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Leaf blight disease of vegetables and ornamental crops under high rainfall zone of West Bengal and its control possibilities

B. K. JANA, S. K. LAHA AND D. C. KHATUA

Bidhan Chandra Krishi Viswavidyalaya, N. B. Campus, Cooch Behar-736101, India

Incidence of leaf blight disease caused by *Rhizoctonia solani* Kuhn and its detail symptoms were recorded on radish, cabbage, cauliflower, knol khol, spinach, dahlia, chrysanthemum and Vinca in high rainfall zone of West Bengal. Application of Bavistin, Diathane M45 and combined application of Bavistin and Dithane M45 were effective in reducing the severity of the disease.

Key words : Leaf blight disease, Vegetables, Flowers, High rainfall zone, *Rhizoctonia solani*, Control.

The polyphagous plant pathogen, *Rhizoctonia solani* Kuhn is known to attack a large number of hosts causing damping-off, seedling blight, root rot, sheath blight, etc. Khatua and Maiti (1982) recorded severe aerial blight of radish and Vinca from Nadia and 24 Parganas districts of West Bengal. Khatua *et al.* (1981) and Bandyopadhyay and Khatua (1985) also reported the incidence of such diseases on cauliflower, spinach, knol khol and cabbage. Considering the gradual spread of the disease, present investigation was undertaken to record the incidence of such leaf blight in high rainfall areas of West Bengal. Field studies were also conducted to find out suitable chemical control measure.

MATERIALS AND METHODS

To study the incidence of the disease on vegetables and ornamental plants surveys were conducted during the year 1981 and 1982 at Jalpaiguri and Cooch Behar districts of West Bengal. Both the districts are in high rainfall zone of

India (annual rainfall above 300 cm). Detail symptoms of the disease for each affected crop were recorded. Koch's postulate was followed in each case.

Two separate trials were conducted to find out suitable chemicals for control of such diseases. Radish (*Raphanus sativus*) was selected as test crop and fungicides selected for this purpose were :

Bavistin	2—(methoxy carbamoyl) benzimidazole
Diathane M45	Zinc-manganese ethylene bis-dithiocarbamate
Fytolan	Copper oxychloride
Brassicol	Penta chloro nitro benzene
Pusamycin	Streptomycin (15% W/W)+Oxytetracycline (1.5% W/W)

A susceptible local variety of radish was grown in 2 mx1 m plot. One plot was alloted for each treatment and was replicated thrice. A suitable control was maintained, wherewater was sprayed instead of fungicide. Spraying of chemical was started after the appearance of the symptom at 20 days age of the plant. Second and third sprays were done at an interval of 10 days. Disease severity was recorded by using a 10 point scale, 10 days after the last spray.

0=no infection, 1=1 to 10%, 3=11 to 25%,
5=26 to 50%, 7=51 to 75% and 9=76 to 100% of the leaf area affected.

RESULTS AND DISCUSSION

Symptoms and Host Range

i) Radish (*Raphanus sativus*)

The early crop of radish sown in August-October was fonnd to suffer most from leaf blight that developed as water-soaked, light green patches on any part of the leaf lamina. The water-soaked area gradually increased in size and its central part underwent complete blighting. Blighting progressed very fast following rains and most of the leaves were damaged within seven days. In rainy weather blighted areas fell-off from the leaf lamina. Many lesions often developed on each leaf resulting in a number of irregular shaped holes. A single lesion might cover nearly one fourth of the leaf area but mid-ribs were generally not affected. In sunny weather blighted areas dried up. Very thin net work of white mycelium could be noticed in the morning on the under surface of the leaf. The fungus appeared to infect at multiple points simultaneously on the leaf lamina following a primary mycelial growth on leaf surface. The fungus formed numerous small sclerotia on the undersurface of the leaf. The appearance of sclerotia on the leaf was akin to excreta of caterpillar. Generally the disease was confined to leaf lamina alone and did not affect the head or root

Table 1. Effect of fungicides in controlling leaf blight of radish caused by *Rhizoctonia solani*

Fungicides	Dose (% aqeuous solution)	Disease index	
		1st Crop	2nd Crop
Bavistin	0.1	1.00	2.00
Dithane M45	0.2	2.00	2.00
Fytolan	0.4	5.50*	—
Brassicol	0.4	6.25	—
Bavistin+Dithane M45	0.1+0.2	—	1.00
Pusamycin	0 02	8.75*	—
Control	—	6.50	8.00

* Phytotoxicity symptoms were recorded
— not used in field trial.

portion. If inoculum density was high, the disease might cause seedling blight in early stage of growth.

ii) Cabbage (*Brassica oleracea* var. *capitata*) and

iii) Knol khol (*Brassica caulorapa*)

The early crop of cabbage and knol khol was attacked by the disease and the symptoms produced were more or less similar to that produced on radish. Sclerotia were rarely produced on diseased plants under field condition.

iv) Cauliflower (*Brassica oleracea* var. *botrytis)*

v) Spinach (*Beta vulgaris* var. *bengalensis*),

vi) Dahlia (*Dahlia variabilis*) and

vii) Chrysanthemum (*Chrysanthemum morifolium*)

The disease appeared on the above mentioned crop as water soaked lesions on the leaves in August-October. Under rainfall and high humid conditions lesions progressed very fast and caused blighting of major area of leaf lamina. The blighted area might fall off from the leaf. In absence of rain the rotted area turned blackish and numerous sclerotia were produced.

viii) Vinca *(Vinca rosea)*

The disease was commonly observed in the rainy season. The disease first appeared on the lowest leaf as water soaked area on the leaf lamina by the side of mid-rib near the leaf base Water soaked areas gradually developed on both sides of the mid-rib and extended towards the tip of the leaf. Such affected leaves usually rolled, dried up and the dried up and the dried leaf appeared to be black.

Drying of leaves gradually proceeded towards the tip of the affected branches. In the fields many plants had been found to have a few green leaves on the top of the branches and other dried leaves remained attached to the stem. Numerous small brown or black sclerotia were found on the branches. Such affected plants remained alive for many days. In rare cases, the fungus was found to infect the branch itself, forming about 1 cm long brownish patches on it, without being lethal.

The Pathogen

The disease was caused by *Rhizoctonia solani* Kuhn (*Thanatephorus cucumeris* (Frank) Donk). Colonies on PDA were at first colourless and then rapidly becoming brown. Aerial mycelium was variable giving a felted or meally surface on which long sparsely branched hypha at advancing edge of colony were 7.0-10.5 μ wide and upto 200 μ long. The pathogen produced no sclerotia on PDA. Sclerotia formed on host were small with irregular margins and 140-502 μm x 126-415 μm in size. Young sclerotia were white but became brown on maturity. *R. solani* causing sheath blight of rice is known to produce large sized sclerotia and to attack a number of weed hosts. But the present isolate produced small sclerotia and caused leaf blight symptom.

Epidemiology

Generally the sclerotia in the soil were observed to act as primary source of inoculum. High humidity coupled with warm temperature was essential for the development and spread of the disease. Cloudy weather for a few days and rains might cause total rotting of the leaves. Severity of the disease was recorded during July to October when humidity was high and frequent rainfall was common. After October humidity and temperature gradually decreased and the incidence of the disease also got reduced.

Chemical Control

In both the trials (Table 1) Bavistin, Dithane M45 were effective in reducing the severity of the disease. Fytolan and Brassicol were ineffective. Fytolan and Pusamycin showed phytotoxic symptoms at the early stage of the crop growth and produced brown necrotic lesion on leaf lamina. In case of Pusamycin, disease severity was increased which may be due to the effect of antibiotic on the host or indirect effect of this antibiotic on antagonistic microorganisms. Combined effect of Bavistin and Dithane M45 was more pronoueced. Combined

application of such fungicides would help in protecting the crop from other diseases.

Seed treatment and spraying with Bavistin plus/or Dithane M45 will be helpful in protecting cauliflower seedling in seed bed. Spraying with these fungicides will prevent damage of costly ornamental like dahlia, chrysanthemum from *R solani*.

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