EFFECT OF FUNGICIDES TO CONTROL PURPLE STAIN OF SOYBEAN [Glycine max. (L.) Merill] CAUSED BY Cercospora kikuchii

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ABSTRACT

The investigations were carried out to find out effect different fungicides to control purple stain of soybean caused by Cercospora kikuchii. Among all the fungicidal treatments carbendazim @ 0.2 %, copper oxychloride @ 0.25%, thiram + carbendazim @ 0.3 % (1:1 ratio), thiram @ 0.2 % and propiconazole @ 0.05 % were significantly superior over control and rest of fungicidal treatments in controlling purple stain of soybean. Among all the fungicides carbendazim @ 0.2 % showed highest per cent disease control i. e. 93.34 %. It was followed by copper oxychlorides @ 0.25 % (90.88 %), thiram + carbendazim @ 0.3 % (88.48 %), thiram @ 0.2 % (88.00 %) and propiconazole @ 0.05 % (87.36 %).

Keywords : Fungicide, purple stain disease, Cercospora kikuchii.
INTRODUCTION

Soybean [*Glycine max* (L.) Merill] is one of the most important pulse and oilseed crops throughout the world. It is also called as “Golden Bean”. Soybean has been under cultivation in China, Korea, Manchuria and Japan. It is rich in protein and fats and used as foods in eastern countries like China and Japan. Soybean has a nutritional value as it contains protein (43%) which is high biological value, fats (17-26%), carbohydrates (14-33%), vitamins A, B, C and is also a good source of lysine (6.4%) which is a limiting factor in cereals. Soybean has become a major oilseed crop next to groundnut and Indian mustard (Bhatnagar and Tiwari, 1991).

In India, during 2001-02 total area under soybean cultivation was 6.15 million ha with total production of 5.81 million tonnes and the productivity being 945 kg/ha (Anonymous, 2002). In Maharashtra state, during 2000-01 the total area under soybean was 1.14 million ha with total production of 1.27 million tonnes and the productivity being 1109 kg/ha (Anonymous, 2002). Soybean is cultivated in Ahmednagar, Beed, Buldhana, Chandrapur, Gadchiroli, Jalna, Latur, Nanded, Nagpur, Parbhani, Osmanabad and Wardha districts.

Day by day the area under soybean cultivation is increasing in Maharashtra because farmers are fetching good prices to soybean. Many times the soybean crop is exposed to late rains. Due to high humidity and warm temperature the purple stain appears on soybean crop. This disease reduced the seed germination of soybean seed by 30 per cent (Singh and Agarwal, 1986).

Therefore, it was felt necessary to evaluate different fungicides to control purple stain of soybean.

MATERIAL AND METHODS

With a view to test the efficiency of different fungicides against purple stain of soybean caused by *Cercospora kikuchii*, a field trial was laid out during *kharif* season 2002. Soon after the incidence of the disease, spraying operations were carried out with following fungicides. 1. Mancozeb @ 0.25 %, 2. Captan @ 0.2 %, 3. Mancozeb + Captan @ 0.3 % (in 1:1 ratio), 4. Thiram @ 0.2 %, 5. Carbendazim @ 0.2 %, 6. Thiram
+ Carbendazim @ 0.3 % (in 1:1 ratio), 7. Copper oxychloride @ 0.25 %, 8. Propiconazole @ 0.05 %. Control plots were maintained with no spraying of fungicides. The first spraying was given on 20th September, 2002. The second and third spraying were given at an interval of 10 days after first spraying. The observations in respect of percentage disease index (PDI) were recorded on 10th day of last spraying. The observations were recorded by using 0-5 grade scale.

Percentage disease index for each replication of all the treatment was calculated with help of formula given by Mckinney (1923) with slight modification.

\[
\text{Percentage Disease Index (PDI)} = \frac{\text{Sum of all numerical rating}}{\text{Total number of pods examined} \times 5} \times 100
\]

The final data of percentage disease index and yield was subjected to the statistical analysis which was carried out by standard statistical method i.e. analysis of variance. The standard error (SE) for disease index and yield data was calculated. To compare treatment means critical difference (C. D.) at 5 % level of significance was worked out.

RESULTS AND DISCUSSION

A) Percentage Disease Index of purple stain of soybean

The results in respect of effect of fungicides for control of purple stain of soybean are presented in Table 1. It is revealed from the results that all the fungicidal treatment were significantly superior over control in controlling purple stain of soybean caused by Cercospora kikuchii. Among all the fungicidal treatments carbendazim @ 0.2 % copper oxychloride @ 0.25 % thiram + carbendazim @ 0.3% thiram @ 0.2 % and propiconazole @ 0.05 % were significantly superior over control and rest of fungicidal treatments in controlling purple stain of soybean. Among these fungicidal treatments carbendazim @ 0.2 % showed less disease intensity i.e. 2.80 PDI as against 40.02 PDI in the control treatments. It was followed by copper oxychlorides (3.83 PDI), thiram + carbendazim (4.48 PDI) thiram (5.04 PDI) and propiconazole (5.31PDI). However, rest of fungicides showed PDI from 7.28 to 8.38.
Table 1. Effect of different fungicides to control of purple stain of soybean

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Treatments</th>
<th>Conc. (%)</th>
<th>Mean’ PDI PDI</th>
<th>Per cent Disease Control (PDC)</th>
<th>Per cent Yield (q/ha)</th>
<th>Per cent increase in yield over control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mancozeb</td>
<td>0.25</td>
<td>7.63 (16.02)</td>
<td>81.84</td>
<td>28.10</td>
<td>18.66</td>
</tr>
<tr>
<td>2</td>
<td>Captan</td>
<td>0.2</td>
<td>7.28 (15.25)</td>
<td>82.67</td>
<td>30.99</td>
<td>30.87</td>
</tr>
<tr>
<td>3</td>
<td>Mancozeb + Captan (1:1 ratio)</td>
<td>0.3</td>
<td>8.38 (16.83)</td>
<td>80.06</td>
<td>29.81</td>
<td>25.89</td>
</tr>
<tr>
<td>4</td>
<td>Thiram</td>
<td>0.2</td>
<td>5.04 (12.70)</td>
<td>88.00</td>
<td>28.48</td>
<td>20.27</td>
</tr>
<tr>
<td>5</td>
<td>Carbendazim</td>
<td>0.2</td>
<td>2.80 (9.58)</td>
<td>93.34</td>
<td>28.11</td>
<td>18.71</td>
</tr>
<tr>
<td>6</td>
<td>Thiram + Carbendazim (1:1 ratio)</td>
<td>0.3</td>
<td>4.84 (12.66)</td>
<td>88.48</td>
<td>29.72</td>
<td>25.51</td>
</tr>
<tr>
<td>7</td>
<td>Copper oxychloride</td>
<td>0.25</td>
<td>3.83 (10.66)</td>
<td>90.88</td>
<td>28.47</td>
<td>20.23</td>
</tr>
<tr>
<td>8</td>
<td>Propiconazole</td>
<td>0.05</td>
<td>5.31 (12.99)</td>
<td>87.36</td>
<td>30.89</td>
<td>30.45</td>
</tr>
<tr>
<td>9</td>
<td>Control</td>
<td>-</td>
<td>42.02 (40.39)</td>
<td>0.00</td>
<td>23.68</td>
<td>0.00</td>
</tr>
</tbody>
</table>

*S. E. ± 1.70, C. D. at 5 % 5.11, - 2.03 -

* Average of three replication
(Figures in the parenthesis indicate arcsin values)
It is revealed from the results that among all fungicidal treatments carbendazim @ 0.2% showed highest percent disease control i.e. 93.34. It was followed by copper oxychlorides @ 0.25 (90.88 PDC), thiram + carbendazim @ 0.3 % (88.48 PDC) and thiram @ 0.2 % (88.00 PDC). The rest of fungicidal treatments showed percent disease control from 80.06 to 87.36.

These above results are more or less in agreement with following workers. Shukla and Singh (1993) reported that copper oxychloride and carbendazim were found effective to control purple stain of soybean caused *Cercospora kikuchii*. Vishnawat Karuna (2002) reported that foliar sprays with carbendazim @ 0.05 % starting from flowering till full pods sets at 7-10 days interval were found effective to control purple stain. However, no one has reported efficacy of thiram + carbendazim and propiconazole to control purple stain of soybean. Next to above fungicides captan @ 0.2 % and mancozeb @ 0.25 % were found effective in controlling purple stain of soybean. These results are in agreement with following workers. Singh and Agarwal (1987) reported that two application of mancozeb @ 0.25 % at an interval 12-15 days gave best control of pod blight caused *C. kikuchii*. Shukla and Singh (1993) reported that mancozeb was found effective to control purple stain of soybean caused *C. kikuchii*. Vishnanwat Karuna (2002) reported that foliar sprays of mancozeb @ 0.2 % starting from flowering till full pod set at 7-10 days interval was found effective against purple stain of soybean. Vetti *et al.* (1993) reported that captan was found effective against *C. kikuchii* of soybean.

B. Yield of soybean

Among all fungicides captan @ 0.2 % propiconazole @ 0.05 %, mancozeb + captan @ 0.3 % (1:1 ratio) and thiram + carbendazim @ 0.3 % (1:1 ratio) were significantly superior over control and rest of fungicidal treatments in increasing yield of soybean. These results are more or less in agreement with following research workers. Singh and Agarwal (1987) reported that two application of mancozeb used against pod blight of soybean caused by *C. kikuchii* also gave maximum grain yield of soybean. Ploper *et al.* (2000) evaluated different fungicides for control of fungal disease of soybean caused by *C. kikuchii*. They obtained maximum yield increase of soybean with double applications carbendazim (32.4 %).
LITERATURE CITED


