Evaluation of efficacy of chemical fungicides and a plant product for the management of Alternaria blight of sunflower

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Sunflower (*Helianthus annuus* L.), a member of the family Asteraceae, is among the four major oilseed crops in the world apart from soybean, Brassicas and groundnut. In 2010-11, world sunflower production stood at 30.41 million tonnes from an area of 22.91 million hectares. Russia was the largest producer with a production of 5.34 million tonnes from an area of 5.58 million hectares. Other major cultivating countries are Ukraine (6.77 mt from 4.52m ha), Argentina (2.22 mt from 1.48 m ha) and India (0.65 m t from 1.00 m ha) (1). Exploitation of sunflower as a source of oil is not entirely a new idea in India. In India, commercial cultivation of sunflower started in 1972 with the introduction of Russian open pollinated varieties from USSR and Canada, the introductions were Peredovic (EC68414), Armaviriskii 3497 (EC68415) and others. The development of early maturing variety Morden as well as the first sunflower hybrid BSH-1 in 1980 provided the required fillip to expand sunflower cultivation in the country.

Sunflower has attained a prime position in the oilseed economy of the country. Sunflower when introduced during early 1970s was generally thought to be free from diseases. Even during early 1980s it was not much affected by diseases. The popularity of the crop among farmers resulted in spread in area under the crop; many diseases caused by fungi, bacteria and virus have co-evolved with sunflower. Alternaria blight emerged as a major threat in the cultivation during late 1980’s. During 1997 sunflower necrosis disease caused by *Tobacco streak virus* belonging to *Ilar virus group* was reported and soon this disease became number one in terms of losses caused. Along with these diseases downy mildew and rust were also posing problems in cultivation. In all, the diseases in sunflower have reported an average of 25-40 per cent yield loss (10).

Blight caused by *Alternaria helianthi* (Hansf.) Tubaki and Nishihara is another important disease of sunflower and has been reported from almost all sunflower growing countries throughout the world and the severity is known to increase or decrease depending upon the changing environmental conditions during the crop growth period. In Karnataka, the disease occurred in epiphytic form in 1987 with disease incidence as high as 95-100 per cent (5). Favourable weather may result in yield losses up to 62 per cent. Drastic reduction of seed and oil yield to the extent of 80 and 17 per cent, respectively. In addition to reducing seed and oil yield the pathogen was reported to affect seed germination and seedling vigour drastically (3). It has been reported from different parts of the world including India that the disease has been known to cause reduction in flower size, number of seeds per head, seed yield per plant, seed weight and also oilcontent (2). The loss in yield varies from 11.30 to 73.33 per cent depending on the extent of infection (9).

Application of chemicals is one of the most effective and widely recommended methods of disease control. The present investigation was undertaken in order to evaluate some fungicides (chemicals and plant extracts) in combination with seed treatment for their efficacy against Alternaria blight of sunflower.

The present investigation was undertaken during kharif of 2007 and 2008 at the Zonal Agricultural Research Station, University of Agricultural Sciences, GKVK, Bangalore (12°58'N; 77°35'E; 930 m above mean sea level), located in the southern eastern dry zone of Karnataka. The mean annual rainfall of Bangalore is about 825 mm, distributed over a period of seven to eight months (April to November) with two peaks in July and October. April and May are the hottest months (34.4-38.6°C), while December and January are the coldest (14.6-15.8°C).

The experiment was laid in a randomized block design with seven treatments and three replications with a plot size of 4.5m x 3.0m. The hybrid KBSh 44 was sown with a spacing of 60 cm x 30 cm and standard agronomic practices were followed to raise the crop. Seed treatment was done just before sowing and all the fungicidal sprays were applied at 30 and 45 days after sowing (DAS). The plant extract of *Prosopis juliflora* named as Prosopan was supplied by Tamil Nadu Agricultural University, Coimbatore. Disease severity was recorded 15 days after the last spray on five randomly selected plants in each plot using 0-9 scale in each plot and per cent disease severity was calculated for each treatment.

Yield of each treatment was recorded separately using net plot yield data. The experimental data collected was subjected to statistical analysis using Fishers method of analysis of variance (4). Per cent increase or reduction due to any treatment was calculated.

In both the years, all the treatments were significantly superior over control (70.0 and 71.7%) in reducing the severity of Alternaria blight. During 2007, the disease severity ranged from 18.3 to 46.7% in the different treatments tested.
While in 2008 the disease severity ranged from 33.3 to 63.3%. Seed treatment with carbendazim + iprodione @ 0.2% and two sprays of propiconazole @ 0.1% at 30 and 45 DAS resulted in lowest blight severity (18.33 and 33.3 per cent) with the highest per cent disease reduction (73.9 and 53.6 per cent ) in both the years.

In seed treatment with carbendazim + iprodione without any fungicide spray, the disease severity was 33.39 and 56.7 per cent with only 33.39 and 20.92 per cent reduction over control in 2007 and 2008, respectively. Seed treatment with thiram @ 2g per kg seed alone was not effective in reducing Alternaria blight incidence and instead two sprays of mancozeb at disease appearance with and without seed treatment, respectively, recorded mean severity of Alternaria blight (2.55 and 3.79 per cent) and were at par with each other (6).

The grain yield ranged from 1991 to 3365 and 1709 to 2731 kg/ha during 2007 and 2008, respectively. Three sprays of mancozeb on sunflower at 30, 45 and 60 DAS were found to be effective in controlling Alternaria blight and increased sunflower yield significantly in Morden variety (8). Mancozeb sprayed four times at an interval of 7-10 days was very effective in controlling Alternaria blight and rust diseases of sunflower with yield increase by 43 to 45 per cent (7). Grain yield was lowest and at par with control in the treatment receiving only seed treatment in 2008 (Table 1).

From the above study, it is evident that seed treatment alone is not effective in management of the disease, however, seed treatment when combined judiciously with two sprays of propiconazole at 30 and 45 DAS was most effective in the management of the Alternaria blight disease.

### Table 1. Effect of plant extract and fungicides in combination with seed treatment on Alternaria blight severity and seed yield of sunflower

<table>
<thead>
<tr>
<th>Treatment</th>
<th>2007 % reduction over control</th>
<th>2008 % reduction over control</th>
<th>Pooled Mean % reduction over control</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1: Seed treatment with carbendazim + iprodione @ 0.2%</td>
<td>46.7 (2174)</td>
<td>56.7 (1810)</td>
<td>51.7 (1992)</td>
</tr>
<tr>
<td>T2: T1 + Hexaconazole @ 0.1%</td>
<td>30.0 (2381)</td>
<td>55.0 (2111)</td>
<td>42.5 (2246)</td>
</tr>
<tr>
<td>T3: T1 + Propiconazole @ 0.1%</td>
<td>18.3 (3326)</td>
<td>33.3 (2731)</td>
<td>25.8 (3039)</td>
</tr>
<tr>
<td>T4: T1 + Difeconazole @ 0.05%</td>
<td>21.7 (2809)</td>
<td>40.0 (2510)</td>
<td>30.85 (2660)</td>
</tr>
<tr>
<td>T5: T1 + Spraying with Quintal @ 0.2%</td>
<td>30.0 (3365)</td>
<td>58.3 (1962)</td>
<td>44.15 (2664)</td>
</tr>
<tr>
<td>T6: Prosopan 40 EC @ 0.1%</td>
<td>36.7 (2622)</td>
<td>63.3 (1977)</td>
<td>50.0 (2300)</td>
</tr>
<tr>
<td>T7: Control</td>
<td>70.0 (1991)</td>
<td>71.7 (1709)</td>
<td>70.85 (1850)</td>
</tr>
</tbody>
</table>

SEm+ = 3.1 (236), CD(P=0.05) = 9.5 (726), CV(%) = 14.8 (15.3), 18.3 (22.3)

Data in parentheses are of seed yield (kg/ha)

REFERENCES


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