

Efficacy of fungicides against leaf rust of aromatic *Cymbopogons* caused by *Puccinia nakanishikii* (Diet)

PHATIK TAMULI*, MAMONI SAIKIA** AND PARAN BORUAH

Division of Medicinal Aromatic and Economic Plants, North East Institute of Science and Technology, Jorhat 785 006, Assam, *Department of Botany, Darrang College, Tezpur, Assam, and **Department of Botany, DKD College, Dergaon, Assam

Received : 09.07.2010

Acceptance : 25.05.2011

Published :

An investigation was carried out to study the efficacy of fungicides against leaf rust of *Cymbopogons* caused by *Puccinia nakanishikii* (Diet). Five fungicides, viz., Bayer 5072 70 WP, Bayleton 25 WP, Vitavax 75% WP, Bayton 15 SD, Furavax 7.5% WP at two different concentrations (0.1% & 0.2%) were evaluated to control rust diseases of *Cymbopogon martinii* (Roxb.) Wats and *Cymbopogon citratus* (DC) Stapf. Results indicated that Bayleton at 0.1% exhibited good control of the disease with 3.25% and 6.25% disease intensity in *C. martinii* and *C. citratus* respectively. Other fungicides were not so effective in controlling the disease.

Key words: *Cymbopogons martinii*, *C. citratus*, fungicide, leaf rust, *Puccinia nakanishikii*

INTRODUCTION

Cymbopogon martinii (Roxb) Wats (Palmarosa) and *Cymbopogon citratus* (DC) Stapf. (Lemongrass) are essential oil bearing aromatic plants belonging to the genus *Cymbopogon*. The oil of *Cymbopogon martinii* is used as base for fine perfumery and is valued because of its geraniol contents. Besides the perfumery value, the oil has a great wound healing effect. *Cymbopogon citratus* is one of the sources of citral, an important monoterpene aldehyde, large quantity of which are being utilized for production of ionones, vitamin A and geraniol besides the use in perfumery soaps and cosmetics.

Although *C. citratus* and *C. martinii* are two economically important essential oil yielding grasses, due to the infection by rust fungus these two species of *Cymbopogons* show serious losses in terms of herb yield, oil content and its quality. Rust fungi are obligate parasites and are highly destructive. Boruah and Bordoloi (1984) reported the pathogen associated with rust disease of *Cymbopogons* as *Puccinia nakanishikii* (Diet). Since, these valuable oil bearing plant species loss their herb yield and oil quality due to rust disease, the study on its control is needed. The present paper, therefore, deals with the chemical control of this rust disease under field condition.

MATERIALS AND METHOD

Field trial with *C. martinii* (Cm) and *C. citratus* (Cc) plants were laid down in randomized block design with 4 replications during 1999-2000 and 2001-2002. The size of each plot was 6.5 x 3.5 m. The plots were artificially inoculated using leaf rust spore suspension taken from Cm and Cc plants. Simple spray of fungicides viz, Bayleton, Furavax, Bayton, Bayer 5072 70 WP, PLantavax and Vitavax, each taken singly was sprayed at concentration of 0.1% and 0.2% of the products. Suitable controls were also kept where instead of chemicals, only water was sprayed. Final recording of disease intensities were taken after 5 weeks of spraying with a 0–4 points rating scale, where 0 = no disease (healthy); 1 = 1–25%, 2 = 26 – 50%; 3 = 51– 75%; 4 = 76 – 100 % leaf areas infected, using the following formula : Disease Intensity = Sum of all numerical rating x 100 / Total number of leaves rated x maximum disease grade

RESULTS AND DISCUSSION

Data in Table 1 indicate that Bayleton at 0.1 per cent gave good control of the disease with 3.25 per cent of intensity in *C. martinii* and 6.25 per cent intensity in *C. citratus* followed by Furavax (31.25% and 17.50 % respectively). But the fungicide was

more effective when applied at the rate of 0.2 percent. Other fungicides namely, Bayton, Bayer, Plantvax and vitavax were not effective in the control of *Puccinia* rust of the *Cymbopogons*. In control, the disease intensity was found as 85% and 88.75% respectively in *C. martinii* and *C.citratius*.

Table 1 : Effect of various fungicides on intensity of *Puccinia* rust on *Cm* and *Cc* plants

Fungicides	Concentration %	Disease intensity (%)	
		<i>Cm</i>	<i>Cc</i> .
Bayer 5072 70 wp	0.2	62.50 (52.28)*	60.00 (51.11)*
	0.1	65.00 (53.78)	81.25 (65.71)
Bayleton 25 wp	0.2	2.00 (7.54)	3.00 (9.33)
	0.1	3.25 (8.91)	6.25 (14.30)
Vitavax 75% wp	0.2	37.50 (37.73)	65.00 (54.75)
	0.1	45.00 (42.10)	80.00 (64.18)
Bayton 15 SD	0.2	27.50 (31.33)	37.50 (37.45)
	0.1	33.75 (35.41)	45.00 (42.12)
Furavax 7.5% wp	0.2	17.50 (24.44)	10.00 (18.43)
	0.1	31.25 (33.75)	17.50 (24.54)
Control (Untreated)	-	85.00 (67.50)	88.75 (70.91)
CD (0.05)		18.21	11.41

Figures in parenthesis are angular transformed value ; *Cm* = *Cymbopogon martinii*, *Cc* = *Cymbopogon citratus*

Several chemotheraputants, protectants and antibiotics have been tried for the control of wheat rust. Livingston. (1953) recommended that Zineb and Maneb control wheat rust effectively and give more profits. Shrivastava *et al*, (1983) observed that Dithane M – 45 was more effective in reducing the severity of black and brown rust when compared with Dithane Z – 78, Moreston and control. Shrivastava *et al*. (1983) studied the efficacy of Triadimefon in the control of leaf rust of wheat. Single foliar spray of Triadimefon (Bayleton 25 WP) along with Furavax 7.5%, Bayer 5072 70WP and Bayton 15 – SD was compared with the four sprays of Mancozeb against leaf rust of wheat. Bayleton showed high effectiveness in the glasshouse and field conditions when applied at the rate of 0.2 per cent. Significant increase in 1000 grain weight was also observed in Bayleton treated plots. Furavax, Bayer 5072 and Bayton were not effective. Brahma and Asir (1988), and Brahma *et al*. (1989) studied the efficacy of Propiconazole and Dithane M – 45 the control of *Puccinia graminis tritici*, *P.recondita*, *P striiformis* in wheat and found that Propiconazole

at 0.125 % gave the best result. In 1991, Brahma *et al*. performed experiments on efficacy of Tilt (Propiconazole) on different wheat cultivars. Propiconazole (0.1%) was applied to seedlings at the first appearance of rust. The fungicide was effective against all rusts but there were significant differences amongst the cultivars in relation to the increase of 1000 grain wt. Foliar spraying is a popular test method for evaluating fungicides against cereal rusts in seedlings tests (Livingston, 1953; Keli *et al.*, 1958; Davis *et al.*, 1960). The drop test is another foliar method for evaluating the effectiveness of systemic fungicides against cereal rusts (Rowell, 1972, 1976). In this method a 10 µl drops of the test compound in a solution of Tarun 20 at 500 µg / ml is placed on the abaxial surface at a distance of 5 cm from the tip of fully elongated first foliar leaves of seedlings. Result of our present investigation is in conformity with earlier findings of Siebert (1976) who has also reported Bayleton as highly effective against cereal rust of wheat.

REFERENCES

- Boruah, P. and Bordoloi, D.N. 1984 Leaf rust of *C. martinii* var motia in North-East India *Indian Phytopathology*, **37**(3): 584
- Brahma, R. N. and Asir, R. 1988 Chemical control of wheat rust with tilt (Propiconazole). *Indian Phytopathology*, **41** : 482-484
- Brahma, R.N., Asir, R. and Saikia, A. 1989 Control of stem rust of wheat with tilt. *Indian Phytopathology*, **42**(4): 568-569.
- Brahma, R.N., Asir, R. and Saikia, A. 1991 Efficacy of Tilt (Propiconazole) in different wheat cultivars. *Indian Phytopathology*, **44**(1): 110-118.
- Davis, D. Chalet, L., Rothrock, J. W., Deak, J., Halmos, S. and Garber, J.D.; 1960 Chemotherapy of cereal rusts with a new antibiotic. *Phytopathology*, **50**: 841-843.
- Keil, H.L., Frohlich, H.P. and Van Hook, J.O. 1958 Chemical control of cereal rust. 1 Protective and eradicated control of Rye leaf rust in the greenhouse with various chemical compounds. *Phytopathology*, **48**: 652-655.
- Livingston, J.E. 1953 The control of leaf and stem rust of wheat with chemotheraputants. *Phytopathology*, **43** : 496-499.
- Rowell, J.B. 1972 Fungicidal management of pathogen populations. *J. Environ. Qual*, **1** : 216-220.
- Rowell, J.B. 1976 control of leaf rust on spring wheat by seed treatment, with 4-n-butyl 1,2,4 triazol. *Phytopathology*, **66** : 1129-1134.
- Siebert, M. 1976 New approach to the control of rust diseases of cereals with Bayleton *Pflanzenschat Nachrichten Bayer*, **24**: 303-309.
- Srivastava, K.D., Singh, D.V. and Joshi, L.M. 1983 Efficacy of Triadimefon in the control of leaf rust of wheat. *Indian Phytopathology*, **36**(4): 712-715.