

Genetic analysis in amaranthus

P. ARUNA AND P. GEETHA RANI

Accepted : September, 2008

See end of the article for authors' affiliations

Correspondence to :

P. ARUNA
Department of
Vegetable Crops
Horticulture College
and Research Institute,
PERIYAKULAM (E.)
(T.N.) INDIA

ABSTRACT

Six genotypes of vegetable amaranth were involved in a full diallel crossing. The six parents and their 30 F1 hybrids were evaluated for genetic parameters. Predominance of additive and non-additive genes for yield per plant was observed. High heritability estimates for most of the characters indicated the suitability of the material for pedigree selection. Since overdominance was prominent for many traits, recurrent selection and heterosis breeding followed by selection in advanced generation would be most appropriate. It is also suggested to practice reciprocal recurrent selection because it utilizes both additive and non additive genetic components to the maximum possible extent.

Key words : Amaranthus, Genetic analysis, Additive gene, Dominance gene.

Genetic information on the inheritance of major quantitative characters associated with yield is more important in developing a sound breeding strategy. Hence, the present study was carried out to gather information on the nature of gene action of various quantitative traits in amaranthus. Genetic variation could arise from additive, dominance and epistatic gene effects. The present investigation was planned to assess the gene action in vegetable amaranthus, so that inference could be drawn from the study and could be utilized in forming breeding programme accordingly.

MATERIALS AND METHODS

Six genotypes of amaranthus were crossed in a diallel fashion. The crossed seeds are then planted in the main field at a spacing of 60 x 60 cm in RBD with three replications at College orchard, Horticultural College and Research Institute, Coimbatore. The recommended cultural practices as applicable to a leafy vegetable crop (Annon, 1974) were applied. Observations on yield of greens, number of leaves, weight of leaves, weight of stem, leaf area, Days for 50% flowering, plant height at maturity, thousand seed weight and total drymatter were recorded 35 days after sowing. Genetic components were analysed using diallel analysis of Hayman (1954a and 1954b) and Jinks (1955).

RESULTS AND DISCUSSION

The estimates of genetic parameters are presented in Table 1, 2 and 3.

Yield of greens :

The significance of H_1 , H_2 and H^2 suggested

dominance effect for this trait. It was also confirmed by the variance that D was greater than H_1 which indicated the presence of additive gene action. The variance of F1 was greater than zero indicating that the dominant alleles predominant than the recessive alleles. The KD/KR ratio being more than unity (1.692) and F value being positive (226.09) indicated that the parents had more of dominant genes for this character. The $h_2/4H_1$ ratio being less than 0.25 (0.20) revealed the asymmetrical distribution of positive and negative genes among the parents. Moderate heritability estimates (0.631) was observed. This reveals the action of preponderance of non additive gene action, Pandey and Pal (1985), Johnson *et al.* (1955) and Ananthalakshmi (2001) reported moderate to high heritability for yield of greens in amaranthus.

Number of leaves :

The ratio of mean degree of dominance supported the presence of over-dominance. Significant values of H_1 , H_2 (351.43) and h^2 proves the presence of both additive and dominance gene action. The component D was less than H_1 and this confirmed the preponderance of dominant alleles. The component F was less than zero suggesting the presence of recessive alleles. The parameter KD/KR (0.72) being less than unity suggested the involvement of greater proportion of recessive genes. The $H_2/4H_1$ ratio being less than 0.250 revealed the asymmetrical distribution of positive and negative genes among the parents. The mean degree of dominance (H_1/D) $1/2$ indicated over dominance. This is in consonance with the findings of Pal (1972) and Mohanalakshmi (1993) in Amaranthus.