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## Evaluation of mungbean and urdbean genotypes against web blight disease under natural field condition

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**Abstract**

Fifty seven mungbean and forty urdbean genotypes were screened under natural field condition against web blight disease at Centre for Pulses Research (CPR), Berhampur under Orissa University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha. In case of Mungbean, none of the genotypes were found free, highly resistant or resistant. However six genotypes namely ML 818, LGG 607, LGG 460, Pant M 4, Pant M 6, Pusa 1772 showed moderately resistance reaction against the disease. In case of urdbean, one genotype (TPU 4) exhibited disease free reaction, one (TU 94-2) was highly resistant and two genotypes namely KPU 12-1730 & KPU 128-105 were resistant whereas nine genotypes (IPU 94-1, MDBGV-04, LBG 623, LBG 645, KU 16-07, KU 96-3, TJU 98-14, RU (IU) 02-1-3, VBG 14-016) were found to be moderately resistant against the disease. Most of the genotypes i.e. thirty eight in case of Mungbean and 20 in case of urdbean were grouped under susceptible category against this soil borne disease.

**Keywords:** Mungbean, urdbean, genotypes, web blight disease

**Introduction**

Mungbean and urdbean are the important pulse crops of India and is being cultivated over a wide range of agro-climatic zones of the country. Mungbean is cultivated in an area of 4.32 million ha with a production of 2.16 million tones and productivity of 418 kg/ha whereas urdbean is cultivated in an area of 4.50 million ha with a production of 2.80 million tones and productivity of 623 kg/ha (Anonymous, 2018)<sup>[2]</sup>. These two crops are mainly grown in *Kharif* and *rabi*, however in non-traditional niches of cultivation, particularly in summer, spring and rice fallow the area and production of both the crops in India have seen a phenomenal growth during last decade. Various centres of All India Coordinated Research Project (AICRP) on Mungbean, Urdbean, Lentil, Lathyrus, Pea (MULLaRP) conduct front line demonstrations (FLD) on new production and protection technology to strengthen the pulse production in the country. In this context, Orissa University of Agriculture and Technology (OUAT) has initiated steps to enhance pulse production in the state of Odisha through pulse seed hub, cluster demonstration on pulses etc. in 2016. Several steps are being taken to enhance the area and production; however the productivity is declining due to the attack of numbers of diseases and pests to the pulse crop. Thus attack of diseases and pest poses a major constraint in achieving the full potential of productivity. Amongst diseases, web blight (WB) caused by *Thanatephorus cucumeris* (= *Rhizoctonia solani*) is a major threat in the production of many pulses in warm humid tropic zones of the world.

WB disease has been observed to reduce 33 to 40 per cent of grain yield and 28.6 per cent reduction in weight of 1000 grains at different levels of disease severity in different varieties of mungbean (Singh, 2006; Gupta and Singh, 2002 and Gupta *et al.*, 2002)<sup>[10, 7, 8]</sup>. The disease appears in distinct phases attacking different plant parts at various stages of crop growth. Both mungbean and urdbean crops are damaged seriously due to seed rot, seedling blight at early stages and premature death and leaf blight at later stages (Agrawal, 1991)<sup>[1]</sup>. This leaf blight at later stages is also known as web blight due to presence of spider web like mycelium on stems and foliages. The typical symptom of web blight starts as water soaked lesion near the petiole of trifoliolate leaves. The lesions enlarge at age and affect all aerial parts. Severely affected plants in field can show whitish spider-web like fungus.

Twigs become twisted, pods become shriveled and colour of leaves and pods changes from green to brown (Bara, 2007)<sup>[3]</sup> which in turn causes loss in production and productivity of these two crops. To avoid the losses caused due to WB diseases it is very crucial to manage the disease at early stage. Use of resistant varieties is the cheapest and best method for the management of diseases of legumes caused by *R. solani*. For developing resistant varieties there is a need for hunting the sources of resistance against WB disease so that those sources can be developed into cultivable varieties either by selection or by using them as parental materials for crossing programmes by the plant breeders. In the present investigation an attempt has been made to search for the source of resistance by screening a large number of germplasms of mungbean and urdbean under natural field condition.

### Materials and Methods

Fifty seven numbers of mungbean and forty numbers of urdbean genotypes received under AICRP on MULLaRP during *Kharif*-2017 constituted the experimental germplasms. These genotypes were sown the experimental farm of Centre for Pulses Research (CPR), Berhampur, under Orissa University of Agriculture and Technology (OUAT), Bhubaneswar, Odisha. The centre is situated in East and South Eastern Coastal Plain Zone of the State and coming under South Zone of the country. The weather condition of the region generally remains warm and humid during most part of the year. Geographical location of Berhampur is at 19°18' N Latitude, 84°54' E Longitude and 34 meter above the mean sea level. *Kharif* season provides congenial environment for the development of web blight disease. Each germplasm or genotype was sown in a row of 3 m length following the infector row technique wherein two rows of each test entry was followed by one row of a susceptible check with a spacing of 30×10 cm. The experiment was laid out in two replications. The susceptible check used for WB diseases was IPM 02-3 for mungbean and in case of urdbean it was PU 31. All the recommended agronomic practices were followed except insecticidal and fungicidal spray, in order to encourage the natural infection. Symptomatic observations of the plants were taken as per the disease rating scale recommended by AICRP on MULLaRP (Table 1).

**Table 1:** Disease rating scale of web blight for mungbean and urdbean

Grade	% foliage affected	Reaction
1	No infection	Free
2	0.1-5	Highly resistant
3	6-10	Moderately resistant/Resistant
4	11-15	Moderately resistant
5	15-20	Moderately susceptible (MS)
6	21-30	Susceptible (S)
7	31-50	Susceptible (S)
8	51-75	Highly susceptible (HS)
9	Above 75	Highly resistant (HS)

### Results and Discussion

The data on field screening has been presented in tables: 2 and 3 and figures: 1-5. Out of fifty seven lines/genotypes of mungbean, it was found out that none of the genotypes were found free, highly resistant and resistant against web blight. Six and seven numbers of genotypes were found moderately resistant and moderately susceptible, respectively. The moderately resistant groups were namely ML 818, LGG 607, LGG 460, Pant M 4, Pant M 6, Pusa 1772 where as ML 2479, VGG 16-055, PM 14-3, RMG 1097, SVM 6133, JLM 302-46,

IPM 14-7 were found to be moderately susceptible. Thirty eight germplasm (BM 4, NVL 855, SML 1808, SKNM 1504, SKNM 1502, VGG 16-036, PM 14-11, COGG 13-39, COGG 13-19, COGG 912, KM 2355, KM 2241, Type 44, K 851, Pusa 1771, Pusa 0672, RMG 1087, RMG 1092, NDMK 16-324, NMK 15-08, MDGGV 18, JAUM 0936, MH 2-15, MH 1142, MH 1323, IPM 02-14, IPM 512-1, IPM 312-19, OBG 56, OBG 58, IGKM 2016-1, TMB 126, DGG 7, MGG 387, IPM 410-9, RMB 12-07) were found to be susceptible where as five genotypes namely AKM 8802, AKM 12-24, IPM 02-3, IPM 312-20, KOPERGAON were rated as highly susceptible against the disease.

Similarly for urdbean, only one genotype TPU 4 was found free, TU 94-2 was found to be highly resistant, and two genotypes (KPU 12-1730, KPU 128-105) were placed under resistant category. IPU 94-1, MDBGV-04, LBG 623, LBG 645, KU 16-07, KU 96-3, TJU 98-14, RU (IU)02-1-3, VBG 14-016 comprising of nine genotypes were rated as moderately resistant where as 7 genotypes namely Shekhar- 3, LBG 787, RBU 12-02, KU 16-4, KPU 12-213, KPU 1720-140, DBG 11 were found to be moderately susceptible against WB disease. A total of 20 genotypes of urdbean out of 40 received exhibited susceptible reaction, however, none of them were found highly susceptible. The susceptible genotypes against web blight disease were IPU 2-43, LBG 752, LBG 888, RU 03-22, Pant U 31, Pant U 14-19, PU 14-28, PU 10-23, AKU 13-16, NUK 15-09, NUL 242, NUL 7, VBG 12-034, VBG 13-003, VBG 12-111, COG 13-08, KUG 791, Barabanki Local, NDUK 15-222, KUG 479.

Godoy-Lutz *et al.* (1996)<sup>[6]</sup> demonstrated that isolates of the web blight pathogen from different regions vary in virulence patterns. Thus to have durable resistance against WB disease in Odisha it was pertinent to screen the germplasms in locally available natural condition. Bara (2007)<sup>[3]</sup> screened 15 no. of entries out of which none was found resistant. Levels of resistance in different legumes against the causal pathogen have been very low. In case of french bean, Moody *et al.* (1980)<sup>[9]</sup> evaluated 149 cultivars against *Rhizoctonia solani* and reported only 10 cultivars to be resistant. Upmanyu *et al.* (2004)<sup>[11]</sup> evaluated 93 cultivars/ germplasm lines of french bean against the web blight, only one line was found resistant at natural condition. Several efforts have been made to screen large number of germplasm of legumes, but result has not been satisfactory. Most of them were moderately susceptible to highly susceptible (Dubey and Dwivedi, 2000)<sup>[5]</sup>. However, in our case we were able to find six entries of mungbean as moderately resistant while in case of urdbean one entry was free from WB, one as highly resistant, two as resistant and nine genotypes as moderately resistant. The pathogen has a wide host range (Yadav, 2007)<sup>[12]</sup>. If favourable condition prevailed for a long time it can infect all available plant parts. Therefore, there is very strong possibility for breaking down of resistance, thus there is a need for continuous discovery of sources of resistance in legumes in general and mungbean and urdbean in particular. The present investigation was the outcome of one season, hence more trials over a period of seasons is needed to come out with sound recommendations.

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**Table 2:** Distribution of Mungbean lines into various infection categories against web blight in *Kharif- 2017*

Disease rating scale	Disease reaction	No. of genotypes	Genotypes
1	F	0	
2	HR	0	
3	R	0	
4	MR	6	ML 818, LGG 607, LGG 460, Pant M 4, Pant M 6, Pusa 1772
5	MS	7	ML 2479, VGG 16-055, PM 14-3, RMG 1097, SVM 6133, JLM 302-46, IPM 14-7
6-7	S	38	BM 4, NVL 855, AKM 12-28, AKM 12-24, SML 1808, SKNM 1504, SKNM 1502, VGG 16-036, PM 14-11, COGG 13-39, COGG 13-19, COGG 912, KM 2355, KM 2241, Type 44, K 851, Pusa 1771, Pusa 0672, RMG 1087, RMG 1092, NDMK 16-324, NMK 15-08, MDGGV 18, JAUM 0936, MH 2-15, MH 1142, MH 1323, IPM 02-14, IPM 512-1, IPM 312-19, OBG 56, OBG 58, IGKM 2016-1, TMB 126, DGG 7, MGG 387, IPM 410-9, RMB 12-07
8-9	HS	4	AKM 8802, IPM 02-3, IPM 312-20, KOPERGAON,

**Table 3:** Distribution of Urdbean lines into various infection categories against web blight in *Kharif-2017*

Disease rating scale	Disease reaction	No. of genotypes	Genotypes
1	F	1	TPU 4,
2	HR	1	TU 94-2,
3	R	2	KPU 12-1730, KPU 128-105,
4	MR	9	IPU 94-1, MDBGV-04, LBG 623, LBG 645, KU 16-07, KU 96-3, TJU 98-14, RU (IU)02-1-3, VBG 14-016
5	MS	7	Shekhar- 3, LBG 787, RBU 12-02, KU 16-4, KPU 12-213, KPU 1720-140, DBG 11,
6-7	S	20	IPU 2-43, LBG 752, LBG 888, RU 03-22, Pant U 31, Pant U 14-19, PU 14-28, PU 10-23, AKU 13-16, NUK 15-09, NUL 242, NUL 7, VBG 12-034, VBG 13-003, VBG 12-111, COG 13-08, KUG 791, Barabanki Local, NDUK 15-222, KUG 479
8-9	HS	0	

**Fig 1:** Leaf blight infection on foliage of mungbean**Fig 3:** Water soaked lesion developed near the petiole of the trifoliate leaf**Fig 2:** on urdbean**Fig 4:** White microsclerotia of the fungus visible on the affected parts



**Fig 5:** Spider web like mycelium spreading plant to plant in a row

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