Genetic divergence in kale (*Brassica oleracea* var. *acephala* L.)

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ABSTRACT

Forty diverse genotypes including three commercial checks namely *Khanyari*, *Kawdari* and *Jumadari* collected from various parts of the valley and maintained by the Division of Olericulture, SKUAST (K), Shalimar, Srinagar were evaluated for various yield and yield attributing traits at three locations in Kashmir valley during *rabi* 2004-05 in a randomized block design with three replications at each location. Analysis of variance for dispersion revealed that the genotypes tested expressed significant variability for various yield-attributing traits in the individual as well as in pooled analysis over the environments. In pooled analysis of the data over environments four meaningful clusters were formed. Cluster I accommodating seven genotypes namely SH-K-1, SH-K-2, SH-K-3, SH-K-4, SH-K-5, SH-K-6 and SH-K-7. Cluster II grouped 19 genotypes *viz.*, SH-K-9, SH-K-10, SH-K-11, SH-K-16, SH-K-17, SH-K-18, SH-K-19, SH-K-20, SH-K-21, *Jumadari*, SH-K-23, SH-K-24, SH-K-25, SH-K-35, SH-K-36, SH-K-37, SH-K-38, SH-K-39 and SH-K-40. Cluster III grouped 13 genotypes namely SH-K-8, SH-K-13, SH-K-14, SH-K-15, *Khanyari*, SH-K-27, SH-K-28, SH-K-29, SH-K-30, *Kawdari*, SH-K-32 SH-K-33 and SH-K-34. Cluster IV was mono-genotypic *i.e.* having only one genotype in the cluster *viz.*, SH-K-12. In the pooled analysis estimation of mean inter and intra cluster distance among the cultivars falling in different clusters indicated that the cluster II had the highest intra cluster distance (D^2) value of 214.57 followed by cluster III and I having a intra-cluster distance of 213.69 and 112.21, respectively. The maximum inter cluster distance (D^2) values of 2636.17 was observed between cluster I and IV followed by cluster I and cluster III (1623.28), cluster II and IV (1409.32), cluster III and VI (780.19), cluster II and I (637.59) and cluster II and III (595.2) indicating wide diversity between the clusters. From the present investigation four clusters were formed in pooled analysis and two genotypes from each cluster could be selected for hybridization programme. The selection would however, depend on individual's merit. Cluster-IV having only one genotype could be crossed in all possible combinations for increase in number of leaves and earliness; cluster-III genotypes for tall stature and earliness; cluster-I genotypes for dwarf stature and leaf weight and cluster-II genotypes for dwarf stature and winter hardiness.

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Among the leafy vegetables, kale (*Brassica oleracea* var. *acephala* L.) is cultivated on a large scale in the temperate regions of the country. In India kale has not been grown as a vegetable crop for commercial use. However, it is commercially grown in Kashmir and to a limited extent in Jammu, Assam (Choudhury, 1977) and Himachal Pradesh. In Jammu and Kashmir it is a popular vegetable both among rich and poor, grown in almost all kitchen gardens and also as a commercial crop around cities and towns. Kales grown in Kashmir are popularly known as "HAK". The Sanskrit nomenclature for all edible green leaves "SHAK" appears to have gradually changed in present day local nomenclature as "SAG" in most parts of the country and "HAK" in Kashmir (Wanchoo, 2000). It becomes necessary for a breeder to develop varieties of kale through genetic improvement. Even though the farmers in Kashmir continue to grow different kale varieties yet the number of local adapted varieties has

declined in the recent years. Kales being highly cross-pollinated and the diversity found in Kashmir are probably result of complex natural intra- and inter-specific crosses with inadequate knowledge of the hereditary transmission of numerous characters. As a result rational basis for the choice of the parents to be crossed are generally not available. Therefore, for effective plant breeding programme the knowledge of genetic diversity among the parents is essential to exploit hybrid vigour and help in convergence of elite gene pools in the desired genotypes. Multivariate technique using D^2- statistics (Mahalanobis, 1928) is one of the potent techniques to measure genetic divergence among biological populations at genotypic level.

The information on these aspects in kale under the climatic conditions of Kashmir and also in other parts of India is almost negligible. The present investigation was therefore, planned to generate information on (a) genetic