Physical and quality seed traits observed in new pigeon pea (*Cajanus cajan*) hybrids

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Introduction Pigeon pea seed production may be affected by factors such as % of pure seeds, mean seed weight, incidence of pests and diseases and environmental stresses. Harvested seeds from different cultivars may also vary in germination %, hardseededness and germination speed. Hardseededness (seed coat impermeability to water) commonly occurs in forage legume species (Hopkinson, 1993). There is considerable variation among different entries for seed characters but this is not considered within genetic materials. This research analysed harvested seeds of selected individuals of two segregating F_2 pigeon pea populations for the above cited traits and assessed the range of variation for them resulting from the hybridisation process.

Materials and methods Selected individuals of two segregating F_2 pigeon pea populations, arisen from previous artificial crossings, had their seeds carefully harvested in special cloth bags and transferred to the laboratory. After a manual cleaning for separating seeds damaged by insects and fungi (Kashyap & Punia, 1996), the following physical seed traits were scored: physical purity (percentage of pure seeds/sample) and number of seeds/10g (ISTA, 1985). Seed standard germination tests were then performed using 4x50 replicates and the number of hard seeds scored at the first count (4^{th} day), when their coats were partially removed by forceps; mean germination time test (T_{50}) was also carried out (Alvarado & Bradford, 1988).

Results In both segregating F_2 populations, most of the genotypes analysed showed low incidences of damaged seeds by insects and fungi (0-10%). For physical purity, there was a marked concentration of individuals in the ranges of 61-90 and >90% (population 1 and 2, respectively). There was a clear difference in the number of seeds/10g between the populations, the first showing high concentration of individuals in the range 91-100 and >100 while the second had a more uniform distribution (Table 1). Most of the selected individuals of both populations (75 and 60%, respectively) showed hardseededness, varying from <20 to 40%, while population 1 showed a higher frequency of individuals in the germination percentage interval of 61-100%. Both segregating populations presented similar distributions of their individuals as to mean germination times.

Table 1 Frequency distribution of physical and physiological seed traits in two pigeon pea (*Cajanus cajan*) segregating populations

SP	Damaged seeds (%)					Physical purity (%)			Number of seeds/10g			
	Insects			Fungi								
	0-10	11-20	>20	0-10	11-20	30-60	61-90	>90	71-80	81-90	91-100	>100
1	16	5	3	18	6	4	13	7	-	2	9	13
2	15	3	2	17	3	1	6	13	2	8	7	3
	Hardseededness (%)					Germination (%)			Mean germination time (T_{50}, days)			
	<20	21-40	41-60	>60	<40	41-60	61-80	>81	4-5	5-6.3	>6.3	
1	4	11	6	3	1	1	16	6	9	7	8	
2	6	6	4	4	2	9	7	2	6	6	8	

SP, segregating population with SP1 and SP2 having 24 and 20 individuals respectively; physical purity is pure seed weight/working seed sample weight

Conclusions The hybridisation process used was effective as to significantly increasing the available genetic variability for several seed quality traits, making feasible effective selection for them in the near future.

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