



SCREENING OF URDBEAN GENOTYPES AGAINST LEAF CRINKLE DISEASE UNDER FIELD CONDITIONS

M. SUSHMA*, K. BAYYAPU REDDY, G. BINDU MADHAVI, M. RAGHAVENDRA AND B. RUPESH KUMAR REDDY

Department of Seed Science & Technology, S.V. Agricultural College, ANGRAU, Tirupati-517 502.

Date of Receipt: 04-06-2022

ABSTRACT

Date of Acceptance: 14-08-2022

Among the viral diseases, Urdbean Leaf Crinkle Virus (ULCV) is one of the most serious disease in all urdbean growing areas. The causal agent is reported to be transmitted by seed, sap, aphid and whitefly. However, there is limited work on the development of resistant cultivars to Urdbean Leaf Crinkle Disease (ULCD) due to the non-availability of the resistant sources. Hence the present investigation was carried out at RARS, Lam, Guntur district, Andhra Pradesh during 2021-22. Screening was conducted in RARS, Lam during *Rabi*, 2021-22 among 25 urdbean genotypes along with LBG 623 (Susceptible check) against ULCD under field conditions using 0-5 disease rating scale revealed that one genotype was found highly resistant, 10 genotypes were resistant, 9 genotypes were moderately resistant, 3 genotypes were moderately susceptible and 3 genotypes exhibited susceptible reaction to ULCV. While none of the urdbean genotypes were found to be highly susceptible to the disease.

KEYWORDS: Urdbean, ULCV, Resistance, Screening.

INTRODUCTION

Urdbean [*Vigna mungo* (L.) Hepper] also known as black gram, mash, mash kalai, black mapte *etc.*, belongs to the family Leguminosae. It is the fourth most important short duration pulse crop grown in India. It is mainly consumed as 'dal' and in preparation of many dishes in diet. Urdbean has the ability to fix atmospheric nitrogen and thus helps in restoring the soil fertility. It has high amounts of total carbohydrates (60%) with protein content of 25%. Urdbean crop is infected by several viral diseases such as yellow mosaic virus, Urdbean leaf crinkle Virus (ULCV) and leaf curl. Under field conditions, ULCV is severe in urdbean than mungbean and other pulse crops (Biswas *et al.*, 2009; Rehman *et al.*, 2018).

Urdbean leaf crinkle disease was first reported in the year 1966 from Uttar Pradesh and Delhi by Williams *et al.*, (1968). Later in 1967, the disease appeared in Tarai region of Uttar Pradesh (Kolte and Nene, 1970). These workers, named the disease as urdbean leaf crinkle disease, proved the infectious nature of the pathogen and designated it as urdbean leaf crinkle virus (ULCV). The symptoms of disease appear in the form of extreme crinkling, puckering, rugosity and curling of leaves, malformation of floral organs, stunting of plants causing heavy yield losses annually in major urdbean producing countries of the world and also pollen fertility and pod formation is also reduced severely in infected plants (Nene, 1972). ULCV infected plants produce barren

flowers and a small number of pods (Bashir *et al.*, 1991).

MATERIAL AND METHODS

Experimental layout

The present investigation was carried out Regional Agricultural Research Station (RARS), Lam, Guntur. Geographically the RARS, Lam is located at an altitude of 31.5 m above mean sea level with 16° 2'N latitude and of 80° 3'E longitude. The field experiment was laid out in Randomized Block Design (RBD) with two replications to evaluate all 25 urdbean genotypes. Infector row technique was used for disease evaluation. Each genotype was sown in two rows of 4 m length with spacing of 30×10 cm with a susceptible check (LBG 623). All the recommended package of practices were followed for raising good crop. Observations were recorded at 20, 40 and 60 DAS.

ULCV incidence was scored by counting the total number of plants infected in each row and per cent disease incidence was calculated by using the following formula:

Per cent Disease Incidence (PDI) =

$$\frac{\text{No. of plants infected in a row}}{\text{Total no. of plants in a row}} \times 100$$

*Corresponding author, E-mail: medamsushma7102@gmail.com

Table 1. List of urdbean genotypes used for field screening against ULCV

S. No.	Genotype	S. No.	Genotype	S. No.	Genotype
1.	LBG 933	10.	PU 31	19.	VBN 11
2.	LBG 944	11.	VBN 8	20.	VBG 12-110
3.	LBG 787	12.	GBG 1	21.	GBG 4
4.	GBG 12	13.	TBG 104	22.	LBG 645
5.	LBG 648	14.	LBG 884	23.	VBN 10
6.	LBG 932	15.	GBG 45	24.	TU 40
7.	LBG 941	16.	GBG 67	25.	TBG 129
8.	LBG 904	17.	LBG 918	26.	LBG 623 (Check)
9.	LBG 752	18.	LBG 685		

RESULTS AND DISCUSSION

Out of twenty five genotypes screened to ULCV during *rabi* 2021-22, VBN 10 was highly resistant with 0% incidence, ten genotypes *viz.*, TU 40, TBG 129, TBG 104, GBG 1, LBG 941, GBG 45, LBG 904, LBG 933, LBG 645 and LBG 932 were categorized under resistant with 1.26 to 10.05% incidence, nine genotypes *viz.*, LBG 752, VBN 11, LBG 648, VBG 12-110, LBG 787, LBG 918, VBN 8, PU 31 and LBG 685 were categorized under moderately resistant with 11.44 to 19.23% incidence, three genotypes *viz.*, GBG 4, LBG 944 and LBG 884 were found moderately susceptible with 21.1 to 22.57% incidence and rest of the two genotypes *viz.*, GBG 12 and GBG 67 were found susceptible with 20.675 and 31.08% incidence of ULCV respectively. Check LBG 623 was also found susceptible with 32.25% incidence and none of the entries are found to be highly susceptible to Urdbean leaf crinkle infection (Fig 1).

Subba Rao (1984) screened 119 urdbean germplasm entries from Lam and NBPGR to blackgram leaf crinkle virus under natural epiphytotic conditions during *kharif* and found that none of the entries are found highly susceptible to ULCV, 23 genotypes showed moderately resistant reaction, 35 entries were resistant. Vijaykumar (1993) screened 40 genotypes against ULCV during 1992-93 and reported that four genotypes (PLU-807, MASA-69, LBG-667 and LBG-668) were moderately resistant, seven genotypes (PLU-290, PLU-429, PLU-1079, PLU-1146, NP-3, KL-270-41 and UG-407) were moderately susceptible and the remaining 23 genotypes were susceptible.

Rehman *et al.* (2018) screened eight urdbean genotypes (Arooj, 6065-3, 6036-21, 4em-716, ES-I, M-95, ARRIM-08 and ARRIM-16) against urdbean leaf crinkle virus and correlated with epidemiological factors (temperature, relative humidity). The overall results revealed that, among all these lines, one genotype (M-95) was susceptible, three genotypes (6065-3, 4em-716, ES-I) were moderately susceptible, three genotypes (6036-21, ARRIM-08, ARRIM-16) moderately resistant and only one genotype Arooj showed resistance response to urdbean leaf crinkle virus. Sravika *et al.* (2018) stated among the sixty nine blackgram genotypes screened thirty, twenty nine, five genotypes were fall under resistant (R), moderately resistant (MR) and susceptible (S) respectively.

TIME OF URDBEAN LEAF CRINKLE DISEASE OCCURRENCE

Among 26 urdbean genotypes screened for ULCV infection, the disease occurred at three weeks after sowing *i.e.*, 25 DAS in fourteen genotypes *viz.*, LBG 933, LBG 944, LBG 787, GBG 12, LBG 648, LBG 932, LBG 941, VBN 8, LBG 884, GBG 45, VBN 11, GBG 4, LBG 645, LBG 623. While in 24 genotypes *viz.*, LBG 933, LBG 944, LBG 787, GBG 12, LBG 648, LBG 932, LBG 941, LBG 904, LBG 752, PU 31, VBN 8, GBG 1, TBG 104, LBG 884, GBG 45, GBG 67, LBG 918, LBG 685, VBN 11, VBG 12-110, GBG 4, LBG 645, TBG 129, LBG 623 the disease has appeared at five weeks after sowing *i.e.*, 40 DAS (Table 3). Among all 26 genotypes, ten were resistant to ULCV infection *viz.*, LBG 933, LBG 932, LBG 941, LBG 904, GBG 1, TBG 104, GBG 45, LBG 645, TU 40, TBG 129.

Table 2. Disease rating scale (0-5) for ULCV (AICRIP, MULLaRP)

Per cent infection	Disease grade	Reaction
All plants free of symptoms	0	HR
1-10% plants infected showing mild crinkling at the top, pods normal	1	R
11-20% plants infected showing crinkling and curling of top leaves, pods normal	2	MR
21-30% plants infected showing crinkling, puckering, malformation, shortening of pods	3	MS
31-40% plants infected showing all typical disease symptoms	4	S
More than 40% plants infected showing severe symptoms, few pods containing few seeds	5	HS

HR – Highly Resistant; R – Resistant; MR – Moderately resistant; MS – Moderately susceptible; S – Susceptible; HS – Highly susceptible

Table 3. Reaction of urdbean genotypes against urdbean leaf crinkle disease in Rabi 2021-22

Resistance level	Genotypes
HR	VBN 10
R	TBG 104, LBG 645, TU 40, TBG 129, GBG 1, LBG 933, GBG 45, LBG 932, LBG 941, LBG 904
MR	LBG 787, LBG 648, LBG 752, PU 31, VBN 8, LBG 918, LBG 685, VBN 11, VBG 12-110
MS	LBG 944, LBG 884, GBG 4
S	GBG 67, GBG 12, LBG 623 (Check)
HS	

The results were in agreement with Ashfaq *et al.* (2007) who observed incidence of ULCV 20 – 25 days after planting in urdbean and also with Kadian (1982) who recorded ULCV infection before 24 days old. Meanwhile, the results vary with the findings of Rehman *et al.* (2018) who identified disease occurrence early in one genotype at the first week after sowing, later the disease progressed with increase in the age of the plants.

In the present investigation, 26 genotypes were evaluated for their resistance to ULCD. Among the genotypes, VBN 10 recorded highly resistant reaction to ULCD. Genotypes *viz.*, TBG 104, LBG 645, TU 40, TBG 129, GBG 1, LBG 933, GBG 45, LBG 932, LBG 941, LBG 904 were recorded as resistant reaction to ULCD. Hence, these genotypes can be utilized for the ULCD resistance breeding programme.

LITERATURE CITED

- Ashfaq, M., Khan, M.A., Mughal, S.M., Javed, N., Mukhtar, T and Bashir, M. 2007. Evaluation of urdbean germplasm for resistance against urdbean leaf crinkle virus. *Pakistan Journal of Botany*. 39(6): 2103-2111.
- Bashir, M., Mughal, S.M and Malik, B.A. 1991. Assessment of yield losses due to leaf crinkle virus in urdbean (*Vigna mungo* (L) Hepper). *Pakistan Journal of Botany*. 23:140-142.
- Biswas, K.K., Tarafdar, A., Kumar, A., Dikshit, H.K and Malathi, V.G. 2009. Multiple infection in urdbean (*Vigna mungo*) in natural condition by *Begomovirus*, *Tospovirus* and urdbean leaf crinkle virus complex. *Indian Phytopathology*. 62: 975-982.

- Kadian, O.P. 1982. Yield loss in mungbean and urdbean due to leaf crinkle disease. *Indian Phytopathology*. 35:642-644.
- Kolte, S.J and Nene, Y.L. 1970. Know the leaf crinkle disease of urdbean. *Indian Farmers Digest*. 3: 6-7.
- Nene, Y.L. 1972. A survey of viral diseases of pulse crops in Uttar Pradesh. G. B. Pant University of Agriculture and Technology Research. 4: 191.
- Rehman, K., Iftikhar, Y., Ali, Y., Yasin, O., Arshad, O., Ahmed Khan, W., Hafeez, A., Jafir, M and Ali.S. 2018. Screening of Urdbean (*Vigna mungo* (L) Hepper) genotypes against ULCV in relation to epidemiological factors. *Advances in Zoology and Botany*. 6(1): 41-46.
- Sravika, A., Kennedy, J.S., Rajabaskar, D and Rajeswari, E. 2018. Screening of blackgram genotypes against leaf crinkle virus. *Journal of Entomology and Zoology Studies*. 6(6): 119-122.
- Subbarao, K. 1984. Studies on leaf crinkle disease of blackgram. *M.Sc. (Ag.) Thesis*. Acharya N.G. Ranga Agricultural University, Hyderabad, India. 2(1): 12-14.
- Vijaykumar, S. 1993. Studies on Blackgram leaf crinkle virus. *M.Sc. (Ag.) Thesis*. Acharya N.G. Ranga Agricultural University, Hyderabad, India.
- Williams, F.J., Grewal, J.S and Amin, K.S. 1968. Serious and new diseases of pulse crops in India in 1966. *Plant Disease Reporter*. 52: 300-304.