

Heterosis and inbreeding depression in cowpea

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ABSTRACT

Heterosis and inbreeding depression were studied in 28 F₁s and 28 F₂s of eight parental diallel for green pod yield and its component characters in cowpea. The cross IC 201085 x CO 4 recorded the maximum heterosis over better parent for green pod yield (34.90%), followed by EC 4865 x SL 3, EC 4865 x IC 201085 and EC 4865 x Pusa Dofasli. These crosses also exhibited positive and significant inbreeding depression. The heterosis for green pod yield in these crosses was only attributed due to heterosis in dry matter in pod, pods/cluster and pods/plant. Non-additive gene action was mainly operative in the expression of these characters. Hence, the scheme of inter-mating in F₂ and resulting generation may be advantageous for rapid fixation of dominant genes and to break undesirable linkages for facility of selection to improve the green pod yield in cowpea.

Key words : Heterosis, Inbreeding depression, Cowpea

INTRODUCTION

Heterosis is being utilized successfully now a days in cross pollinated crops. However, in the commercial exploitation of heterosis in self pollinated crops like cowpea [*Vigna unguiculata* L. Walp)] is locked up due to difficulties in large scale emasculation and lack of availability of male sterile lines with suitable fertility restoring system. The alternative left to the breeder is to isolate the superior segregants from the crosses showing high heterotic response. Hence, an attempt was made in this study to know the nature and magnitude of heterosis and inbreeding depression in eight parental diallel crosses to select out the economic crosses for search for transgressive segregants of cowpea.

MATERIALS AND METHODS

A diallel cross excluding reciprocals was made among eight genetically diverse parents namely, EC 4865, IC 201085, Pusa Dofasli, V 39, CO 4, GC 27, SL 3 and DL 1. The parents were selected from the germplasm collected from NBPGR, different research centres of the country and indigenous collection made from various parts of the State of Madhya Pradesh. The parents, and their all possible 28 F₁s and 28 F₂s were evaluated in randomized complete block design with three replications during rainy season of 1998. The experiment was sown on June 27, 1998. All the genotypes were sown in a single row plot of 5m length. The distance between and within row was maintained at 45 and 30cm, respectively. Fertilizer was applied @ 100 kg DAP/ha. Observations were recorded on ten randomly selected and tagged plants on each genotypes in each replications for plant height, days

to 50% flowering, pods/cluster, pod length (cm), pods/plant, seeds/pod, dry matter in pod (%), protein content (%) and green pod yield/plant. The protein content was determined by estimating organic nitrogen using conventional micro-kjedahl's techniques as described in AOAC (1965) and by multiplying in nitrogen percentage with factor 6.25. Heterosis and inbreeding depression were estimated according to formula given by Hayes *et al.* (1955).

RESULTS AND DISCUSSION

The results obtained from the present investigation are presented in Table 1 and 2.

Highly significant differences among the genotypes observed for all the characters, which indicated that considerable/genetic variability was generated in the present materials for all the characters. The partitioning of mean sum of squares due to genotypes into its components namely parents, F₁ and F₂ also showed significant differences for all the characters except days to 50% flowering. In all the populations, the mean sum of squares due to parents Vs F₁ were also significant for plant height, pods/cluster, pods/plant, dry matter in pod and green pod yield /plant.

The magnitude of overall heterosis ranged from -47.84 to 16.34% for plant height, -20.79 to 7.59% for days to 50% flowering, -20.25 to 34.01% for pods/cluster, -24.37 to 9.15% for pod length, -53.37 to 39.91% for pods/plant, -34.05 to 15.25 % for seeds/pod, -58.84 to 46.38% for dry matter in pod, -59.87 to 35.50% for protein content and -59.91 to 34.90% for green pod yield/plant (Table 1). Similarly, inbreeding depression ranged from -75.11 to 20.66% for plant height, 1.31 to 14.29% for days to 50%

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