

## Effect of Foliar Spray of Fungicides and Macronutrients (Tracel) Against Early Blight (*Alternaria solani*) of Potato” under Field Conditions

Niraj Kumar Tripathi\* and Sobita Simon

Department of Plant Protection Sam Higginbottom Institute of Agriculture, Technology & Sciences,  
Deemed-to-be University Allahabad-211007

\*Corresponding Author E-mail: [mailnirajtirpathi@gmail.com](mailto:mailnirajtirpathi@gmail.com)

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### ABSTRACT

The Field experiment was conducted at S.H.I.A.T.S during rabi season of 2011- 2012 to show the effect of Tracel @ 2500 g/ha (N,P,K) Ril-057/F1@1000/ha (formulation) + TaceL @ 2500 g/ha Mancozeb 75% @ 1500 g/ha (formulation) Ril-057/F1 @ 1000 g/ha (formulation) + Mancozeb 75 % WP @ 1500 g/ha (formulation) Ril-057/F1 @ 1000 g/ha (formulation) as compare to Control in the form of foliar spray to manage the early blight of potato. The Experiment was analyzed by using randomized block design (R.B.D.). Foliar spray with Ril-057/F1@1000g/ha (formulation) + Mancozeb 75 % WP @ 1500 g/ha (formulation) proved to be most effective against early blight of potato showing minimum disease intensity at 45, 60 & 75 DAS (6.25, 13.25 & 21.50%) and producing maximum yield (148.75 q/ha) (74.41 cm), plant height at 30, 60, 90 DAS (21.25, 42.12, 52.27 cm) followed by Mancozeb 75% @ 1500g/ha minimum disease intensity at 45, 60 & 75 DAS (9.25, 15.50 & 23.50%) and maximum plant height at 30, 60, 90 DAS (19.97, 40.35,49.80 cm). It was observed Ril-057/F1 @ 1000 g/ha (formulation) + Mancozeb 75 % WP @ 1500 g/ha (formulation) was significantly superior as compared to other treatments. Thus foliar spray with Ril-057/F1 @ 1000 g/ha (formulation) + Mancozeb 75 % WP @ 1500 g/ha (formulation) can be made become a part of management of early blight of potato.

**Key words:** Potato, *Alternaria solani* and fungicides

### INTRODUCTION

Potato is well known as the king of vegetables has emerged as one of the most important food crop in India. Potato takes the 4<sup>th</sup> places in order of importance after wheat, rice and maize. It is a major source of starch, vitamin, minerals and proteins. However, early blight of potato. Agriculture is the backbone of the Indian economy. The most important goal in

agriculture is to achieve higher productivity and production to meet the ever increasing demand of food commodity production.

At the inception of CPRI in 1999, India used to produce 1.54 million tonnes potato out of 0.234 million hectares with an average yield of 6.58 tonnes/ha based on the average ranging from 1999-2000.

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India has produced 23.63 million tonnes of potatoes from 1.29 million ha with an average of 18.23 per ha. India is second largest producer of vegetable in the world (suppressed only by china) in 2002. India has produced 78.2 million tonnes of vegetable from 5.37 million ha of land. Indian farmer grow amazing numbers of about 175 different vegetables, among these potato, tomato, onion, cabbage, and cauliflower account for 60% of total production. It projected the domestic vegetable requirement rise from current 83-91 million tonnes to 151-193 million tonnes by 2030. Indian former cannot meet the high demand for vegetables, Indian Council of Agricultural research has three major institutes for conducting research on vegetables, Indian institute of vegetable research (IIVR) In Varanasi, Indian Institute of Horticulture Research (IIHR) in Bangalore, Hassargatta, Karnataka, and Indian Agriculture Research Institute (IARI) in New Delhi.

#### MATERIALS AND METHODS

The Field experiment was conducted at S.H.I.A.T.S during rabi season of 2011- 2012. Allahabad is situated at 25.27 degree north latitude 80.5 degree East longitude and at an altitude of 98 meter above sea level. The climate is typically semi arid and sub tropical. The maximum temperature reaches upto 47.7<sup>0</sup>C in summer and drops down to 1.5 degree in winter. In the experiment Randomized Block Design (RBD) was adopted. The analysis of variance (ANOVA) technique was applied for drawing conclusion from data. The potatoes were peeled and cut into small pieces and boiled in 500 ml of water till they become soft. The extract obtained was filtered through cheese cloth and all the liquid was squeezed in beaker. 20 g agar was added bit by bit to the rest of 500 ml hot water to dissolve. Then 20 g of dextrose was added. Volume of broth made up to 1000 ml by adding more distilled water. Then 200 ml of this solution was dispensed to each of five conical flasks and sterilized at 121<sup>0</sup>C at 15 lbs pressure/inch<sup>2</sup> for 15 minutes in an autoclave. The infected plant, showing characteristic

symptoms of early blight of potato (infected plant collect from Plant Protection Central Research Farm) was cut with healthy portion into small pieces (2 mm), surface sterilized with 0.1 percent mercuric chloride (HgCl<sub>2</sub>) solution, 3time washed with sterilized distilled water and then transferred on aseptically on PDA medium containing petri-plates.

#### RESULT AND DISCUSSION

##### Plant height (cm) at 30 DAT

The data reported in table No.1 and deputed in graph No.1 Result showed that the significant increase of plant height was recorded in T<sub>5</sub> foliar spray with Ril-057/F1 + Mancozeb75%WP (21.25cm) followed by T<sub>4</sub>. Mancozeb 75%WP (19.975cm), T<sub>6</sub>- Ril-057/F1 (16.850cm), T<sub>3</sub>. Ril-057/F1 + Tracel (15.975cm), T<sub>2</sub>- Tracel (14.225cm) as compared to Control T<sub>1</sub> (13.125cm).

All the chemical treatments were found statistically significant over control and T<sub>3</sub> T<sub>6</sub> were non significant among each other. However, foliar spray of Ril-057/F1 + Mancozeb was found superior over all the treatments and T<sub>2</sub> (Tracel) was found least significant among chemical treatments.

Result showed that significant increase of plant height was recorded in T<sub>5</sub> foliar spray with Ril-057/F1 + Mancozeb75%WP (42.1cm) followed by T<sub>4</sub>. Mancozeb 75%WP (40.3cm), T<sub>6</sub>- Ril -057/F1 (38.0cm), T<sub>3</sub>. Ril-057/F1 + Tracel (37.3cm), T<sub>2</sub> - Tracel (39.2cm) as compared to control T<sub>1</sub> (31.1cm).

All the chemical treatments were found statistically significant over control and T<sub>6</sub>, T<sub>3</sub>, T<sub>3</sub>, T<sub>2</sub>, T<sub>2</sub>, T<sub>4</sub>, T<sub>4</sub>, T<sub>5</sub> were non significant among each other.

However, foliar spray of Ril-057/F1 + Mancozeb was found superior over all the treatments and ( Tracel) was found least significant among chemical treatments.

The maximum plant height was recorded in T<sub>5</sub> foliar spray with Ril-057/F1+ Mancozeb75%WP (52.2cm) followed by T<sub>4</sub>. Mancozeb 75%WP (49.8cm), T<sub>6</sub>- Ril -057/F1 (46.6cm), T<sub>3</sub>. Ril-057/F1 + Tracel (47.3cm), T<sub>2</sub> - Tracel (49.1cm) as compared to control T<sub>1</sub> (41.0cm).

All the treatments were found statistically significant over control and T<sub>6</sub>, T<sub>3</sub>, T<sub>3</sub>, T<sub>2</sub>, T<sub>2</sub>, T<sub>4</sub>, T<sub>4</sub> T<sub>5</sub>, were non significant among each other.

However, foliar spray of Ril-057/F1 + Mancozeb was found superior over all the treatments and (Tracel) was found least significant among treatments.

The results of the present study are in accordance to the findings of they reported that In the present-result showed that all the treatments tested in this study gave satisfactory result against early bight of potato (*Alternaria solani*) T<sub>5</sub> = Ril057/F1 @ 1000g/ha + Mancozeb75% WP @ 1500g/ha at 30 DAS, 60 DAS and 90 DAS ( 21.25, 42.12 and 52.27 cm ) of plant height were observed compared

as Control(13.12,31.12 and 41.07cm) which are agreement to the present finding.

The data reported at 45 DAT, result showed that the maximum plant height was recorded in T<sub>5</sub> foliar spray with Ril-057/F1 + Mancozeb75%WP (6.2cm) followed by T<sub>4</sub> Mancozeb 75%WP (9.2cm), T<sub>6</sub>- Ril -057/F1 (10.2cm), T<sub>3</sub>- Ril-057/F1 + Tracel ( 9.2cm), T<sub>2</sub> - Tracel (8.2cm) as compared to control T<sub>1</sub> (41.0cm).

All the treatments were found statistically significant over control and T<sub>5</sub>, T<sub>4</sub> ; T<sub>4</sub>, T<sub>3</sub>; T<sub>3</sub> T<sub>2</sub>., T<sub>2</sub>, T<sub>6</sub> were non significant among each other.

However, foliar spray of Ril-057/F1+Mancozeb was found superior over all the treatments and (Tracel) was found least significant among treatments.

CD (0.05%) 3.423

Treatment	T <sub>5</sub>	T <sub>4</sub>	T <sub>3</sub>	T <sub>2</sub>	T <sub>6</sub>	T <sub>1</sub>
Mean	6.25	8.25	9.25	9.25	10.25	20.80

The data reported at 60 DAT, results showed that the maximum plant height was recorded in T<sub>5</sub> foliar spray with Ril-057/F1 + Mancozeb75%WP (13.2cm) followed by T<sub>4</sub> Mancozeb 75%WP (15.5cm), T<sub>6</sub>- Ril -057/F1 (19.2cm), T<sub>3</sub> Ril-057/F1 + Tracel (17.5cm), T<sub>2</sub> - Tracel (17.5cm) as compared to control T<sub>1</sub> (37.6cm).

All the treatments were found statistically significant over control and T<sub>5</sub>, T<sub>4</sub>; T<sub>4</sub>, T<sub>2</sub>; T<sub>2</sub>, T<sub>3</sub>; T<sub>3</sub>, T<sub>6</sub> were non significant among each other.

However, foliar spray of Ril-057/F1 + Mancozeb was found superior over all the treatments and ( Tracel) was found least significant among treatments.

CD (0.05%) 3.007

Treatment	T <sub>5</sub>	T <sub>4</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>6</sub>	T <sub>1</sub>
Mean	13.25	15.50	17.50	17.50	19.25	37.60

The data reported in At 75 DAT Result showed that the maximum plant height was recorded in T<sub>5</sub> foliar spray with Ril-057/F1 + Mancozeb75%WP (21.5cm) followed by T<sub>4</sub> Mancozeb 75%WP (23.5cm), T<sub>6</sub>- Ril -057/F1 (28.7cm), T<sub>3</sub> Ril-057/F1 + Tracel (27.0cm), T<sub>2</sub> - Tracel (26.0cm) as compared to Control T<sub>1</sub> (54.0 cm).

All the treatments were found statistically significant over control and T<sub>5</sub>, T<sub>4</sub>; T<sub>4</sub>, T<sub>2</sub>; T<sub>2</sub>, T<sub>3</sub>, T<sub>3</sub>, and T<sub>6</sub> were non significant among each other.

However, foliar spray of Ril-057/F1 + Mancozeb was found superior over all the treatments and (Tracel) was found least significant among treatments.

CD (0.05%) 3.352

Treatment	T <sub>5</sub>	T <sub>4</sub>	T <sub>2</sub>	T <sub>3</sub>	T <sub>6</sub>	T <sub>1</sub>
Mean	21.50	23.50	26.50	27.50	28.75	54.00

The results of the present study are in accordance to the findings of the Chand, G<sup>1</sup>., and Yadav *et al*<sup>2</sup>., the reported that In the present-result showed that all the treatments tested in this study gave satisfactory result against early bight of potato (*Alternaria Solani*) T<sub>5</sub>= Ril057/F1@1000g/ha+ Mancozeb75%WP@ 1500g/ha at 45 DAS,60 DAS and 75 DAS ( 6.2, 13.2 and 21.5cm ) of disease intensity were observed compared as Control(20.0,37.6 and 54.0cm). These finding agreement with 4,5,2.

#### Yield at 120 Days

The data reported in table No.3 and deputed in graph No. 3 The yield was recorded at 120 DAT and analyzed data is presented in table

CD (0.05%) 16.319

Treatment	T <sub>1</sub>	T <sub>6</sub>	T <sub>4</sub>	T <sub>3</sub>	T <sub>2</sub>	T <sub>5</sub>
Mean	100.00	113.00	126.00	130.00	140.25	148.75

(3) Result shows that the maximum yield was recorded in Ril-057/F1 + Mancozeb75%WP (148.75q/ha) in treatment T<sub>5</sub> followed by Tracel (140.25q/ha) in treatment T<sub>2</sub> Ril-057/F1 + Tracel (130.00q/ha) in treatment T<sub>3</sub> Mancozeb 75%WP (126.00) in treatment T<sub>4</sub> Ril-057/F1 (113.00q/ha) in the treatment T<sub>6</sub> Control (100.00q/ha) in treatment T<sub>1</sub>.

All the treatment were found statistical significant over control and non significant with each other. However Ril-057/F1 + Mancozeb T<sub>5</sub> foliar spray found superior over all the treatment in least significant was found in treatment T<sub>6</sub> (Ril-057/F1). These finding supported by 1.

The results of the present study are in accordance to the findings of the 1, 6, and 3.

**Table 1: Effect the foliar spray of Tracel, Ril and Mancozeb on plant height(cm) of potato**

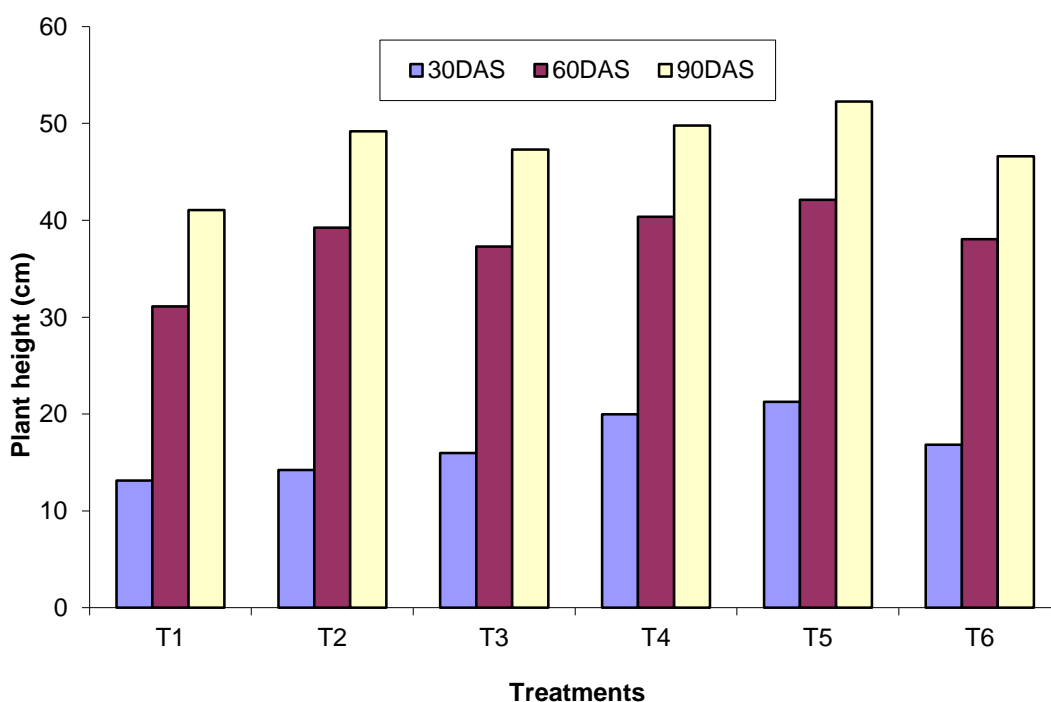
Treatments		Plant height(cm)		
		30 DAS	60 DAS	90 DAS
T <sub>1</sub>	Control (N,P,K)	13.125	31.125	41.075
T <sub>2</sub>	Tracel@2500g/ha	14.225	39.225	49.175
T <sub>3</sub>	Ril-057/F1@1000/ha(formulation) + Tracel@2500g/ha	15.975	37.300	47.300
T <sub>4</sub>	Mancozeb75% @1500g/ha(formulation)	19.975	40.350	49.800
T <sub>5</sub>	Ril-057/F1@1000g/ha(formulation)+ Mancozeb75% WP@1500g/ha (formulation)	21.250	42.125	52.275
T <sub>6</sub>	Ril-057/F1@1000g/ha (formulation)	16.850	38.050	46.600
<b>F test</b>		S	S	S
<b>SEd (±)</b>		0.471	1.662	1.281
<b>CD (p= 0.05)</b>		0.884	3.574	2.730

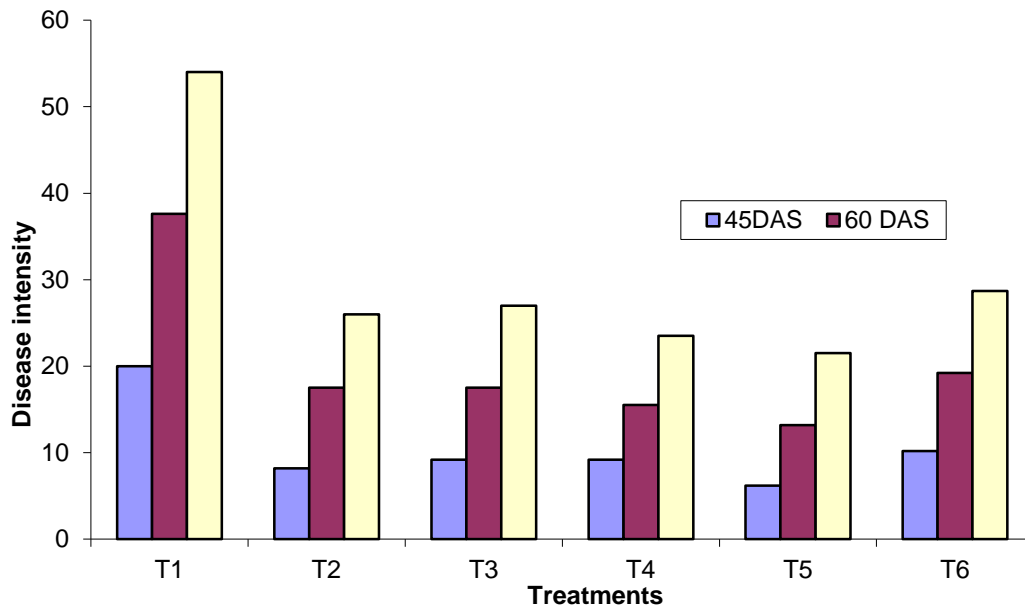
**Table 2: Effect the foliar spray of Tracel, Ril and Mancozeb on % disease intensity of potato at different days of interval**

Details of Treatments		Disease Intensity (%)		
		45DAS	60 DAS	75 DAS
T <sub>1</sub>	Control (N,P,K)	20.0	37.6	54.0
T <sub>2</sub>	Tracel@2500g/ha	8.2	17.5	26.0
T <sub>3</sub>	Ril057/F1@1000/ha(fromulation)+Tracel@2500g/ha	9.2	17.5	27.0
T <sub>4</sub>	Mancozeb75% @1500g/ha(formulation)	9.2	15.5	23.5
T <sub>5</sub>	Ril-057/F1@1000g/ha(formulation)+Mancozeb75% WP@1500g/ ha (formulation)	6.2	13.2	21.5
T <sub>6</sub>	Ril-057/F1@1000g/ha (formulation)	10.2	19.2	28.7
<b>F test</b>		<b>S</b>	<b>S</b>	<b>S</b>
<b>SEd (+)</b>		1.5	1.3	1.4
<b>CD(p=0.05%)</b>		3.4	3.0	3.3

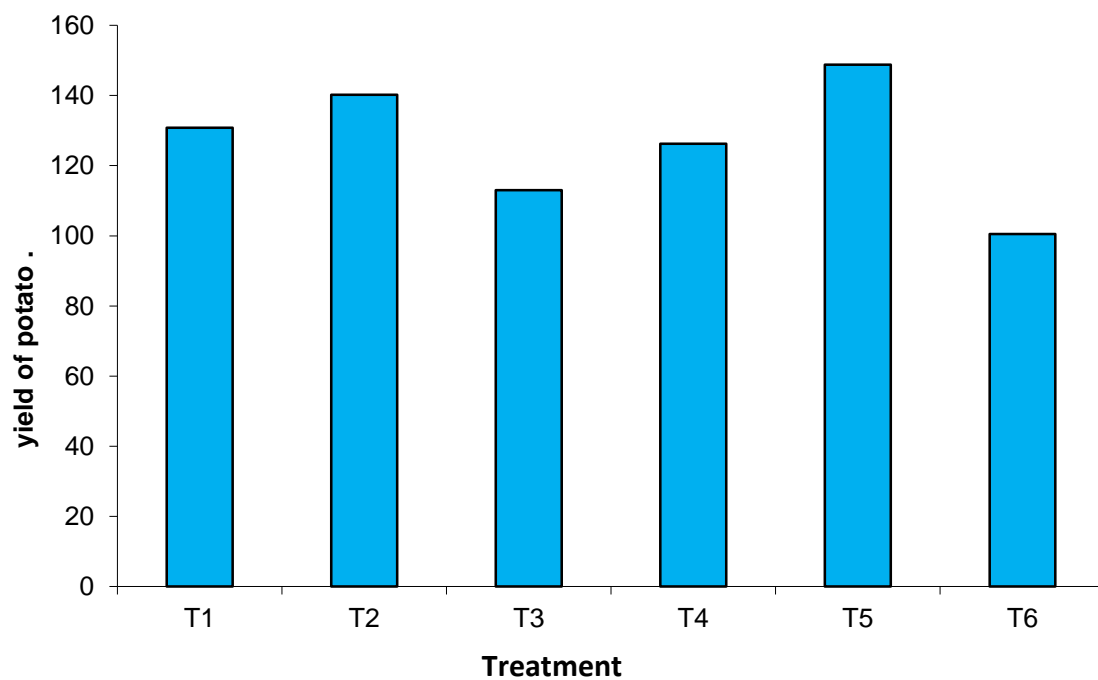
**Table 3: Effect the foliar spray of Tracel, Ril and Mancozeb on yield of potato**

Details of Treatments		Yield q/ha
T <sub>1</sub>	Control (N,P,K)	130.80
T <sub>2</sub>	Tracel@2500g/ha	140.25
T <sub>3</sub>	Ril-057/F1@1000/ha(fromulation)+ Tracel@2500g/ha	113.00
T <sub>4</sub>	Mancozeb75% @1500g/ha(formulation)	126.25
T <sub>5</sub>	Ril-057/F1@1000g/ha(formulation)+Mancozeb75% WP@1500g/ ha (formulation)	148.75
T <sub>6</sub>	Ril-057/F1@1000g/ha (formulation)	100.50
<b>F test</b>		<b>S</b>
<b>SEd (+)</b>		<b>7.220855</b>
<b>CD(p=0.05%)</b>		<b>16.31913</b>

**Graph No. 1: Effect the foliar spray of Tracel, Ril and Mancozeb on plant height(cm) of potato**



**Graph No. 2: Effect the foliar spray of Tracel, Ril and Mancozeb on % disease intensity of potato at different days of interval**



**Graph No. 3: Effect the foliar spray of Tracel, Ril and Mancozeb on yield of potato**

### CONCLUSION

Based on the result it was observed that Foliar spray with Ril-057/F1@1000g/ha(formulation) +Mancozeb75%WP@1500g/ ha (formulation) proved to be most effective against *Alternaria solani* showing minimum disease intensity and producing maximum plant height and yield followed by different concentration of Mancozeb and Tracel.

The use of macro nutrients increases the health problems and decreases the soil fertility as well as increases the resistance in pathogens. The fungicides lead the positive role in increasing the soil fertility and decrease the health problems. So it is concluded that the (Ril+ Mancozeb) can be successfully exploited as a chemical for the management of early blight of potato.

Based on the result it was observed that Foliar spray with Ril-057/F1@1000g/ha(formulation)+Mancozeb75 %WP@1500g/ ha (formulation) proved to be most effective against *Alternaria solani* showing minimum disease intensity and producing maximum plant height and yield followed by different concentration of Mancozeb and Tracel.

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