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PEDIGREE METHOD OF BREEDING IN GRASSPEA

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Pedigree method has proved to be quite successful for highly heritable traits in evolving the pure line varieties but particularly because of genotype × environment variation arising during the advancement of generations its efficiency for improvement in yield and other quantitative traits has been debated [1-3].

In the present study two crosses of grasspea, RED × P 28 and RED × EC 242692 were advanced by pedigree method from F_1 to F_5 generations as per procedure described[4] during the period from 1992-93 to 1994-95 at Indian Agricultural Research Institute, New Delhi and IARI offseason nursery, Dharwad, Karnataka.

The individual plant progenies of 50 plants in F_4 and F_5 generations were sown in rows of 3.5 m long in a compact family block design with two replications for each cross, keeping row-to-row and plant-to-plant spacing of 50 cm and 15 cm, respectively at IARI, New Delhi during *rabi*, 1995. The data recorded on 10 plants for yield and its major components in all 50 families were subjected to analysis of variance for the design and estimation of GCV, PCV, broad sense heritability and genetic advance at 10% selection intensity was done as per procedure discussed [5, 6].

Analysis of variance revealed significant differences among 50 families in both F_4 and F_5 populations of the two crosses for yield per plant and other yield components indicating that hybrid gene pools of two crosses were separated into a large number of significantly distinct families as a result of generation advancement through pedigree breeding method (Table 1).

A wide range was observed for all the characters studied in both F_4 and F_5 generations of the two crosses (Table 2). Yield per plant and number of pods per plant showed high GCV and PCV in both the crosses and in both generations. The high difference between GCV and PCV observed for number of seeds per pod as

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compared to other traits indicated greater influence of environment on the expression of this trait, whereas number of pods per plant was least affected by the environment as shown by the lowest difference between GCV and PCV.

Table 1. ANOVA for "Between" and "Within" variation in F_4 and F_5 populations for different characters in two grasspea crosses advanced by pedigree method

Cross / Character	RED × P 28		RED × EC 242692	
	Mean squares			
	Between families	Within families	Between families	Within families
	F_4 Population			
Pods/plant	170.01**	33.59	104.63**	26.97
Seeds/pod	0.11*	0.06	0.04**	0.02
100-seed wt.	0.09**	0.01	0.07**	0.01
Yield/plant	28.79*	15.49	84.68*	43.01
	F_5 Population			
Pods/plant	128.78*	22.21	179.40**	40.10
Seeds/pod	0.17*	0.08	0.33**	0.11
100-seed wt.	0.56**	0.05	0.85**	0.11
Yield/plant	70.38*	31.60	50.54*	25.06

*, ** Significant at 5% and 1% level of significance, respectively

The estimate of heritability was highest for 100-seed weight in both F_4 and F_5 generations of both crosses (Table 2). Number of pods per plant also exhibited a considerably higher heritability. It was interesting to note that the estimate of genetic advance did not necessarily correspond to that of heritability. For example, 100-seed weight having the highest heritability showed a lower genetic advance than number of pods per plant which had a lower heritability as compared to 100-seed weight. However, the heritability alone provides no indication of the amount of progress that would result from selection, because the genetic advance increases with increase in GCV and thus, GCV along with heritability gives a better picture of expected genetic advance[7]. Here, the lower genetic advance for 100-seed weight, in spite of being highly heritable character, was due to its low GCV. Only the number of pods per plant showed high heritability along with high genetic advance as a result of having high GCV. So, selection based on number of pods per plant in pedigree

breeding method should bring about the desired genetic improvement yield in grasspea crosses.

Table 2. Estimates of genetic parameters of F_4 and F_5 populations for different characters in two grasspea crosses advanced by pedigree method

Character	Range	Mean ± SE	GCV (%)	PCV (%)	Heritability (%)	Genetic advance (% of mean)
		Cross : RED × P 28				
		F_4 Population				
Pods/plant	35.00 - 139.00	79.52 ± 4.09	10.38	12.68	67.80	15.14
Seeds/pod	2.25 - 4.00	3.14 ± 0.17	4.08	9.01	20.50	3.53
100-seed wt. (g)	5.50 - 12.16	8.17 ± 0.06	2.50	2.73	83.94	3.83
Yield/plant (g)	7.68 - 40.06	19.98 ± 2.78	12.91	23.55	30.02	12.61
		F_5 Population				
Pods/plant	44.00 - 148.00	83.78 ± 3.33	8.45	10.47	65.11	12.08
Seeds/pod	2.60 - 4.00	3.22 ± 0.20	6.43	11.26	32.62	6.52
100-seed wt. (g)	5.12 - 12.18	8.37 ± 0.16	6.05	6.48	87.32	9.74
Yield/plant (g)	10.61 - 35.92	21.78 ± 3.97	21.57	34.18	38.01	21.95
		Cross : RED × EC 242692				
		F_4 Population				
Pods/plant	42.00 - 146.00	79.25 ± 3.67	7.86	10.23	59.01	10.63
Seeds/pod	2.55 - 3.92	3.13 ± 0.09	3.42	5.48	37.23	3.79
100-seed wt. (g)	5.80 - 12.39	8.56 ± 0.06	2.08	2.33	79.83	3.13
Yield/plant (g)	10.47 - 37.59	20.58 ± 4.63	22.17	38.82	23.01	16.32
		F_5 Population				
Pods/plant	40.00 - 147.00	83.10 ± 4.47	10.04	12.60	63.09	14.01
Seeds/pod	2.50 - 3.74	3.19 ± 0.23	10.39	14.70	48.29	12.54
100-seed wt. (g)	5.06 - 12.93	8.74 ± 0.2	36.95	7.92	77.39	10.75
Yield/plant (g)	11.81 - 39.92	22.42 ± 3.53	15.92	27.42	32.98	15.97

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