



Short communication

## Genetic divergence in cowpea (*Vigna* spp.) varieties for seed quality

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### Abstract

An investigation was carried out with seeds of ten cowpea varieties to study the genetic divergence of the varieties with respect to storability and seed quality parameters. The seeds were evaluated for four seed quality parameters viz., germination, speed of germination, seedling vigour index I and seedling vigour index II and diversity was assessed using Mahalanobis  $D^2$  analysis after ten months of storage under ambient conditions. There was significant variation for the quality aspects related to storage. Variety Kashi Kanchan had a germination of 61.67 per cent after ten months of storage. On the basis of  $D^2$  values the genotypes were grouped into four clusters. Cluster I was the largest containing four varieties (Lola, Vellayani Jyothika, Vyjayanthi and Anaswara). The maximum inter-cluster distance was recorded between clusters I and IV (Hridya and Bhagyalakshmi). The maximum intra-cluster distance was found in cluster IV followed by I. Varieties Kanakamony and Kashi Kanchan grouped in cluster II and Kairali and Sreya in cluster III.

**Key words:** Cowpea, Genetic divergence, Germination, Speed of germination, Vigour index

Cowpea is an important vegetable crop of Kerala. An array of improved varieties is available for cultivation. Maintenance of seed quality during storage is essential and inevitable. The rate at which the process of seed ageing takes place depends on the weather conditions of the storage atmosphere and the ability of seeds to resist the degradative changes. Genetic make up of the species and varieties also decide the senescence pattern.

$D^2$  analysis developed by Mahalanobis (1930) helps in grouping genotypes into specific or distinct clusters. This tool was employed to study the genetic divergence of cowpea varieties based on their ability to maintain seed quality parameters during storage. The storage experiment was conducted as a completely randomised design involving ten genotypes and three replications in the Department of Seed Science and Technology, College of Horticulture, Kerala Agricultural University, Thrissur, Kerala located between 10° 54' North

latitude and 76° 28' East longitude during July 2014 to May 2015.

Ten cowpea varieties viz., Lola, Vellayani Jyothika, Vyjayanthi, Anaswara, Kairali, Kanakamony, Kashi Kanchan, Sreya, Hridya and Bhagyalakshmi were grown under uniform management. Seeds were extracted and dried to a moisture content of eight per cent before packing in 700G polyethylene bags. The seeds were stored under ambient conditions for a period of ten months. Seeds samples were drawn from each replication at monthly intervals and evaluated for germination (%) (ISTA, 1985) and seed quality parameters such as speed of germination (Maguire, 1962), seedling length (cm), seedling dry weight, seedling vigour index I and seedling vigour index II (Abdul-Baki and Anderson, 1973). The  $D^2$  analysis was done based on observations at the end of storage period using SPAR 1 software.

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*Table 1.* Seed germination and quality parameters of cowpea varieties at ten months of storage

Variety	Germination (%)	Speed of germination	Seedling shoot length (cm)	Seedling root length (cm)	Seedling dry weight (g)	Seedling vigour index I	Seedling vigour index II
Lola	50.83	14.53	19.06	7.72	0.067	1361	3.43
Vellayani Jyothika	30.83	9.45	19.83	7.39	0.082	839	2.54
Vyjayanthi	51.67	15.56	19.78	7.84	0.071	1424	3.67
Anaswara	53.33	16.08	17.40	6.27	0.068	1262	3.64
Kairali	45.00	13.32	21.16	8.35	0.063	1343	2.82
Kanakamony	57.50	17.77	21.34	8.30	0.040	1704	2.28
Kashi Kanchan	61.67	18.32	20.12	8.29	0.042	1751	2.57
Sreya	49.17	13.85	19.19	7.59	0.054	1317	2.68
Hridya	45.00	13.82	16.67	6.77	0.017	1054	0.75
Bhagyalakshmi	46.67	14.34	17.89	6.60	0.031	1143	1.46
CD	4.55	1.21	1.21	0.33	0.030	115.73	0.30
CV	0.36	0.17	0.08	0.09	0.38	0.21	0.43

Seed quality parameters recorded are furnished in Table 1. The CD value for the characters under the study were significant indicating significant differences among the genotypes for the characters studied. There was significant variation for the quality aspects related to storage. Variety Kashi Kanchan had a germination of 61.67 per cent and high speed of germination after ten months of storage. It indicates that genetic variability exists among the genotypes for the storage potential of the seed.

The varieties were found to group into four distinct clusters as shown in fig 1. The diagram indicates that, cluster IV which includes the varieties Hridya and Bhagyalakshmi showed the highest intra cluster distance (103.89) followed by cluster I with varieties Lola, Vellayani Jyothika, Vyjayanthi and Anaswara (66.58). The lowest intra cluster distance (7.32) was found in cluster II with the varieties Kanakamony and Kashi Kanchan.

Considering the inter cluster distance, the maximum distance (1454.11) was found between cluster I (Lola, Vellayani Jyothika, Vyjayanthi and Anaswara) and cluster IV (Hridya and Bhagyalakshmi); and minimum distance (156.85) existed between cluster I (Lola, Vellayani Jyothika,

Vyjayanthi and Anaswara) and cluster III (Kairali and Sreya) (Tables 2 and 3). The mean values of four clusters for four seed quality parameters in ten cowpea varieties are shown in Table 4.

*Table 2.* Distribution of ten varieties of cowpea into different clusters based on seed quality

Cluster no.	Varieties
I	Lola (V1), Vellayani Jyothika(V2), Vyjayanthi (V3), Anaswara (V4)
II	Kanakamony (V6), Kashi Kanchan (V7)
III	Kairali (V5), Sreya (V8)
IV	Hridya (V9), Bhagyalakshmi (V10)

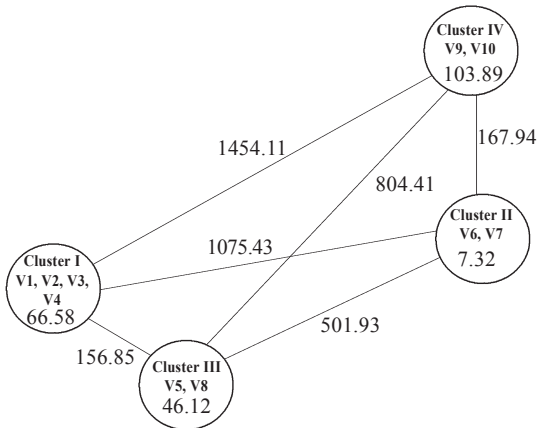
*Table 3.* Average intra (bold) and inter cluster distance (D) values

	Cluster I	Cluster II	Cluster III	Cluster IV
Cluster I	66.58			
Cluster II	1075.43	7.32		
Cluster III	156.85	501.93	46.12	
Cluster IV	1454.11	167.94	804.41	103.89

Results indicated that the intra cluster distance was less between the varieties Kanakamony and Kashi Kanchan. This means Kanakamony and Kashi Kanchan are less diverse in their seed quality parameters and pattern of seed senescence. Very

*Table 4.* Mean values of four clusters for four seed quality parameters in ten cowpea varieties

Cluster no.	Germination (%)	Speed of germination	Vigour index I	Vigour index II
I	46.67	13.91	1222	3.32
II	59.56	18.05	1728	2.43
III	47.09	13.59	1330	2.75
IV	45.84	14.08	1099	1.11

*Figure 1.* Cluster diagram of cowpea varieties for seed quality parameters at ten months of storage

high inter cluster distance indicate the occurrence of wide variations in seed quality parameters and storability between the varietal groups. The study pointed existence of genetic divergence among the cowpea varieties with respect to storability and seed

quality parameters. In general, trailing types (cluster I except Anaswara) and bush types (cluster IV) registered maximum genetic distance for seed quality parameters. Such information will be useful for crop improvement programmes of cowpea.

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