

## Effect of different Solid Media and Temperature level on Growth of *Cercospora canescens* causing Cercospora Leaf Spot Disease in Mungbean

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**ABSTRACT:** The present paper describes the effects of various solid media and temperatures for the growth on *Cercospora canescens*. Efficacy of various solid media at the growth of *Cercospora canescens* were tested and resulted that in Malt Extract Agar medium (64.70 mm) was found with maximum mycelial growth of the tested pathogen observed by Potato Dextrose Agar (43.50 mm). The minimum mycelial growth was noticed in Corn Meal Agar (16.00 mm). The temperature studies revealed that highest mycelial growth (85.00 mm) became found at 25°C and minimum mycelial (20.33 mm) growth was found at 35°C. However, 20°C, 30°C and 15°C also not favoured good growth of *Cercospora canescens* but differ significantly from growth at 25°C. Not growth was found at 40°C. It can be concluded that 25°C is the optimum temperature for mycelial growth of *Cercospora canescens*. Temperature plays important role among the external factors which influence the growth and reproduction of fungi. All the fungi have minimum temperature, below which they cannot grow and above which they are inactivated or killed. Every fungus has its own temperature to grow.

**Keywords:** Mungbean, Solid Media, Temperature, *Cercospora canescens*.

### INTRODUCTION

Mungbean (*Vigna radiata* L.) is one of the vital pulse crop in India, which has been cultivated for the reason that historical instances. It is versatile crop grown for green manure, forage and seeds. It's also taken into consideration as "Golden Bean" due to its nutritional values. through enhancing biological, chemical and physical surroundings in soil, pulses can arrest the declining fashion in productiveness of cereal systems (Masood *et al.*, 2002). Mungbean is extra toothsome, nutritious, digestible and non- flatulent than different pulses (Anjum *et al.*, 2006). It is widely cultivated during the Asia, which includes India, Bangladesh, Sri Lanka, Thailand, Cambodia, Indonesia, Malaysia, and South China. In India, it's far grown over on a place of 34.4 lac hectares with a production of 13 lac tones and with average productiveness 407.95 kg /ha. The major growing states of mungbean are Rajasthan, Andhra Pradesh, Karnataka, Maharashtra, Uttar Pradesh and Tamil Nadu, respectively (Anonymous, 2014). The total area covered beneath mungbean in India changed into 32.530 lakh hectares with a complete manufacturing of 15.087 lakh tones having productiveness of 494 kg/ha. The coverage of area and its production was maximum in Rajasthan *i.e.* 24.65 lakh hectares with annual production of 12.21 lakh tones with average productivity of 495 kg/ha (Anonymous, 2019). Most of the diseases, Cercospora

leaf spot is a serious sickness of mungbean (Verma and Sandhu, 1992). Quebral and Cagampang (1970) reported as much as 23.00 consistent with cent losses in yield of the crop because of leaf spot disorder, at the same time as Iqbal *et al.*, (1995) found loss of upto 61.00 per cent in grain yield losses upto fifty eight in keeping with cent (Lal *et al.*, 2001). The disorder starts appearing approximately 30-40 days after sowing, however, relying on the temperature and humidity, it spreads unexpectedly in inclined varieties causing premature defoliation and reduction in length of pods and grains (Iqbal *et al.*, 2004). The present work was undertaken with the aim to recognise the impact of various solid medium and temperature on growth and development of *Cercospora canescens*. The results obtained are presented in this paper.

### MATERIALS AND METHODS

Present investigations were carried out during 2018-19. The laboratory experiments were carried out in the Department of Plant Pathology, SKN College of Agriculture, Sri Karan Narendra Agriculture University Jobner, Jaipur (Rajasthan) India.

#### A. Growth and sporulation of *Cercospora canescens* on different solid media

The growth characters of the fungus were studied on six different solid media. All the media were sterilized at 121.6°C for 20 minutes at 15 psi to carry out the study.

20 ml of each of the medium was poured in to 90 mm diameter petridishes. Such plates were inoculated with five mm disc of culture and incubated at  $25 \pm 1^\circ\text{C}$ . Each treatment was replicated four times. Colony diameter was recorded by averaging the linear growth of the colony in two directions for each plate after 15<sup>th</sup> day of inoculation. The fungal colony, surface elevation and sporulation were also noticed at the end of the incubation period. The data on mycelium growth was analyzed statistically. The preparation of various media was done. The following procedure given by Ainsworth (1971); Tuite (1969).

**B. Effect of different temperature levels on mycelial growth of *Cercospora canescens***

Effect of temperature on mycelial growth of *Cercospora canescens* was studied *in vitro*. Twenty ml of sterilized Malt Extract Agar medium was poured in each sterilized petri plates. Inoculation was made with 5 mm disc from fifteen days old fungal culture and incubated at six different temperatures *viz.*, 15, 20, 25, 30, 35 and  $40^\circ\text{C}$ . Observation on mycelial growth at each temperature level was recorded when maximum growth was observed in plate after 15 days of inoculation.

**C. Statistical analysis**

In laboratory experiments, Petri plates were arranged in completely randomized design (CRD). The data were analysed by one-way analysis of variance (ANOVA) after angular transformation. Mean comparison was done using Fisher-LSD test at 0.05 level of significance.

**RESULTS AND DISCUSSION**

**A. Growth and sporulation of *Cercospora canescens* on various solid media**

Variability in cultural characters of pathogen were studied on five various solid media at  $25 \pm 1^\circ\text{C}$  as mentioned in “Material and Methods” and the results gained are showed in Table 1, plate 1 and fig. 1.

The colony diameter, their characters and sporulation of *C. canescens* were observed, when the highest mycelial growth was gained in any one of the used media. The effect of various solid media on the growth of *C. canescens* differed significantly. Highest mycelial growth of tested pathogen became recorded in Malt Extract Agar media (64.70 mm) followed by Potato Dextrose Agar medium (43.60 mm). Both were followed by Oat Meal Agar medium (34.52) and Czapek’s Dox Agar media (30.20 mm).

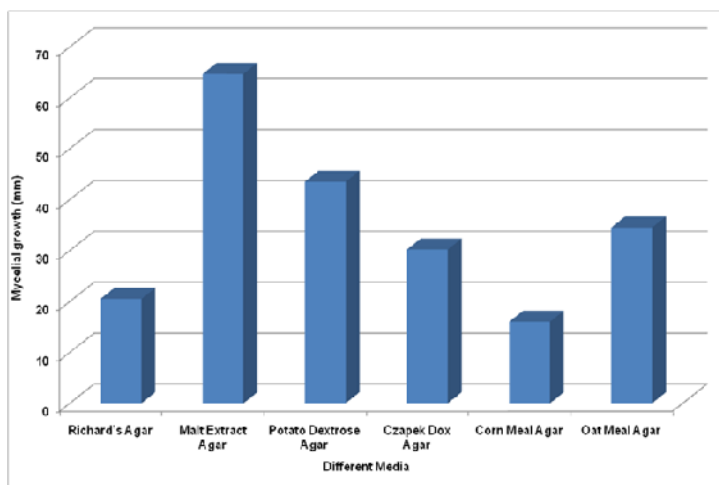
**Table 1: Growth and sporulation of *Cercospora canescens* on different solid Media.**

Sr. No.	Different Media	Mycelial growth (mm)	Growth characters	Sporulaion
1.	Richard’s Agar	20.50 (26.92)	Slow, flat whitish mycelial growth with regular margin	-
2.	Malt Extract Agar	64.70 (53.55)	Good, convex, pluffy colony, and whitish mycelial growth with concave at centre	+++
3.	Potato Dextrose Agar	43.60(41.27)	Moderate, concave pluffy whitish mycelial growth with dense raised centre	++
4.	Czapek Dox Agar	30.20 (33.34)	Slow, concave pluffy whitish mycelial growth with Irregular margin	+
5.	Corn Meal Agar	16.00 (23.58)	Slow, raised, whitish mycelial growth	-
6.	Oat Meal Agar	34.52 (35.98)	Moderate, pluffy, whitish colony with raised growth	-
	SEM±	0.82		
	CD (p=0.05)	2.52		
	CV (%)	5.10		

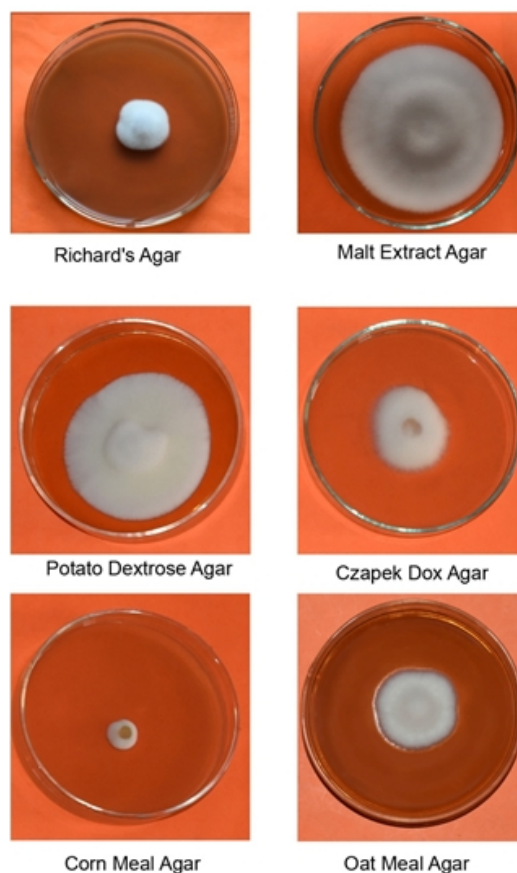
\* Average of three replications

Paranthesis are angular transformed value

\* - = no sporulation, + = scanty sporulation (one to two spores per microscopic field), ++ = moderate sporulation (upto 10 spores per microscopic field) and +++ = good sporulation (11 to 19 spores per microscopic field)



**Fig. 1. Growth and sporulation of *Cercospora canescens* on different solid media.**



**Plate 1.** Growth and sporulation of *Cercospora canescens* on different solid media.

The minimum mycelial growth was noticed in Corn Meal Agar media (16.00 mm). This was followed by Richard's Agar media (20.50 mm). The growth characters of *Cercospora canescens* on different media were varied from aerial to submerged, raised, smooth and regular to irregular colonies was observed. Among the media, good growth was observed on Malt Extract Agar with convex, pluffy whitish colony with concave at centre. Test pathogen showed moderate growth on Potato Dextrose Agar with convex, pluffy whitish colony with concave centre and on Oat Meal Agar with concave pluffy whitish growth with irregular margin. Pathogen showed slow growth on Corn Meal Agar with raised whitish mycelial growth and Czapek's Dox Agar with concave pluffy whitish colony growth with irregular margin. Among the six media, sporulation on different media also showed variation. Good sporulation was recorded in Malt Extract Agar media and moderate sporulation was noticed in Potato Dextrose Agar media. Poor sporulation was observed in Czapek's Dox Agar media and no sporulation was observed in Richard's Agar media, Corn Meal Agar media and Oat Meal Agar medium. Mishra and Bhattacharyya (2002) observed that Potato Dextrose Agar media and Oat Meal Agar media were found good for vegetative growth of the *Cercospora canescens*. These investigations are in contrary to earlier reports of Sathyaprasanth (2004) the reported that maximum colony diameter was observed on Malt Extract Agar media.

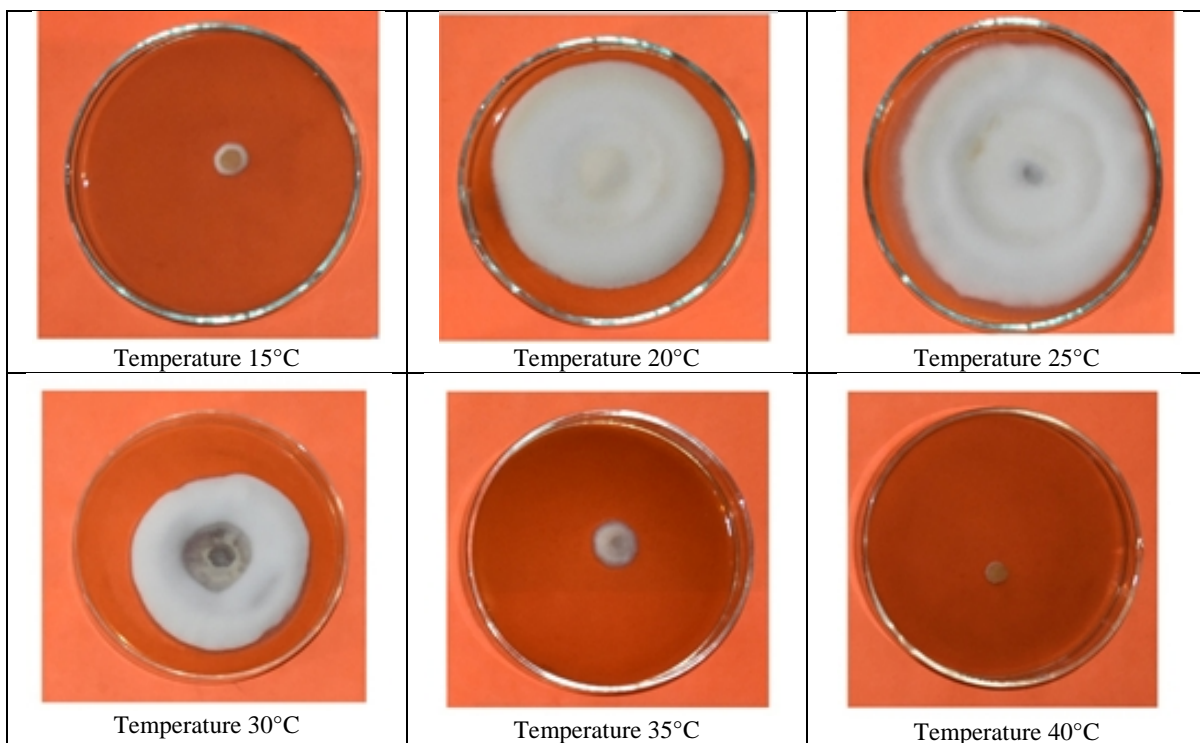
#### *B. Effect of different temperature levels on mycelial growth of Cercospora canescens*

The temperature ranges for the growth vary for all the microorganisms as well as for favorable host- pathogen interactions. It is evident from the data presented in Table 2 plate 2 and Fig. 2, that the fungus grown at temperature ranges from 15 to 40°C under this investigation. Highest mycelial growth (85.00 mm) became observed at 25 °C followed by 79.66 mm and 71.20 mm at 30°C and 20°C temperature, respectively. Lowest mycelial (20.33 mm) growth was observed at 35°C followed by 26.00 mm mycelial growth at 15°C. However, 20°C, 30°C and 15°C also not favoured good growth of *Cercospora canescens* but differ significantly from growth at 25°C. Do not growth was observed at 40°C. It can be concluded that 25°C is the optimum temperature for mycelial growth of *Cercospora canescens*. Similar result were also founded by Ekpo and Esuruoso (1978) in *Cercospora canescens*, Satyaprasanth (2004) in *Cercospora kikuchii*, Mallappa Prakash (2007) observed that maximum growth of *Cercospora nicotianaet* 25°C and Veena and Hegde (2014) in *Cercospora canescens*. In the present investigation, the best fungus growth and sporulation was recorded at 25°C followed by 30°C. Hence, the temperature range of 25 to 30°C can be recommended to obtain very good fungal growth of *Cercospora canescens* (Dange and Patel, 1968).

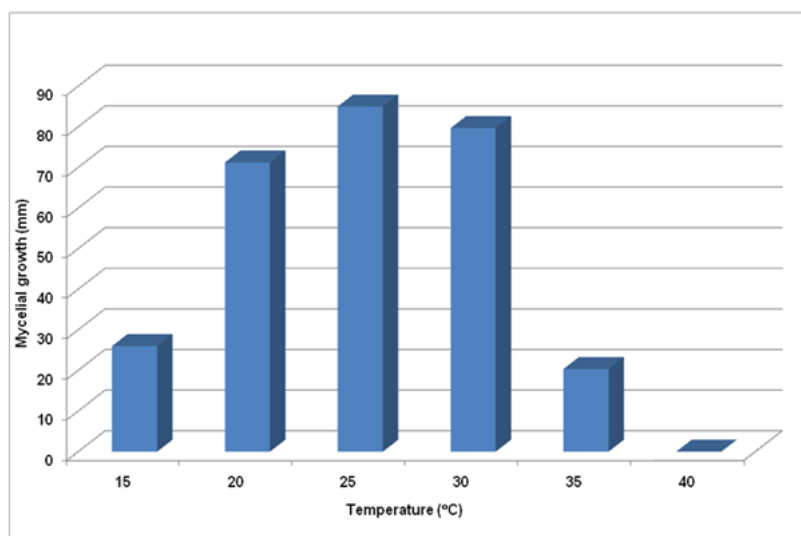
**Table 2: Effect of different temperature levels on mycelial growth of *Cercospora canescens*.**

Sr. No.	Temperature (°C)	Mycelial growth* (mm)
1.	15	26.00 (30.66)
2.	20	71.20 (57.54)
3.	25	85.00 (67.21)
4.	30	79.66 (63.19)
5.	35	20.33 (26.80)
6.	40	0.00 (0.00)
	SEm±	1.45
	CD (p=0.05)	4.47
	CV	4.07

\* Average of three replications; Parenthesis are angular transformed value



**Plate 2.** Effect of different temperature levels on mycelial growth of *Cercospora canescens*.



**Fig. 2.** Effect of different temperature levels on mycelial growth of *Cercospora canescens*.

## CONCLUSION

In the present study, the Malt Extract Agar medium was found with maximum mycelial growth of the tested pathogen followed by Potato Dextrose Agar medium. The minimum mycelial growth was noticed in Corn Meal Agar. The growth characters varied from concave to convex, raised, pluffy, whitish to light grey colony colour and regular to irregular colonies were noticed. Sporulation of the pathogen was also showed variation on different media. Good sporulation was recorded in Malt Extract Agar media and moderate sporulation was noticed in Potato Dextrose Agar. Poor sporulation was observed in Czapek's Dox Agar media and no sporulation were observed in Richard's Agar, Corn Meal Agar and Oat Meal Agar media.

The temperature studies revealed that highest mycelial growth was observed at 25°C and lowest mycelial growth was observed at 35°C. However, 20°C, 30°C and 15°C also not favoured good growth of *Cercospora canescens* but differ significantly from growth at 25°C. No growth was found at 40°C. It can be concluded that 25°C is the most excellent temperature for mycelial growth of *Cercospora canescens*. Temperature performs essential function the various external factors which affect the growth and replica of fungi. All of the fungi have minimum temperature, underneath which they cannot develop and above which they are inactivated or killed. Each fungus has its temperature range for the growth.

## FUTURE SCOPE

Significantly highest mycelial growth was recorded on Malt Extract Agar media and minimum mycelium growth was observed on Corn Meal Agar. In physiological studies, maximum mycelial growth was observed at 25 °C. No growth observed at 40 °C temperature. These results may be helpful for further investigation of this pathogen at pathogenic variability and molecular diversity.

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**Conflict of Interest.** None.

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