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Short Communication

Inbreeding depression in vegetable cowpea [*Vigna unguiculata* (L.) Walp.]

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Cowpea is one of the most important multipurpose legume crop grown for pulse, green vegetable, fodder, cover as well as green manuring. Its wider adaptability over different agro-climatic conditions and cheap and high quality protein provides good place in different cropping situations throughout India as well as south-east Asia. The phenomenon of crossing and producing F_1s that manifests itself by greater vitality, rapid growth and development, higher productivity, resistance adoption and uniformity of F_1s has been extensively exploited in many self pollinated crops (Hazra, 1991; Kumar *et al*. 2000; Lal *et al*. 2007).

The experiment was conducted during *Kharif* season of 2012 and 2013 at Department of Horticulture, IGKV, Raipur (C.G.). The experiment comprises of different phenotypic genotypes like six lines *viz*., ICP-26 (L_1), ICP-38 (L_2), ICP-42 (L_3), ICP-45 (L_4), ICP-49 (L_5) and ICP-54 (L_6) and four testers *viz*., Pusa Komal (T_1), Arka Garima (T_2), Indira Hari (T_3) and Khalleshwari (T_4) along with their 24 F_1s produced by utilizing line x tester matting design as given by Kempthorne (1957). The experiment was laid out in randomized block design with three replications. Each genotype consisted of three rows of 3.15 m long and 7 plants in each row. The spacing given was 60 cm between rows and 45 cm within a row. Observations were recorded on ten randomly tagged competitive plants from each genotype. Inbreeding depression was calculated using following formula:

$$\text{Inbreeding depression} = \frac{\overline{F}_1 - F_2}{\overline{F}_1} \times 100$$

The estimates of inbreeding depression in F_2 (expressed as the reduction in F_2 means from F_1 means) were worked out for all the characters under study. Significant and negative inbreeding depression was found in cross ICP-38 x Indira Hari for days to first flowering, days to 50% flowering and days to first picking. The cross ICP-42 x Khalleshwari had highest significant and negative inbreeding depression for plant height whereas, ICP-54 x Khalleshwari had highest significant and positive inbreeding depression for number of branches per plant. None of the cross showed significant positive inbreeding depression for number of flowers per cluster and number of pods per cluster while, highest significant and negative inbreeding depression was noted in cross ICP-54 x Khalleshwari and ICP-26 x Indira Hari, respectively. The cross ICP-38 x Khalleshwari had highest positive inbreeding depression for pod length and pod weight. None of the cross showed significant inbreeding depression for number of pods per plant however, lowest and highest values of inbreeding depression was observed in crosses ICP-49 x Arka Garima and ICP-45 x Khalleshwari, respectively. Green and tender cowpea pod is very important for eating but number of seeds per pod and 100-seed weight had equal importance for multiplication and vigor, the crossed ICP-38 x Indira Hari had recorded highest positive inbreeding depression for number of seeds per pod, whereas, lowest negative inbreeding depression in cross ICP-54 x Indira Hari and ICP-26 x Khalleshwari for 100-seed weight and per cent protein content in green pods respectively. The lowest and highest magnitude of inbreeding depression for green pod yield per plant was recorded for ICP-26 x Arka Garima and ICP-42 x Arka Garima, respectively. Inbreeding depression was also reported by Kumar *et al.* (2000), Sangwan and Lodhi (2002) and Lal *et al.* (2007). Some of the crosses even showed negative inbreeding depression in F_2 generation for some attributes, this could be due to the appearance of large number of transgressive segregants in the experimental population. The above findings were also in agreement with Kheradnum *et al*. (1975) and Vishwanatha *et al*. (1998). Although cowpea is a self pollinated crop, the result revealed high to moderate degree of inbreeding depression for most of the characters which may be

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Table 1: Mean performance of parents, F_1s, F_2s and range of inbreeding for green pod yield and its components in vegetable cowpea

S. No.	Characters	Mean performance			Range of Inbreeding (%)
		Parents	F_1	F_2	
1.	Days to first flower	44.43	43.39	45.57	-093 – 14.72
2.	Days to 50% flowering	50.62	48.26	50.46	-0.93 – 13.47
3.	Days to first picking	52.07	50.19	52.38	-0.80 – 12.49
4.	Plant height (cm)	171.41	193.26	178.43	-16.63 – (-) 2.06
5.	Number of branches per plant	7.91	8.07	7.66	-16.07– 14.51
6.	Number of flower per cluster	5.82	6.83	6.57	-30.16 – 2.07
7.	Number of pods per cluster	2.53	3.30	3.10	-9.09 – 0.00
8.	Days to final picking	103.37	105.93	107.15	-7.17 – 4.24
9.	Pod length (cm)	29.54	27.70	26.03	-18.10 – 4.52
10.	Pod weight (g)	8.84	8.15	7.63	-18.18– 4.44
11.	Number of pods per plant	18.55	24.78	24.01	-7.33 – 5.03
12.	Number of seeds per pod	14.67	15.36	14.89	-13.05 – 5.88
13.	Protein content in green pods (%)	2.59	3.13	2.89	-9.06 – (-) 4.15
14.	100 seed weight (g)	11.05	10.15	9.88	-5.30 – (-) 2.05
15.	Green pod yield /plant (g)	151.10	187.41	169.07	-22.89 – 5.65

due to the appreciable genetic divergence in material used for study. Kheradnum *et al*. (1975) reported that when values of a measured character were close for the two parental lines involved in a cross, the mean values of the subsequent generation deviated very little from mid parent value and thus low magnitude of inbreeding depression or heterosis was exhibited.

It may be concluded that a single generation of selfing in cowpea has been sufficient to bring about inbreeding depression that could negate most of the heterosis obtained from the crossing for various traits. The inbreeding depression results due to fixation of unfavourable recessive genes in F_2. The moderate and high magnitude of inbreeding depression indicates the presence of additive and non-additive gene action for respective attributes.

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