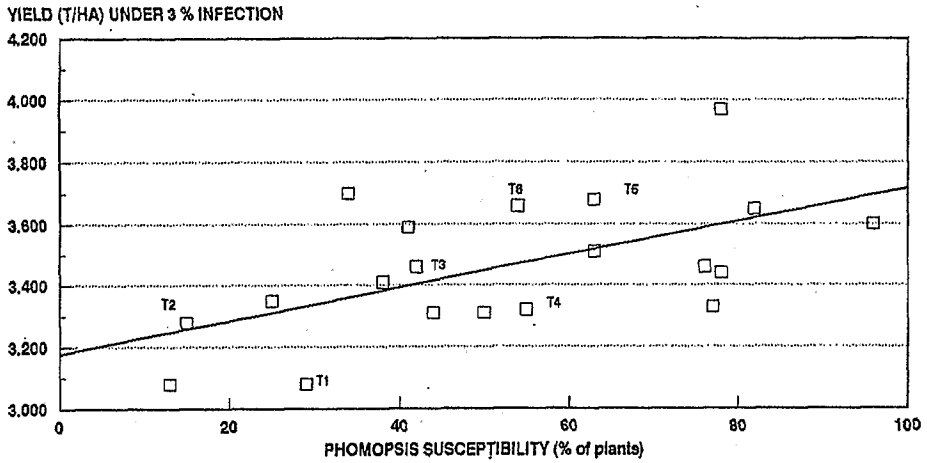
Only yield and oil content are here discussed, although, beside yield, oil content is also affected.

DISCUSSION
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The first observation is that the yield can be reduced with a really low infection level. (15 - 20 % of the plants expressing symptoms means that the yield will be lower).

The second observation is that the classification of the hybrid yield is different under infection levels of 5 % and 17 %. Consequently, we can see that the minimum level of infection necessary to induce differences of reactions between varieties is very low. (See fig. 1)

**YIELD WITH 3 % AVERAGE PHOMOPSIS (1991)
/SUSCEPTIBILITY MEASURED IN DESEASE NURSERY**



**YIELD WITH 17 % AVERAGE PHOMOPSIS (1990)
/SUSCEPTIBILITY MEASURED IN DESEASE NURSERY**

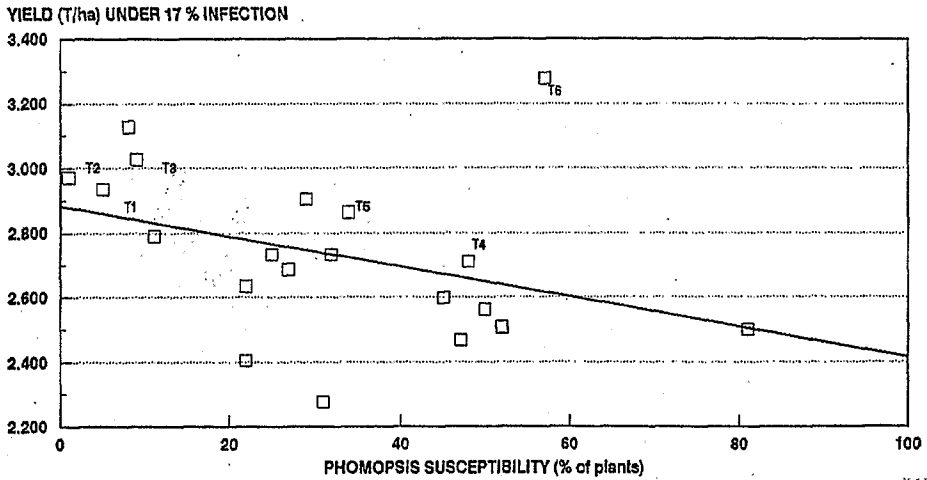


Fig. 1

YIELD/PHOMOPSIS ATTACK (%)

RESULTS OF 17 TRIALS (1939-1952)

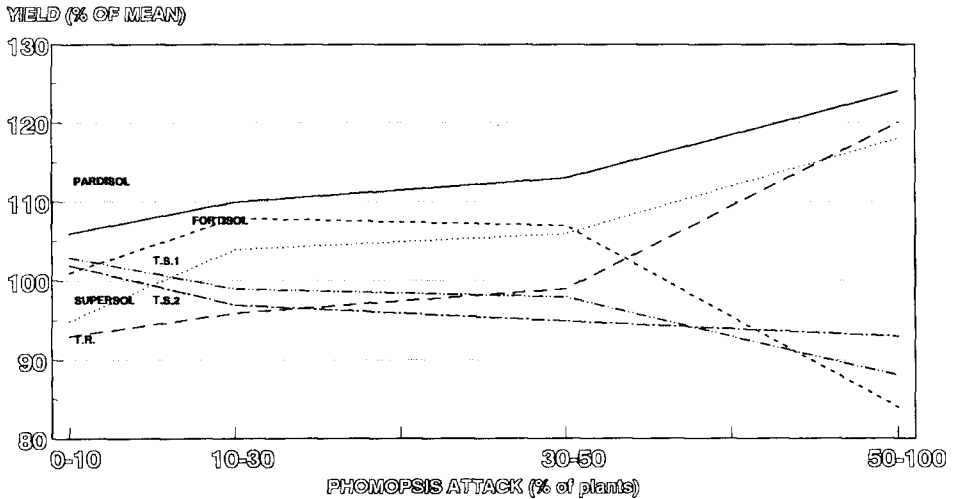


Fig. 2

The hybrid performances show a continuous variation according to their resistance or susceptibility. It is not possible to divide the hybrids into two separated groups that could be the resistant and the susceptible ones.

We could confirm the limited potential of the resistant hybrids under safety conditions.

We also had a confirmation of the effects of the strong reaction of the more susceptible hybrids under infection: yield losses and economical risk.

The performance of the hybrids vary largely according to the intensity of the attack.

Three different kind of reactions can be seen :

The more susceptible varieties are well performing under safety conditions. But the more the Phomopsis is present, the less they yield, compared with the other types.

Some intermediate varieties (like Pardisol) are well performing under safe conditions and also under an average attack of the disease (i.e. 30 % of plants with spots on the stem), although they express symptoms.

Is it a kind of tolerance ? This is largely due to their good stay-green. The distinction between them and the more resistant types is reduced when the infection becomes stronger. In case of very strong or very early infection, this type of varieties doesn't present the same advantage. (See fig. 2)

At last, the qualities of the more resistant varieties (like Supersol) are expressed mainly under strong attacks of Phomopsis (around 50 % of the plants with symptoms , and more).

CONCLUSION

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From year to year, it can be established that the average level of attack of Phomopsis in the south-west of France does not exceed generally 50 %, with, of course, local variations.

Among the different reactions to the disease, some compromise between a high potential and a medium resistance seems to be widely adapted, and offers a good economical compromise. The main interest of this behaviour is to enhance the threshold of harmfulness of the Phomopsis.