Effect of Culture Media on the Growth of *Macrophomina phaseolina* Isolate

Sowmya Tetali[1] and S. Karpagavalli[2]

[1]Student, M.Sc., Plant Pathology G.B. Nagar, Kalavai, Vellore, T.N- 632 506
[2]Department of Plant Pathology, APAC G.B. Nagar, Kalavai, Vellore, T.N- 632 506
E-mail: [1]sowmyatetali@gmail.com

Abstract—*Macrophomina phaseolina a soil-inhabiting fungus is an important root pathogen and causes dry root rot, stem canker, stalk rot and charcoal rotdiseases. The M. phaseolina is a high temperature loving fungus and reported to produce dry root rot/charcoal rot of over 500 species of plants The Dry root rot disease caused by Macrophomina phaseolina (Tassi) Goidanich may cause considerable damages in a hot as well as in dry seasons. The Growth of different media was investigated on the growing patterns of 10 Macrophomina phaseolina isolates, collected from different districts of Tamil Nadu. The fungus exhibited the most intensive growth on potato dextrose agar (86.43 mm) followed by maize meal agar 78.36 mm and Czapek's agar 71.66 mm while rose bengal agar showed lesser growth of 41.50 mm in solid media. Among the seven liquid media tested, potato dextrose broth revealed the highest mean mycelial dry weight (150.70 mg) followed by maize meal broth (127.60 mg), Czapek's broth (123.90 mg) and Richards broth (106.10 mg) while rose bengal brothshowed the least mycelial dry weight (50.60 mg).*

Keywords*: Macrophomina phaseolina, Dry root rot, Different media*

1. INTRODUCTION

Blackgram (*Vigna mungo* L.) also known as urdbean, mash and blackmaple is widely consumed edible legume grown throughout India, both as a pure and as inter-mixed crop. Blackgram ranks fourth in production and acreage. In India it covers an area of about 3,011,300 hectares with the annual production of 1,295,400 tonnes. In Tamil Nadu, blackgram is grown in an area of 275.60 lakh ha with a production of 127.20 lakh /tonnes and productivity of 462 kg/ha during 2011-2012 (Season and Crop report [5]).It is infected by number of diseases caused by fungi, bacteria and viruses. Among the fungus, the root rot caused by *Macrophomina phaseolina* (Tassi.) Goid. is a major barricade that leads to severe crop loss (Indra and Gayathri, [2]).

Macrophomina phaseolina a soil-inhabiting fungus is an important root pathogen and causes dry root rot, stem canker, stalk rot and charcoal rotdiseases. The *M. phaseolina* is a high temperature loving fungus and reported to produce dry root rot/charcoal rot of over 500 species of plants (Sinclairand Backman [7] ; Mirza and Qureshi, [3] and Shahzad *et al.*,[6]). Since *M. phaseolina* is a soil-borne fungus, it poses a greater problem in managing the disease. Soil-borne diseases are difficult to control. The evidence suggested that it is primarily a root inhabiting fungus. The sclerotia of the fungus served as a primary means of survival (Mirza and Bey[4]).

2. MATERIALS AND METHODS

2.1 Growth of *M. phaseolina* isolates on solid and liquid media

The growth of *M. phaseolina* on different solid media *viz.,* Czapek's dox agar, carrot dextrose agar, corn meal agar, oat meal agar, rose bengal agar and Richard's agar were compared by pouring 20 ml of each solid media was poured into 90mm diameter Petridishes. One ml of streptomycin sulphate solution of 100ppm strength was added to the medium just before pouring into the plates. Inoculation was done by transferring five millimeter disc of mycelial mat, taken from the periphery of four days old culture on various media. The plates were incubated at 30 ± 1OC for four days and replicated thrice. The plate containing PDA was used as control. The radial mycelial growth was measured seven days after incubation.

Mycelial disc (9 mm) of *M. phaseolina* was taken from 3-4 days old culture and inoculated separately into each conical flask containing sterilized Czapek's dox broth, carrot dextrose broth ,corn meal broth, oats meal broth, rose bengal broth and Richard's broth and incubated at room temperature (28 ± 2°C) for seven days. After seven days the mycelial mat was filtered through Whatman No.1 filter paper and oven dried at 60^0C for 48 h. and weighed immediately on an electronic balance. (Singh and Kaiser[8]). The conical flask containing potato dextrose broth was used as control .The dry weight of mycelium of each isolate was recorded.

3. RESULTS AND DISSCUSSION

Radial growth and Mycelial dry weight of *M. phaseolina* isolates on different solid and liquid media

The difference were observed in radial growth of the fungal isolates under study. The mean radial mycelial growth of the isolates on different solid media was studied and it was ranged between 41.50 mm and 86.43 mm. Among the seven solid media, potato dextrose agar medium was significantly superior and recorded the highest mycelial growth of 86.43 mm and this was followed by maize meal agar (78.36 mm), Czapek's agar (71.66 mm), Richard's agar (67.66 mm), carrot dextrose agar (51.50 mm), oat meal agar (47.20 mm) and rose bengal agar (41.50 mm) (Table 1, Plate 1) An experiment was conducted to identify the best liquid medium which supported the increased mycelial growth of the pathogen,*M. phaseolina.* Among the seven liquid media, potato dextrose broth significantly encouraged the mycelial dry weight (150.70 mg) followed by maize meal broth (127.60 mg), Czapex's Dox broth (123.90 mg), Richard broth (106.10 mg), carrot broth (102.10 mg), oat meal broth (77.50 mg) and rose bengal broth (50.60 mg). Among the various media used potato dextrose broth showed more mycelial dry weight(Table 2,Plate 2).

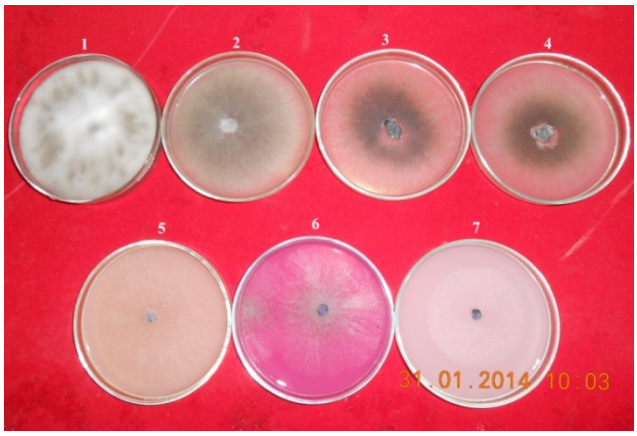
Table 1: Effect of different solid media on the growth of *M. phaseolina*

S. No	Media	Mycelial growth (mm) Mean of 10 isolates*
1.	Maize meal agar	78.36ab
2.	Czapek's agar	71.66bc
3.	Richard's agar	67.66c
4.	Carrot dextrose agar	51.50d
5.	Rose Bengal agar	41.50d
6	Oat meal agar	47.20d
7.	PDA (control)	86.43a

*Mean of three replications

Means in a column followed by same superscript are not significantly different by Ducan's Multiple Range Test at P < 0.05

Plate 1. Growth characters of *M. phaseolina* isolates on different solid media



1. **PDA (control)**
2. **Maize meal agar**
3. **Czapek's agar**
4. **Richard's agar**
5. **Carrot dextrose agar**
6. **Rose Bengal agar**
7. **Oat meal agar**

Table 2: Effect of various liquid media on mycelial dry weight of *M. phaseolina*

S. No	Different Media	Mycelial dry weight (mg) Mean of 10 isolates*
1.	Maize meal	127.60b
2.	Czapek's	123.90b
3.	Richard's	106.10c
4.	Carrot dextrose	102.10c
5.	Oat meal	77.50d
6.	Rose bengal	50.60e
7.	Potato Dextrose (control)	150.70a

*Mean of three replications

Means in a column followed by same superscript are not significantly different by Ducan's Multiple Range Test at P < 0.05

Plate 2. Growth characters of *M. phaseolina* isolates on different liquid media

1. **Potato dextrose broth (control)**
2. **Maize meal broth**
3. **Czapek's broth**
4. **Richard's broth**
5. **Carrot dextrose broth**
6. **Rose Bengal broth**
7. **Oat meal broth**

Good growth in PDA may be owing to provision of some additional nutrients in such media (Devi and Singh [1]). Similar studies on effect of different media on growth of *M. phaseolina* by Sundaravadana *et al.,* [9] reported that blackgram root isolate recorded the maximum growth of 89.85 mm in PDA followed by Czapek's -Dox agar medium (84.46 mm) and peptone sucrose agar medium (71.58 mm) and minimum mycelial growth was recorded in oat meal agar of 70.29 mm. The same trend was observed in liquid medium, the mycelial dry weight of blackgram root isolate was individually significantly superior in all the five media tested *viz.,* potato dextrose broth (751.30 mg), Richards broth (565.00 mg), oats broth (638.00 mg), Czapek's dox broth (694.80 mg) and peptone sucrose broth (652.41 mg). On potato dextrose broth higher dry mycelial weight was obtained when compared with Czapek's broth, both at the highest and lowest range levels, indicating that potato dextrose medium was more favourable growth medium than Czapek's medium for all the 35 isolates (Virupaksha prabhu, [10]).There was a significant difference in mycelial growth between different incubation periods (Table 2). Dry mycelial weight was found to be maximum on 18th day of incubation period (150.70 mg) and remained significantly superior over other treatments. Dry

mycelial weight increased up to 18 days followed by the subsequent reduction in weight. The reduction in weight of mycelium is due to autolysis of the mycelium and exhaustation of nutrients in the medium when incubated after optimum number of days.The present studies confirmed the variability among the isolates of ***M. phaseolina*** in respect of growth upon incubation and growth on various culture media.

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