Integrated disease management of rice in Madhya Pradesh

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Abstract

Rice (Oryza sativa L.) is one of the most important kharif crop grown in India and contributes 40% of total food grain production and covers 42% of the total cropped area. Productivity of the crop can be increased by adopting the hybrid rice and management of biotic stresses. Rice is cultivated under four major eco-system viz, irrigated (19Mha), rainfed low land (14Mha), flood prone (3Mha) and rainfed upland (6Mha) in India. Area under rice cultivation in India is 42 lakh ha. with production of 104.32 Mt and productivity 2404 kg/ha (Anon, 2016). Among the biotic diseases, leaf blast, brown spot, sheath blight, sheath rot, bacterial blight, false smut, seed discoloration and rice tungro virus are major diseases of rice causing severe losses to the crop in India. However, in Madhya Pradesh leaf blast and brown spot are considered as major threat diseases causing tremendous yield reduction. Rice blast caused by Pyricularia grisea is one of the most severe disease posing a huge threat to rice cultivation (Neelakanth et al, 2017) [6]. Similarly, rice brown spot caused by Helminthosporium oryzae incidence shows various types of symptoms at all stages of crop growth and causing heavy economic losses to the crop. (Dev, 1980) [1].

Keeping these facts in view, the present investigation was carried out to study the integrated disease management of rice under natural epiphytotics.

Materials and Methods

The experiment was carried out at in All India Co-ordinated Rice Improvement Project JNKVV, College of Agriculture Farm, Rewa (M.P.) during kharif 2017. The experiment was laid out in randomized complete block design (RBD) with three replications. Highly susceptible variety PS 4 was taken for evaluation of different treatment combinations. Different components were used for the integrated disease management viz Ni(Nursery) FYM @ 1 Kg/m2, N2(Nursery)seed treatment with Carbandim (2g/kg)+ (Carbandim @1 g/m2) 7 days before uprooting the seedling, N3(Nursery) apply DAP@ 108 g/10 m2+Muriate of Potash (MOP) @ 85 g/10 m2, M-4 (Main field) FYM before transplanting @ 1kg/m2, M-5(Main Field)-Application of FYM during land preparation before transplanting (@ 1kg/m2) + Trichoderma formulation 2g/kg of FYM, M-6(Main Field)-Cultural practices (no weed/infected straw on bunds), M-7(Main Field)-apply 100% RDF (Recommended Dose of fertilizers) apply fertilizer @ 120 kg N/ha, 60kg p2o5/ha, 40 k2o/ha and ZnSo4@ 25 kg/ha (N: P: K Zn- 120:60:40:25), M-8(Main Field)-75% RDF (i.e. 90 kg N/ha; 45kg P2O5/ha, 30 K2O/ha and ZnSO4 @ 18kg/ha) (N:P:K Zn- 90:450:30:18) + micronutrient solution @ 0.5 lit/10m2area, M-9 (Main Field)-Phorate10G@10kg/ha, M-10 (Main Field)-Tricyclazole75
WP Beam@0.6 g/l & Carbendazim (12%) and Mancozeb (63%) (Saaf) @ 1.5-2 g/l at grain filling stage and M-11(Main Field) - two times spray of Neem based product @ 3 ml/lt at the time of tillering and booting stage.

Treatment combinations were arranged in following manner: T1; M1 + M5 + M11, T2; N3 + M4 + M7, T3; N2 + N3 + M7 + M9 + M10, T4; N1 + N2 + N3 + M4 + M7 + M10, T5; N1 + N2 + N3 + M5 + M6 + M8 + M9 + M10, T6; N1 + N2 + N3 + M5 + M6 + M8 + M9 + M10, T7(control); N3 + M7.

The yield of grains obtained from each net plot was recorded in kilograms after sun drying of grains and the grain yield per plot was converted into quintal per hectare. Disease incidence was recorded as per IRRI SES Scale, 1996.

The percent disease index (PDI) was calculated by adopting the formula

\[ PDI = \frac{\text{Sum of numerical rating}}{\text{Total numbers of plants observed} \times \text{maximum disease rating}} \times 100 \]

Data was analyzed for analysis of variance (ANOVA) and calculated following Snedecor and Cochran (1967) [9].

**Results and Discussion**

It is obvious from the table that minimum disease incidence of leaf blast as well as brown spot was observed in T6, 9.4% and 12.4% respectively, however maximum disease incidence of leaf blast and brown spot were observed in T1, i.e., 18.7% and 20.4% respectively as compared to other treatment. Similar result was found by Vinod Kumar Nirmalkar et al. (2017) [8], Netam et al. (2014) [7] and Elham Khalili et al. (2012) [4]. They reported that among different fungicides used as foliar spray against rice blast pathogen were significantly more effective for controlling the diseases.

The table (1) and figure (1) result was also reflecting from grain yield in which maximum yield was obtained in T6 (47.80 q/ha) followed by T5 (45.60 q/ha) and least was found in T1 (37.20 q/ha). These results are in accordance with the finding reported by Verma and Santhakimari (2012), Nasruddin and Amin (2013) [5]. Nasruddin and Amin (2013) [5] reported that Difenoconazole and Difenoconazole + Propiconazole were evaluated against the rice blast disease and found effective in suppressing blast and protecting yield as compared to the other tested fungicides.

### Table 1: Disease management practices for managing major rice diseases

<table>
<thead>
<tr>
<th>Tr. No.</th>
<th>Treatment</th>
<th>Percent Disease (PDI) Leaf Blast</th>
<th>Percent Disease (PDI) Brown spot</th>
<th>Grain yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>M1 + M5 + M11</td>
<td>18.7</td>
<td>20.4</td>
<td>37.20</td>
</tr>
<tr>
<td>T2</td>
<td>N3 + M4 + M7</td>
<td>15.9</td>
<td>18.3</td>
<td>38.40</td>
</tr>
<tr>
<td>T3</td>
<td>N2 + N3 + M7 + M9 + M10</td>
<td>13.2</td>
<td>17.4</td>
<td>40.60</td>
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<tr>
<td>T4</td>
<td>N1 + N2 + N3 + M4 + M7 + M10</td>
<td>12.8</td>
<td>16.5</td>
<td>42.45</td>
</tr>
<tr>
<td>T5</td>
<td>N1 + N2 + N3 + M5 + M7 + M9 + M10</td>
<td>10.7</td>
<td>14.7</td>
<td>45.60</td>
</tr>
<tr>
<td>T6</td>
<td>N1 + N2 + N3 + M5 + M6 + M8 + M9 + M10</td>
<td>9.4</td>
<td>12.4</td>
<td>47.80</td>
</tr>
<tr>
<td>T7(control)</td>
<td>N3 + M7</td>
<td>23.4</td>
<td>27.5</td>
<td>34.70</td>
</tr>
<tr>
<td></td>
<td>CD (5%)</td>
<td>2.7</td>
<td>2.5</td>
<td>3.7</td>
</tr>
</tbody>
</table>

**Fig 1:** Disease management practices for managing major rice diseases

**Conclusion**

Integrated disease management treatment T6 (N1 + N2+ N3 + M5 + M6 + M8 + M9 + M10) FYM @ 1 Kg/m² + seed treatment with Carbendazim (2g/kg)+{Carbendazim @1 g/m²} 7 days before uprooting the seedling. + Apply DAP@ 108 g/10 m²+Muriate of Potash (MOP) @ 85 g/10 m² + Application of FYM during land preparation before transplanting (@ 1kg/m²) + Trichoderma formulation 2g/kg of FYM + Cultural practices (no weed/infected straw on bunds)+ 75% RDF (i.e. 90 kg N/ha ; 45kg P₂O₅/ha, 30 KgO/ha and ZnSO₄ @ 18kg/ha)(N:P:K Zn- 90:450:30:18) + micronutrient solution @ 0.5 lit/10m²area + Phorate 10G@10kg/ha + Tricyclazole 75 WP Beam@0.6 g/l & Carbendazim (12%) and Mancozeb (63%) (Saaf) @ 1.5-2 g/l at grain filling stage gave outstanding result for controlling the leaf blast and brown spot of rice significantly and increased the grain yield over other treatments and control.
References