SCREENING OF URDBEAN GERMPLASM FOR THE SOURCES OF RESISTANCE AGAINST YELLOW MOSAIC VIRUS AND LEAF CRINKLE VIRUS

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Of the 49 germplasm lines/cultivars screened against YMV in a disease screening nursery, none of the cultivars was found to be immune or resistant. However, five cultivars (AARI M-13, AARI M-26, AARI M-27, AARI M-196 and AARI M-202) were found to be moderately resistant. The remaining cultivars were moderately to highly susceptible. Among the same test lines screened against LCV in another disease screening nursery, cultivar AARI M-1 and AARI M-35 were proved to be immune and highly resistant, respectively. Ten cultivars were resistant while thirty one were moderately resistant.

INTRODUCTION

Urdbean or black gram *(Vigna mungo* (L.) Hepper) is an ancient and important pulse crop of Pakistan. It covers an area of 86.5 thousand hectares yielding an annual production of 39.4 thousand tonnes of grain with an average yield 460 kg ha^{-1} (Anonymous, 1990). One of the factors for low yield of urdbean is the diseases, the yellow mosaic virus (YMV) and leaf crinkle virus (LCV) being the most destructive ones (Bashir and Malik, 1988). Since the cheapest and the ideal way of controlling plant diseases is the use of resistant cultivars, efforts were directed to screen some selected urdbean lines/cultivars under natural infection conditions against YMV and LCV diseases separately, so that resistant lines could further be exploited for the development of high resistant cultivars.

MATERIALS AND METHODS

Disease screening nursery against YMV: This nursery included a germplasm collection of urdbean lines collected from Directorate of Pulses, Ayub Agricultural

Disease rating scale	Disease intensity (% plants infected)	Disease reaction
0	No plant showing any symptoms	Immune
1	1-5	Highly resistant
2	11-25	Moderately resistant
3	26-40	Moderately susceptible
4	41-60	Susceptible
5	61-100	Highly susceptible
6		

Table 1. Summary statement of cultivars exhibiting various levels of resistance/susceptibility to YMV based on per cent plant infection

Immune %	Highly resistant 1-5%	Resistant 6-10%	Moderately resistant 11-25%	Moderately susceptible 26-40%	Susceptible 41-60%	Highly susceptible 61-100%
None	None	None	AARI M-13	AARI M-9	AARI M-1	AARI M-25
			AARI M-26	AARI M-11	AARI M-2	AARI M-30
			AARI M-27	AARI M-18	AARI M-3	AARI M-31
			AARI M-196	AARI M-20	AARI M-4	AARI M-32
			AARI M-202	AARI M-22	AARI M-5	AARI M-33
				AARI M-23	AARI M-6	AARI M-34
				AARI M-28	AARI M-7	AARI M-35
				AARI M-176	AARI M-8	AARI M-36
				AARI M-205	AARI M-10	AARI M-37
				AARI M-206	AARI M-12	AARI M-38
				AARI M-235	AARI M-14	AARI M-39
				AARI M-238	AARI M-15	AARI M-174
				SEL. 17	AARI M-16	Local susceptible
				SEL. 228	AARI M-17	check
					AARI M-21	
					AARI M-29	
					AARI M-222	
					AARI M-224	

Research Institute, Faisalabad. Each of the forty nine test lines were planted in single row subplot having row to row length 4 m, row spacing 30 cm and plant to plant distance 10 cm. A row of local susceptible check was planted after every two test lines to serve as check and disease spreader. The enteries were subjected to natural invasion and build up of vector i.e. white fly *(Bemisia tabaci)* of yellow mosaic virus and consequently to the infection of urdbean plants by YMV disease. The disease on each of the test enteries was assessed by recording the disease incidence (% plant infection) on 15, 30 and 45 days after the germination. The level of resistance/susceptibility of each test line was determined by using the following self designed disease rating scale.

Disease resistance nursery against LCV: This nursery consisted of the same test lines planted on the pattern of disease screening nursery against YMV. These were also subjected to natural invasion and build up of the vectors and consequently to the infection by

LCV. On each of the test enteries, the data on disease incidence were taken starting from 15, 30 and 45 days after germination. The level of resistance/susceptibility of each test line was determined by using the same scale.

RESULTS AND DISCUSSION

None of the 49 test germplasm lines/cultivars was found to be resistant to YMV. However, lines AARI M-13, AARI M-26, AARI M-27, AARI M-196 and AARI

Table 2. Summary statement of cultivars exhibiting various levels of resistance/susceptibility to LCV based on per cent plant infection developed in disease screening nursery

Immune %	Highly resistant 1-5%	Resistant 6-10%	Moderately resistant 11-25%	Moderately susceptible 26-40%	Susceptible 41-60%	Highly susceptible 61-100%
AARI M-1	AARI M-35	AARI M-12	AARI M-2	AARI M-34	AARI M-4	AARI M-29
		AARI M-15	AARI M-3	AARI M-36	AARI M-7	AARI M-37
		AARI M-16	AARI M-5	AARI M-39	AARI M-23	
		AARI M-38	AARI M-6	AARI M-202	AARI M-28	
		AARI M-174	AARI M-8	AARI M-26		
		AARI M-176	AARI M-9	AARI M-224		
		AARI M-196	AARI M-10	AARI M-235		
		AARI M-205	AARI M-11	AARI SEL-17		
		AARI M-222	AARI M-13	AARI SEL-28		
		AARI M-238	AARI M-14			
			AARI M-14			
			AARI M-17			
			AARI M-18			
			AARI M-20			
			AARI M-21			
			AARI M-22			
			AARI M-25			
			AARI M-26			
			AARI M-27			
			AARI M-30			
			AARI M-31			
			AARI M-32			
			AARI M-33			

M-202 were found to be moderately resistant. Out of the rest cultivars, 14 were moderately susceptible, 18 susceptible and 12 highly susceptible (Table 1). This revealed that germplasm lines varied greatly for their response to virus infection and this may be attributed to their genetic make up. Moreover, the resistance of urdbean to YMV is not uncommon, as prevalence of resistance have been recorded by other workers. For example, Gurha *et al.* (1982) while observing the reaction of 281 urdbean cultivars to MBYMV under conditions of high natural infection have reported that 15 remained free from infection, 11 were tolerant, 20 moderately tolerant, 33 susceptible and the remainder highly susceptible. Similarly, in the varietal screening studies in Pakistan by Ahmad (1975) in the summer of 1972 and 1974, 17 out of the 96 exotic and 8 out of the 20 indigenous urdbean types were found to be highly resistant to YMV and 50% of the total material was fairly tolerant.

Out of 49 test lines evaluated for their reaction to LCV, AARI M-1 and AARI M-35 were found to be immune and highly resistant, respectively while ten lines such as AARI M-12, AARI M-15, AARI M-16, AARI M-38, AARI M-174, AARI M-176, AARI M-196, AARI M-205, AARI M-222 and AARI M-238 were found to be resistant, thirty one moderately resistant, nine moderately susceptible, four susceptible and only AARI M-29 and AARI M-37 were found to be highly susceptible (Table 2). These results indicated that urdbean germplasm possessed higher level of resistance against LCV rather than YMV diseases. Resistance of urdbean to LCV has already been reported by Iqbal *et al.* (1991).

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