

Original Research Article

Occurrence and Distribution of *Macrophomina phaseolina* (Tassi.) Goid Causing Leaf Blight Disease in Mung Bean in Maharashtra

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ABSTRACT

The survey was conducted during *Kharif*, 2016-17, at 68 farmer's mung bean region in Jalna and Aurangabad district of Marathwada. In Jalna district, the average occurrence of *Macrophomina* leaf blight was 28.33 per cent. The rate ranged from 07.34% to 40.00%. Maximum incidence was noticed in the highly prone areas for *Macrophomina* leaf blight of mung bean were Bethel (40.00 %), Amba (38.90 %) and Bodhkha (37.40 %) while it was least at Nimgaon (07.34 %). Similarly the severity data 23.70 per cent disease intensity in Jalna district. It was noticed in the range of 03.46 to 33.24 per cent. The maximum disease intensity of 33.24 per cent observed at village Amba followed by Bodhkha (32.40 %), Pimpalgaon (32.24 %) and Khadki (32.12 %). However, least disease was noticed at village Dhoksal (03.46 %). The occurrence of disease incidence in Aurangabad district was reported 22.24 per cent. It was varied from 03.18 to 40.00 per cent. The maximum disease incidence was noticed at Pandhari and Bagdi (40.00 % each) while least disease incidence was reported at village Jamgaon (03.18 %). The disease intensity was ranged from 1.23 to 35.56 per cent. The highest disease intensity of *Macrophomina* leaf blight of mung bean were observed at villages Bagdi (34.90 %), followed by Adgaon (32.20 %) whereas minimum disease was found at village Jamgaon (1.23 %). The variety wise average leaf blight incidence in Jalna and Aurangabad districts was ranged from 3.58 (BPMR-145) to 36.15 (Local) per cent.

Keywords

Leaf blight, mung bean, survey, yield losses, incidence and intensity

Introduction

One of the most common pulse crops, mostly grown as staple pulse foods in India, is mung bean (*Vigna radiata* L. Wilczek). Pulses are high in protein content (18 to 32%), which plays an important role in the diet of humans and animals. In Madhya Pradesh,

Maharashtra, Uttar Pradesh, Andhra Pradesh and Tamil Nadu, mung beans are widely cultivated. Approximately 4.2 M ha, 2.0 MT and 472 kg/ha, respectively, were reported for the region, production and productivity of mung beans in India during 2017-18 (Anonymous 2018). Around 3.97 lakh ha, 1.66 lakh tonne and 361 kg/ha were reported

in Maharashtra during the year 2017-18, area, production and productivity of mung bean, respectively. Maharashtra accounts for 11% of the total area and 8% of the total production of mung beans in India (Anonymous 2018). During seed germination to its maturity phases, Mung bean is known to infect >35 fungal, a few viral, some bacterial and some nematode species, resulting in major yield losses (Agarwal and Sharma 1989). One of the refers to protective in the cultivation of mung beans in India is *M. phaseolina* among the fungal pathogens. In India, Vidhyasekaran and Arjunan (1978) reported the incidence of LB disease in mung beans caused by *M phaseolina* (Tassi.) Goid. from Tamil Nadu.. *M phaseolina* is mainly a pathogen borne by soil and is capable of infecting monocot and dicots (Mayek-Perez *et al.*, 2001; Su *et al.*, 2001).

M. Phaseolina is one of the main seed-borne pathogens that cause numerous symptoms on various crop plants, including seedling blight, root rot, charcoal rot, wilt or dry root rot, stalk rot, stem blight, fruit rot, seedling decay or damping-off, crown rot and leaf blight. *M. phaseolina* infects >500 plant species including peanut (*Arachis hypogea*), beet (*Beta vulgaris*), cabbage (*Brassica oleracea*), pepper (*Capsicum annum*), chick pea (*Cicer arietinum*), *Citrus* spp., *Corchorus* sp., *Cucumis* spp., *Fargaria* sp., soybean (*Glycine max*), *Gossypium* spp., sunflower (*Helianthus annuus*), sweet potato (*Ipomoea batatas*), alfalfa (*Medicago sativa*), *Phaseolus* spp., *Pinus* spp., *Prunus* spp., sesame (*Sesamum indicum*), potato (*Solanum tuberosum*), sorghum (*Sorghum bicolor*), bean (*Vigna unguiculata*), and maize (*Zea mays*) (Wyllie 1993).

Different groups of researchers have researched the morphological, pathogenic and molecular characterization of isolates in different geographical areas over the last

decade (Babu *et al.*, 2007; Baird *et al.*, 2009; Purkayastha *et al.*, 2006; Su *et al.*, 2001). According to long-term survival and longevity as a soil saprophyte and having a broad host range, management of *M phaseolina* is challenging. The control of *M phaseolina* in various crops has therefore been accomplished by integrated approaches to disease management (Mandhare and Suryawanshi 2009). Preventive and curative steps using chemicals play an important role in soil-dwelling and seed-borne infection control across the different IDM approaches. In addition, less information is available on the resistance, survey and surveillance sources for mung bean LB disease in India. The research was also carried out in the latest investigations, taking into account the effect of LB disease on mung bean production

Materials and Methods

Surveys and collection of leaf samples

During 2016-17 cropping season, surveys were conducted for recording the prevalence of LB disease in mung bean in 68 villages covering 272 farmer's field in Jalna and Aurangabad districts of Maharashtra, India.

The disease incidence and severity were recorded from seedling to the crop harvesting stage. During survey, diseased leaves were collected from different locations and were stored at 4-6°C in the refrigerator for further investigation.

Statistical analysis

Data from the present study was subjected to analysis of variance (ANOVA). The percent disease incidence data was arcsine transformed for analysis (Gomez and Gomez 1984). The standard error of mean (SEM±), standard error of deviations (SEd) and critical difference (C.D.) values were calculated by

randomized block design using the protocol described by Sheron *et al.*, (1998).

Results and Discussion

Survey

Prevalence of leaf blight of mungbean in different locations in Jalna and Aurangabad districts of Marathwada region

The survey of the 68 farmer's fields of mung bean crop from (Jalna and Aurangabad) districts of Marathwada region of Maharashtra state was carried out during *Kharif*, 2016-17 to record the incidence and intensity of leaf blight disease. The results obtained are presented. (Tables 1 to 3 and Fig. 1).

Prevalence of leaf blight in Jalna District during *Kharif*, 2016-17

Per cent disease incidence

The data presented in (Table.1) showed that the average mean incidence of *Macrophomina* blight of mung bean in Jalna district was 28.83 per cent. The incidence was recorded varied from 07.34 to 40.00 per cent. The highly prone areas for *Macrophomina* leaf blight disease were Bethel (40.00 %), Abmba (38.90 %), Bodhkha (37.40 %), Patoda (36.18 %), Devthanamantha (35.20 %), Shirgaon (34.18 %), Pimpalgaon (33.10 %) followed by Khadki (32.00 %). The least disease incidence were recorded at Nimgaon (07.34 %), followed by Kalegaon (08.00 %), Dhoksal (08.33 %) and Bhutegaon (08.62 %). Looking in to the tahsilwise average mean high incidence was noticed in Badnapur (31.25 %), followed by Partur (30.70 %), Jalna (30.35 %), Jafrabad (29.20 %), Ghansawangi (27.72 %), Mantha (27.63 %)

and Ambad (26.91 %). The lowest disease incidence was observed in Bhokardan (26.88 %). Similarly severity data also revealed that during *Kharif*, 2016 on an average 23.70 per cent disease intensity was noticed in Jalna district it was in the range of 03.46 to 33.24 per cent. Maximum disease intensity of 33.24 per cent was observed at village Amba. Followed by Bodhkha (32.40 %), Pimpalgaon (32.24 %) and Khadki (32.12 %). However lowest (03.46 %) disease intensity was recorded at Dhokasal. The Tahsil wise reports of per cent intensity indicate that the leaf blight mean disease intensity was recorded in the range of 20.64 to 26.19 per cent. The mean highest disease intensity of 26.19 percent was recorded in Badnapur. While lowest disease intensity was observed in Ambad (20.64 %). It was moderate in all other tahsils.

Prevalence of leaf blight in Aurangabad District during *Kharif*, 2016-17

Per cent disease incidence

The data depicted in (Table.2) revealed that the average mean incidence of disease in Aurangabad district was 22.99 per cent. The disease incidence was varied from 03.18 to 40.00 per cent. The maximum disease incidence was noticed at Pandhari and Bagdi (40.00 % each) followed by Gaultgaon and Pathri (38.00 %), Adgaon (37.00) and Golwadi (36.00 %). The lowest disease was reported at village Jamgaon (03.18 %) followed by Kaigaon (03.74 %) and Mhasla (04.00 %). Similarly tahsil wise survey report revealed that (Table.2) highest leaf blight of mung bean mean disease incidence was found in Soygaon tahsil (27.26 %). It was followed by Paithan (26.71 %), Vaijapur (26.68 %), Phulambri (26.50 %), Aurangabad (22.35 %), Khultabad (20.39 %), Gangapur (20.39 %).

Table.1 Leaf blight disease incidence and intensity surveyed in Jalna and district of Maharashtra during 2016-17.

Block/ Division	Village	Varieties	Incidence (%)	Intensity (%)
Jalna	Bodhkha	Local	37.40	32.40
	Malegaon	JL-781	36.00	26.57
	Kalegaon	BM-2002-1	08.00	5.90
	Bethel	Local	40.00	31.23
Badnapur	Badnapur	JL-781	35.00	27.98
	Kusli	Nirmal	27.00	19.77
	Dudhanwadi	Kopargaon	29.00	27.10
	Akola	Local	34.00	29.94
Ambad	Dahipuri	BM-4	12.00	10.00
	Hastpokhari	Tatanagar	29.00	19.61
	Karjat	Local	30.00	22.27
	Raniunchegaon	JL-781	36.64	30.78
Bhokardan	Palaskheda	Local	34.00	29.81
	Khadki	Local	32.00	28.00
	Shirgaon	Local	34.18	31.10
	Nimgaon	BM-2003-2	07.34	05.23
Jafrabad	Kolhapur	JL-781	37.00	31.30
	Takli	Local	35.00	29.90
	Borikhedi	Local	32.00	28.88
	Davargaon	BM-4	12.80	10.58
Partur	Amba	Local	38.90	33.24
	Ashti	JL-781	34.00	24.66
	Karhala	BM-4	11.90	10.56
	Khadki	Local	38.00	32.12
Mantha	Dhoksal	BM-2002-1	08.33	3.46
	Jatkheda	Kopargaon	35.00	24.68
	Kanphodi	Local	32.00	28.70
	Devthanamantha	Local	35.20	30.14
Ghansavangi	Bhutegaon	Vaihav	08.62	7.80
	Pimpalgaon	Local	33.10	32.24
	Raniwahegaon	JL-781	33.00	27.88
	Patoda	Local	36.18	24.58

Note: In each block four villages were selected and in each village 4 fields were randomly surveyed for leaf blight disease incidence and intensity

Table.2 Leaf blight disease incidence and intensity surveyed in Aurangabad district of Maharashtra during 2016-17.

Block/ Division	Village	Varieties	Incidence (%)	Intensity (%)
Aurangabad	Pandhari	Local	40.00	27.40
	Goaltgaon	Local	38.00	32.11
	Itkheda	BPMR-145	03.00	02.22
	Karmad	Green Gold	08.40	03.22
Paithan	Bokudjalgaon	Local	34.00	28.84
	Adgaon	Local	37.00	32.20
	Balapur	BM-2002-1	08.12	07.89
	Bidkin	Kopargaon	27.72	23.86
Gangapur	Jamgaon	BPMR-145	03.18	01.23
	Bagdi	Local	40.00	34.90
	Dhanora	BM-4	12.17	10.81
	Phulshivra	Chamki	21.00	16.71
Vaijapur	Lasur	BM-2003-2	07.34	4.22
	Golwadi	Local	36.00	32.84
	Dahegaon	Local	35.09	31.10
	Palkhed	Kopargaon	28.40	27.64
Khultabad	Ghodegaon	Vaibhav	08.64	11.23
	Golegaon	BM-2002-1	08.00	04.44
	Sonkhed	Tatanagar	29.95	19.61
	Khirdi	Local	35.00	33.19
Kannad	Devgaon (R)	BM-2002-1	07.92	07.88
	Devli	Local	32.00	26.74
	Kandgaon	BM-2002-1	8.00	08.88
	Vitkheda	JL-781	34.00	26.00
Phulambri	Phulambri	Kopargaon	28.00	22.22
	Pathri	Local	38.00	34.27
	Mhasla	BPMR-145	04.00	02.24
	Naigaon	JL-781	36.00	22.76
Sillod	Chauka	JL-781	34.00	34.55
	Kaigaon	BPMR-145	03.74	02.24
	Bodhwad	BM-2003-2	05.15	04.84
	Undangaon	Kopargaon	27.00	25.44
Soygaon	Soygaon	Vaibhav	08.22	10.24
	Fardapur	Kopargaon	28.17	22.44
	Dastapur	Local	32.00	28.22
	Amkheda	BPMR-145	04.00	02.06

Note: In each block four villages were selected and in each village 4 fields were randomly surveyed for leaf blight disease incidence and intensity

Table.3 Variety wise incidence and intensity of mung bean blight disease in Jalna and Aurangabad district of Marathwada region of Maharashtra region during *Kharif*, 2016.

Variety	No. of locations	Incidence	Intensity
Local	26	36.15	30.52
JL-781	09	35.05	28.05
BM-2002-1	06	08.06	06.40
Nirmal	01	27.00	19.77
Kopargaon	07	29.04	24.76
BM-4	04	12.21	10.48
Tatanagar	02	29.47	19.61
BM-2003-2	03	06.61	04.76
Vaibhav	03	08.49	09.75
BPMR-145	05	03.58	01.99
Green gold	01	08.40	03.22
Chamki	01	21.00	16.71
	68	18.75	14.66

Fig.1 Leaf blight disease incidence and intensity recorded on mung bean from the two major mung bean growing districts Aurangabad and Jalna of Maharashtra state, India.



The lowest disease mean incidence was found in Sillod tahsil (17.47 %). In case of per cent disease intensity it was ranged from 1.23 to 35.56 per cent. Throughout the Aurangabad district the maximum disease

intensity of *Macrophomina* leaf blight were observed at village Bagdi (34.90 %). It was followed by Adgaon (32.20 %) and Dahegaon (31.10 %). The minimum disease was recorded at village Jamgaon (01.23). It

was followed by Amkheda (02.06 %), Itkheda (02.22 %) and Kaigaon (02.24 %).

The data an tahsil wise per cent mean disease intensity in Aurangabad district indicate that it was ranged between 15.91 to 23.95 per cent. The maximum per cent disease intensity was reported in Vaijapur tahsils followed by Paithan (23.19 %), Soygaon (22.96 %), Phulambri (20.37 %), Kannad (17.37 %), Khultabad (17.11 %), Sillod (16.76 %), and Aurangabad (16.23 %). The lowest mean disease intensity was reported in Gangapur tahsil.

Variety wise incidence and intensity

In two districts of Marathwada region of Maharashtra surveyed, a wide range of mungbean cultivars and varieties were grown by the farmers. The results obtained on blight disease incidence and intensity are presented (Tables.3 and depicted in the fig.1).

During *Kharif*, 2016-17 (Table.3 and fig.1) the average leaf blight disease incidence and intensity on the mung bean cultivars and varieties grown were ranged from 3.58 (BPMR-145) to 36.15 (Local) per cent and 1.99 (BPMR-145) to 30.52 (Local) per cent respectively. However, among the varieties maximum average leaf blight disease incidence (36.15%) and intensity (30.52) was recorded on local cultivar.

Other mung bean cultivar found more prone to the disease was JL-781 with disease incidence (35.05%) and intensity (28.05 %) respectively. It was followed by Kopargaon with disease incidence (29.04%) and intensity (24.76%). Rest of the mung bean varieties exhibited average blight disease incidence and intensity in the range of 12.21 to 29.00 per cent and 10.48 to 19.77 per cent respectively. The mung bean cultivars *viz.*, BM-2002-1, BM-2003-2, Vaibhav, Green

gold, BPMR-145 were found to be suffer with the disease. The minimum average blight incidence of 3.58 per cent and average blight intensity of 1.99 were recorded in cultivar BPMR-145. The results of the present investigations are also in agreement with findings of several earlier workers *viz.*, Uppal *et al.*, (1936), Raja mohan *et al.*, (2012), Thombre, (2013), Khaire *et al.*, (2018) and Tandel *et al.*, (2015). In India, least information is available on genotype specific reaction against leaf blight and root rot disease in different crops including mung bean.

Therefore, from the present study it was inferred that the survey, occurrence of leaf blight disease in mung bean was recorded and inflecting heavy losses in Jalna and Aurangabad districts of Maharashtra, India. Cultivar JL-781 was found severely affected.

In the present investigation, systematic surveys were carried out for the occurrence of LB disease incidence and severity in different genotypes and their reaction was observed against this disease. JL-781 was found to be the moderately susceptible mung bean genotype and therefore, its cultivation on large area may lead to the heavy crop losses in the state. In this connection, cultivation of BPMR-145 is encouraged to the growers of the state.

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Conflict of Interest

All the authors declare that they have no conflict of interests.

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