Short Communication

Assessment of genetic diversity pattern in exotic germplasm lines of grain crop quinoa (*Chenopodium quinoa* Willd)

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ABSTRACT

Thirty two germplasm lines of grain crop quinoa (*Chenopodium quinoa* Willd) were assessed by using divergence analysis. Clustering pattern revealed that lines were grouped into 4 different clusters. Cluster I was the largest comprising 9 lines while cluster II was smallest with 7 lines. The inter-cluster distance was maximum between clusters I and II followed by II and III and III and IV. Cluster I had highest mean value for all the characters among all clusters except number of leaves per plant.

Keywords: Clusters; diversity; germplasm lines; quinoa; yield; characters

INTRODUCTION

Quinoa (*Chenopodium quinoa* Willd) is a pseudo-cereal crop having rich source of minerals, protein, vitamins and oil. In addition it is an undemanding crop that has remarkable productive advantages of cultivation under adverse environmental conditions. It is still an underutilized crop due to lack of popularity and poor yield. Knowledge of genetic diversity among exotic germplasm lines is essential for success in breeding programme and to maximize the exploitation of germplasm resources. Under such circumstances, the present study was conducted to assess diversity in germplasm lines of quinoa.

MATERIAL and METHODS

Thirty two exotic germplasm lines along with four checks viz EC 507741, EC 507738, SSQC-1 and CG 18-1 of quinoa were grown in RBD with three replications at the research farm of Indira Gandhi Agricultural University, Raipur, Chhattisgarh during rabi 2019-2020. Seed materials were received from Project Director, Potential crops, NBPGR, New Delhi. The rows were 3 metre long and 30 cm apart. The data on 5 plants in each replication were recorded for 14 morphological characters (Table 2). Divergence analysis was computed following Mahalanobis (1936) to measure the divergence.

RESULTS and DISSCUSSION

In order to assess the pattern of variation, divergence analysis was done among 14 variables. Thirty two lines were grouped into 4 clusters. Maximum number of lines was recorded in cluster I (9 lines) followed by III and IV (8 lines) and II (7 lines). The intra-cluster number was maximum in cluster II (1,86,669.92) followed by I (1,85386.35) and IV (1,31,966.56) (Table 1). This showed considerable diversity. Therefore it needs to be be incorporated in future breeding programmes. Minimum intra-cluster showed by cluster III (82,738.88) exhibited limited diversity among the constituents of germplasm lines.

Inter-cluster distance was maximum between clusters I and II (74,71,598.71) followed by II and III (27,19,989.39), III and IV (4,19,184.05). Selection to cluster with maximum for hybridization has been reported by Bhargava et al (2007) who reported that cluster III had maximum value distance.

Table 1. Intra- and inter-cluster distance values among 32 lines of quinoa

Cluster	I	II	III	IV
I	1,85,386.35	74,71,598.71	13,06,624.65	28,96,497.95
II		1,86,669.92	27,19,989.39	12,26,298.52
III			82,738.88	4,19,184.05
IV				1,31,966.56

Table 2. Cluster means for yield and its characters in 32 lines of quinoa

Cluster number	Number of lines	Character						
		Days to 50% flowering	Days to maturity	Plant height (cm)	Number of leaves/plant	Number of branches/plant	Inflorescence length (cm)	Inflorescence diameter (cm)
I	9	65.59	130.29	111.79	52.33	9.59	29.44	6.75
II	7	63.66	126.09	103.83	54.71	9.52	26.38	5.46
III	8	65.78	127.83	101.94	53.12	8.75	28.00	6.05
IV	8	65.00	127.87	104.20	50.54	9.25	28.87	5.72

Table 2. Contd…..

Cluster number	Number of lines	Character						
		Number of inflorescence/ plant	Biological yield/plant (g)	Inflorescence weight (g)	Number of seeds/plant	1000-seed weight (g)	Harvest index (%)	Seed yield/ plant (g)
I	9	8.03	51.25	39.71	6073.85	2.62	25.14	12.65
II	7	6.85	39.38	34.19	3370.37	2.61	18.73	7.10
III	8	7.95	44.37	35.67	4983.97	2.56	23.17	10.06
IV	8	7.20	43.33	34.45	4413.68	2.58	22.20	9.45

Cluster I resulted in highest cluster mean values for the traits days to 50 per cent flowering, days to maturity, plant height, number of branches per plant, inflorescence length, inflorescence weight, seeds per plant, 1000-seed weight, harvest index and seed yield per plant except number of leaves per plant (Table 2).

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