Management of Leaf Blight of Garlic with Fungicides in Central Tarai of Nepal

Prem C.P. Chaurasia[1], Jang B. Prasad[2] and Aanandi Mandal[2]

[1] Sugarcane Research Programme, Jeetpur, Bara
[2] Reasonal Agrilcultural Research Station, Parwanipur, Bara, Nepal

ABSTRACT

Management of purple blotch in garlic was carried out in 2005/06 and 2006/07 at horticultural farm of Regional Agricultural Research Station, Parwanipur in Complete Randomized Block Design with three replications. First year's results indicated insignificant effect of fungicides on Percentage Disease Intensity (PDI) of purple blotch disease of garlic as number of sprays used seemed to be inadequate. Second year's result revealed that two sprays of Bavistin @ 0.2% had lowest PDI value but at par to other different number of sprays of different fungicides except no spray of fungicide. Bulb yield was highest in two sprays of Dithane M-45 @ 0.3% followed by two sprays of Krinoxyl @ 0.15%, three sprays of Blitox-50 @ 0.3%. Plant height was insignificant and highest bulb weight was found with three sprays of Blitox-50 followed by two sprays of Bavistin. Two year's combined results indicated that two sprays of Bavistin @ 0.2% had lowest PDI value and all others PDI values were at par except control. The highest bulb yield was given by two sprays of Dithane M-45 followed by three sprays of Bavistin. Plant height and bulb weight were insignificant. It can be recommended that purple blotch disease can be managed by spraying Bavistin @ 0.2% thrice at 15 days interval or any other tested fungicides to have less disease, higher bulb yield and more economic return.

Key words: *Alternaria porri*, disease, percentage disease intensity, purple blotch

INTRODUCTION

Garlic (*Allium sativum* L.) is the most important spice crop of Nepal. It is extensively grown by every household in their kitchen gardens on small scale. It is used as spice in every vegetable dishes by Nepalese communities. It has medicinal value also. Most of the diseases reported on onion (*Allium cepa L*) are common on garlic (Miller and Lacy 1996). Garlic is heavily attacked by purple blotch disease, which is caused by *Alternaria porri* (Ell.) Neergard. Purple blotch is characterized by appearance of whitish sunken lesions on succulent leaves. The lesions appear on leaf tip and spread later to lower parts. With time they enlarge, several of them coalesce to cover large patches and girdle the succulent leaf. Pandey et al (2002) tested many fungicides and plant extracts against purple blotch which is a common disease of onion and garlic and reported that all fungicides and leaf extracts significantly controlled disease but Indofil M-45 (Mancozeb) was found the best in respect to disease control. In vitro screening of fungicides revealed them to be highly fungitoxic to leaf blight (purple blotch) of onion. Mancozeb was the effective fungicide against purple blotch disease (Quadri et al 1982). Vijay and Rahman (2004) reported that four sprays of Mancozeb @ 0.3% with Monocrotophos @ 0.05% was the best treatment and recorded the least disease incidence and highest yield. This study was undertaken to find the most effective fungicide in managing purple blotch disease of garlic.

MATERIALS AND METHODS

The trial was carried out in Randomized Complete Block Design with three replications in 2005/06 and 2006/07. The plot size was 3.0- × 2.4-m. Row to row spacing was 15 cm and bulb to bulb spacing was 10 cm. Fertilizer were applied at the rate of 80:40:50 kg NPK/ha. Half of the nitrogen and all P and K were applied as basal at the time of planting and remaining half of nitrogen was

applied in two equal parts. First part of nitrogen was given on first irrigation just 30 days after planting and second part was given one month later. In both year the trial was planted on 13 November 2005 and 2006 and harvested on 30 March 2006 and 28 March 2007. Fungicides were applied on 24 Jan and 8 Feb 2006 in first year and 2 Dec 25, Dec 2006 and 4 Jan 2007 in second year respectively. In first year one and two sprays of each fungicide were applied. However in second year two and three sprays of each fungicide were given. Fungicides used were Dithane M-45 (Mancozeb) @ 0.3%, Bavistin (carbendazim) @ 0.2%, Blitox-50 (copper oxychloride) @ 0.3% and Krinoxyl (Metalaxyl + Mancozeb) @ 0.15%. The fungicides were started to apply when leaf tip started to become yellow. The fungicides were sprayed at 15 days interval. Disease was scored once just after a month of last spray of fungicides. A half meter quadrate was thrown in the centre of plot and garlic plants enclosed inside the quadrate were graded into different grades and Percentage Disease Intensity (PDI) was calculated using the scale and formula as under:

Scale:
1 = No disease symptoms on leaves
2 = 1-5% leaf area covered with lesions
3 = 6-20% leaf area covered with disease lesions
4 = 21-50% leaf area covered with disease lesions
5 = more than 50% leaf area covered with disease lesions

$$\text{Percentage Disease Intensity (PDI)} = \frac{100 \times \text{Grade for each plant} \times \text{Number of plants}}{\text{Maximum grade} \times \text{Number of plants observed}}$$

PDI values were transferred to Arcsine values according to Gomez and Gomez (1983).

RESULTS AND DISCUSSION

First year results did not indicate significant effect of any fungicides used on management of purple blotch of garlic as number of sprays of fungicides were inadequate to bring significant effects (Table 1). However, highest bulb yield was obtained with one spray of Dithane M-45 @ 0.3% and least PDI with two sprays of Blitox -50 @ 0.3%.

Table 1. Effect of sprays of different fungicides on PDI of purple blotch, average bulb weight and bulb yield in 2005/06

SN	Fungicide	Plant ht, cm	Average bulb weight, g	Bulb yield kg/ha	Normal value
1	Dithane M -45 @0.3% one spray	44.3	22.7	2210	19.0
2	Dithane M -45 @0.3% two sprays	47.8	21.2	1650	15.5
3	Bavistin @ 0.2% one spray	48.9	30.4	1958	14.3
4	Bavistin @ 0.2% two sprays	48.0	19.8	2034	15.7
5	Blitox-50 @ 0.3% one spray	47.7	22.2	1692	15.2
6	Blitox-50 @ 0.3% two sprays	51.0	24.9	1983	14.2
7	Krinoxyl @ 0.15% one spray	46.3	25.0	1983	17.2
8	Krinoxyl @ 0.15% two sprays	48. 6	25.5	1983	14.7
9	Control (no spray0	50.0	25.4	1388	22.8

The control had highest plant height and lowest bulb yield and average bulb weight was highest in case of one spray of Bavistin @ 0.2%. Vijay and Rahman (2004) found that four sprays of Mancozeb @ 0.3% was the most effective in controlling purple blotch of onion. In he current study, use of one and two sprays of different fungicides' results was inconclusive.

From second year's results, it was evident that two and three sprays of different fungicides had significant effect on PDI of purple blotch, bulb weight (kg/ha), average bulb weight and arcsine value of PDI (Table 2). The lowest PDI value was recorded in two sprays of Bavistin @ 0.2% followed by three sprays of Krinoxyl @ 0.15%, two sprays of Blitox-50 @ 0.3%, three sprays of

Bavistin, three sprays of Blitox-50 @ 0.3% and two sprays of Krinoxyl @ 0.15% and two spray of Dithane M-45 @ 0.3% respectively. Control had significantly higher PDI value. Plant heights were insignificant and highest average bulb weight was found in case of three sprays of Blitox-50 @ 0.3% followed by two sprays of Bavistin @ 0.2%. The highest bulb yield was found in two sprays of Mancozeb (Dithane M-45) followed by two sprays of Krinoxyl and three sprays of Blitox -50.

Table 2. Effect of two and three sprays of different fungicides on PDI, Arc sine value of PDI and other agronomic parameters 2006/07

SN	Fungicides	Plant ht, cm	Average bulb weight, g	Bulb yield, kg/ha	Percentage Disease Intensity (PDI)	
				kg/ha	Normal value	Arc sine value
1	Dithane M-45 two sprays @ 0.3%	40.9	27.2b	2328.7a	11.6 bc	19.8 bc
2	Dithane M-45 three sprays @ 0.3%	42.0	22.7e	1254.6fe	12.1 b	20.4 b
3	Bavistin two sprays @ 0.2%	47.3	30.4a	1505.3d	9.8 c	18.3c
4	Bavistin three sprays @ 0.2%	40.4	20.6f	1745.4cb	11.2 bc	19.4bc
5	Blitox -50 two sprays @ 0.3%	42.7	24.3d	1486.1d	11.1 bc	18.4 bc
6	Blitox-50 three sprays @ 0.3%	47.3	31.6a	1893.5b	11.4 bc	19.7 bc
7	Krinoxyl two sprays @ 0.15%	41.8	27.9b	1898.1b	11.4 bc	19.7 bc
8	Krinoxyl three sprays @ 0.15%	44.5	27.9b	1824.1b	10.7 bc	19.1 bc
9	No spray, control	46.3	26.6c	1388.6e	20.6 a	26.9 a
	CV, %		13.9	14.4	8.5 3	4.72

Figures marked with same letters are not significantly different at P = 0.05% as judged by DMRT.

Two year's pooled results indicated that three sprays of Bavistin @ 0.2%, three sprays of Blitox-50 @ 0.3% and three sprays of Krinoxyl @ 0.15% gave better control and were at par in respect to PDI followed by three sprays of Dithane M-45 @ 0.3%, two sprays of Bavistin @ 0.2% (Table 3). Highest bulb yield was obtained with two sprays of Dithane M-45 @ 0.3% and lowest bulb yield was given by control (no spray of fungicide).

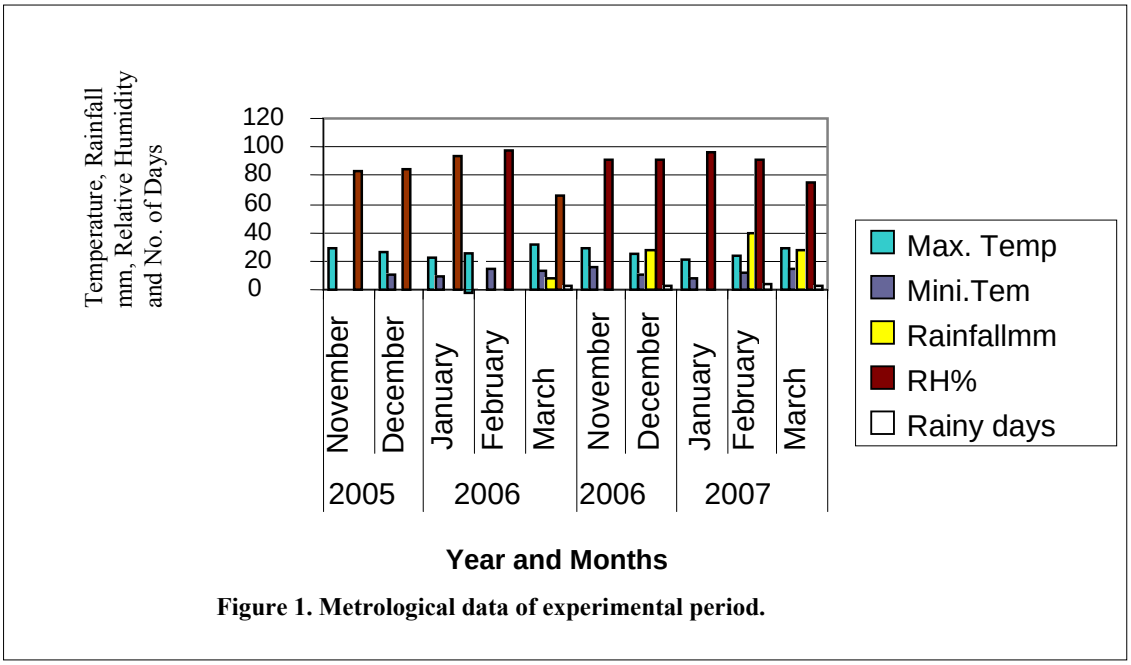

Figure 1. Metrological data of experimental period.

This contracdict with others' findings who had reported that four sprays of Dithane M-45 @ 0.3% was the most effective in controlling purple blotch of onion (Vijay and Rahman 2004, Panday et al 2002). However, we have not tested four sprays of any fungicides so effects of four sprays of fungicides were unknown. From above discussion, it is clear that purple blotch of garlic can be effectively managed by applying three sprays of either Bavistin @ 0.2% or Blitox-50 @ 0.3%, Krinoxyl @ 0.15% or Dithane M-45 @ 0.3%. Maximum, minimum temperature and relative

humidity were favorable for disease development in both the years (Figure 1) during experimental periods.

Table 3. Two years pooled effect of different number of sprays of different fungicides on PDI, Arc sine PDI value and agronomic parameters

SN	Fungicides	Plant ht, cm	Average bulb weight, g	Bulb yield, kg/ha	Percentage Disease Intensity (PDI)	
					Normal value	Arc sine value
1	Dithane M-45 two sprays	44.3	22.7	2210 a	19.0 b	25.4 b
2	Dithane M-45 three sprays	47.8	21.2	1650 f	15.5 c d	23.1 c d
3	Bavistin two sprays	48.9	30.4	1958 d	14.1d	21.8 d
4	Bavistin three sprays	48.0	19.8	2034 b	15.7 cd	23.0 c d
5	Blitox two sprays	47.7	22.2	1692 e	15.2 d	22.8 d
6	Blitox three sprays	51.0	24.9	1983 c	14.2 d	22.0 d
7	Krinoxyl two sprays	46.3	25.0	1990 c	17.2 c	24.2 b c
8	Krinoxyl three sprays	48.6	25.0	1986 c	14.7 d	22.1d
9	Control	50.0	25.0	1388 g	22.8 a	28.1 a
	CV, %		21.27	21.27	27.14	3.68

Figures marked with same letters are not significantly different at P = 0.05% as judged by DMRT.

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