

## Evaluation of Appropriate Time for the Application of Rovral Against Alternaria Blight Incidence and Yield of Mustard

<sup>1</sup>N.A. Sultana, <sup>1</sup>M.A.H. Khan, <sup>1</sup>M.N. Islam and <sup>2</sup>Kamrun Nahar

<sup>1</sup>Agricultural Research Station, Bangladesh Agricultural Research Institute, Comilla, Bangladesh

<sup>2</sup>Department of Agricultural Botany, Sher-e-Bangla Agricultural University, Dhaka-1207, Bangladesh

**Abstract:** A field experiment was conducted at agricultural research station, Comilla during winter (November, 2008 to February, 2009) to identify the appropriate time of single application of Rovral® in controlling *Alternaria* blight disease of mustard. Results revealed that single spray of Rovral® @ 2 g LG<sup>1</sup> of water at 30, 40, 50 and 60 days after sowing (DAS) control the disease severity of leaf blight compare to 70 DAS and control. These results indicate that disease severity, seed yield and yield contributing characters were significantly influenced by variety and single time of spray. Three time application of Rovral® produced the lowest disease severity and produced highest seed yield. The highest seed yield (1747.33 kg haG<sup>1</sup>), lowest disease severity (1.7) and PDI (8.89) were recorded from the treatment combination V<sub>1</sub>T<sub>6</sub> (BARI Sarisa-9 with 3 spray). The second highest seed yield (1588.10 kg haG<sup>1</sup>) and lowest severity (2.0) were obtained from treatment combination V<sub>1</sub>T<sub>3</sub> (BARI Sarisa-9 with single spraying Rovral® at 50 DAS).

**Key words:** Rapeseed % *Alternaria* blight % Disease severity % Incidence % Seed yield

### INTRODUCTION

Amongst the oilseed crops, rapeseed and mustard (*Brassica spp.*) play a pivotal role in Agricultural economy of the world. These two crops are affected by a number of diseases limiting productivity of the crop over a wide area. Among them leaf blight caused by *Alternaria brassicae* and *Alternaria brassicicola* is widely distributed and the most predominant damaging foliar disease of rapeseed- mustard in Bangladesh. It occurs quite regularly every year during the cropping season (October to March). The disease cause a considerable yield loss and degrades the health of the seed. All the green parts of the plant are attacked. This is a seed borne, air borne as well as soil borne disease. The yield loss due to this disease has been estimated up to 47% [1]. The loss were also variable like 30-60% [2,3] and 10-70% [4]. In certain cultivar of *Brassica juncea*, the yield loss may go to the extent of 70%. Pathogen survives in the soil along with the refuge of the infected plants. If the weather condition are favorable the conidia form within three or four days after infection. The leaves of the plant fall prematurely, covered with spots and the spot ripen before time. The disease causes blight of leaf, pod and stem [2] and seed abnormalities [5]. In addition to direct loss of

yield it also affect the quality of seed, its germination by reducing seed size, impairing seed colour and oil contents [6, 7]. In the absence of having disease resistant variety chemical are being successfully used in controlling the disease [2, 6]. The disease can be manage to some extent, by the use of fungicides [7] but environmental imbalanced is the major problem in various regions due to injudicious, unplanned and ultimately application of fungicides which causes health hazards. Fungicide Rovral® was identified to effectively control the disease but which is expensive. To overcome some of this problem it is necessary to use minimum chemical for controlling the disease. Therefore, the present investigation was undertaken to determine the appropriate time of single application of Rovral® for reducing disease severity and obtain maximum yield so that effective disease management strategy can be developed against *Alternaria* blight of mustard.

### MATERIALS AND METHODS

The research work was carried out at the Agricultural Research Station Comilla during winter season (November, 2008 to February, 2009). The experiment was laid in a Randomized Complete Block

Design (RCBD) with a factorial arrangement with three replications. The land was well prepared and seeds of susceptible short duration variety BARI Sharisa-9 and BARI Sharisa-14 were sown on November 5, 2008 in 30 cm apart from lines. The unit plot size was 3 m × 2 m. Seven (7) treatments were included in the experiment. The treatments were T<sub>1</sub>= single spray of Rovral® @ 50WP @ 2g LG<sup>1</sup> at 30 DAS (Days after sowing) T<sub>2</sub>= single spray of Rovral® at 40 DAS, T<sub>3</sub>= single spray of Rovral® at 50 DAS, T<sub>4</sub>= single spray of Rovral® at 60 DAS, T<sub>5</sub>= single spray of Rovral® at 70 DAS, T<sub>6</sub>= Recommended that means three spray were done at 10 days interval starting from just appeared the symptom at the disease and T<sub>7</sub>= Control. The crop was allowed to grow under natural infections. Fertilizer was applied 120 kg, 90 kg, 60 kg, 33 kg, 13.5 kg and 1.9 kg per hectare as N P K S, Zn and B respectively. Half of the urea and all other fertilizers were applied before sowing of seeds. The rest of urea was top dressed at 25 DAS and other agronomic practices like weeding and Irrigations were done whenever needed to raise a good crop. The Data were recorded from 10 randomly selected plants per plot. The Data were statistically analyzed through MSTAT [8] and the Treatment means were separated by DMRT. After maturity crop was harvested and Data of Plant height, Branch per plant, pods plantG<sup>1</sup>, seeds plantG<sup>1</sup>, 1000-seed weight and seed yield (kg haG<sup>1</sup>) was taken. Finally yield loss was also calculated as percentage. Leaf blight disease severity was recorded after last spray on the basis of 0-5 disease rating scale proposed by Meah [9].

#### **The Scales Are as Follows:**

- 0 = leaves free from leaf spot
- 1 = 0.1-6% leaf or pod area diseased
- 2 = 6.1% - 12% leaf or pod area diseased
- 3 = 12.1-25% leaf or pod area diseased
- 4 = 25.1% -50% leaf or pod area diseased
- 5 = Above 50% leaf or pod area diseased

Finally percentage of disease index (PDI) was computed using the formula below:

$$\text{PDI} = \frac{\text{Total sum of rating}}{\text{Number of leaf counted}} \times \text{maximum grade} \times 100$$

## **RESULTS AND DISCUSSION**

**Effect on Variety:** Results of the experiment showed that number of pod plantG<sup>1</sup>, pod length, seed podG<sup>1</sup>, percent disease index, disease severity and seed yield (kg haG<sup>1</sup>)

were significant among the varieties. The higher number of pod plantG<sup>1</sup> and pod length was observed in BARI Sarisa-9 but higher number of seed podG<sup>1</sup> and 1000 seed wt was found in BARI Sarisa-14. BARI Sarisa-9 produced higher seed yield (1489.73 kg haG<sup>1</sup>) than BARI Sarisa-14. The lower disease severity and PDI was observed in BARI Sharisha-9. The lower disease severity and PDI indicate the higher seed yield of mustard. Among two varieties BARI Sarisa-14 showed more susceptibility compare to BARI Sarisa-9.

**Effect on Single Spray:** All of the yield and yield contributing characters give significant result among the single spray of Rovral® except plant height and pod length. The highest number of branches plantG<sup>1</sup> (6.1) was observed from recommended sprayed plot which was followed by spraying at 60 DAS (5.5) and they are statistically identical. Pod plantG<sup>1</sup>, seed podG<sup>1</sup> and 1000-seed weight was also found highest in the recommended sprayed plot. Results revealed that single spray of Rovral® (2 g LG<sup>1</sup>) at 30, 40, 50 and 60 DAS control the leaf blight disease severity and increased seed yield compared to spraying at 70 DAS and controlled plot. Recommended Rovral® sprayed plot produced lowest disease severity (1.83) which was significantly differ among other treatments. The second lowest disease severity was found in spraying at 50 DAS (2.33) which was statistically identical to spraying at 30 DAS and 40 DAS. The significantly lowest PDI value was also found in recommend spray (10.73) followed by spraying at 50 DAS (23.91) and 40 DAS (25.03) and 30 DAS (25.80) they are statistically identical. The highest 1000 seed weight was (3.38 g) was obtained from Recommended spray which was statistically identical to spraying at 50 DAS (3.28 g) and 40 DAS (3.26). The highest seed yield of mustard (1622.58 kg haG<sup>1</sup>) was found in recommended sprayed plot followed by spraying at 50DAS (1412.44 kg haG<sup>1</sup>). The lowest PDI as well as disease severity indicated the highest seed yield. It was also proved from recommended Rovral® sprayed plot. Control plot produced highest disease severity (4.83) and PDI (53.55) which indicate lowest seed yield (1120.94 kg haG<sup>1</sup>) of mustard.

**Interaction of Variety and Single Spray Time:** Interaction of variety and single spray time of Rovral® showed significant influence in disease severity, yield and yield contributes. The maximum number of pod plantG<sup>1</sup> was found in T<sub>6</sub>V<sub>1</sub> (149.55) and it was statistically identical in T<sub>2</sub>V<sub>1</sub> to T<sub>5</sub>V<sub>1</sub>. The number of seed podG<sup>1</sup> was found

Table 1: Effect on mustard variety of *Alternaria* leaf blight severity, yield and yield contributing characters at ARS, Comilla during Rabi 2008-09

Variety	Plant population	Plant height(cm)	No. of branches plantG <sup>1</sup>	No. of pods plantG <sup>1</sup>	Pod length(cm)	No. of seed podG <sup>1</sup>	1000-seed weight (g)	Disease severity (0-5) scale	PDI	Seed yield (kg haG <sup>1</sup> )	% yield loss
V <sub>1</sub>	61.657	106.32	5.70	138.66	5.19	14.88	2.88	3.09	26.58	1489.73	14.95
V <sub>2</sub>	62.357	95.36	4.82	71.34	4.94	27.03	3.15	3.38	31.08	1209.19	30.68
LSD <sub>0.05</sub>	NS	NS	NS	16.02	0.859	3.701	NS	0.68	3.556	81.01	4.627
CV (%)	10.96	6.61	13.64	9.09	10.10	10.52	8.22	12.61	7.35	3.60	12.08

V<sub>1</sub>=BARI Sarisa-9, V<sub>2</sub>=BARI Sarisa-14

Table 2: Effect on appropriate time on single spray of Rovral® against leaf blight severity, yield and yield contributing characters at ARS, Comilla during Rabi 2008-09

Time of single spray	Plant height(cm)	No. of branches plantG <sup>1</sup>	No. of pods plantG <sup>1</sup>	Pod length(cm)	No. of seed podG <sup>1</sup>	1000-seed weight(g)	Disease severity (0-5) scale	PDI	Seed yield (kg haG <sup>1</sup> )	% yield loss over T <sub>6</sub>
T <sub>1</sub> (30 DAS)	97.3	4.88 bc	97 b	5.09 ab	21 abc	3.0 bc	2.83 c	25.8 d	1366 bc	21.6 d
T <sub>2</sub> (40 DAS)	104	5.43 abc	109 ab	5.18 b	22 ab	3.26 ab	2.66 c	25.0 d	1397 b	20.2 d
T <sub>3</sub> (50 DAS)	98.0	4.53 c	108 ab	5.39 a	22 ab	3.28 ab	2.33 c	23.9 d	1412 b	19.8 d
T <sub>4</sub> (60 DAS)	99.5	5.50 ab	101 b	4.89 ab	20 bc	3.01 bc	3.66 b	29.5 c	1304 c	25.1 c
T <sub>5</sub> (70 DAS)	101.0	5.06 bc	101 b	5.10 ab	20 bc	2.75 c	4.50 a	33.3 b	1221 d	30.0 b
T <sub>6</sub> (3 spray)	100.0	6.10 a	119 a	5.26 a	23 a	3.38 a	1.83 d	10.7 e	1622 a	-
T <sub>7</sub> (No spray)	104.0	5.30 abc	100 b	4.55 b	19 c	2.43 d	4.83 a	53.55 a	1120 e	35.8 a
LSD <sub>0.05</sub>	NS	1.204	16.02	NS	3.701	0.417	0.68	3.556	81.01	4.62
CV (%)	6.61	13.64	9.09	10.10	10.52	8.22	12.61	7.35	3.60	12.1

Values in a column sharing common letters do not differ significantly (P<0.05)

Table 3: Combined effect on appropriate time on single spray and variety against leaf blight severity, yield and yield contributing characters at ARS, Comilla during Rabi 2008-09

Treatment	Plant height(cm)	No. of branches plantG <sup>1</sup>	No. of pods plantG <sup>1</sup>	Pod length(cm)	No. of seed podG <sup>1</sup>	1000-seed weight(g)	Disease severity (0-5) scale	PDI	Seed yield (kg haG <sup>1</sup> )	% yield loss over T <sub>6</sub> V <sub>1</sub>
V <sub>1</sub> T <sub>1</sub>	99.17 b-e	4.83 b-e	124.43 c	5.34 ab	14.83 bcd	2.80 bcd	3.0 cde	24.40 fg	1493.78 cd	14.31 de
V <sub>1</sub> T <sub>2</sub>	111.1 ab	6.20 ab	145.00 ab	5.52 a	15.23 bcd	3.10 abc	2.3 efg	22.50 gh	1550.50 bc	11.89 e
V <sub>1</sub> T <sub>3</sub>	102.8 a-e	5.46 abc	149.08 a	5.38 a	16.56 bc	3.20 ab	2.0 fg	20.26 h	1588.10 b	10.44 e
V <sub>1</sub> T <sub>4</sub>	106.2 a-d	5.66 abc	138.38 abc	5.49 a	14.0 cd	2.80 bcd	3.7 bc	27.73 h	1487.99 de	18.07 cd
V <sub>1</sub> T <sub>5</sub>	108.3 adc	6.40 a	132.93 abc	5.11 abc	13.63 cd	2.70 cd	4.3 ab	31.46 def	1374.87 e	21.21 c
V <sub>1</sub> T <sub>6</sub>	103.0 a-e	5.86 abc	149.55 a	5.14 abc	18.26 b	3.26 ab	1.7 g	8.89 d	1748.33 a	-
V <sub>1</sub> T <sub>7</sub>	113.4 a	5.46 abc	131.33 bc	4.36 bc	11.66 d	2.33 d	4.7 a	50.80 j	1244.55 f	28.71 b
V <sub>2</sub> T <sub>1</sub>	95.53 cde	4.93 bcd	68.65 e	4.83 abc	26.73 a	3.20 ab	2.7 def	27.20 b	1238.74 f	28.95 b
V <sub>2</sub> T <sub>2</sub>	96.86 cde	4.66 cde	72.80 e	4.84 abc	28.13 a	3.43 a	2.3 efg	25.33 ef	1244.05 f	28.57 b
V <sub>2</sub> T <sub>3</sub>	93.27 de	3.60 e	66.40 e	5.4 a	26.83 a	3.36 a	3.3 cd	29.80 fg	1236.77 f	29.08 b
V <sub>2</sub> T <sub>4</sub>	92.86 e	5.33 abc	64.06 e	4.30 c	26.86 a	3.23 ab	3.7 bc	31.20 de	1181.60 f	32.19 b
V <sub>2</sub> T <sub>5</sub>	95.53 cde	3.73 de	69.02 e	5.08 abc	26.46 a	2.80 bcd	4.7	35.20 d	1068.43 g	38.86 a
V <sub>2</sub> T <sub>6</sub>	97.80 cde	6.33 a	88.86 d	5.38 a	28.53 a	3.50 a	2.0 fg	12.57 c	1496.82 cd	14.19 de
V <sub>2</sub> T <sub>7</sub>	95.67 cde	5.13 abc	69.40 e	4.75 abc	26.63 a	2.53 d	5.0 a	56.30 a	997.32 g	42.89 a
LSD <sub>0.05</sub>	11.19	1.204	16.02	0.859	3.701	0.417	0.68	3.556	81.01	4.627
CV (%)	6.61	13.64	9.09	10.10	10.52	8.22	12.61	7.35	3.60	12.08

Values in a column sharing common letters do not differ significantly (P<0.05)

highest in T<sub>6</sub>V<sub>2</sub> (28.53) followed by T<sub>2</sub>V<sub>2</sub> and it was statistically identical in T<sub>1</sub>V<sub>2</sub> to T<sub>7</sub>V<sub>2</sub>. In 1000 seed weight the highest seed weight was recorded from T<sub>6</sub>V<sub>2</sub> (3.5) and the lowest was recorded from T<sub>7</sub>V<sub>1</sub> (2.3). In case of disease severity, the lowest disease severity was found in T<sub>6</sub>V<sub>1</sub> (1.7) followed by T<sub>3</sub>V<sub>1</sub> (2.0), T<sub>6</sub>V<sub>2</sub> (2.0) and they are statistically similar. The highest disease severity was

found in T<sub>7</sub>V<sub>2</sub> (5.0) which was statistically similar to T<sub>5</sub>V<sub>2</sub>, T<sub>7</sub>V<sub>1</sub> and T<sub>5</sub>V<sub>1</sub>. The maximum seed yield (1748.33 kg haG<sup>1</sup>) was obtained from T<sub>6</sub>V<sub>1</sub> followed by T<sub>3</sub>V<sub>1</sub> (1588 kg haG<sup>1</sup>) and the lowest seed yield (997.32 kg haG<sup>1</sup>) was recorded from control treatment. As high as 42.89% yield reduction was calculated in control treatment (T<sub>7</sub>V<sub>2</sub>) compared to the yield of (T<sub>6</sub>V<sub>1</sub>).

From the result of the experiment it may be concluded that spraying Rovral® (recommended) as well as single spray of Rovral® @ 2 g LG<sup>1</sup> at 50 DAS is well adjusted to reduce disease severity significantly over control and also increased seed yield. This finding is also supported by the reports on Meah *et al.* [10].

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