RESEARCH PAPER International Journal of Agricultural Sciences, June, 2010, Vol. 6 Issue 2 : 412-414

Physiological and quality characteristic in seed of cowpea (*Vigna unguiculata* (L.) Walp) cultivars

SANJAY SINGH
Department of Seed Technology, R.B.S. College Agra Campus, AGRA (U.P.) INDIA

ABSTRACT

The experiment was conducted during to season 2007-08 at Seed Research laboratory, Department of seed technology R.B.S. College, Agra campus, Dr. B.R. Ambedkar University, Agra. The design used for this experiment was CRD with twenty varieties. The observation recorded on character *viz.*, seed length, seed breadth, seed coat characters, seed volume, 100 - seed weight, germination, vigour index and dry matter production (g/ seedling -10). The observation was made in seeds from different outlets for the physiological seed quality parameters and their test weight. The germination percentage of the initial seed lots was 90 and 86 per cent in Bl-1 and BL-2, respectively. The final produce of pure seed for the first and second pass was 93.0 and 98.0 for and 91 and 99 per cent for the BL-2, respectively. The germination percentage was least with the seeds collected from the flown outlet, 70 and 86 in BL-1 and 84 and 81 in BL-2 for the first and second, respectively. The same trend was noted with the seedling length, vigor index and dry matter production of the seedling

Key words : Seed, variety, Seed coat, Germination, Cowpea

INTRODUCTION

Cowpea [*Vigna unguiculata* (L.) Walp] is an important crop of food and forages. It belongs to the family leguminosae sub family fabaceae, with 170 spp. of which 22 spp found in India. It is considered more tolerant to drought than soybeans and better adopted to sandy soils and well adopted to stress conditions. The variability among the different varieties of a species is known as genetic diversity, which arises due to geographical separation (Henry and Mathur, 2003). But the bases objective of varietals identification is to test the occurrence of traits that help to identify a particular variety when grown in different environmental conditions and generations (Flenner and Smith, 1983). The information on varietals diversity in cowpea is limited. (Thiyagarajan *et al.*, 1989; Dharmalingam and Kadamba Vanasundaram (1969).

In earlier days varietals tests were relatively easier with fewer varieties having greater differences among them. The advent of the modern plant breeding techniques resulted in variety explosion and evolving of many closely related varieties. Hence, seed analysts have been obliged to find newer ways of distinguishing among varieties in the seed laboratory. The simple tests like morphology of seed, seedling and seed size are useful indices of varietals identification. Recent strides in plant varietal production, legislation and increase in global trade of seed, it is essential to evolve stable diagnostic characters, which are not influenced under variable environmental factors. Contaminants such as inert material and off size are not in themselves harmful but greatly influence seed plant ability, incidence of insect infestation and contribute to storage problem. Hence, seed are processed to remove contaminants, size grade for plant ability and to upgrade quality.

MATERIALS AND METHODS

The experiment was conducted at Research laboratory R.B.S. College Agra campus, Dr. B.R. Ambedkar University, Agra. The seeds of the different varieties of Cowpea were obtained from the germplasm collection of C.S.A. University of Agriculture and Technology, Kanpur. The data collected from experiment were analyzed statistically adopting the methods described by Panse and Sukhatme (1967). The twenty varieties of cowpea namely V – 585, GC – 3, RC – 19, BL - 1, V - 240, V – 130, KBC – 2, EC -4216, RC – 101, BL – 2, IGFRI– 95 – 1, UPC 5286, IL – 380, IL – 1156-1, IL – 3192, HY–10–P–583, IL – 160 -11, IL – 886, EC – 240884 and IL – 161 – 1. The Twenty-five seeds from each variety were selected at random for measuring the morphological and physical characteristics.

RESULTS AND DISCUSSION

The seeds of different genotype displayed significant differences for the length and width of seed. The mean of seed length and width was 0.77 cm and 0.62 cm, respectively. V - 585 and RC - 101 recorded maximum seed length of 0.91 cm and 0.90 cm, respectively while IGFRI – 95-1 registered minimum values (0.61 cm). Seed breadth was recorded more in KBC - 2, EC - 4216 and V - 585 (0.70 cm) each while the least value was recorded

with IL – 161 - 1 (0.52 cm). The seed coat is being described by virtual observation for their colour and localization of pigments observation on the seed testa from the basis of the classification. In few varieties and genotype *viz.*, BL 1, EC 4216, IL - 380, IL - 3192, IL – 160 - 11 and EC - 240884 the seed coat was mottled in appearance with brown to black speckles. The testa of the seeds of HY – 10 – P - 583 was completely black. The seed volume showed variations among the different genotype. The seed volume was more than 1.6 cc in IL – 161 – 1.

Seed test weight showed differences among the genotypes. Seeds were classified as small (6-8 g), medium (9-12 g) and bold (13-15 g) based on their test weight. Accordingly, Co-5, IL – 5, IL161 – 1, IGFRI-95 – 1 was under the small category, GC – 3, V240, IL – 3192, HY – 10 –P-583, V – 130, RC – 19, BL – 1, V – 585 and IL – 886 were medium and the rest were bold as their weight was above 13.0 g (Table 1).

Different genotypes showed significant differences for the physiological parameters studied like germination percentage, seedling length and vigour index and dry matter production. The mean germination percentage irrespective of genotypes was 88 per cent with a range of 80 in IL-380 IGFRI – 95 – 1 to 97 in BL- 1. The average shoot and root length of different genotypes was 10.93 and 10.29 cm, respectively. The maximum vigour index was recorded in V-240 (2774) followed RC19 (2502) and V – 585 (2238). The minimum vigour index was recorded in RC – 101 (1176) where as over all the average vigour index was 1872.6. The average dry matter production of the seedling for different genotypes was 0.719 gram seedling -10 with a range from 0.362 in IGFRI-95-1 to 1.022 g seedling -10 in RC-101 (Table 2).

The primary diagnostic characters based on physical characteristics of the seed could be helpful in distinguishing the varieties and genotypes for the verification of the varietals purity of the seed lots in seed testing laboratories. Similarly morphological characteristics of the seed were employed for varietals identification in Soybean (Agrawal and Panwar, 1990). The difference among the genotypes for the germination and seedling growth indicates the efficient translocation of metabolism from the cotyledons to the embryonic axis as stated by Sharma *et al*. (2002).

The different response of the staining pattern reveals the differences among the varieties for dehydreogenase enzyme activity, which is an index to respiration rate and

Table 1 : Physical characters of different cowpea cultivars

Sr. No.	Genotypes	Seed length (cm)	Seed width (cm)	Seed coat colour	Seed volume (cc)	100-seed weight
1.	V - 585	0.91	0.70	Yellowish cream	1.4	11.051
2.	GC – 3	0.82	0.63	Yellow with brown spots	1	8.796
3.	RC - 19	0.75	0.61	Brown	0.9	10.759
4.	BL - 1	0.75	0.65	Mottled and reddish brown	1	11.642
5.	V - 240	0.88	0.67	Reddish brown	1.2	8.409
6.	V - 130	0.78	0.56	Creamy white	0.8	10.941
7.	KBC – 2	0.89	0.70	Pale brown	1.4	13.523
8.	EC -4216	0.72	0.70	Mottled black	1.2	13.308
9.	RC – 101	0.90	0.66	Creamy white	1.6	13.238
10.	BL – 2	0.79	0.68	Light brown	1.2	14.372
11.	IGFRI– 95 – 1	0.61	0.47	Light brown	0.6	7.325
12.	UPC 5286	0.81	0.59	Pale brown	1.2	15.013
13.	IL – 380	0.71	0.64	Mottled black	1	15.041
14.	IL – 1156-1	0.79	0.61	Creamy grey	1.2	14.44
15.	IL – 3192	0.69	0.57	Mottled brown and black	0.8	9.606
16.	HY–10–P–583	0.79	0.58	Complete black	1	9.611
17.	IL – 160 -11	0.79	0.63	Mottled ash colored	1.4	15.143
18.	IL – 886	0.75	0.63	Dark brown	1	12.352
19.	EC – 240884	0.70	0.68	Mottled black	1	14.380
20.	IL – 161 - 1	0.63	0.52	Greenish white	1.6	6.378
	Mean	0.77	0.62		1.13	11.7664
	S.E.±	0.023	0.018		0.032	0.261
	C.D. (P=0.05)	0.064	0.049		0.098	0.652

Table 2: Physiological seed quality parameters of different cowpea cultivars

Sr. No.	Genotypes	Germination (%)	Shoot length (cm)	Root length (cm)	Vigour index	Dry matter production (g Seedling^{-10})
1.	V - 585	91	13.5	11.1	2238	0.809
2.	GC – 3	96	11	11.9	2198	0.564
3.	RC - 19	91	12.8	14.7	2502	0.567
4.	BL - 1	97	15.5	6.3	2114	0.531
5.	V - 240	96	18.3	10.6	2774	0.815
6.	V - 130	86	11.1	9.1	1737	0.607
7.	KBC – 2	94	11.8	12.0	2237	0.823
8.	EC -4216	87	12.2	10.6	1983	0.869
9.	RC – 101	84	8.8	5.2	1176	1.022
10.	BL – 2	91	10.5	7.6	1647	0.734
11.	IGFRI– 95 – 1	80	8.4	7.1	1240	0.362
12.	UPC 5286	77	8.2	8.0	1247	0.944
13.	IL – 380	80	11.7	14.6	2088	0.844
14.	IL – 1156-1	81	7.9	8.2	1304	0.715
15.	IL – 3192	83	10	13.6	1959	0.704
16.	HY–10–P–583	83	8.6	9.1	1469	0.621
17.	IL – 160 -11	92	10	11.4	1969	0.765
18.	IL – 886	89	11.8	13.8	2278	0.747
19.	EC – 240884	85	8.5	11.4	1691	0.753
20.	IL – 161 - 1	91	8.1	9.5	1601	0.445
	Mean	87.7	10.93	10.29	1872.6	0.712
	S.E.±	2.73	0.511	0.608	85.9	0.039
	C.D. (P=0.05)	7.72	1.444	1.72	242	0.110

seed viability indicating their capacity to produce normal seedlings irrespective of their intensity, the red colour stained seeds were categorized as viable seeds. The seeds categorized under the necrotic and dead category were non-viable, while those categorized under mechanical on the injury in the vital seed structures like cell division areas of embryo. The vigorous seeds showed staining of higher intensity in colour, which was reliable in evaluating seed vigour in seeds (Woodstock, 1976).

REFERENCES

Agrawal, R.L. and Panwar, Anil (1990). Identification of soybean varieties on the basis of seed and seedling characteristic. *Seed Res.,* **18** (1): 77-81

Dharmalingam, V. and Kadamba Vanasundaram, M. (1989). Genetic divergence in Cowpea. *Madras agric. J*., **76** (7): 394-399.

Flenner, B. and Smith, S. (1983). Pioneer corn descriptor systems. *Pioneer Tech. Bull.,* 1-60.

Henry, A. and Mathur, B.K. (2003). Varietal divergence in Cowpea. In : *Advances in arid legume research* (Eds. A. Henry, D. Kumar and N. B. Singh) *Sci. Publ.,* pp. 67-70.

Panse, V.G. and Sukhatme, P.V. (1967). *Statistical Methods for Agricultural Workers,* ICAR New Delhi. p.327.

Sharma, Subrata, Rao, Sthrupa and Raut, N.D. (2002). Screening of Soybean genotypes for high temperature tolerance. JNKVV. *Res. J.,* **35** (1/2): 66-67.

Thiyagarajan, K., Kalavathi, D. and Krishnaveni, K. (1989). Effect of seed size on seedling vigour in soybean. *Newsletter Tamil Nadu Agriculture University*, **14** (7): 3

Woodstock, L.W. (1976). Progress report of the seed vigour-testing handbook. Accelerated aging. *Assoc. Off. Seed Analy. New – Lett*., **50**: 7-13.

Received : November, 2009; Accepted : March, 2010