



Inheritance of growth habit and leaf-shape in mungbean [*Vigna radiata* (L.) Wilczek.]

Tulika Talukdar (Lahiri) and Dibyendu Talukdar

Department of Botany, Barasat Govt. College, Barasat, North 24 Parganas 743 201

(Received: December 2002; Revised: May 2003; Accepted: May 2003)

Growth habit and shape of leaflets in trifoliate leaves are two important morphological traits in mungbean. Despite the usefulness of these two traits as genetic marker, not much work [1-4] in the study of inheritance of these two characters has been done. Narrow genetic variation of these two traits and poor adaptability in common cultivars of mungbean are prime difficulties in this study. A wild species and progenitor of mungbean *Vigna radiata* var. *sublobata* with different growth habit and leaflet shape [5] with good adaptability was collected from northern hilly tracts (Darjeeling district) of west Bengal. The collected plants though were uniform growth habit showed considerable gradation in leaflet lobation pattern. According to this gradation, plants were categorized as entire to very sharply lobed. They

were numbered as sub 1 to sub 17. The present study was undertaken to investigate the inheritance pattern of this leaflet character alone with growth habit and detection of linkage between them, if any.

Two local cultivars of mungbean A-20 and KGP-16 and the wild sub 17 were used as parents for the present study. Both the cultivars are determinate in growth and their leaflets are entire. Sub 17, on the other hand, is indeterminate and has very sharply lobed leaflets. All the three parents were selfed during 1998-2000 and no segregation of these two traits was noticed. During rabi 2001, crosses in different combinations (Table 1) among parents were made. Sub 17 was crossed to both cultivars for each trait.

Table 1. Segregation for growth habit and leaf shape in F_2 and backcross generation

Cross	F ₁ phenotype	Segregation in F ₂		Total	Expected ratio	χ ²	
Growth habit		Indeterminate	Determinate				
Sub 17 × A-20	Indetertminate	207	67	274	3:1	0.04	
Back cross (F ₁ × A-20)	-	66	62	128	1:1	0.12	
Sub 17 × KGP-16	Indeterminate	125	39	164	3:1	0.12	
Back cross (F ₁ × KGP-16)	-	35	32	67	1:1	0.13	
Leaf shape:		Sharply lobed	Entire				
Sub 17 × A-20	Sharplyobed	206	62	268	3:1	0.49	
Back cross (F ₁ × A-20)	-	101	95	196	1:1	0.18	
Sub 17 × KGP-16	Sharplyobed	112	34	146	3:1	0.22	
Back cross (F ₁ × KGP-16)	-	51	48	99	1:1	0.09	
Joint segregation		Indeterminate	Determinate				
		Sharply lobed	Entire	Sharply lobed	Entire	Expected ratio	χ ²
Sub 17 × A-20	Indeterminate growth and sharply lobed leaflet	178	56	59	15	9:3:3:1	1.16
F ₁ × A-20	-	41	38	40	37	1:1:1:1	0.24
Sub 17 × KGP-16	Indeterminate growth and sharply lobed leaflet	160	51	58	19	9:3:3:1	0.52
F ₁ × KGP-16	-	34	32	36	31	1:1:1:1	0.78

The F_1 s were grown in subsequent seasons and were backcrossed with A-20 and KGP-16 cultivars, both recessive parents. The F_1 s now were selfed to produce F_2 seeds. Chi-square test was applied to test the goodness of the segregation ratios in F_2 plants.

All F_1 plants, in both crosses were indeterminate in growth habit and sharply, lobed leaflets in trifoliate leaves, indicating complete dominance of these two traits over determinate growth and entire leaflet. Reciprocal crosses among parents overruled the involvement of cytoplasmic inheritance. In the F_2 generation, segregation ratio of indeterminate : determinate growth and sharply lobed leaflet: entire leaflet showed good fit to 3:1 monohybrid segregation ratio (Table 1) in each case.

Joint segregation for these two traits (Table 1) suggested that growth habit and leaf lobation pattern in mungbean assorted independently (9:3:3: 1) and no evidence of linkage was observed.

References

1. **Dana S.** 1966. Species cross between *Phaseolus aureus* and *P. trilobus*. *Cytologia.*, **31**: 176-187.
2. **Ahuja M. R. and Singh B. V.** 1977. Induced genetic variability in mungbean through interspecific hybridization. *Indian J. Genet.*, **37**: 133-138.
3. **Singh G. R., Sareen P. K. and Saharan R. P.** 2000. Induced chlorophyll and morphological mutations in mungbean. *Indian J. Genet.*, **60**: 391-393.
4. **Mukherjee A. and Pradhan K.** 2002. Genetics of lobation in trifoliate leaf of mungbean. Abstracted in: *Perspectives in cytology and Genetics*, **11**: 88.
5. **Talukdar (Lahiri) Tulika and Talukdar Dibyendu.** 2002. Leaf shape variation in two naturally occurring varieties of mungbean [*Vigna radiata* (L.) Wilczek]. Abstracted in: *Perspectives in Cytology and Genetics*, **11**: 97.