

Management of Leaf Spots and Rust Diseases of Peanut by Single Fungicide

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ABSTRACT Out of twelve fungicides evaluated *in vitro* and *in vivo* to manage rust and leaf spot diseases; Biloxazole was found to control both the diseases simultaneously and also increased the yield of peanut.

KEY WORDS Rust, leaf spots, fungicides, Biloxazole.

INTRODUCTION

Leaf spots of peanut (*Arachis hypogea* L.) caused by *Cercosporidium personatum* (Berk & Curt) Deighton and *Cercospora arachidicola* Heri are considered to be important diseases in peanut growing areas and rust is becoming serious menace in recent years (Ramakrishna and Subbaya, 1975 ; Hammons, 1977). Both the diseases reduce yield considerably individually as well as in combination. So far none of the cultivated varieties is known to be resistant against both diseases in India, however, many fungicides have been reported to control these diseases (Siddaramaiah *et al.*, 1977 ; Harrison, 1971 and 1973 ; Sesadri, 1976). But none of these fungicides could control both the diseases effectively and multiple disease control through single fungicide may be effective and economical. Therefore, attempts were made to find effective single fungicide to manage both the diseases, as these occur almost simultaneously.

MATERIALS AND METHODS

Fungicide test *in vitro*. Slide germination test was used to evaluate systemic and non-systemic fungicides viz. carbendazim(Bavistin,

methyl-2-benzimidazole carbamate); carboxin (vitavax, 5,6-dihydro-2-methyl-1, 4-oxathiin-3-carboxanlid-4, 4-dioxide); Triadimefon (Bayleton 25 WP, 1-(4-chlorophenoxy) 3,4 dimethyl-1-1H-(1,2, 4-triazole-1-yl) butan-2-one); Tridemorph (Calixin, N-tricecyl-2, 6-dimethyl-morphonine); Triforine (Saprol, N, N=1, 4-piperazindiy1-bis-(2,2,2-trichloroethyliden)-bis-formamide); Biloxazol (Baycor, P-((1,1-biphenyl)-4-yloxy1-a-(1,1-dimethylethyl)-1H-1,2, 4-triazole-1-ethanol); Dodine (Syllit, Dodecylguanidine acetate); Guaztine (Panolil, Guanidated 9-aza-1, 1-1-diamino heptadecane acetate); Dithane M-45 (Zinc ion and manganese ethylene bisdithio carbamate and Delan (Diathion (2,3, dicarbonitrile-1, 4-dithiaanthraanthraquinone) at different concentrations i.e. 25, 50 and 100ppm by using urediniospores for finding out best fungicides for rust control.

Fungicidal test *in vivo*. To find out the effect of fungicides on rust and leaf spot diseases, the experiments were conducted at farmer's fields and Agronomy farm of the institute. A susceptible variety AK 12~24 was used in every experiment and plot size measuring 3×2.5m was taken in every experiment which was replicated four times.

The fungicides were sprayed at the appearance of initial symptoms of leaf spots (few

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spots on lower leaves) and second spray was repeated after 20 days interval. Leaf spots appeared 30 days after sowing and rust was observed 5~7 days later every year. Observation on disease intensity was recorded after 15 days of final spraying. Disease intensity was estimated by using 0~5 (0, no disease and 5 maximum disease) as used by Mishra and Mishra, 1977 and Sharma and Kulkarni, 1974 in rust and leaf spots respectively. The infection indices were calculated by using following formulae.

$$\text{Infection index} = \frac{\text{Sum of individual rating}}{\text{Total number of leaves observed}} \times \frac{100}{5}$$

$$\text{Per cent efficiency of disease control} = \frac{\text{Infection index in control} - \text{Infection index in treatment}}{\text{Infection index in control}} \times 100$$

Fungicides used for the experiments were Carbendazim, Triadimefon, Biloxazol, Tridemorph, Dithane M-45, Guazatine, Dithane flowable, Sulfex and Topsin-M. The experiment was conducted for 4 years i.e. 1979~80, 1980~81, 1981~82 and 1983~84.

RESULTS AND DISCUSSION

Out of 11 fungicides tested in lab at different concentrations, all were effective in inhibiting the germination at 50ppm and above, however, per cent inhibition of germination of uredini-

ospires was 86 per cent in carbendazim as compared to all other fungicides which was 100 per cent. More than 90 per cent inhibition in germination was found in all the treatments at 25ppm but in carbendazim (Table 1).

Field experiment against leaf spots and rust diseases: Field experiments at farmer's field and college farm revealed that carbendazim, Topsin-M and Triadimefon were highly effective to control leaf spots whereas Tridemorph and Triadimefon could also manage rust efficiently (Table 2), however, Biloxazol followed by Triadimefon were the fungicides which could control both the diseases in these experiments.

It is evident from the yield data that all fungicides used increased yield, nevertheless, maximum yield was obtained in Biloxazol which was followed by Tridemorph and Dithane M-45. Biloxazole which was found most effective to manage both the diseases was further tested for concentrations and number of sprays. It is apparent from the experiments conducted during 1983~84 that out of 3 concentrations of Biloxazole tried namely 0.05, 0.1 and 0.2 per cent, the maximum disease control of both diseases could be observed when sprayed at 0.2 per cent. The percentage efficiency of disease control was 66.6 and 47.0 in leaf spot and rust respectively. However, the

Table 1. Effect of fungicides on urediniospore germination under lab conditions

| S. No. | Fungicide | Treatment concentration in ppm | | |
|--------|--------------|--------------------------------|--------|--------|
| | | 25 | 50 | 100 |
| 1. | Carboxin | 100.00 | 100.00 | 100.00 |
| 2. | Oxycarboxin | 94.63 | 100.00 | 100.00 |
| 3. | Triadimefon | 96.13 | 100.00 | 100.00 |
| 4. | Dithane M-45 | 100.00 | 100.00 | 100.00 |
| 5. | Carbendazim | 72.24 | 86.05 | 93.46 |
| 6. | Triforine | 100.00 | 100.00 | 100.00 |
| 7. | Dodine | 100.00 | 100.00 | 100.00 |
| 8. | Guazatine | 100.00 | 160.00 | 100.00 |
| 9. | Delan | 100.00 | 100.00 | 100.00 |
| 10. | Biloxazole | 100.00 | 100.00 | 100.00 |
| 11. | Tridemorph | 96.83 | 100.00 | 100.00 |

Table 2. Efficiency of fungicides for the control of rust and leaf spots of peanut under field conditions

| S. No. | Treatment | Concentration % | Rust | | Leaf spot | | Yield | |
|---------|------------------|-----------------|------------------|-------|------------------|-------|-------------------|----------------------------|
| | | | PDI ^a | PEDC | PDI ^a | PEDC | Yield per plot(g) | Per cent increase in yield |
| 1. | Dithane M-45 | 0.2 | 35.27 | 40.65 | 46.08 | 34.59 | 973.8 | 17.69 |
| 2. | Carbendazim | 0.1 | 44.48 | 25.21 | 1.81 | 96.85 | 947.4 | 14.50 |
| 3. | Carbendazim | 0.05 | 44.42 | 25.26 | 5.72 | 90.06 | 946.8 | 14.43 |
| 4. | Triadimefon | 0.1 | 36.30 | 38.92 | 20.31 | 64.70 | 930.0 | 12.40 |
| 5. | Guazatine | 0.2 | 36.84 | 38.01 | 37.90 | 34.12 | 915.6 | 10.66 |
| 6. | Tridemorph | 0.05 | 27.73 | 53.34 | 39.74 | 30.92 | 1002.6 | 21.18 |
| 7. | Biloxazole | 0.1 | 3.07 | 94.83 | 13.57 | 76.41 | 1009.8 | 22.04 |
| 8. | Sulfex | 0.3 | 34.24 | 42.39 | 30.83 | 46.41 | 945.0 | 14.21 |
| 9. | Topsin-M | 0.2 | 38.49 | 35.23 | 5.07 | 91.19 | 967.8 | 16.97 |
| 10. | Dithane flowable | 0.2 | 34.27 | 42.34 | 44.16 | 22.24 | 965.7 | 16.72 |
| 11. | Check | — | 59.43 | — | 57.53 | — | 26.29 | — |
| S.Em. ± | | | 9.06 | | 4.12 | | 26.29 | |
| C.D. 5% | | | 17.88 | | 12.16 | | 77.56 | |

^a Average of 3 years.¹ Percent Disease Index² Percent Efficiency of disease control

increase in yield in case of 0.2 and 0.1 per cent sprayed plant was nonsignificant, i.e. 11.5 and 11.9 respectively. Two sprays of Biloxazole at 0.05 did not control leaf spots as well as diseases of peanut.

Hence it is concluded from 4 years experimentation that Biloxazole can be recommended in the peanut growing areas for controlling leaf spots as well as rust diseases simultaneously.

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적 요

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