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# EFFECT OF FUNGICIDES ON THE CONTROL OF GRAM BLIGHT

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An *in vitro* evaluation of the fungitoxicity of various fungicides against *Ascochyta rabiei* revealed Sunlate, Topas C-50, Dithane M-45, Rizolax, Daconil and Pencozeb to be the most effective, in that order, in inhibiting mycelial growth of the fungus. Foliar application of fungicides to field grown gram plants revealed Topas C-50 and Daconil to be the most effective in reducing gram blight ratings, the effectiveness of former being better than that of the latter.

## INTRODUCTION

In gram (*Cicer arietinum* L.) with the present low yield level, the best way of controlling gram blight disease, caused by *Ascochyta rabiei* (Pass.) Lab. is through the use of cultivars which possess durable resistance (Reddy, 1980). Efforts to develop gram cultivars resistant to blight infection, either through conventional breeding methods or through mutation breeding procedures, are on their way in Pakistan. Although these efforts have consequently led to the development of some partially resistant cultivars (Haq *et al.*, 1981; Anon, 1986), still it will be a long way to follow when durable resistance against gram blight disease will be achieved and incorporated into our commercial gram cultivars. Until gram cultivars with durable resistant to gram blight disease are developed, fungicidal control of the disease is an alternative possibility which will help either to avoid crop losses or to produce, at least, disease-free healthy seed for the next season crop. In view of this, some of the available fungicides were evaluated for their comparative effectiveness against the gram blight disease.

## MATERIALS AND METHODS

***In-vitro* evaluation of Fungicides:** The comparative fungitoxicity of each of the eleven fungicides was evaluated by poisoned food technique. A weighed quantity of each fungicide was amended into autoclaved gram seed meal agar (GSMA) to obtain 5,10,20 and 50 µg/ml concentrations. GSMA without fungicide served as the control. The composition of GSMA was:

| | |
|---|---|
| Gram flour | 20 g |
| Dextrose | 20 g |
| Agar agar | 20 g |
| Distilled water | up to 1000 ml |

Twenty millilitres of the amended and non-amended medium was poured in each of the four 90 mm diameter petriplates. After the agar medium was solidified, 6 mm agar plugs containing *A. rabiei* mycelium were cut from a 25-day-old GSMA culture plate, using sterile cork borer and placed in the centre of petriplates. The inoculated petriplates were incubated at 22 ± 2 °C and radial growth (mm) of the fungus was recorded after 21 days of incubation.

**Foliar application of Fungicides:** A blight susceptible gram cultivar was planted in each of the four row subplots (4 x 1.2 meter) with 30 cm row to row distance and 23 cm plant to plant distance. The experiment was conducted in Randomized Complete Block Design with 60 mm distance between treatments and 90 cm between replications. At the onset of flowering stage, the fungicidal sprays were started on plots, with 0.2 (active ingredient a.i.) per cent solution of each of the eleven test fungicides, with a hand sprayer, at 14 days interval beginning with at 95 days after planting and there were, in all, four fungicidal sprays. A spore suspension of *A. rabiei* ($1.8\text{-}2 \times 10^4$ spores/ml) in tap water was also sprayed after 24 hours of each fungicidal spray. The inoculum was applied on alternate days in the evening and continued till the complete development of blight on non-fungicide sprayed control plots. The disease ratings were recorded after 15 days of last fungicidal spray, following disease rating scale of Morrall and McKenzi (1974). The plots were harvested after full maturity and yield data were recorded. The data were analyzed statistically to visualize the differences between the effect of various fungicidal spray treatments.

0 = Healthy plants; no lesions visible on any plant.

1 = Traces; a few scattered lesions on the plants, usually found on the plants with careful searching.

2 = Slight; lesions commonly observed on plants, lack of defoliation and damage not great.

3 = Moderate; lesions very common and damaging.

4 = Severe; all plants with extensive lesions, defoliation and dying branches and a few, if any, plants killed.

5 = Dead; all plants or all but parts of a few plants killed.

## RESULTS AND DISCUSSION

*In-vitro* **evaluation of Fungicides:** In general, there was a significant decrease in mycelial growth with an increase in fungicide concentration (Table 1). However, the most effective fungicides in inhibiting mycelial growth, in descending order, were Sunlate, Topas C-50, Dithane M-45, Daconil and Pencozeb whereas Panoram, Cuprosan, Sandofan, Nemispore and Ridomil were the least effective. Sunlate, being the most effective, inhibited 100 per cent mycelial growth at 5 $\mu$g/ml concentration throughout the incubation period while Topas C-50 inhibited 100 per cent mycelial growth at 20 $\mu$g/ml concentration uptil 7 days of incubation. The active ingredient of Sunlate is Benomyl which has been reported to be highly fungitoxic to *A. rabiei* (Bashir & Ilyas, 1983 a; Anon., 1986) while Topas C-50 is a combination of Penconazole and Captan, the former being a systemic fungicide.

**Foliar application of Fungicides:** Topas C-50 and Daconil were the most effective in reducing disease ratings, Topas C-50 being statistically better over the Daconil (Table 2). Nemispore, Sunlate, Sandofan, Ridomil and Dithane M-45 were the least but statistically equally effective in controlling the disease while Pencozeb displayed intermediate effectiveness. Panoram, Cuprosan and Rizolex appeared to be completely ineffective in controlling blight of the field grown grams plants. With regards to yield, Topas

**Table 1. Growth of *A. rabiei* on fungicide amended gram-seed-meal-agar**

| Treatment | Concentration in μg/ml | | | |
|---|---|---|---|---|
| | 5 | 10 | 20 | 50 |
| Sandofan | 71.75defg* | 65.75 ghij | 61.25 jki | 46.25 op |
| Cuprosan | 61.25 jkl | 57.50 lm | 53.50 mn | 48.75 nop |
| Ridomil | 71.25 dafg | 67.50 fghi | 64.50 bijk | 32.50 rst |
| Nemispor | 75.75 abcd | 71.25 defg | 51.25 no | 37.50 qr |
| Pencozeb | 62.50 ijkl | 62.50 ijkl | 45.00 p | 18.75 uv |
| Panoram | 77.50 abc | 76.25 abcd | 78.75 ab | 72.50 cdef |
| Rizolex | 58.75 kl | 61.25 jkl | 28.25 t | 18.75 uv |
| Dithane M-45 | 34.35 rs | 31.75 st | 22.00 u | 11.00 wx |
| Topas C-50 | 22.25 u | 19.00 uv | 15.75 vw | 8.25 x |
| Daconil | 40.00 q | 32.50 rst | 27.50 t | 20.75 uv |
| Sunlate | 0.00 y | 0.00 y | 0.00 y | 0.00 y |
| Control (without fungicides) | 80.00 a | 80.00 a | 80.00 a. | 80.00 a |

*Means not sharing a letter differ significantly at 5% level of significance.

**Table 2. Disease ratings and yield data of gram plants sprayed with fungicides**

| Treatment | Disease rating | Yield per plot (g) (4' x 1.2' m) |
|---|---|---|
| Sandofan | 4.00 bc | 80.50 cd* |
| Sunlate | 4.13 b | 84.75 cd |
| Cuprosan | 5.04 a | 13.75 e |
| Ridomil | 3.99 bc | 74.75 cd |
| Panoram | 5.00 a | 4.75 e |
| Rizolex | 5.00 a | 11.75 e |
| Nemispore | 4.26 b | 65.50 d |
| Pencozeb | 3.50 c | 110.25 c |
| Dithane M-45 | 3.88 bc | 83.50 cd |
| Topas C-50 | 1.25 e | 426.25 a |
| Daconil | 1.88 d | 294.50 b |
| Control (inoculated) | 5.00 a | 7.25 e |

*Means in a column having same letters do not differ at 5% level of significance.

C-50 was the best spray treatment, as plants sprayed with it yielded 426.25 g per plot, followed by Daconil which yielded 294.50 g per plot. Pencozeb, Sunlate, Dithane M-45, Sandofan, Rizolex and Panoram being ineffective in controlling blight, yielded at par with the control treatment (Table 2). The effectiveness of Daconil in controlling gram blight disease has been reported (Ilyas & Bhatti, 1982; Bashir & Ilyas, 1983 b) but that of Topas C-45 is being reported for the first time.

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