

Host range and cross inoculation studies on *Macrophomina phaseolina* from sunflower

M.SURIACHANDRASELVAN, K.E.A. AIYYANATHAN AND R.VIMALA

Dept. of Plant Pathology, Agril. College and Res. Institute, Tamil Nadu Agril. Univ., Madurai-625 104.

Abstract: *M. Phaseolina* isolated from sunflower infected all the 22 plants tested but failed to infect finger millet, pearl millet, haryali, nutgrass, mookkuthipoondu and saranai. *M. phaseolina* isolates from sunflower, blackgram, greengram, cowpea, sesame and cotton were cross pathogenic. Sunflower and blackgram isolates were the most aggressive while those of sesame and cotton were the least virulent. There was a positive correlation between *M. phaseolina* infection and the crop plants belonging to botanical families Fabaceae, Pedaliaceae, Asteraceae and Malvaceae.

Key words: *Macrophomina phaseolina*, Host range, Cross infection

Introduction

The ubiquitous sclerotial fungus *Rhizoctonia bataticola* (Taub.) Butler (= *Sclerotium bataticola* Taub.) in its pycnidial stage is known as *Macrophomina phaseolina* (Tassi.) Goid. The fungus causes charcoal rot of several important crop species and is especially prevalent in arid, subtropical and tropical climates (Manici *et al.* 1995). In the semi-arid tropics, the crops, such as blackgram, greengram, cowpea, sunflower, sesame and cotton are normally used in rotations and intercropping systems. All these crops are infected by *Macrophomina phaseolina*. Host range and cross inoculation studies were carried out to determine the specificity of *M. phaseolina*, if any, and to obtain information that could be useful in managing this pathogen.

Materials and Methods

Host range

The host range of sunflower charcoal rot pathogen, *M. phaseolina* was studied in pot culture experiment. The sand maize inoculum of *M. phaseolina* was added to the sterilized pot culture soil in earthen pots (30 cm) at 1:19 ratio (w/w) a week before sowing/planting the host plants. A total of 21 plant species belonging to nine botanical families (Table 1) were tested. The surface sterilized seeds/healthy

seedlings of the test host species were planted @ five numbers per pot. Three replications were maintained with four pots in each. The pots were maintained in the glasshouse with judicious, uniform and regular watering. The disease incidence was recorded at maturity phase of the plants and expressed as per cent charcoal rot incidence.

Cross inoculation studies

A pot culture experiment was conducted to study the cross inoculation of *M. phaseolina* among six different hosts. The pathogen isolated from different hosts was separately multiplied in sand maize medium for 21 days. These inocula were separately mixed with the sterilized pot soil at 1:19 ratio (w/w) in earthen pots (30 cm) a week before sowing. Five well-matured uniform sized and surface - sterilized, seeds of blackgram (cv. T9), greengram (cv. KM2), cowpea (cv. C. 152), sunflower (cv. CO2), gingelly (cv. SVPR 1) and cotton (cv. SVPR 1) were separately sown in these sets of pots. Three replications were maintained for each species with four pots in each. The pots were kept in the glass house with judicious, uniform and regular watering. The disease incidence was observed at the harvest stage and expressed as per cent incidence.

Table 1. Host range of sunflower isolates of *M. phaseolina* (artificial inoculation)

S.No	Common / names	Botanical name	Botanical family	Charcoal rot incidence (%)*
1	Sunflower	<i>Helianthus annuus</i> L.	Asteraceae	88.3(70.12)
2	Blackgram	<i>Vigna mungo</i> (L.) Hepper	Fabaceae	61.7 (51.78)
3	Greengram	<i>Vigna radiata</i> (L.) Wilczek	Fabaceae	58.3 (49.79)
4	Cowpea	<i>Vigna unquiculata</i> (L.) Walp	Fabaceae	51.7 (45.96)
5	Soybean	<i>Glycine max</i> (L.) Merr	Fabaceae	48.3 (44.04)
6	Chickpea	<i>Cicer arietinum</i> L.	Fabaceae	33.3 (35.25)
7	Pigeonpea	<i>Cajanus cajan</i> (L.) Mallop	Fabaceae	23.3 (28.86)
8	Groundnut	<i>Arachis hypogea</i> L.	Fabaceae	13.3 (21.34)
9	Sunnhemp	<i>Crotalaria juncea</i> L.	Fabaceae	28.3 (32.14)
10	Maize	<i>Zea mays</i> L.	Gramineae	16.7 (24.05)
11	Sorghum	<i>Sorghum bicolor</i> (L.) Moench	Gramineae	21.7 (27.71)
12	Finger millet	<i>Eleusine coracana</i> Gaertn	Gramineae	0.0 (0.00)
13	Pearl millet	<i>Pennisetum americanum</i> Leeke	Gramineae	0.0 (0.00)
14	Haryali	<i>Cynodan dactylon</i> (L.) Pens.	Gramineae	0.0 (0.00)
15	Nut grass	<i>Cyperus rotundus</i> L.	Cyperaceae	0.0 (0.00)
16	Parthenium	<i>Parthenium hysterophorus</i> L.	Asteraceae	23.3 (28.86)
17	Gingelly	<i>Sesamum indicum</i> L.	Pedaliaceae	56.7 (48.84)
18	Cotton	<i>Gossypium hirsutum</i> L.	Malvaceae	38.3 (38.24)
19	Manja Kadugu	<i>Cleome viscosa</i> L.	Cleomaceae	21.7 (27.71)
20	Castor	<i>Ricinus communis</i> L.	Ei[jprbiaceae	36.7 (37.26)
21	Mookkuthi poondu	<i>Tridax procumbens</i> L.	Asteraceae	0.0 (0.00)
22	Saranai	<i>Trianthima portulacastrum</i> L.	Aizoceae	0.0 (0.00)
	CD(P = 0.05)			3.20

* Mean of three replications
(Figures in parentheses are arcsine-transformed values)

Results and Discussion

Host range

M. phaseolina isolate from sunflower infected all the host plants tested except finger millet, pearl millet, haryali, nutgrass, mookkuthipoondu and saranai (Table 1). Pawar *et al.* (1978) also reported that sunflower isolate of *M. phaseolina* infected all the host plants tested except pearl millet, paddy, bhendi and brinjal. The pathogen was reported to be omnipresent infecting over 500 plant species (Jones and Canada, 1994). Singh *et al.* (1990) however found that mookkuthi poondu and saranai were also infected by the pathogen. It could be worthy to consider these facts while choosing the cropping sequence for the management of this disease.

Cross inoculation studies

All the isolates of *M. phaseolina* from different crops were cross-pathogenic. The isolates from sunflower and blackgram were more aggressive while cotton and gingelly isolates were the least aggressive. Blackgram was the most susceptible followed by greengram, cowpea and sesame (Table 2). Similar observations were reported by Byadgi and Hegde (1985) and Manici *et al.* (1995). Diourte (1987) observed a general trend of *M. phaseolina* isolates being more aggressive towards the host species than towards the other host species. The positive correlation

