

INHERITANCE OF RESISTANCE TO PHIALOPHORA YELLOWS OF SUNFLOWER

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Phialophora yellows of sunflower (*Helianthus annuus* L.) is caused by an unidentified species of *Phialophora*. This systemic disease is potentially destructive, but has occurred only sporadically in Manitoba, Canada. Although yellows was identified in 1972 (Hoes, 1972), it has not been reported from other sunflower growing areas. Field observations suggested that yellows could be controlled by breeding for resistance (loc. cit.). This paper reports the initial results of a study of the inheritance of resistance to *Phialophora* yellows.

MATERIALS AND METHODS

Crosses were made in 1971 in the field between inbreds CM 162 (female, susceptible) and CM 361 (male, resistant). The male parent was selfed and the seed harvested in order to check whether it was pure for resistance or not. Back-cross progenies were obtained in the greenhouse by pollinating hybrid plants with bulk pollen of the susceptible parent. The F_2 seed was grown in Arizona in the winter of 1971—1972.

Plants to be tested were raised and incubated in a growth cabinet maintained at 21—22° and equipped with fluorescent lighting to provide 9,500—16,000 lx/m² at plant height, for an 18 hr. daylength. Test material was planted in „Perlite“, an inert synthetic material, and irrigated with water until the cotyledons had fully expanded. The roots were washed free of perlite, immersed in inoculum for 5—7 min. trimmed slightly and replanted in flats containing a 7 cm layer of perlite. Control plants were treated with distilled water. Plants after transplanting were irrigated daily with 0.03% RX 15, a complete fertilizer (Garden Research Laboratories Ltd., Toronto, Canada). Inoculum had been prepared by suspending conidia, from cultures grown on 2% potato dextrose agar, in distilled water. Concentration of inoculum was 1.5×10^6 spores/ml, determined with a haemocytometer.

Plants free of disease or with only mild symptoms were classified as resistant, while plants with more severe symptoms and those that were dead were classified as susceptible.

RESULTS AND DISCUSSION

The results in table 1 show that all plants of CM 361 were resistant, while those of CM 162 were all susceptible; the data confirmed field observations. All but one F_1 plant were resistant; the occurrence of the

Tableau 1

Reaction of parental sunflower (*Helianthus annuus*) inbreds, and of F_1 , backcross and F_2 progenies to *Phialophora* sp., cause of sunflower yellows

Generation	Disease Reaction	
	Resistant	Susceptible
CM 162 (susceptible parent)	0	49
CM 361 (resistant parent)	104	0
F_1 — CM r62 CM 361	39	1
BC — $F_1 \times$ CM r62	20	20
	23	16
F_2	113	19

single susceptible plant is ascribed to inadvertent selfing of the female, susceptible parent. The two backcross progenies fitted a 1 : 1 susceptible ratio ($P = 0.30-0.50$). The pooled F_2 progenies fitted a 13 resistant : 3 susceptible ratio ($P = 0.10-0.20$), the same ratio fitting each of the 9 progenies, while the heterogeneity chi-square was also acceptable ($P = 0.20-0.30$).

The data suggest that resistance to *Phialophora yellows* is based on 2 genes, one of which is dominant. Transfer of resistance to yellows to new varieties will not be difficult.

LITERATURE CITED

1. Hoes, J. A., 1972, *Sunflower yellows, a new disease caused by Phialophora sp.*, *Phytopathology*, 62, 1088—1092.