DISEASE CONTROLLING POTENTIAL OF TRICHODERMA HARZIANUM AND TRICHODERMA VIRIDE AGAINST COLLAR ROT OF CHICKPEA

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Abstracts: Disease controlling potential of Trichoderma strains are evaluated in vivo against collar rot in chickpea. Ten Trichoderma strains (T1,T2,T3,T4,T5,T6,T7,T18,T28) were taken among which nine were Trichoderma harzianum and one Trichoderma viride (T18). All strains of Trichoderma harzianum/Trichoderma viride were superior over control for disease controlling parameters i.e. mortality percentage, no. of pods per plant, yield (quintal/hectare), yield (g/plot). Treatment with Different strains of Trichoderma spp. @ 10 g/kg seed. Untreated control was kept for making comparison. Seeds @ 100 kg/ha were sown in each plot under randomized block design with three replications. Fertilizers i.e. NPK @ 20:60:0/ha were applied as basal dose. Plant population /plot were counted from each plot after 25 days of sowing. Plant growth parameters i.e. root & shoot length, number of pods per plant, yield g/plot, yield q/ha were calculated from each treatment.

Keywords: Chickpea, Sclerotium rolfsii, Trichoderma harzianum, Trichoderma viride

INTRODUCTION

Chickpea is known in this country since ancient times. It is a widely grown major pulse crop in India, accounts for nearly 75 per cent of the total pulse production in the world. Chickpea crop is prone to many diseases viz., Fusarium wilt, dry root rot, collar rot, Ascochyta blight, Verticillium wilt, black root rot, Phytophthora root rot, wet root rot, foot rot, Pythium rot and seed rot etc. Among these, collar rot caused by Sclerotium rolfsii which is gaining importance. Sclerotium rolfsii is an economically important pathogen on numerous crops worldwide. It has an extensive host range; at least 500 species in 100 families are susceptible, the most common hosts are legumes, crucifers and cucurbits, and commonly occurs in the tropics, subtropics, and other warm temperate regions (Punja, 1985). Sclerotium rolfsii has wide host range, abundant growth of the pathogen and its capability of producing excessive sclerotia that may persist in soil for several years (Chet and Henis, 1972). Hence management of Sclerotium rolfsii causing collar rot of chickpea is difficult to achieve chemically, in this context plant extracts and bioagents can be used as an alternative source for controlling soil-borne diseases.

MATERIALS AND METHODS

Experiment was conducted under direct sown conditions chickpea cultivar Garou in upland chickpea field having clay loam soil. The land was well prepared by ploughing two three times. Sick soil was prepared using Sclerotia of Sclerotium rolfsii @ 3800/plot. Talc powder based formulations of different strains of Trichoderma spp. were developed and used as seed treatment. Seeds of chickpea were treated with Different strains of Trichoderma spp. @ 10 g/kg seed. Hexaconazole +Zineb were used @ 3 g kg/seed. Untreated control was kept for making comparison. Seeds @ 100 kg/ha were sown in each plot under randomized block design with three replications. Fertilizers i.e. NPK @ 20:60:0/ha were applied as basal dose. Plant population /plot were counted from each plot after 25 days of sowing. Plant growth parameters i.e. root & shoot length, number of pods per plant, yield g/plot, yield q/ha were calculated from each treatment.

Glasswares and plasticwares

Whenever required, the glasswares of Borosil make plastic plates of Tarson make, blotter paper of standard grade and chemicals of standard grade (Merck, Qualigens, S.D. fine etc.) were used during the course of investigation. All the glasswares, polythene bags, ethyl alcohol, formalin, chemicals and other materials were procured from the Thakur Chhedilal Barrister College of Agriculture and Research Station Bilaspur (C.G.).

Equipments used

The following equipments or materials used in present investigation were-
1. Autoclave for media sterilization
2. BOD incubator for incubation
3. Binocular research microscope
4. Compound microscope
5. Hot air oven for glassware sterilization
6. Forceps, needles, blades, inoculation needle, cork borer, petri dishes
7. Growth chamber
8. Laminar air flow for isolation and purification

Preparation of bio mass of strains of Trichoderma viride and Trichoderma harzianum

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RESEARCH ARTICLE
Potato dextrose broth was prepared and sterilized in 500 ml conical flasks. Sterilization of media was done by autoclaving at 1.41 kg cm\(^{-2}\) pressure for 20 minutes. Broth containing flasks were further inoculated with fungal disc of different strains and incubated at 25 ± 2°C inside the B.O.D. Incubator for 15 days. Green biomass along with extract was homogenized using grinder mixer for developing formulations.

**Preparation of Talc based formulations of strains of Trichoderma viride and Trichoderma harzianum**

Talc powder in 250 g poly bags was sterilized. Sterilization of talc powder was done by autoclaving at 1.41 kg cm\(^{-2}\) pressure for 20 minutes. Homogenized green biomass of each strain was incorporated in talc powder in the ration of 1:10 (one part of bio mass in 10 parts of talc powder) and thus 10% (W/V) talc based formulation of each strain was obtained. Talc based formulations of different strains were used as seed treatment, soil treatment and foliar on different crops under various sets of experiments. CFUs were also counted from talc based formulations and it was ranged between 10\(^3\) to 10\(^{10}\) / g sample.

**Chemicals used**

Analytical grade chemicals supplied by different manufacturers and some of the chemicals were procured from Thakur Chhedral College of Agriculture and Research Station Bilaspur (C.G.).

4. Disease parameters : Mortality per cent
(Number of wilted plant / total number of plant x 100)

**RESULTS AND DISCUSSION**

Experiment was conducted under *in vivo* to study the plant growth promoting and disease controlling potential of *Trichoderma harzianum* / *Trichoderma viride* strains against collar rot of chickpea caused by *Sclerotium rolfsii*. All strain used as seed treatment @10g/kg seed along with recommended dose of fertilizer and agronomical practices. Data indicates that all strains of *Trichoderma harzianum* and *Trichoderma viride* were found significantly effective in reducing mortality % and enhancing yield and yield components over control. However, *Trichoderma* strains i.e *Trichoderma viride* (T 18), *Trichoderma harzianum* (T 28) were more effective in controlling collar rot of chickpea. All strains of *Trichoderma harzianum* / *Trichoderma viride* was superior over control for disease controlling parameters i.e mortality percentage , no. of pods per / plant ,yield (quintal/hectare), yield (g/plot). Minimum mortality percentage was recorded in *Trichoderma viride* strain number T18 followed by T8, T28 and maximum mortality percentage was recorded in *Trichoderma* strain T1 and T7. Highest number of pod /plant was recorded in *Trichoderma* strain number T6 (55.20) followed by T5 whereas least number of pod / plant recorded in T4 (26.80) but superior over control (7.40). Higher yield in quintal / hectare was recorded in *Trichoderma* strain T18 (18.97) followed by T 28(17.05), T 6(16.99), T 7 (16.20) whereas least yield in quintal/hectare was recorded in *Trichoderma* strain T3 (10.84). Similarly higher yield g/plot was recorded in T18 (0.22), T8 (0.21), T6 (0.19), T5 (0.17), T7 (0.17) whereas least in strain T2 (0.12). Test weight (weight of 100 grain) was maximum recorded in strain T6 (16.02), T18 (13.54) which is statistically at par among themselves followed by strain T8 (13.04), T3 (12.08), T6 (12.06) and least test weight was recorded in strain T2 (10.10). Similar study were proposed by Jabber et al. (2014) *in vitro* shows the bio efficacy of eight antagonists tested through dual culture technique respectively against *S. rolfsii* causing collar rot of chickpea. Among the eight bioagents tested against *S. rolfsii*, *Trichoderma harzianum* -55 IIHR recorded maximum inhibition of 70% followed by *T. harzianum* (62%).

**Table 1. Disease controlling potential of indigenous strains of Trichoderma harzianum / Trichoderma viride as seed treatment against collar rot of chickpea.**

<table>
<thead>
<tr>
<th>Trichoderma strains</th>
<th>Designation</th>
<th>Mortality %</th>
<th>No. of pods / plant</th>
<th>Yield g/plot</th>
<th>Test weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T1</td>
<td>9.04</td>
<td>31.60</td>
<td>11.41</td>
<td>0.13</td>
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<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T2</td>
<td>6.94</td>
<td>19.60</td>
<td>11.93</td>
<td>0.12</td>
</tr>
<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T3</td>
<td>7.71</td>
<td>16.00</td>
<td>10.84</td>
<td>0.13</td>
</tr>
<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T4</td>
<td>4.83</td>
<td>26.80</td>
<td>14.71</td>
<td>0.15</td>
</tr>
<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T5</td>
<td>6.15</td>
<td>51.40</td>
<td>15.98</td>
<td>0.17</td>
</tr>
<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T6</td>
<td>5.81</td>
<td>55.20</td>
<td>16.99</td>
<td>0.19</td>
</tr>
<tr>
<td><em>Trichoderma harzianum</em></td>
<td>T7</td>
<td>9.89</td>
<td>27.60</td>
<td>16.20</td>
<td>0.17</td>
</tr>
<tr>
<td>Designation</td>
<td>T8</td>
<td>3.23</td>
<td>28.80</td>
<td>11.66</td>
<td>0.21</td>
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<td>-----------------------------------</td>
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</tr>
<tr>
<td>Trichoderma harzianum T8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trichoderma viride T18</td>
<td>1.14</td>
<td>37.80</td>
<td>18.97</td>
<td>0.22</td>
<td>13.54</td>
</tr>
<tr>
<td>Trichoderma harzianum T28</td>
<td>3.76</td>
<td>37.40</td>
<td>17.05</td>
<td>0.19</td>
<td>15.02</td>
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<tr>
<td>Control</td>
<td>12.29</td>
<td>7.40</td>
<td>7.64</td>
<td>0.13</td>
<td>6.65</td>
</tr>
<tr>
<td>SE m(±)</td>
<td>0.39</td>
<td>0.51</td>
<td>0.61</td>
<td>0.01</td>
<td>0.83</td>
</tr>
<tr>
<td>CD 5%</td>
<td>1.16</td>
<td>1.50</td>
<td>1.84</td>
<td>0.05</td>
<td>2.48</td>
</tr>
</tbody>
</table>

Fig. 1. Disease controlling potential of indigenous strains of *Trichoderma harzianum* / *Trichoderma viride* as seed treatment against collar rot of chickpea.

Plate 1: Effect of different indigenous strains of *Trichoderma viride* and *Trichoderma harzianum* against disease controlling potential against Collar rot of chickpea.
REFERENCES


