

Evaluation of Mungbean Germplasm

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Eighty five and 72 lines of mungbean germplasm were evaluated in 1978 and 1979 respectively. The 'Lam GG 127' and 'CC 1' were earliest maturing lines. The highest number of pods were recorded in 'LM 294-1' (118.6) and 'ML 5' (130.4) in 1978 and 1979 respectively. 'LM 294-1' also gave the highest yield (24.59 g) in 1978. EC 162000-1' has highest number of seeds/pod (12.1) and gave the highest yield (25.50 gm) in 1979. The lines viz., '11/99, 11/395' and '16-303-20-3-g' were resistant to MYMV and CLS. The positive and significant correlations of plant, height with pods/plant, yield/plant and of pods/plant with yield/plant were observed in both the years. The MYMV and CLS reactions had negative and significant correlations with yield, pods/plant in both the years.

The natural variability, its collection, maintenance, evaluation and the preservation of the variability for the characters of economic importance is useful in crop breeding. The desirable genes for different characters could be transferred through hybridization to the cultivated varieties and superior strains can be developed. Therefore, the indigenous and exotic lines were evaluated for 11 important characters.

MATERIAL AND METHODS

The mungbean (*Vigna radiata* (Linn.) Wilczek) germplasm consisting of 85 and 72 lines were grown in rainy season of 1978 and 1979 respectively. Each line was grown in a single row 5 m long, spaced 50 cm apart. The plant to plant distance was 10 cm. A green seeded, highly susceptible to mungbean yellow virus (MYMV) black gram (*Vigna mungo* (Linn.) Hepper) cultivar ('UL 2') was planted after every 5 and 6 rows in 1978 and 1979 respectively. This was done to

intensify the inoculum of MYMV from natural sources. No chemical was sprayed in the crop seasons to maintain the natural whitefly (*Bemisia tabaci* Genn.) population in the field.

The data for days to initial flowering and maturity was recorded on line basis. Observations on plant height (cm), pods/plant, seeds/pod, yield/plant(g), MYMV and cercospora leaf spot (CLS) reaction were recorded on 5 randomly selected plants. The scoring for MYMV was recorded after 100 percent plants of the infector row showed disease symptoms. The rating scale was 1-9, where, 1=resistant; 3=moderately resistant; 5=tolerant; 7=moderately susceptible; 9=susceptible. At podding stage plants were scored for CLS on 1-4 scale, where, 1-1 to 20% infected leaf area (resistant; 2=21 to 40% infected leaf area (moderately resistant); 3=41 to 60% infected leaf area (moderately susceptible); 4=60% infected leaf area (susceptible). One sample of 100 seeds from

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each line was weighed in grams and the same sample was used to score the seed colour as per Bose (1932), from 1 to 12, where, 1=pale lemon yellow, shining; 2=greenish yellow, shining; 3=greenish yellow dull; 4=green and dull; 5=green and shining; 6=dark green and dull; 7=dark green and shining; 8=light brown; 9=dark brown; 10=dark green with blackish marbling, dull; 11=green with blackish marbling, shining and 12=dark green with blackish marbling, shining. One more seed colour viz, 13=yellow seed was observed. The plant type was classified as non-viny (NV) viny (V) and semi-viny (SV). The simple correlation coefficients were calculated as per Panse and Sukhatme (1967).

RESULTS AND DISCUSSION

The mean, standard error and range for yield, yield components, MYMV and CLS (caused by *Cercospora species*) are presented in Table. Enough variability was present for all the characters in the germplasm evaluated in 1978 and 1979. 'Lam GG 127' (71 days) and 'CC 1' (67 days) were earliest maturing in 1978 and 1979 respectively. The highest number of pods were recorded on 'LM 294-1' (118.6) in 1978 and 'ML 5' (130.4) in 1979. 'EC 162000-1' had highest number of seeds/pod (12.1). Since pods/plant and seeds/pod are the important yield components in mungbean, the lines viz; 'LM 294-1' 'EC 162000-1' gave the highest yield of 24.59 and 25.50 g/plant in 1978 and 1979 respectively. 'LM 294-1' has been utilized in the hybridization programme at Pantnagar and several high yielding lines are in F_2 and F_3 generations.

'CES-1-F-5' showed the bold seed size of 4.94 g/100 seed.

The agronomic characters of lines having field resistance to MYMV and/or to CLS have been presented in Table 2 and 3. In 1978, 'L 80' and in 1979, '11/99', '11/395' and '16-303-20-3-8' showed the resistant reaction to MYMV. For CLS, 'Gujrat 1' and 'BR 1' were resistant in 1978 and 'ML9' '24-11-23-3-9-1' 'CES-2C-1' and 'Suneuna' showed the resistant reaction in 1979. 'MLG' has been reported as resistant to CLS in Taiwan (AVRDC, 1976). The lines viz; '11/99', '11/395' and '16-302-20-3-8' were also resistant to CLS.

The simple correlation coefficients between yield, yield components, MYMV and CLS score in 1978 and 1979 have been presented in Table 4. In general the direction of correlations was same in both the years, except for plant height and 100 seed weight, plant height and MYMV, 100 seed weight, and CLS score which could be because of the fact that the lines grown were different in both the years. Significant and positive correlation coefficients were observed between days to flowering and maturity and plant height, plant height and pods/plant and yield/plant, pods/plant and yield/plant. Significant negative correlations were noted of yield with MYMV and CLS score. The negative correlation of yield with virus and mildew score was reported by Yohe and Poehlman (1975). Singh *et al.* (1978) observed negative correlations of yield components with MYMV score.

The findings of the present investigation suggest that the lines viz; 'LM 294-1', 'ML 5', 'EC 162000-1', 'CES-1-F-5', '11/99', '11/395', 'L 80', '16-303-20-3-8', 'ML 9', '24-11-23-3-9', and 'Suneuna' may be involved in mungbean hybridization programme. This will facilitate the recovery of superior genotypes for yield components and resistance to MYMV and CLS diseases.

We express our sincere thanks to Drs. Fazlul Haque, S. M. Hasan, Yadvendra and P. C. Doloï of Bihar, Gujrat and Assam respectively for the supply of germplasm. We are equally thankful of Drs. Duangploy and Smottzer of Thailand for the supply of germplasm lines.

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TABLE-1. The variability for different characters in mungbean germplasm in 1978 and 1979

Character	1978		1979	
	Mean \pm SE	Range	Mean \pm SE	Range
Days to initial flowering	42.2 \pm 0.644	33.0-67.0	41.8 \pm 0.910	31.0-60.0
Days to maturity	81.0 \pm 0.678	71.0-97.0	76.9 \pm 1.294	67.0-113.0
Plant height (cm)	56.1 \pm 1.743	31.3-139.2	62.2 \pm 1.752	32.0-94.6
Pods / plant	44.7 \pm 1.964	3.0-118.6	51.7 \pm 3.383	9.6-130.1
Seeds / pod	-	-	9.9 \pm 0.157	6.5-12.1
100 seed weight (g)	2.23 \pm 0.055	1.27-3.43	2.55 \pm 0.053	1.80-4.94
yield / plant (g)	5.68 \pm 0.402	1.13-24.59	8.94 \pm 0.665	1.01-25.50
MYMV reaction	7.6 \pm 0.211	1.0 - 9.0	6.5 \pm 0.239	1.0-9.0
CLS reaction	3.5 \pm 0.018	2.0 - 4.0	2.1 \pm 0.073	1.0-4.0

TABLE 2. Agronomic characters of lines for field resistance to mungbean yellow mosaic virus (MYMV) and cercospora leaf spot (CLS) in mungbean in 1978

No. / Name of variety	Days to initial flowering	Days to maturity	Plant height (cm)	Pods/plant	100 seed weight (g)	Yield/plant (g)	MYMV score	CLS colour	Grain colour	Plant type
'ML 2'	56	80	139.2	63.8	3.43	20.24	2.6	2.8	5	V
'ML 62'	34	75	53.6	48.6	2.74	9.36	3.0	4.0	2	NV
'ML 65'	39	76	69.0	53.4	3.22	10.24	2.2	3.6	4	NV
'ML 75'	37	76	53.2	66.4	2.70	8.47	3.0	3.6	4	NV
'BR 1'	44	81	70.4	69.0	2.52	11.01	9.0	2.0	2	SV
'Gujrat 1'	47	85	55.6	41.6	2.17	2.87	7.4	2.0	11	NV
'L 80'	57	97	68.6	54.4	2.46	10.17	1.0	3.2	4	NV
'T 44' (check)	34	75	49.0	47.0	2.95	7.32	6.6	4.0	3	NV
'G 65' (check)	39	78	50.6	33.6	2.11	3.54	8.2	4.0	3	NV

TABLE 3. Agronomic characters of lines for field resistance to mungbean yellow mosaic virus (MYMV) and/ or cercospora leaf spot (CLS) in mungbean in 1979.

No./Name of variety	Days to initial flowering	Days to maturity	Plant height (cm)	Pods/plant	Seeds/pod	100 seed weight(g)	Yield/plant (g)	MYMV score	CLS score	Grain colour	Plant type
'Suneuna'	37	73	45.8	13.6	8.8	2.86	3.00	8.0	1.0	2	NV
'ML 70'	37	75	48.0	42.2	10.5	3.01	9.00	2.6	2.6	4	NV
'ML 69'	33	76	50.4	56.2	10.1	2.87	8.14	2.6	1.2	4	NV
'ML 62'	36	82	60.8	83.6	11.2	2.73	10.08	3.0	1.6	2	NV
'11/99'	42	75	52.2	36.0	10.0	3.33	7.47	1.0	2.0	8	NV
'11/395'	43	77	63.4	42.8	10.0	2.45	6.25	1.0	1.2	10	NV
'16-303-20-3-8'	47	76	62.7	113.0	8.8	2.47	18.94	1.0	1.4	5	NV
'24-11-23-3-9-1'	33	73	41.2	52.0	9.0	2.14	7.39	7.4	1.0	12	NV
'ML 9'	51	80	79.4	130.0	11.0	2.43	20.98	6.2	1.0	4	NV
'CES-2C-1'	51	80	69.6	12.8	9.5	3.30	4.00	8.2	1.0	1	NV
'T44' (check)	33	74	42.0	28.2	10.8	2.73	7.00	6.6	1.8	3	NV
'G 65' (check)	33	69	50.2	42.2	10.0	2.53	5.86	6.6	3.2	3	NV

EVALUATION OF MUNGBEAN GERmplasm

TABLE 4. Correlation coefficients for 9 characters in mungbean in 1978 and 1979.

1978/1979	1	2	3	4	5	6	7	8	9
1	-	0.563**	0.527**	0.239*	-0.074	-0.001	0.243*	0.261*	-0.188
2	0.657**	-	0.344**	0.186	-0.140	-0.016	0.151	0.167	-0.092
3	0.355**	0.218	-	0.356**	-0.001	-0.085	0.312**	0.163	-0.134
4	0.134	0.189	0.516**	-	0.377	-0.110	0.869**	0.121	-0.261*
5	-	-	-	-	-	-0.184	0.388**	0.091	-0.050
6	-0.238*	-0.266*	0.105	-0.042	-	-	0.037	-0.213	-0.143
7	0.106	0.062	0.677**	0.690**	-	0.301	-	-0.105	-0.355**
8	0.066	0.134	-0.359**	-0.259	-	-0.297**	-0.523**	-	0.093
9	-0.324**	-0.376**	-0.373**	-0.355**	-	0.025	-0.373**	0.017	-

*,** Significant at 0.05 and 0.01 probability level

1 = Days to initial flowering, 2 = Days to maturity, 3 = Plant height (cm), 4 = Pods/plant, 5 = Seeds/pod,
 6 = 100 seed weight (g), 7 = Yield/plant (g), 8 = Mungbean yellow mosaic virus (MYMV) and 9 = Cercospora leaf spot
 (CLS) reaction.