

DIFFERENTIAL REACTION OF SUNFLOWER GENOTYPES TO ISOLATES OF MACROPHOMINA PHASEOLINA

S. Asad; Shafiullah; M.A. Rana * and I. Ahmed **

* National Oilseeds Development Project.

** Crop Diseases Research Institute.

NARC, Islamabad, Pakistan

SUMMARY

Ten Sunflower (*Helianthus annuus* L.) genotypes reacted differently when inoculated by tooth pick inoculation method with three isolates of *M. phaseolina* obtained from three different locations in sunflower growing areas of Pakistan. Disease severity was determined by the length of internal stem discoloration. Significant main effects for both genotypes and isolates were noted for internal stem discoloration. Similarly, significant isolate x genotype effects were noted indicating physiological specialization within *M. phaseolina*. Genotypes, SP 1140, Novinka and 316-3 were highly susceptible whereas Sunx-843, NK-265, Sungro-380, C-204 and Shams were susceptible. Only 953-102 and IMP-1141 were found moderately resistant.

INTRODUCTION:

Diseases are among the major biological constraints affecting the productivity of sunflower crop. Many diseases such as charcoal rot, leaf spots, head rot, rust, powdery mildews, stalk rot and collar rot have been reported in Pakistan. (Mirza and Beg, 1983; Mirza and Khokhar, 1985; Mirza, Ahmad and Beg, 1985). Among these, charcoal rot of sunflower is the most devastating disease in Pakistan which takes a regular toll of yield whenever this crop is grown (Mirza, Ahmad and Beg, 1985). Because the pathogen of charcoal rot is soil borne so use of resistant variety is most feasible disease management strategy. At NARC efforts are under way in this direction to identify sources of resistance and incorporation of these in the commercial material. In this study 10 sunflower genotypes were screen against three isolate of *M. phaseolina* differing in aggressiveness.

MATERIAL AND METHODS:

Ten sunflower genotypes viz, 953-102, Imp-1141, 316-3, Novinka, SX-843, Sungro-380, C-204, Shams, SP1140 and NK-265 were tested against 3 isolates (MP-10, MP-5 and MP-4) of *Macrophomina phaseolina* collected from sunflower growing areas of Pakistan and maintained by CDRI culture collection service.

INOCULUM PREPARATION:

Inoculum of *M. Phaseolina* was produced on sterile tooth picks. Tooth picks were boiled in water for an hour, air dried and loosely packed in glass jars containing 200 ml of potato dextrose broth covering lower one third of the tooth picks. Jars were autoclaved for 20 minutes at 15 PSI with their lids loosely screwed. When cooled, tooth picks were inoculated with PDA discs of fresh cultures of *M. phaseolina* isolates. The jars were incubated at 33°C in the dark till the tooth picks were covered with grayish mycelium and dark colored sclerotia.

INOCULATION:

Sunflower genotypes were sown in 4 rows in a randomized complete block design with three replications. Row and plant spacing was 75 cm and 25 cm, respectively. Plants were inoculated at the head initiation stage by inserting inoculated tooth picks inoculum into the 3rd internode (i.e., about one foot above the ground level) of each plant by pricking the stem with pointed needle. After harvesting the plants, disease was rated by measuring the spread of the rot by splitting the stem vertically into 2 halves. The data were subjected to analysis of variance using M- Stat program.

RESULTS AND DISCUSSION:

Mean length of internal stem discoloration of sunflower genotypes tested against three isolates of *M. phaseolina* is given in Table 1. Using an analysis of variance, significant main effect for both genotypes and isolates was found. Similarly, the interaction between varieties and isolates was also significant. This indicated a significant difference in susceptibility between sunflower genotypes and in aggressiveness between the isolates of *M. phaseolina* tested.

In an earlier study Ahmad *et al.*, 1991 found significant differences in susceptibility of sunflower varieties and in aggressiveness between the isolates of *M. phaseolina*. Aggressiveness index indicates that isolate MP-4 was most aggressive on almost all genotypes followed by MP-5 and MP-10. On the basis of susceptibility index, the genotypes could be easily distinguished into three main groups, viz., highly susceptible (SP-1140, Novinka and 316-3), susceptible (Sunx-843, NK-265, Sungro-380, C-204 and Shams) and moderately resistant (953-102 and IMP-1141).

Table 1. Response of sunflower genotypes to three different isolates of *M. phaseolina* after toothpick inoculation.

Variety	Length of Internal Stem Discoloration (cm)			Susceptibility Index
	Isolates			
	MP-4	MP-5	MP-10	
953-102	27.87	25.47	18.13	23.82
Imp-1141	35.13	30.60	25.80	30.51
SunX-843	49.47	34.47	26.27	36.73
NK-265	43.73	35.80	41.40	40.31
Sungro-380	51.00	41.60	34.67	42.42
C-204	57.80	41.00	32.53	43.77
Shams	56.80	47.93	43.87	49.53
SP-1140	62.13	49.07	45.47	52.22
Novinka	60.00	51.20	51.13	54.11
316-3	65.80	53.80	48.67	56.09
Agressiveness ² Index	50.97	41.09	36.79	
LSD (0.05) for varieties	=		3.58	
LSD (0.05) for isolates	=		3.18	
LSD (0.05) for Variety x Isolate	=		10.05	

1. Susceptibility Index: Over all average length of internal stem discoloration of each sunflower genotype caused by isolates.
2. Aggressiveness Index: Over all average length of internal stem discoloration caused by each isolate on sunflower genotypes tested.

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