Effect of temperature on growth of cercospora canescens causing leaf spot disease in greengram
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Abstract: The temperature studies revealed that maximum mycelial weight of fungus was observed at temperature of 20°C (442.50 mg), which was followed by 25°C (382.50 mg). The least growth was observed at 15 and 40°C (20.00 mg). Maximum radial growth was observed at temperature 25°C (8.65 cm) followed by 20°C (7.03 cm). The optimum temperature range for C. canescens was 20 to 25°C. 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. Each fungus has its temperature range for the growth.

Key words: Greengram, Cercospora canescens, Temperature, Growth

Introduction
Greengram [Vigna radiata (L.) Wilczek], is an important pulse crop of India. It is also commonly known as mungbean, which is an ancient and well known leguminous crop of Asia. It is quite versatile crop grown for seeds, green manure and forage and it is also considered as “Golden Bean” because of its nutritional values. Greengram is grown mainly as a kharif season crop. However, its cultivation in rabi season is restricted to the eastern and southern parts of the country. The major greengram growing states are Orissa, Maharashtra, Andhra Pradesh, Rajasthan, Karnataka and Gujarat. It ranks third among all pulses grown in India after chickpea and pigeonpea (Rajendra Prasad, 2006). Cercospora leaf spot (CLS) caused by Cercospora canescens is one of the major biotic constraints in greengram production. The disease causes severe losses in greengram crop (Poehlman, 1978). Temperature plays an important role in infection and disease development.

The present work was undertaken with the aim to know the effect of temperature on growth and development of C. canescens. The results obtained are presented in this paper.

Materials and Methods
Both Potato Dextrose Agar (PDA) and Potato Dextrose Broth (PDB) medium was used in this experiment. Petriplates containing PDA and 100 ml flasks containing 30 ml PDB were inoculated with 5 mm mycelial discs taken from periphery of 16 days old pure culture grown on PDA in Petriplate and incubated at different temperature levels viz., 15, 20, 25, 30, 35 and 40°C. In each case, four replications were maintained.

Liquid media (PDB): Flasks were harvested at every 48 hrs starting from the 4th day of inoculation. Culture was filtered through Whatman No. 42 filter paper disc of 12.15 cm diameter, which was dried to a constant weight at 60°C in an electrical oven, prior to filtration. The mycelial mat on the filter paper was washed thoroughly with distilled water to remove any salts likely to be associated with it. The filter paper along with mycelial mat were dried to a constant weight in an electrical oven at 60°C, cooled in a desiccator and weighed immediately in an analytical electric balance and dry mycelial weight was calculated. Results were analyzed statistically.

Solid media (PDA): The colony diameter at each temperature level was recorded when maximum growth was observed in plate.

Results and Discussion
Effect of temperature on growth of C. canescens in liquid media: C. canescens was grown on potato dextrose broth at six temperature levels viz., 15, 20, 25, 30, 35, 40°C to know the optimum temperature required for maximum dry mycelial weight. The results obtained are presented in Table-1 and Fig-1 and 2.

The temperature of 20°C was found to be significantly superior to other temperature levels by recording the maximum dry mycelial weight (442.50 mg) and was followed by, 25°C (382.50 mg) and 30°C (370.00 mg) which are in decreasing order and differed significantly. However, growth was poor at 15 and 40°C (20.00 mg). In liquid media, maximum dry mycelial weight was recorded at 20°C followed by 25°C. Hence, the temperature range of 20 to 25°C can be recommended to obtain excellent fungal growth of C. canescens.

Table-1: Effect of temperature on growth of Cercospora canescens

<table>
<thead>
<tr>
<th>Temperature (°C)</th>
<th>Dry mycelial weight (mg) in PDB</th>
<th>Radial growth (cm) in PDA</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>20.00</td>
<td>0.00 (1.00)*</td>
</tr>
<tr>
<td>20</td>
<td>442.50</td>
<td>7.03 (2.82)</td>
</tr>
<tr>
<td>25</td>
<td>382.50</td>
<td>8.65 (3.10)</td>
</tr>
<tr>
<td>30</td>
<td>370.00</td>
<td>4.41 (2.31)</td>
</tr>
<tr>
<td>35</td>
<td>107.50</td>
<td>1.54 (1.59)</td>
</tr>
<tr>
<td>40</td>
<td>20.00</td>
<td>0.00 (1.00)</td>
</tr>
<tr>
<td>S.Em. ±</td>
<td>2.95</td>
<td>0.01</td>
</tr>
<tr>
<td>CD at 1%</td>
<td>11.99</td>
<td>0.05</td>
</tr>
</tbody>
</table>

*Figure in parentheses indicate √X+1 transformed values
Effect of temperature on *C. canescens* in solid media:

*C. canescens* was grown on potato dextrose agar at six temperature levels viz., 15, 20, 25, 30, 35 and 40°C to know the optimum temperature required for maximum radial growth. The results obtained are presented in Table-1 and Fig-1 and 2.

Growth of *C. canescens* on PDA showed variation in radial growth at different temperature. The maximum mycelial growth was recorded at 25°C (8.65 cm), which was significantly superior to all other temperatures tested, followed by 20°C (7.03 cm), 30°C (4.41 cm) and 35°C (1.54 cm), no mycelial growth was recorded at 15 and 40°C temperature. The growth differences at all the temperatures were statistically significant from each other.

In the present study, maximum radial growth of *C. canescens* was obtained at 25°C (8.65 cm), whereas optimum temperature range was 20-25°C. Similarly Mallappa prakash (2007) observed that maximum growth of *C. nicotianae* 25°C. Dange and Patel (1968) reported that 25-30°C as optimum temperature range for *C. beticola*.

**References**


