

Studies on the Inheritance of Certain Plant Characters in Red Gram (*Cajanus cajan* (L.) Millsp.)

Red gram (*Cajanus cajan* (L.) Millsp.) exhibits a wide range of variation in its morphological features. The information available on the pattern of inheritance of different characters is very meagre. Dave (1934), Shaw (1936) and Sen *et al.* (1968) have reported the inheritance of plant habit and pod colours in red gram. The inheritance of a few characters is reported in this article using induced mutants of red gram as one of the parents in crosses.

Among the fourteen macromutants screened in M 2 generation of gamma irradiated red gram (CO 1), one was a dwarf plant with condensed internodes and the other was spreading in nature with open branches (Mohamed Alikhan and Veeraswamy, 1974). These two mutants were crossed with CO 1 red gram as the pollen parent, during monsoon 1973. A total of 123 crosses between spreading mutant and CO 1 and 95 crosses between dwarf mutant and CO 1 were effected by hand emasculation. The performance of the parents and hybrids are presented in Table. 1

TABLE 1. Performance of parents and hybrids
(Mean of 10 plants)

| Plant character | Parents/Hybrids | | | | |
|----------------------------|-----------------|------------------|-------------------------|---------------------|-----------------|
| | CO 1 | Spreading mutant | Spreading mutant x CO 1 | Dwarf mutant x CO 1 | Dwarf mutant |
| Height (cm) | 103.0 | 73.5 | 109.3 | 105.2 | 30.0 |
| Spread (cm) | 93.6/73.0 | 129.3/124.3 | 147.2/100.0 | 104.0/76.2 | 26.4/22.2 |
| No. of branches/plant | 11.6 | 13.4 | 12.0 | 11.2 | 7.2 |
| No. of clusters/plant | 80.0 | 72.0 | 210.0 | 156.2 | 12.6 |
| No. of pods/plants | 156.6 | 149.3 | 332.7 | 294.5 | 38.0 |
| Weight of grain/plant (gm) | 26.7 | 22.7 | 59.6 | 48.2 | 12.5 |
| Plant habit | erect, tall | spreading | erect, tall | erect, tall | erect, dwarf |
| Leaf colour | dark green | light green | dark green | dark green | dark green |
| Pod colour | maroon blotched | maroon blotched | maroon blotched | maroon blotched | maroon blotched |

Spreading mutant x CO 1

The hybrid population was uniformly erect and resembled the CO 1 parent, indicating the dominance of the erect plant habit. Seeds gathered from ten F_1 plants were studied during monsoon 1974 in a replicated trial and the data are presented in Table 2.

The occurrence of erect and spreading plants in a ratio of 3:1 in F_2 genera-

tion indicates that the plant habit in red gram is controlled by a single pair of genes. This is similar to the earlier observations reported by Krauss (1932), Shaw (1936) and Rekhi (1966).

The segregation obtained in F_2 for pod colour (15:1) indicates the interaction of two identical non-allelic pairs of genes determining the pod colour and fits well with a 15:1 ratio. Dave (1934)

TABLE 2. Segregation in F_2 mutant x parent crosses.

| Crosses | Character | Observed number of plants | Total | X ² | P value | Mode of segregation |
|-------------------------|---------------|---------------------------|-------|----------------|-------------|---------------------|
| Spreading mutant x CO 1 | Plant habit | Erect = 1284 | 1722 | 0.175 | 0.50 - 0.70 | 3 : 1 |
| | | Spreading = 438 | | | | |
| | Pod colour | Maroon blotched = 1613 | 1722 | 0.019 | 0.80 - 0.90 | 15 : 1 |
| | | Green = 109 | | | | |
| Dwarf mutant x CO 1 | Plant stature | Tall = 554 | 728 | 0.467 | 0.30 - 0.50 | 3 : 1 |
| | | Dwarf = 174 | | | | |

observed two pairs of factors for the inheritance of pod colour and obtained dark pods in F_1 and 9:3:4 ratio segregation (dark: maroon blotched: green) in F_2 of cross between "Green" x "Dark". Sen *et al.* (1968) also explained the inheritance of pod colour as due to two pairs of factors but one of which showed incomplete dominance. In the present study also the pod colour is found to be controlled by two pairs of factors but having duplicate gene action. Thus the results reported by different authors are at variance with regard to gene interaction though it is evident that the trait is controlled by two pairs of genes.

Dwarf mutant x CO 1

All the F_1 progenies were erect and tall like the CO 1 parent. Segregation in F_2 occurred only in respect of plant stature. The tall plant habit was dominant over dwarf and the proportion of 3:1 obtained for tallness and dwarfness indicates that a single pair of genes determine the plant stature in red gram (Table 2).

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REFERENCES

- DAVE, B. B. 1934. Inheritance of characters in *Cajanus cajan* (L.) Millsp. *Indian J. agric. Sci.* 4: 674-91.
- KRAUSS, F. G. 1932. The Pigeon Pea (*Cajanus indicus*). Its improvement, culture and utilization in Hawaii. *Hawaii Agr. Station Bull.* No. 64.
- MOHAMED ALIKHAN, W. and R. VEERASWAMY. 1974. Mutations induced in Red gram (*Cajanus cajan*) (L.) Millsp.) by gamma radiation and EMS. *Radiation Bot.* 14: 237-42.
- REKHI, S. S. 1966. Studies in the intervarietal crosses of *Tur* (*Cajanus cajan* (L.) Millsp.) *Nagpur Ag. Coll. Mag. Spec. Res.* 100.
- SEN, S., S. C. SUR and K. SENGUPTA. 1968. Genetical studies in *Cajanus cajan* (L.) Millsp. Genetics of Pod Colour. *Ther. Appl. Genet.* 38: 123-50.
- SHAW, F. J. F. 1936. Studies in Indian Pulses. The inheritance of morphological characters and wilt resistance in arhar (*Cajanus indicus* Spreng) *Indian J. agric. Sci.* 6: 139-87.

Spreading mutant x CO 1

The hybrid population was uniformly erect and resembled the CO 1 parent, indicating the dominance of the erect plant habit. Seeds gathered from ten F₁ plants were studied during monsoon 1974 in a replicated trial and the data are presented in Table 2.

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- MOHAMED ALIKHAN, W. and R. VEERASWAMY. 1974. Mutations induced in Red gram (*Cajanus cajan*) (L.) Millsp.) by gamma radiation and EMS. *Radiation Bot.* 14: 237-42.
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- SEN, S., S. C. SUR and K. SENGUPTA. 1968. Genetical studies in *Cajanus cajan* (L.) Millsp. Genetics of Pod Colour. *Ther. Appl. Genet.* 38: 123-50.
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