

## Low Natural Outcrossing in 'Cleistogamous' Pigeonpea Mutant

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Pigeonpea, has considerable degree (0-50%) of natural outcrossing when compared with other grain legumes, which poses problems in developing pure lines and in maintaining the purity of released cultivars and germplasm accessions (Gupta et al. 1981). Natural outcrossing in pigeonpea takes place by frequent insect visits from one flower to another within and across the fields. A large variation in the extent of natural outcrossing has been reported from different countries, and different locations within a country which has been recently reviewed by Saxena et al. (in press). Byth et al. (1982) reported <2% outcrossing in cv Royes, and attributed it to the floral modification (wrapped flower) of the cultivar. This trait, however, does not inhibit outcrossing in different environments (Saxena et al. 1987).

Another floral mutant 'cleistogamous' type, was isolated from a progeny of an intergeneric cross between *Cajanus cajan* (cv T 21) and *Atylosia lineata*. In this mutant, unlike normal cultivars, the anthers are not in di-adulphous (9+1) configuration and the keel petal partly surrounds the standard petal enfolding the two wing petals and thereby delaying flower opening until after the fertilization is complete. To obtain preliminary information on the extent of natural outcrossing in this floral variant, 160 single row plots of 4-m length of the 'cleistogamous' line were planted in two different fields at ICRISAT Center in the 1986 rainy season. Each plot was flanked by the genotype having normal flowers. Five random plants were harvested

from each row for progeny evaluation. Our observations (Saxena et al. in press) have shown that the gene controlling 'cleistogamous' character is recessive to 'normal' flowers and, therefore, the extent of natural outcrossing was determined by counting the hybrid plants (normal flowers) in the single plant progenies of mutant plants.

From both the fields, 648 open-pollinated single plants were harvested and progenies were grown in 1987 in 4-m long, two row plots with an interplant spacing of 25 cm. Observations on the flower type were recorded on each plant. The data indicated that natural outcrossing in different progenies ranged from 0.02% to 0.40% with a mean of 0.16% in one field, whereas in the other field it ranged from 1.09% to 4.30% with an average of 2.67% (Table 1). This variation could be attributed to variable insect activity in the two fields at the time of flowering. Natural outcrossing over both the fields was only 0.54%. These outcrossing values are extremely low in comparison to the outcrossing values reported earlier at ICRISAT Center (around 20%) and other locations. The exact reasons for low natural outcrossing in this mutant have not been determined. However, it appears that a delay in the floral bud opening perhaps fails to attract insect pollinators, resulting in a high level of self-fertilization.

These preliminary observations indicated that in the 'cleistogamous' mutant, the extent of natural outcrossing is very low and this trait, if incorporated in breeding lines, can be of great use in maintaining the purity of pigeonpea cultivars.

## References

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**Table 1. Natural outcrossing in 'cleistogamous' pigeonpea mutant line at ICRISAT Center, India, 1987.**

Field number	Block number	Progenies grown	Total plants	Plants with cleistogamous flowers	Plants with normal flowers	Plants outcrossed (%)	
BP 11B	3	85	2775	2764	11	0.40	
	4	135	4211	4210	1	0.02	
	5	161	4737	4732	5	0.11	
	6	45	596	594	2	0.34	
	7	33	412	411	1	0.24	
	8	46	752	751	1	0.13	
			505	13483	13462	21	
	Mean						0.16
BP 2B	1	42	921	911	10	1.09	
	2	21	295	283	12	4.07	
	3	25	419	401	18	4.3	
	4	55	797	772	25	3.14	
			143	2432	2367	65	
Mean						2.67	
Total/overall mean		648	15915	15829	86	0.54	

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