

## Association studies and construction of selection indices in grain amaranth

V.P. KUSUMA, T.E. NAGARAJA\* AND P.M. SALIMATH

Department of Genetics & Plant Breeding, University of Agricultural Sciences, DHARWAD (KARNATAKA) INDIA

(Accepted : June, 2007)

### SUMMARY

An evaluation of 64 accessions of grain amaranth (*Amaranthus* sp.) for quantitative traits revealed highly significant differences among the accessions. The genotypic correlations were slightly higher than the phenotypic correlations. Seed yield exhibited significant and positive association with panicle fresh weight, panicle length, number of spikes per panicle, dry weight of panicle, dry weight of stem and harvest index. These characters also recorded high heritability and genetic advance. The selection indices revealed that relative efficiency was greater for the minimum character combination of panicle fresh weight + panicle length + panicle dry weight. Selection based on these characters would enhance the yield potential in grain amaranth.

Key words : Grain amaranth, Correlation, Selection indices, Discriminant function.

*Amaranthus* sp. are being cultivated since centuries for leafy vegetables as well as an important subsidiary food grain crop, (Hauptli and Jain, 1978) under different agro climatic zones. To exploit the potentiality of grain amaranth several crop improvement programmes have been undertaken. Yield is a complex character, which depends upon many independent contributing characters. Knowledge of the magnitude and type of association between yield and its components themselves greatly help in evaluating the contribution of different components towards yield. Yield being a polygenic character, is highly influenced by the fluctuations in environment. Hence selection of plants based directly on yield would not be very reliable. Smith (1936) initiated the use of discriminant function, which could maximize the regression of phenotypic value on the genotypic value of a plant or a progeny. Reports on association studies are still largely lacking and none has reported the genetic gain from selection indices in grain amaranth. Hence, the present study was undertaken to elucidate the association among different agronomic traits and to know the superiority of discriminant function technique over straight selection for seed yield.

### MATERIALS AND METHODS

In the present study 64 strains of grain amaranth belonging to three different species viz., *Amaranthus hypochondriacus*, *Amaranthus cruentus* and *Amaranthus edulis* were grown during kharif 2002 following 8 x 8 simple lattice design, at Botanical garden of University of Agricultural Sciences, Dharwad. The

rows were 2.5m long and 60cm apart. In each row plant-to-plant distance was maintained 20cm by thinning. All the recommended package of practices was followed. Observations were recorded on days to 50% flowering, days to maturity, stem girth at collar region (cm), number of leaves, number of branches, plant height (cm), panicle fresh weight (g), panicle length (cm), number of spikes per panicle, dry weight of panicle (g), dry weight of stem (g), harvest index (%) and seed yield per plant (g). The data collected were subjected to statistical analysis. Selection indices were constructed according to the method of Smith (1936) as presented by Brim *et al.* (1951). The total expected genetic advance from selection for a particular index was calculated according to Robinson *et al.* (1951).

### RESULTS AND DISCUSSION

Analysis of variance revealed significant difference for yield and yield components, suggesting the existence of significant variation among the entries. Similar pattern of variability was reported by Mohinudeen *et al.* (1983) and Waghmode *et al.* (1998). Heritability in broad sense and genetic advance were observed to be high for number of branches, number of leaves, panicle fresh weight, panicle length, number of spikes per panicle, dry weight of panicle, dry weight of stem, harvest index and seed yield per plant (Table 1). From the study of heritability and genetic advance it is inferred that simple selection among germplasm accessions can bring about significant improvement in the yield and its component characters as the heritability and estimated genetic advance were

\* Author for correspondence.