

## Effect of seed Treatment of Sheath Blight Pathogen infected seeds of rice with fungicides on germination, growth and vigour of rice seedling.

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Sheath blight disease affected seeds of ADT. 31 were treated with fungicides and the seed germination, seedling growth, seedling vigour and the viability of seeds were studied after 8 months storage. The seeds were treated with the fungicides viz. NF. 48, Difolatan, Dexon, EL. 273, Brassicol, Bavistin, Captan, Demosan, Vitavax, Benlate, Brestan, Agrosan, Thiram, Plantvax, Agallol and Daconil at 0.1, 0.2 and 0.3 per cent levels. The seed treatment with fungicides have increased the seed germination, seedling growth, vigour and maintained the viability upto 8 months. The fungicides Demosan and Brestan were not effective in increasing the seed germination and inhibited the same slightly.

Sheath blight disease of rice caused by *Rhizoctonia solani* Kuhn (*Thanatephorus cucumeris* (Frank) Donk) is a serious disease in many tracts of Tamil Nadu. Its occurrence has been intensified with the introduction of susceptible high yielding varieties and increased use of nitrogen fertilizer. The occurrence was reported by Venkata Rao and Kannaiyan (1973) and Kannaiyan Prasad (1976). The reduction in grain yield due to this disease has been estimated to vary from 5.2 to 50 per cent (Ou, 1973, Lee 1974 and Kannaiyan and Prasad, 1978a). The seed-borne nature of sheath blight disease was reported by Kannaiyan and Prasad (1978b). An attempt was made to study the influence of fungicidal treatments on paddy seeds on seed germination, seedling growth, seedling vigour and viability of seeds after 8 months storage and the results are presented hereunder.

### MATERIAL AND METHODS

The paddy seeds of ADT- 31 were collected from the sheath blight infected field and used for this study. Well dried, cleaned seed lots of 1 kg were separately treated with test fungicides and stored in polythene bage for 8 months. the test fungicides viz. NF.48, Difolatan, Dexon, EL.273, Brassicol, Bavistin, Captan, Demosan, Vitavax, Benlate, Brestan, Agrosan, Thiram, plantvax, Agallol and Daconil were used at 0.1, 0.2 and 0.3 per cent levels. The seeds were sown on sterile filter papers kept in the sterilised petridishes. Four hundred seeds were tested in each treatment and the seed germination was observed and recorded. The seed germination was carried out on 7th day after fungicides treatment and also after 8 months storage. The shoot and root growth of rice seedlings were recorded on 5th day after germination.

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The seedling vigour was studied by growing the seedlings in well sieved sterilized clay:sand (1:1) in small earthen pots. The vigour of the seedlings was estimated by taking the mean dry weight of 15 day-old seedlings.

## RESULTS AND DISCUSSION

### (i) Seed treatment with fungicides on seed germination after 7 days :

Benlate, Daconil and Vitavax increased the seed germination to a considerable extent over the control (Table-1). Dexon, Difoltan, EL-273, Bavistin, Captan, Demosan, Vitavax, Agrosan and 0.3 per cent than at 0.1 per cent. Demosan and Brestan were not effective in improving the seeds germination and even inhibited the same slightly.

### (ii) Seed treatment with fungicides on seed germination after 8 months storage:

The results are presented in table 1. All the fungicides tried for seed treatment did not alter the viability of paddy seeds upto 8 months of storage excepting Demosan and Brestan. The seeds treated with plantvax and Agallol in all concentrations maintained the viability of more than 90 per cent. Vitavax, EL-273, Bavistin and Brassicol also resulted more than 90 per cent germination at 0.1 per cent. However a reduction in seed germination was observed at higher concentrations. The results have clearly indicated that paddy seeds can be stored for longer period after fungicidal treatment without affecting the seed germination.

### (iii) Effect of fungicides on shoot and root growth of rice seedlings.

Benlate, Daconil, Plantvax and Vitavax have significantly increased the shoot growth compared to control (Table 2). Vitovax, Agallol, Dexon, Plantvax, Daconil, Benlate and Captan have considerably increased the root growth of rice seedlings. Brestan inhibited the root growth while Demosan decreased the shoot growth of rice seedlings.

### (iv) Effect of fungicides on the vigour of rice seedlings.

The seeds treated with fungicides have increased seedling vigour than control (Table-2). Benlate, Daconil, Plantvax, Vitavax and Bavistin have consistently increased the seedling vigour at all concentrations as compared to the control. There was little variation in seedling vigour due to various chemical concentrations.

Treatment of seeds with fungicides prior to storage appeared to offer certain amount of protection during storage. Seed treatment also gives a good protection to the seed during the process of germination and promotes healthy and vigorous seedlings (Kannaiyan *et al.*, 1975). The fungicides Bavistin, Demosan, Benlate, Daconil, Vitavax and Agrosan have completely suppressed the survival of *R. Solani* in paddy seeds (Kannaiyan, 1977). The effective control of seed-borne infection of fungal pathogens of rice with fungicides have been reported by Kaul (1962), Kannaiyan *et al.* (1975) and Shinde *et al.* (1976).

The fungicidal seed treatment of rice seeds has improved the germination significantly. However, Demosan and Brestan were slightly inhibitory to seed germination. The fungicidal treatment of sorghum seeds (Venkata Rao *et al.*, 1969), sunflower seeds (Kannaiyan *et al.*, 1974) and rice seeds (Kannaiyan *et al.*, 1975) were reported to increase the seed germination. The results of the present study are in line with the above findings. The rice seeds treated with fungicides have maintained the viability even upto eight months. Seed treatment with different fungicides was reported earlier to preserve the viability of rice seeds (Padmanabhan, 1956 and Kannaiyan *et al.*, 1975).

The treatment of rice seeds with Benlate, Daconil, plantvax, Vitavax, Agallol, Thiram and Agrosan have increased the root and shoot growth of rice seedlings. On the other hand Brestan has inhibited the root growth while Demosan has arrested the shoot growth of rice seedlings. Misra and Singh (1972) also observed an increase in seedlings growth as influenced by treating rice seeds with Captan and Fytolan. The increase in seedling growth due to treatment of rice seeds with Vitavax was also reported by Kannaiyan *et al.* (1975)

Seed treatment with fungicides have also markedly increased the seedling vigour. Venkata Rao *et al.* (1969) have shown increased in seedling vigour due to treatment of sorghum seeds with fungicides. Similar observations were made with the treatment

of rice seeds with fungicides. (Misra and Singh, 1972 and Kannaiyan *et al.*, 1974). Kannaiyan *et al.* (1975) found that seeds tested with Vitavax registered higher seedling vigour in rice. Thus the study indicated the effectiveness of seed treatment with fungicides in controlling the sheath blight of rice without causing injury to the germinability of seeds.

The Senior author is very much thankful to the Indian Council of Agricultural Research for the award of a senior Research fellowship.

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Table 1. Effect of treatment of infected seeds with different fungicides on seed germination of rice.

| Fungicides | 0.1%                   |                        | 0.2%                   |                        | 0.3%                   |                        |
|------------|------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|
|            | After one week storage | After 8 months storage | After one week storage | After 8 months storage | After one week storage | After 8 months storage |
| NF-48      | 80.37                  | 71.19                  | 81.47                  | 70.91                  | 80.90                  | 68.53                  |
| Difolatan  | 80.02                  | 63.51                  | 76.44                  | 55.88                  | 76.66                  | 69.30                  |
| Dexon      | 80.90                  | 60.87                  | 80.02                  | 60.20                  | 77.48                  | 95.08                  |
| EL-273     | 82.29                  | 72.15                  | 77.75                  | 56.66                  | 77.34                  | 67.45                  |
| Brassicol  | 81.87                  | 72.15                  | 80.55                  | 67.21                  | 82.96                  | 70.27                  |
| Bavistin   | 90.02                  | 72.84                  | 79.69                  | 72.84                  | 80.02                  | 70.27                  |
| Captan     | 80.37                  | 70.00                  | 78.91                  | 69.39                  | 78.17                  | 68.35                  |
| Demosan    | 77.75                  | 59.50                  | 73.36                  | 56.79                  | 69.56                  | 56.53                  |
| Vitavax    | 84.26                  | 72.84                  | 84.26                  | 68.28                  | 76.44                  | 71.56                  |
| Benlate    | 80.90                  | 69.12                  | 82.96                  | 71.56                  | 82.51                  | 72.84                  |
| Brestan    | 77.34                  | 57.17                  | 74.11                  | 55.73                  | 70.63                  | 53.49                  |
| Agrosan    | 79.69                  | 67.45                  | 78.46                  | 69.38                  | 76.44                  | 70.27                  |
| Thiram     | 80.02                  | 63.15                  | 80.02                  | 68.03                  | 79.69                  | 52.72                  |
| Plantvax   | 78.46                  | 73.15                  | 80.37                  | 75.00                  | 81.87                  | 71.56                  |
| Agallol    | 76.44                  | 74.21                  | 80.02                  | 75.82                  | 71.85                  | 75.00                  |
| Daconil    | 82.96                  | 66.97                  | 81.87                  | 65.21                  | 80.02                  | 65.35                  |
| Control    | 73.05                  | 56.35                  | 73.05                  | 56.35                  | 73.05                  | 56.35                  |

(—) Decrease

- (i) Treatments : C.D. (one week) = 2.89 (ii) Concentrations : C.D. = 12.5  
C.D. (8 months) = 2.80

Table 2 Effect of treatment of infected seeds with fungicides on the root and shoot growth and Vigour of rice seedlings.

| Fungicides | 0.1%                  |                        |                                    |
|------------|-----------------------|------------------------|------------------------------------|
|            | Mean root length (mm) | Mean shoot length (mm) | Mean dry weight of a seedling (mg) |
| Benlate    | 98.5                  | 54.4                   | 13.4                               |
| Daconit    | 90.4                  | 50.1                   | 13.2                               |
| Plantvax   | 92.0                  | 49.1                   | 13.1                               |
| Agallol    | 85.1                  | 46.1                   | 11.9                               |
| Vitavax    | 88.8                  | 49.8                   | 13.6                               |
| NF-48      | 82.3                  | 45.8                   | 11.5                               |
| Agrosan    | 82.4                  | 48.1                   | 12.8                               |
| Thiram     | 83.8                  | 48.8                   | 12.5                               |
| Difolatan  | 83.2                  | 42.0                   | 11.9                               |
| Daxon      | 69.0                  | 41.9                   | 11.8                               |
| EL-273     | 83.4                  | 44.5                   | 12.6                               |
| Bavistin   | 77.5                  | 43.4                   | 13.2                               |
| Captan     | 79.8                  | 46.7                   | 13.0                               |
| Demosan    | 73.0                  | 31.1                   | 11.6                               |
| Brassicof  | 67.7                  | 43.0                   | 12.1                               |
| Brestan    | 47.6                  | 41.3                   | 11.7                               |
| Control    | 63.3                  | 35.2                   | 10.7                               |

Root length : C.D. = 8.04

Shoot length : C.D. = 2.29

Seedling Vigour : C.D. = 0.68