

Effect of Foliar Sprays of Chemicals at Different Stages of Plant Growth and Their Effect on Banded Leaf and Sheath Blight of Maize

Alok Kumar Singh*

Jai P. Rai **

Introduction-

Maize (*Zea mays* L.) is third most important cereal crop in the world agricultural economy as food for man and feed for live stock. It is grown throughout the temperate, subtropical and tropical zones. It belongs to the grass family (graminae) and is a cross pollinated, monoecious plant.

In India, the major maize growing states are Andhra Pradesh, Bihar, Haryana, Himanchal Pradesh, Karnataka, Madhya Pradesh, Panjab, Rajasthan and Uttar Pradesh.

Banded leaf and sheath blight in maize, caused by *Rhizoctonia solani* (Kühn) Exner Perfect state *Thanatephorus cucumeris* (Frank) Donk is the most important disease in *Tarai* region of Uttrakhand and Uttar Pradesh which reduces the yield coupled with its qualitative degradation. Banded leaf and sheath blight of maize was described for the first time from Sri Lanka (Bertus, 1927) as sclerotial disease. In India, the disease was reported as banded leaf and sheath blight of maize by Ullstrup in 1960 from the *Tarai* region of Uttar Pradesh (Payak and Renfro, 1966). The symptoms of the disease have been observed on all aerial parts of maize plant except the tassel, with its frequent occurrence on lower leaf sheaths and ears. The disease appears on basal leaf sheaths as water soaked, straw coloured, irregular to roundish spots on both the surfaces. A short of wave pattern of disease

*Department of Plant Pathology Faculty of Agriculture Udai Pratap Autonomous College, Varanasi- 221002

**Assistant Professor (Plant Protection), KVK, I. Ag. Sci. BHU, RGSC, Barkachha, Mirzapur- 231001

advancement can be seen not only on leaves but also on sheaths and husk leaves. Later as infection becomes older numerous sclerotial bodies are also seen (Saxena, 1997). The disease results in direct losses as premature death, stalk breakage, destruction of leaves, leaf sheath and ear rot. Losses to the extent of 10-97 percent have been reported on different cultivars (Singh and Sharma, 1976).

In the present investigation the experiment was conducted to study the effect of foliar sprays of Tilt and Bavistin at different stages of plant growth, with respect to stand count, disease severity, grain yield and 1000- grain weight.

Materials and Methods

Effect of foliar sprays of chemicals at different stages of plant growth:

Foliar spray of Tilt: The most popular variety Navin was planted in two rows of 5 m length and 0.75 m spaced apart having the treatments in Randomised Block Design. Disease was created through artificial inoculation using sorghum grain inoculums. For keeping the treated plants free from the banded leaf and sheath blight disease, chemical Tilt (propaconazole 25 EC) obtained from Hindustan Ciba-Geigy of India Ltd. was applied as foliar sprays at three different stages of plant growth alone and in combination.

Treatments were as follows:

1. One spray of Tilt at 30 days.
2. One spray of Tilt at 40 days.
3. One spray of Tilt at 50 days.
4. Two sprays of Tilt at 30 and 40 days.
5. Two sprays of Tilt at 30 and 50 days.
6. Two sprays of Tilt at 40 and 50 days.
7. Three sprays of Tilt at 30, 40 and 50 days of plant growth.
8. Check (unsprayed).

The suspension of Tilt was used @ 0.1 per cent by dissolving 1 ml of chemical in 1 litre of water in a plastic bucket. A total of 10 litres of suspension was used to spray all the plants one treatment alone and in combinations. The foliar sprays were applied with help of Maruti foot sprayer.

Observations on disease severity were recorded after 65th day of planting. At harvesting, data on stand count, grain yield per plot (kg/ha) and 1000- grain weight were recorded and analyzed statistically.

Foliar sprays of Bavistin:

To find out the efficacy of Bavistin (carbendazim 50 WP), obtained from Hindustan Antibiotics against *R. solani*. Cultivator Navin was planted in field experiment. Other culture and artificial disease development method were same as done for foliar sprays of Tilt.

The fungicide Bavistin was sprayed at the rate of 0.05 per cent at different stages including an unprotected common check.

Treatments were as follows at different plant growth stage-

1. One spray of Bavistin at 30 days.
2. One spray of Bavistin at 40 days.
3. Two spray of Bavistin at 50 days.
4. Two spray of Bavistin at 30 days and 40 days.
5. Two sprays of Bavistin at 40 and 50 days.
6. Three sprays of Bavistin at 30, 40 and 50 days.
7. Check (No spraying).

Observation on Disease Severity:

Observations on the banded leaf and sheath blight disease were recorded two weeks after flowering following 1-5 disease score scale (Butchaiah,1977) as follows:-

- 1.0 = no infection;
- 2.0 = partial infection up to lower four leaf sheaths and leaves;
- 3.0 = Heavy infection up to lower four leaf sheath and leaves, partial on upper leaf sheaths below the ear placement, no cob infection.
- 4.0 = Heavy infection on all leaf sheaths and leaves below the ear placement partial infection on cobs.
- 5.0 = Complete rotting of cobs, very little or no grain formation, grain become chaffy or may be rotten.

Thousand Grain Weight:

The weight of one thousand grain was taken on single pan electronic balance upto two digits after decimal point.

Results and Discussion**Effect of Tilt sprays at different stages of plant growth on BL&SB:**

The data on the experiment conducted to study the effect of foliar sprays of Tilt at different stage of plant growth, with respect to stand count, disease severity, grain yield (kg/ha) and 1000-grain weight (g) are represented in table 1

Stand Count: The data on stand count, indicate significantly more number of plant in all treatments as compared to unsprayed check. Maximum number of plant stand 46.0 was recorded in plots when two sprays were applied at 30th and 50th day, followed by 45 in three sprays at 30th+40th+50th days and two sprays at 30th+ 40th days of planting.

Disease Severity: The data indicate that significantly lower disease scores was recorded in all combinations of Tilt sprays as compared to unsprayed check (4.0). The lowest disease levels (2.6) were found in case when three foliar sprays were applied at 30th +40th+50th days, followed by 2.8 when two sprays at 40th+50th days, as compared to check(4.0)

Grain Yield: The data on grain yield (table 1) indicate that all the sprayed treatment gave significantly higher yield per ha as compared to check (2296.88 kg/ha). The highest grain yield 4050kg/ha was recorded in treatment where three sprays of Tilt were applied at 30th+40th +50th days of planting followed by 3415.1 kg in 40th +50th day of sprays whereas the lowest grain yield 2840.88 kg/ha was recorded in treatment where one spray of Tilt at 40th day of planting was applied.

1000- Grain Weight: The data on 1000-grain weight indicates all the treatments of Tilt spraying significantly increased 1000- grain weight (Table 28) The maximum 1000- grain weight (223.17) was recorded in treatment of Tilt sprays at 30th + 40th +50th days of planting. Whereas 184.95 g in one spray of Tilt at 50th days, 185.75 at 30th days, 188.90 g at 40th days and 189.64 g at 30th + 40th day of Tilt sprays, were statistically at par as compared to unsprayed check (184.54g) (Table 1)

Effect of Bavistin Sprays at Different Stages of Plant Growth on B L & S B:

The data on experiment conducted to study the effect of foliar sprays of Bavistin on banded leaf and sheath blight disease of maize with respect to stand count, disease severity, grain yield/ha and 1000-grain weight are presented in table 2

Stand Count: The data on stand count significantly shows more number of plants in all Bavistin sprayed plots as compared to unsprayed check (41.0). The maximum number of plant were found where sprays of Bavistin at 30th+40th+th day (53.0) were applied followed by (49.33) in one spray at 40th day, 48.66 in two sprays at 30th +50th day and 48.0 in

two sprays at 40th +50th day as compared to 45.33 in one spray at 50th day and 42.0 in one spray at 30th day of planting.

Disease severity: The data on disease severity indicate that significantly lower disease levels were observed in all the Bavistin spray plots as compared to unsprayed check (3.8). The minimum disease score (2.5) was recorded when three sprays were applied at 30th+40th+50th day followed by 3.1 in two sprays at 30th +50th day and 3.2 in two sprays at 30th +40th day of planting as compared to 3.8 in unsprayed check.

Grain Yield: In case of grain yield (kg/ha) the data indicate significantly higher grain yield in all treatments as compared to unsprayed check (2417.8 kg/ha) (Table 29). The maximum grain yield 3566.22 kg was found in treatment where three sprays of Bavistin were given at 30th+40th+50th day of planting, followed by 3233.77kg in two sprays at 30th+40th day and 3022.2 kg in one spray at 40th days of planting. The lowest grain yield (2719.77 kg) was recorded when one spray was applied at 50th day, followed by 2810.66 kg in two sprays at 40th+50th day of planting.

1000-Grain Weight: The data on 1000- grain weight indicate that all the Bavistin sprays were effective in increasing 1000- grain weight significantly as compared to unsprayed check (171.0g). Maximum 1000- grain weight 213.42 g in treatments where Bavistin was sprayed at 30th+40th +50th day of planting, followed by 204.34 g in two sprays at 30th+40th day and 2503.27 g in two sprays at 40th+50th day of planting. The lowest 1000-grain weight (1481.8 g) was recorded when one spray was applied at 30th day of planting.

To sustain the yield potential of high yielding varieties that to under intensified agriculture, employment of chemicals have been a necessity. In this context several fungicides were evaluated to find out the one which could control the disease effectively.

Among the fungicides Tilt (propriconazole) sprayed @ 0.1% 30th, 40th and 50th day after planting protected the crop significantly and also improved the yield. Following this fungicide, was Bavistin which was used @ 0.05%. These observations are in accordance with the reports already existing (Roy and Saikia, 1976; Mathi and Nair, 1977; Verma and Menon, 1977; Butchiaiah, 1977; reported most effective control of banded sclerotial disease with Bavistin (carbendazim).

Table 1: Effect of Tilt spraying at different stage of plant growth and their effect on BL& SB Cv. Navin

Treatments	Stand Count	Disease Rating (1-5)	Av. Yield (Kg/Ha)	1000-Grain Weight (g)
Tilt Spraying @0.1%				
At 30 days	34.00	3.3	2871.10	185.75
At 40 days	44.33	3.5	2840.88	188.90
At 50 days	40.00	3.5	2901.33	184.95
At 30+40 days	45.00	3.2	2901.33	189.64
At 30+50 days	46.00	3.1	2992.00	200.37
At 40+50 days	40.00	2.8	3415.10	198.16
At 30+40+50 days	45.00	2.6	4049.77	223.17
Check (Unsprayed)	32.33	4.0	2296.88	184.54
'F' Test	S	S	S	S
CD at 1%	9.0	0.53	649.61	11.58
CV.	9.0	6.70	8.81	2.45

- Each value is an average of three replications.

Table 1: Effect of Bavistin spraying at different stage of plant growth and their effect on BL& SB Cv. Navin

Treatments	Stand Count	Disease Rating (1-5)	Av. Yield (Kg/Ha)	1000-Grain Weight (g)
Bavistin Spraying @0.05%				
At 30 days	42.00	3.4	2840.66	181.79
At 40 days	49.33	3.3	3022.20	190.19
At 50 days	45.33	3.3	2719.77	200.13
At 30+40 days	46.00	3.2	3233.77	204.34
At 30+50 days	48.66	3.1	2871.00	190.47
At 40+50 days	48.00	3.3	2810.66	203.27

At 30+40+50 days	53.00	2.5	3566.22	213.42
Check (Unsprayed)	41.00	3.8	2417.77	170.99
'F' Test	S	S	S	S
CD at 1%	5.8	0.73	622.37	10.52
CV.	5.11	9.21	8.72	2.22

-Each value is an average of three replications.

References:

- **Bertus, L. S. 1927.** A sclerotial disease of maize due to *Rhizoctonia solani* (Kühn). Year Book, deptt. Agric., Cylone, 46-48
- **Butchaiah, K. 1977.** Studies on banded sclerotial disease of maize. Thesis M. Sc. (Ag.) G.B. Pant Univ. of Agriculture and Technology, Pantnagar. 65 p
- **Mathi, G. and Nair, P. 1977.** Field inoculation of fungicides against *Corticium sasakii* (shirai) Matsumoto causing sheath blight of rice. *Agril. Res. J. Kerala* **14**:184-196
- **Payak, M. M. and Renfro, B. L. 1966.** Disease of maize new to India. *Indian Phytopath. Soc. Bull.* 3, IARI, New Delhi. pp. 14-18.
- **Roy, A. K. and Saikia, U. N. 1976.** Chemical control of sheath blight of rice. *Indian Phytopath.* **24**: 334-356
- **Saxena, S. C. 1997.** Banded leaf and sheath blight of maize In: Agnihotri, V. P. ; Sarbhoy, A. K. and Singh, D. V. eds. Management of threatening plant diseases of national importance. Malhotra Publishing House, New Delhi. pp. 31-50
- **Singh, B. M. and Sharma, Y. R. 1976.** Evaluation of maize germplasm to banded disease and assessment of yield loss. *Indian Phytopath.* **29**:129-132

- **Ullstrup, A. J. 1960.** An Abstract of a report on major diseases in India. Progress Report of Coordinated Maize Breeding Scheme. I.C.A.R.
- **Verma, A. S. and Menon, M. R. 1977.** Fungicidal trial on the control of sheath blight of rice. *Madras Agric. J.* **64**: 416-417
