Management of sugarbeet seedling disease complex by combination of fungicides

S.N. SRIVASTAVA and R.C. TRIPATHI
Indian Institute of Sugarcane Research, Lucknow 225 002

ABSTRACT: The effectiveness of five combinations (two fungitoxicants in each combination) of four compatible fungicides, PCNB (brassicol), TMTD (thiram), carboxin (vitavax) and carbendazim (bavistin) at the rate of 2.5 g/kg seed (mixed in equal proportion) incorporated in seed pellets of sugarbeet was evaluated against seedling disease complex caused by four soil borne pathogens, namely, Pythium aphanidermatum, Rhizoctonia solani, R. bataticola and Sclerotium rolfsii. Seed pelleted with all combinations of fungicides provided better protection to seedlings as against steeping of seeds in aqueous suspension of a combination of fungicides. Of various combinations used, a mixture of bavistin + thiram was most efficacious in reducing seedling mortality as compared to other treatments.

Key words: Sugarbeet, seedling disease complex, management, pelleting

Sugarcane seedlings in nature are very vulnerable to different soil borne pathogens. Among soil borne pathogens, viz., seedlings disease complex caused by Pythium aphanidermatum, Rhizoctonia solani, R. bataticola and Sclerotium rolfsii is the most destructive and causes acute pre- and post-emergence mortality of sugarbeet seedlings resulting into gappy stands of the crop in the field (Sen et al., 1974). Recently, a disease complex caused massive damage to sugarbeet seedlings in Sriganganagar area of Rajasthan where the crop is regularly grown for commercial cultivation. It has been established that pelleting of sugarbeet seeds with various seed fungicides provides better protection of seedlings against these pathogens than the conventional seed treatment (Singh et al., 1978; 1982). Singh and Srivastava (1987) also reported that mixture of two fungicides showed lesser mortality than the treatment with single fungicide. Therefore, in order to select the best suitable and economically feasible combination, the present study was undertaken with five combinations of four compatible fungicides, brassicol, thiram, vitavax and bavistin during 1988-89 and 1989-90 under the All India Coordinated Research Project on Sugarbeet at the Indian Institute of Sugarcane Research, Lucknow.

RESULTS AND DISCUSSION
Two years data (1988-89 and 1989-90) recorded on germination, pre- and post-emergence mortality are presented in Table 1. Data revealed that seedling mortality was higher in 1988-89 than in 1989-90. The reason may be due to numerous complex interactions including those of temperature, moisture and other ecological factors which are known to affect infection and disease development (Garren, 1964).

Seed pelleted with all five combinations of two fungicides reduced both pre- and post-emergence mortality of seedlings which, in turn, increased the seed
Table 1. Management of sugarbeet seedling disease complex due to soil borne pathogens through combination of fungicides

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Emergence of* seedlings</th>
<th>Pre-emergence* mortality</th>
<th>Post-emergence* mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1988-89 89-90 Mean</td>
<td>88-89 89-90 Mean</td>
<td>88-89 89-90 Mean</td>
</tr>
<tr>
<td>I. Uninfested Soil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Unpelleted seed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Pelleted seed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. Infested Soil</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Unpelleted seed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Pelleted seed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C.D. at 5%</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Data transformed as $\sin^{-1} \%$Emergence/pre-post -emergence mortality.

germinability and plant stand in all the treatments which was more when the seeds were steeped in aqueous suspension of same combination of fungicides. Similar findings have been reported by many workers in different sugarbeet growing countries (Veverka, 1976; Osinka and Szymczak-Nowak, 1983; Vörbanov et al., 1984; Singh and Srivastava, 1987; Ferro and Manaresi, 1994; Heubrock and Huubregts, 1995). The mean value of the two years data revealed that maximum emergence was recorded with seeds pelleted with a mixture of vitavax + PCNB (73.53%) followed by vitavax + thiram (68.93%) and bavistin + thiram (58.38%). However, the differences were non-significant. As regards disease management, minimum pre- and post-emergence mortality occurred with seeds pelleted with bavistin + thiram, i.e., 7.72 and 26.08%, respectively as against other treatments including the inoculated check (Table 1). Reisolations from diseased seedlings invariably yielded test pathogens. The combined effect of fungicides and their sufficient availability at the site where infection occurs and appropriate concentration of chemicals in the pelleted seed may be responsible for providing effective control of seedling mortality (Singh et al., 1982; Singh and Srivastava, 1987). Conversely, with steeped seeds, the effectiveness of the fungitoxicants was lost due to han-
dling and more exposure to soil (Mills, 1972).

Since it is not feasible to manage the disease complex in our conditions through soil treatment or drenching of fungicides due to high cost involved, it is advised to pellet the seeds with mixture of bavistin + thiram. Pelleting of sugarbeet with above two fungicides costs approximately Rs. 2.50/ kg seed and, therefore, can be easily adopted by the farmers. While pelleting sugarbeet seeds, the possibility of incorporating insecticides alongwith fungicides be explored as such a treatment will provide effective control of disease and pest complex attacking the crop in the beginning. Such pelleted seeds are regularly employed in European countries (Chavanes, 1995; Rosso et al., 1995).

REFERENCES


Received for publication March 25, 1997.