STUDIES ON ALTERNARIA BLIGHT OF CHICKPEA

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ABSTRACT

Alternaria blight of chickpea was noticed in western Maharashtra. The disease affected all the plant parts. Symptoms of the disease were recorded. The temperature 30.1°C maximum and 13.7°C minimum with relative humidity 84% (morning) and 39% (evening) was found to favour disease development. Under laboratory conditions, growth of Alternaria alternata was inhibited by Trichoderma koningii, T. lignorum and T. virens. In field screening the desi varieties viz; PG-5, JG-62, WR-315, PG-96006 and PG-9414-7 and kabuli varieties Virat, Vihar, PG-95333, PG-96329, PG-96323, PG-00304, PG-0108, PG-0109, PG-0110 and BCP-101 were completely free from Alternaria blight.

Chickpea (Cicer arietinum L.) is as important pulses crop in India. Maharashtra has the major share in area and production in respect of this crop in the country. The crop is attacked by several pathogens, many of which are seed borne (Nene et.al. 1996). Blight caused by Alternaria alternata is an important seed borne disease of chickpea. Alternaria blight of chickpea was first noticed in 1970-72 from Uttar Pradesh by Vishwakarma and Basuchaudhary (1984). Thereafter, it was also reported by Haware and Nene (1976) from Andhara Pradesh, Bartaria and Gupta (1982) from Gwalior (MP), Raut and Somani (1988) from Vidharbha region of Maharashtra, Singh and Ahmed (1989) from Bihar and Gaur and Singh (1990) from Rajasthan. In Western Maharashtra the disease was first noticed during rabi 2001-2002, at Rahuri. Earlier Khare and Bhargava (1999) studied the symptoms, morphology and epidemiology of the pathogen A. alternata infecting chickpea. They reported that all the aerial plants parts and seeds are infected by this disease. Temperature around 25-26°C and more than 80% relative humidity favour the disease. They also reported that the cultivars viz; BDN-9-3, BG-229, JG-1258, JG-62 and C-235 showed high resistance to Alternaria blight. Therefore, it was decided to study symptomatology, morphology of pathogen, epidemiology and effect of Trichoderma species on pathogen growth. Available chickpea genotypes were also screened against the disease.

Total 30 desi and 14 Kabuli genotypes were screened against blight pathogen. The incidence of blight was recorded using 0-9 scale by selecting 10 random plants from each entry and per cent disease intensity was calculated (Mayee and Datar, 1986). The genotypes were categorized as free, resistant, moderately resistant and susceptible. The pathogenicity was proved on thirty and sixty days old seedlings. The plants were inoculated (sprayed) with spore suspension of Alternaria alternata in second week of January 2003 on variety Phule G-12. The symptoms appeared 13-17 days after inoculation on all plants parts (stem, petiole, leaflet, pod, flower bud, flower and seed (Plate 1. A-C).

The disease appeared at seedling, flowering and podding time. It first appeared on older leaves. The circular, water soaked small spots appeared on leaves which later turned brown to dark brown. The affected leaflets turned black and dropped off. On the pods, the lesions were circular, slightly sunken and irregularly scattered and were dark brown to black in colour. The infected pods remained small, got shriveled and turned black. In severe case entire foliage showed blightened appearance.

The colony of pathogen on potato dextrose agar was gray to black. The
conidiphores were simple or branched, brown, septate and 38 to 46 μ long and 2.4 to 6.5 μ thick. Conidia were formed in branched chains, light brown to dark brown, smooth, muriform with 1 to 4 transverse and 2 to 3 longitudinal septa and measured 11.25-31.5 × 4.5-13.5 μ and beak 3.60-9.00 × 12-18 μ (plate 2). The temperature 30.1 oC maximum and 13.7 oC minimum with relative humidity (morning 84% and evening 39%) in second week of January found to favour the disease development in the field and it increased up to first week of February (minimum temperature 13.8oC, maximum 31.8oC, maximum humidity 72% and minimum 32%). The studies on antagonism between Alternaria alternata and Trichoderma spp. (T. viride, T. harzianum, T. hamatum, T. lignorum, T. koningii, and T. virens) were carried out by ‘Direct Bit’ placement method (Broadbent et al. 1971). Patato dextrose agar was poured in sterilized Petriplates. After solidification a discs of Trichoderma spp. (5 cm diameter) were inoculated aseptically. The discs (5 cm diameter) of test fungus (7 day old culture) was placed opposite to the disc of Trichoderma spp. The disc were placed in a manner that both the fungi would get equal opportunity for their growth. There were three replications with suitable control containing only test fungus. The plates were incubated at 26 ± 1oC. Observations were recorded when the growth of test fungus was full in the control. The per cent inhibition of fungus was calculated by the formula (Arora and Upadhaya, 1978).

\[
\text{Per cent inhibition} = \frac{\text{Colony growth in control plate} - \text{Colony growth in intersecting plate}}{\text{Colony growth in control plate}} \times 100
\]

\[
\text{Control} = 90.0 \quad \text{–} \\
\text{SE±} = 2.61 \quad \text{–} \\
\text{C.D. at 5%} = 8.06 \quad \text{–} \\
\text{C.V. (%)} = 12.06 \quad \text{–}
\]

\[\text{*: Mean of three replications}\]

In in-vitro tests Trichoderma koningii, T. lignorum and T. virens inhibited growth A. alternata by 91.11, 80.00 and 75.55% respectively (Table 1). Similarly, T. viride and T. harzianum also inhibited fungal growth by 66.66 and 55.55% respectively. In field, the varieties viz; PG-5, JG-62, WR-315, PG-96006 and PG-9414-7 were completely free from the disease. The desi varieties Vijay, Vishal, PG-92926, PG-9425-5, PG-9425-9, BDNG-9-3, BDNG-797, AKG-2001-1, JAKI-9218, PG-9408, PG-9425-3, PG-9421-1 and PG-9426-2 were promising against A. alternata while the cultivars PG-97115, PG-97022, PG-97124, PG-9409-1 and PG-9426-10 were found susceptible. The kabuli genotypes Virat, Vihar, PG-95333, PG-96329, PG-96323, PG-00304, PG-00402 were resistant. The results were inconformity with Bartaria and Gupta (1982) and Gaur and Singh (1990). They reported that PG-5 and JG-62 were free/resistant to Alternaria blight.

**REFERENCES**


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**Table 1. Effect of Trichoderma species on growth of Alternaria alternata in laboratory.**

<table>
<thead>
<tr>
<th>Trichoderma sp.</th>
<th>Colony diameter* (mm)</th>
<th>Growth inhibition (%)</th>
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</thead>
<tbody>
<tr>
<td>T. viride</td>
<td>30.0</td>
<td>66.66</td>
</tr>
<tr>
<td>T. harzianum</td>
<td>43.0</td>
<td>55.55</td>
</tr>
<tr>
<td>T. hamatum</td>
<td>52.0</td>
<td>42.22</td>
</tr>
<tr>
<td>T. lignorum</td>
<td>18.0</td>
<td>80.0</td>
</tr>
<tr>
<td>T. koningii</td>
<td>8.0</td>
<td>91.11</td>
</tr>
<tr>
<td>T. virens</td>
<td>22.0</td>
<td>75.55</td>
</tr>
<tr>
<td>Control</td>
<td>90.0</td>
<td>–</td>
</tr>
<tr>
<td>SE±</td>
<td>2.61</td>
<td>–</td>
</tr>
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<td>C.D. at 5%</td>
<td>8.06</td>
<td>–</td>
</tr>
<tr>
<td>C.V. (%)</td>
<td>12.06</td>
<td>–</td>
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</tbody>
</table>

* : Mean of three replications


