

Original Research Article

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Screening against Phomopsis Blight in Brinjal (*Solanum melongena* L.)

Amrendra Kumar^{1*}, Randhir Kumar¹, Mohammad Ansar²,
Shirin Akhtar¹, Anupam Adarsh¹ and Vinod Kumar³

¹Department of Horticulture (Vegetable & Floriculture), BAU, Sabour, Bihar 813210, India

²Department of Plant Pathology, BAU, Sabour, Bihar 813210, India

³Department of Agronomy, BAU, Sabour, Bihar 813210, India

*Corresponding author

ABSTRACT

The field experiment was conducted during the *autumn-winter* season of 2015-16 at Vegetable Research Farm, BAU, Sabour, Bhagalpur to evaluate the Screening against Phomopsis blight in Brinjal (*Solanum melongena* L.). The results indicated that the genotypes were significant for all the 17 characters under study indicated that the genotypes included in the study were genetically diverse and showed considerable amount of variability. The mean sum of square varies 433.79 to 1974.53. Hence, there is ample scope for inclusion of promising genotypes in breeding programme for yield and quality characters. At higher inoculum level, the rotting of fruits began on 4th day and reached to maximum on 9th day whereas with inoculum load of 64 and 34 spores per ml, the disease appeared on and after 6 and 8 days of inoculation. Comparative performance of eighteen brinjal cvs. revealed that most of the cvs. showed different pathogen reaction at various stages of phomopsis blight.

Keywords

Brinjal, Phomopsis blight, Screening

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Introduction

Eggplants are one of the horticultural crops that can be grown by rural farmers to generate additional income and hence reduce poverty (Khalil *et al.*, 2013). It is available in the country throughout the year, especially during the lean period when the seasonal vegetables are in scarcity in the market. Eggplant is regarded as a cash crop. However, the crop is

known to suffer from diseases and pest. Among the biotic factors, eggplants are attached by several pests (Fruit and shoot borer (*Leucinodesor bonalis*), Thrips (*Thrips palmi*), Leafhopper (*Amrascabiguttula biguttula*, *Hishimonus phycitis*), Aphids (*Myzuspersicae*, *Aphis gossypii*, *Macrosiphum euphorbiae*]) and disease (damping off (*Pythium*, *Phytophthora* and *Rhizoctonia*), Bacterial wilt (*Ralstonia*

solanacearum) and *Verticillium* wilt (*Verticillium dahliae*; *Verticillium albo-atrum*), Southern blight, *Alternaria* and *Cercospora* leaf spot, *Phomopsis blight* and several viruses. among them *Phomopsis blight* has been treated as one of the major constraints to eggplant cultivation in the country. *Phomopsis blight*, a commonly occurring disease in Brinjal growing area ranks second only to bacterial wilt in destructiveness (Pandey *et al.*, 2002). This pathogen causes over 50 per cent losses in production and productivity in various parts of the world.

Phomopsis vexans is the asexual morph of *Diaporthe vexans* on brinjal, causing severe damage to the brinjal crop in different regions of the world. *Diaporthe* species are responsible for some important crop diseases worldwide including root rots, fruit rots, dieback, cankers, leaf spots, blights, decay and wilt (Santos *et al.*, 2011 and Thompson *et al.*, 2011). *Phomopsis blight* and fruit rot are very devastating and widespread disease in eggplant (Chen *et al.*, 2002).

Phomopsis blight ranks second only to bacterial wilt in destructiveness of eggplant and varies in severity depending on area, soil type and weather (Meah *et al.*, 2002). *Phomopsis vexans* is both externally and internally seed borne and remains viable for about 14 months in soil with plant debris and in the seed from infected fruits (Sekara *et al.*, 2007). Brinjal is the only economic host of *Phomopsis vexans* and the disease is variously known as tip over, stem blight, canker, leaf blight or spot and fruit rot, even damping off may also occur.

Leaf spots (up to 3 cm diameter) are conspicuous, irregular in outline and may coalesce, lower leaves may be affected first. In stem lesions, the cortex dries and cracks, plants become stunted and girdling cankers

cause death of the plant. Fruit spots are pale sunken, conspicuous and may affect the whole fruit, fruit may drop or remain attached, becoming mummified after a soft decay. Pycnidia are abundant. *Phomopsis vexans* has both α and β conidia, pycnidia with short or no pycnidial beaks. It is the sole causal agent of *Phomopsis* fruit rot of eggplant.

Materials and Methods

The plant materials comprised of thirty one lines of brinjal differing in morphological features as well as yield attributing characters which were selected out of the germplasm collection being maintained at the Department of Horticulture (Vegetable and Floriculture) at BAU, Sabour, and Bhagalpur. Seeds were planted in media containing inoculum. Germination and mortality % were taken. The seeds were planted in plug tray with autoclave media after that seedling emergence and seedling sprayed with inoculum. The incidence of disease was noted.

The seedlings are planted in pots and observances of full plants and fruits for disease incidence. Twenty grams of commercially prepared Potato Dextrose Agar (Oxoid CM0139) was dissolved in 1000 ml of distilled water in a beaker. The medium was amended with 500 mg of chloramphenicol. It was then gently transferred into four flat bottom flasks, covered with aluminum foil and sterilized in an autoclave at 121°C for 15 minutes under pressure of 15 psi. The flasks were removed and cooled after sterilization to about 45°C.

The medium was carefully dispensed into sterile 9-cm diameter Petri dishes in laminar flow hood and allowed to cool to room temperature. Each dish contained 25 ml of the medium. Conidial suspension of *Phomopsis* species was prepared by flooding a 14-day old

culture with 10 ml of sterile-distilled water and gently brushing the surface with a sterile brush into 50 ml-beakers. The conidial suspension of the pathogen was filtered through double layered cheesecloth into a different beaker and the resultant suspension was used as the inoculum. The conidial concentration was adjusted to 1×10^5 ml/1 and used for the inoculation. The conidia were counterered, using haemocytometer.

Samples of *Phomopsis* -infected leaves and fruits were collected during the field surveys as indicated earlier. Small sections of these leaves and fruits were removed using a scalpel with a sharp blade. These small sections of the *Phomopsis* -infected leaves and fruits were surface sterilized with 10 % sodium hypochlorite (1 % Chlorine), rinsed thoroughly with sterile-distilled water and blotted dry. They were then plated on the PDA medium and incubated at 28 °C for seven days. Isolated colonies of the pathogen were sub-cultured into fresh plates of the PDA medium until pure cultures were obtained. The pathogens were observed, using compound microscope, and identified, using identification manuals by Barnett and Hunter (1986) and Watanabe (2002). Disease scoring was calculated using the formula suggested by (Mc-Kinney, 1923).

$$\text{Percentage disease index (PDI)} = \frac{(\text{Sum of individual rating} \times 100)}{(\text{Total no. of plants/fruits assessed} \times \text{maximum disease category})}$$

Resistance-0

Highly susceptible- >61

ModDisease severity=Inoculum potential × Disease potential. irately susceptible-41-60

Samples of *Phomopsis* -infected eggplant leaves and fruits were collected and stored in a refrigerator during the study prior to pathogen isolation at the Plant Pathology Laboratory of the Department of Plant Pathology, BAU, Sabour.

Results and Discussion

The mean sum of squares (Table 1) due to genotypes was significant for all the 17 characters under study indicated that the genotypes included in the study were genetically diverse and showed considerable amount of variability. The mean sum of square varies 433.79 to 1974.53. Hence, there is ample scope for inclusion of promising genotypes in breeding programme for yield and quality characters. The finding is in consonance with Madhukar *et al.*, 2015 and Pandey *et al.*, 2002.

Table.1 Mean sum of square for 5 characters for CRD

Characters	Genotypes (df=19)	Error (df=40)
Phomopsis incidence in inoculated fruits (%) (ASIN)	1974.53**	66.57
Seedling mortality in plugtray after inoculum spray (%) (ASIN)	521.16**	2.81
Seedling mortality in Petriplate after inoculum spray (%) (ASIN)	616.91**	4.92
Inoculated seed mortality (%) (ASIN)	425.57**	4.44
Phomopsis infestation in plants after inoculum spray (%) (ASIN)	433.79**	3.90

Table.2 DMRT

	Phomopsis incidence in inoculated fruits (%)		Seedling mortality in plug tray after inoculum spray (%)		Seedling mortality in petriplate after inoculum spray (%)		Inoculated seed mortality (%)		Phomopsis infestation in plants after inoculum spray (%)	
71-19	75(60)	c	0(34.973)	ef	36.59(37.223)	de	32.86(34.973)	ef	12.01(20.280)	hi
ArkaNeelkanth	63.04(52.557)	cd	32.86(33.803)	f	43.16(41.070)	c	30.95(33.803)	f	20.76(27.107)	def
ArkaNidhi	100(90)	a	30.95(63.640)	a	34.31(35.853)	ef	92.41(74.003)	a	56.28(48.610)	a
BRBL-01	9.8(18.243)	g	80.29(24.853)	ij	13.01(21.143)	g	10.89(19.267)	hi	2.81(9.653)	k
BRBL-02	9.8(18.243)	g	17.66(23.137)	j	4.53(12.287)	h	8.66(17.113)	i	0.71(4.827)	l
BRBL-04	33.33(35.260)	ef	15.44(28.077)	h	16.36(23.857)	g	13.34(21.420)	gh	8.12(16.553)	j
BRBL-07	29.48(32.883)	f	22.15(26.570)	hi	13.01(21.143)	g	15.44(23.137)	g	8.12(16.553)	j
BRBL-11	48.14(43.937)	def	20.01(30.973)	g	33.25(35.217)	ef	17.66(24.853)	g	10.2(18.627)	ij
IIHR-562	93.8(75.580)	b	26.49(34.247)	f	38.15(38.147)	cde	31.06(33.870)	f	26(30.660)	bc
IIHR-563	75.73(60.483)	c	31.67(33.870)	f	41.07(39.857)	cd	35.35(36.480)	def	23.66(29.107)	cd
Muktakeshi	51.86(46.063)	def	31.06(38.857)	cd	43.16(41.070)	c	39.93(39.193)	cd	0.92(5.493)	l
Pant Rituraj	33.33(35.260)	ef	39.36(37.650)	de	28.42(32.213)	f	37.75(37.907)	cde	15.33(23.047)	gh
Pant Samrat	0.5(4.050)	h	37.31(19.267)	k	1.15(6.143)	i	35.52(36.583)	def	0.71(4.827)	l
PPC	55.65(48.247)	cde	10.89(43.077)	b	36.11(36.933)	de	46.65(43.077)	b	16.55(24.007)	fg
PPL	63.04(52.557)	cd	46.65(40.363)	bcd	33.25(35.217)	ef	42.21(40.517)	bc	20.47(26.9)	def
PusaUttam	100(90)	a	41.94(33.687)	fg	50(45)	b	31.06(33.870)	f	22.85(28.553)	cde
Rajendra Baingan-2	66.67(54.74)	cd	30.76(37.907)	cd	63.89(53.067)	a	37.75(37.907)	cde	31.13(33.917)	b
S. aethiopicum	0(4.050)	h	37.75(4.050)	l	0(4.050)	i	35.41(36.517)	def	0(4.050)	l
S. gilo	0(4.050)	h	0(4.050)	l	0(4.050)	i	37.57(37.803)	cde	0(4.050)	l
Swarna Mani	63.04(52.557)	cd	0(40.467)	bc	43.31(41.153)	c	42.12(40.467)	bc	18.47(25.453)	efg
Gen. Mean	43.938	***	31.676	***	30.235	***	35.138	***	20.114	***
C.V.	18.569		5.289		7.333		5.995		9.821	
S.E.M.	4.711		0.967		1.28		1.216		1.14	
C.D. 5%	13.464		2.764		3.659		3.476		3.26	
C.D. 1%	18.016		3.699		4.896		4.652		4.362	

The genotype ArkaNidhi produced significantly the maximum phomopsis incidence on shoot (47.41 cm). On the contrary, the minimum phomopsis incidence on shoot (0.00 cm) was observed in genotype Pant Samrat, *Solanum gilo* and *Solanum aethiicum*. The genotype Pusa Uttam produced significantly the maximum phomopsis incidence on fruit (78.25 cm).

The minimum phomopsis incidence on fruit (0.00 cm) had observed in genotype *solanumgilo* and *Solanum aethiicum*. The genotype ArkaNidhi produced significantly the maximum percent disease index (47.78 cm). On the contrary, the minimum percent disease index (0.00 cm) was observed in genotype Pant Samrat, *Solanum gilo* and *Solanum aethiicum*.

At higher inoculum level, the rotting of fruits began on 4th day and reached to maximum on 9th day whereas with inoculum load of 64 and 34 spores per ml, the disease appeared on and after 6 and 8 days of inoculation. Comparative performance of eighteen brinjal cvs. Revealed that most of the cvs. showed different pathogen reaction at various stages of phomopsis blight.

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