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Study on characterization of chickpea varieties

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Abstract
The field experiment were conducted to Identification and characterization of varieties based on simple distinct seed and seedling morphological characters of different chickpea varieties during rabi season of 2008 at main agricultural Research station, and laboratory of department of Seed Science and Technology, University of Agricultural Sciences, Dharwad. The study included five chickpea varieties namely A-1, Bheema and BGD-103 (Desi) ICCV-2 and KAK-2 (Kabuli) The five chickpea varieties were categorized based on seed shape, colour and texture. A-1, BGD-103 and Bheema found angular in shaped with brown rough seed coat. While, ICCV-2 and KAK-2 were Owl's shaped, creamy white smooth surface. Hundred seed weight differed among varieties; BGD-103, Bheema and KAK-2 were heavy while, ICCV-2 and A-1 were medium in seed weight. The hypocotyl colour differed among varieties as pale green with pigment (BGD-103, Bheema and A-1) as creamy without pigmentation (ICCV-2 and KAK-2). Days to flower initiation, 50 per cent flowering, days to pod initiation and pod maturity were early in ICCV-2 and KAK-2 and late in A-1, BGD-103 and Bheema varieties. Pigmentation and pod colour at maturity differed among varieties; ICCV-2 and KAK-2 were without pigmentation and yellowish brown pod colour. Whereas, rest of varieties were having pigmentation on their pods and were brown in pod colour. The number of pods and seed yield per plant were maximum in BGD-103 (52.68 and 13.88 g) respectively followed by Bheema and A-1 and minimum in ICCV-2 (36.46 and 11.74 g, respectively).

Keywords: Seed, seedling and morphological characters

Introduction
Pulses are the cheapest and rich sources of quality protein and amino acids. They play a major role in crop rotation because they keep the soil alive and productive by enriching the soil fertility in terms of nitrogen and organic matter. Among pulses, chickpea is the third most important pulse crop in the world and it is used in preparation of many sweets, chats snacks and food studs. It contains easily digestible protein (21.1%), carbohydrate (61.51%), fat (4.5%) and relatively free from anti nutritional factors (Saxena, 1990) [1].

In recent past years, several high yielding varieties of chickpea are being released by many private and public sectors. Hence, there is a need for maintenance of genetic purity of chickpea varieties. Identification and characterization of varieties based on simple distinct seed and seedling morphological characters for grow-out test of genetic purity in Kabuli and Desi varieties has became most essential. Such diagnostic characterization studies in chickpea varieties are very limited.

In this context, a field and lab study was conducted on Characterization of Chickpea Varieties in different Kabuli and desi varieties in department of seed science and technology, University of Agricultural Sciences Dharwad during 2008

Material and Method
Genetically pure and fresh seeds of five chickpea varieties *viz.*, A-1, ICCV-2, KAK-2, Bheema and BGD-103 produced during *rabi* season of 2007 were obtained from the department of Genetics and Plant Breeding, College of Agriculture, UAS, Dharwad. The chickpea varieties were sown separately in 10 lines of 30 metre length with 30 x 15 cm spacing in three replications for recording plant growth and phonological characters. The recommended does of fertilizer (20:50:00 kg NPK/ha) was applied as basal dose for each plots in the form of urea and diammonium phosphate at the time of sowing. Soon after sowing plots were lightly irrigated. The necessary after care operations such as thinning, hand weeding, inter cultivation and need based plant protection measures were carried out. The plots were irrigated four times during seed crop period. The experiment was laid out in RCBD with factorial concept in three replications The studies pertaining to identification of chickpea varieties based on seed, seedling, plant morphological and floral biological characters were studied in the field and laboratory at Agricultural College, UAS, Dharwad.

Results and Discussion

For documentation of diagnostic features of varieties with their accurate identification of morphological key characters. In the present study, five chickpea varieties were characterized based on morphology of seed, seedling, plant, flowering and yield attributing parameters. The results of these studies are discussed as follows.

Seed morphology

Seed coat colour of five chickpea varieties differed distinctly. Among varieties, A-1, BGD-103 and Bheema were brown in colour while ICCV-2 and KAK-2 were with creamy white in seed coat colour. Marked variation on seed shape and seed surface in chickpea varieties were evident wherein A-1, BGD-103 and Bheema were angular shape with rough seed coat whereas ICCV-2 and KAK-2 were owls shape with smooth seed coat (Table-1). The variation in seed shape, coat colour and surface noticed in the present study may be accounted for genetic factor (Pundier *et al*., 1985 and Upadhayay et *al*., 2002) [10] in chickpea.

Based on 100 seed weight, the varieties of chickpea were categorized into higher (KAK-2, BGD-103 and Bheema) and medium weight (A-1 and ICCV-2) groups. Similar variations in seed weight were noticed by Pundier *et al*. (1985), Upadhayay (2002) [10] in chickpea, Prashnath (2003) [8] and Chnadrashekhar (2005 and 2008) in frenchbean varieties.

Chickpea varieties showed significant variations in seed coat thickness and mottles on testa. Variety A-1, BGD-103 and Bheema found to have thick seed coat and small black dots on testa. Whereas, ICCV-2 and KAK-2 varieties were without any spots on testa and their seed coat found to be thin. Such variations in seed coat thickness and mottles on testa were related to genetic factors but modified by the environmental factor (Upadhaya *et al.*, 2002) [10] in chickpea.

Variation in seed size interms of length and girth are under genetic control in most of the crops. In the present study also such variations in seed length and girth were seen. A-1 and ICCV-2 were of medium size while KAK-2, BGD-103 and Bheema were of large sized varieties. The variations observed with respect to seed size may be due to bigger size of endosperm and embryo and were indicated to be specific to varieties (Chandrashekhar, 2005). Similar reports were made in chickpea (Anon., 2000) and in frenchbean (Prashant, 2003 and Chandrashekhar, 2005 and 2008) [8, 6, 7].

Seedling morphology The seedling morphological characters are widely used as key diagnostic characters for varietal identification in most of the crops. Among chickpea varieties, the hypocotyl colour of A-1 was pale green, ICCV-2 and KAK-2 were creamy, while BGD-103 and Bheema were light yellow in colour. The pubescence on hypocotyl were present in all the varieties. The pigmentation on seedling was observed in A-1, BGD-103 and Bheema while, ICCV-2 and KAK-2 were without pigmentation on their seedling. The similar, varietal characterization based on seedling morphology were made by Prashnat (2003) [8] and Chandrashekhar (2008) [7] in French bean and Agarwal and Pawar (1990) [1] in soybean and Chakrabarthy and Agarwal (1989) in blackgram. (Table-1).

Plant morphology In field conditions, varietal variations on plant morphological seed characters such as plant height, number of branches, stem colour, hairiness on stem, foliage colour, leaf size, days to flower initiation, days to 50 per cent flowering, pod numbers per plant, pod characteristics, seed yield per plant *etc* are widely taken as basis of varietal identification by breeders. In the present study, varieties showed marked variations in plant height. BGD-103 recorded highest plant height (52.7 cm) followed by Bheema (51.6 cm) and was lowest in A-1 (49.1 cm), while the number of branches were higher in A-1(26.2) followed by BGD-103 (23.4) and were lower in ICCV-2 (20.6). Similarly, variations in the other characteristics like stem colour and pigmentation were evident among chickpea varieties. (Table-3). Varieties A-1, BGD-103 and Bheema were having pink colour stem with anthocynin pigment and ICCV-2 and KAK-2 were pale yellow colour stem and without pigmentation. All the five chickpea varieties were having dense hair on their stem. Desi and Kabuli types showed many variations with respect to foliage colour and leaf size. Among Desi types A-1, BGD-103 and Bheema) were having dark green colour with small leaves and Kabuli types were light green colour with big leaflets.

In the present study, the days to flower initiation, days to 50 per cent flowering, days to pod initiation and pod maturity differed significantly. Both Kabuli varieties (ICCV-2 and KAK-2) were early in flower initiation (39.2 and 39.4 days), days to 50 per cent flowering (41.0 and 41.4 days), days to pod initiation (55.4 and 56.40 days) and pod maturity (92.8 and 97.0 days) respectively. While, Desi types were took relatively more days in to all these parameters and were categorized in medium group. Similarly, varietal identification based on plant height, pigmentation, flowering and pod maturation and pod characters were made in several agricultural and field crops.

Various pod characters such as number of pods per plant, pod length, breadth, pigmentation on pod, seeds per pod in chickpea varieties differed distinctly between Kabuli and Desi types. The numbers of pods per plant were more in varieties BGD-103 (52-78) followed by Bheema (52-67) while less in KAK-2 (36-43). Seeds per pod also differed among the varieties, A-1 and ICCV-2 recorded 1-2 seeds per pod while all other varieties contained only one seed per pod. Though pod length and breadth did not differ much, but were relatively more in KAK-2 (2.3-2.6) and (3.6-3.9 cm) respectively compared to other varieties. (Table-4).

All the varieties found to have dense hairiness on their pod. Based on seed yield per plant, varieties BGD-103 and Bheema were grouped under high yielding varieties, KAK-2 and A-1 under medium and ICCV-2 under low yielding variety. The similar varietal characterization based on plant growth parameters, flowering, pod characteristics and seed yield per plant were made by Chandrashekhar (2008) [7] in French bean.

Table 1: Morphological characters of seed in chickpea genotypes

Genotypes	Seed coat colour	Seed shape	Seed surface	Hilum colour	100 seed weight(g)		
					Range	Average	Group
A-1	Brown	Angular	Rough	Pale yellow	20.73-25.67	23.92	Medium
ICCV-2	Creamy white	Owl's	Smooth	Pale yellow	25.52-26.99	25.52	Medium
KAK-2	Creamy white	Owl's	Smooth	Pale yellow	36.81-38.32	36.68	Large
Bheema	Brown	Angular	Rough	Pale yellow	37.11-39.02	37.34	Large
BGD-103	Brown	Angular	Rough	Pale yellow	36.10-37.23	37.81	Large

Light: < 20, Medium: 20 30 g, Large: > 30 g

Table 2: Seed morphological measurement of chickpea genotypes.

Genotypes	Seed length (mm)			Seed breadth (mm)			Mottles on testa
	Range	Average	Group	Range	Average	Group	
A-1	7.0-8.5	7.70	Medium	17.0-21.0	19.00	Small	Small black spots present
ICCV-2	7.5-9.0	7.90	Medium	21.0-23.0	21.70	Medium	Absent
AK-2	10.0-11.0	10.40	Large	23.5-25.0	23.90	High	Absent
Bheema	10.0-11.0	10.40	Large	23.0-26.0	24.70	High	Present
BGD-103	10.0-11.50	10.50	Large	24.0-27.0	25.30	High	Present

Small : < 7 mm Small : < 20 mm
Medium : 7-10 mm Medium : 20-30 mm
Large : > 10 mm Large : > 30 mm

Table 3: Plant morphological characters - plant height, number of branches, stem colour, pigmentation on stem, hairiness on stem and foliage colour in chickpea genotypes.

Genotypes	Plant height (cm)			Number of branches			Stem colour	Pigmentation on stem	Hairiness on stem	Foliage colour
	Range	Average	Group	Range	Average	Group				
A-1	45.0-53.0	49.10	Short	20.0-28.0	26.20	More	Pink	Present	Dense	Dark green
ICCV-2	47.0-53.50	51.30	Medium	18.0-22.50	20.60	Medium	Pale yellow	Absent	Dense	Light green
KAK-2	49.0-55.0	52.50	Medium	18.0-23.0	21.40	Medium	Pale yellow	Absent	Dense	Light green
Bheema	48.0-56.0	51.60	Medium	20.0-25.0	22.60	Medium	Pink	Present	Dense	Dark green
BGD-103	48.0-58.0	52.70	Medium	20.0-26.0	23.40	Medium	Pink	Present	Dense	Dark green

Short : < 50 cm Less : < 20
Medium : 50-60 cm Medium : 20-25
Long : > 60 cm More : > 25

Table 4: Pod characters - pod breadth, pigmentation on pod, pod colour at harvest, hairiness on pod, number of pods per plant and number of seeds per pod in chickpea genotypes

Genotypes	Pod breadth (cm)			Pigmentation on pod	Pod colour at harvest	Hairiness on pod	Number of pods per plant			Number of seeds per pod
	Range	Average	Group				Range	Average	Group	
A-1	3.00-3.50	3.26	Medium	Absent	Copper brown	Dense	51-65	56.5	Medium	1-2
ICCV-2	3.60-3.90	3.74	Medium	Absent	Yellowish Brown	Dense	36-43	39.5	Less	1-2
KAK-2	3.70-4.00	3.82	Large	Absent	Yellowish Brown	Dense	36-48	42.0	Medium	1
Bheema	3.30-3.70	3.46	Large	Absent	Copper Brown	Dense	50-67	58.5	High	1
BGD-103	3.40-4.00	3.68	Large	Anthocynin pigment present	Copper Brown	Dense	52-78	65.0	High	1

Small : < 3.5 Less : < 40
Medium : 3 – 4 More : 40 – 50
Large : > 4 High : > 50

References

1. Agarwal RL, Pawar A. Identification of soybean varieties based on seed and seedling characteristics. Seed Res. 1990; 18:77-81.
2. Anonymous. National Bureau of Plant Genetic Resources. An. Rep., New Delhi, 2000, 106.
3. Anonymous. Status paper on Chickpea – Bengal gram (Pub. P. V. Subbaiah Choudary, and S. M. Ahamed Ali, Hyderabad), 2004, 1-3.
4. Chakarbarty SK, Agarwal RL. Identification of blackgram varieties-I, utilization of seed characteristics. Seed Res. 1989a; 17:23-28.
5. Chakrabarty SK, Agarwal RL. Identification of blackgram varieties II, utilization of morphological characteristics of seedlings. Seed Res. 1989b; 17:139-142.
6. Chandrashekhar SS. Influence of the age of the seed on plant growth, seed yield and quality and characterization of French bean genotypes. M.Sc. (Agri.) Thesis, Univ. of Agric. Sci., Dharwad, Karnataka (India), 2005.
7. Chandrashekhar SS. Seed technological studies in French bean. Ph.D. Thesis, Univ. of Agric. Sci., Dharwad, Karnataka (India), 2008.
8. Prashanth ND. Studies on spacing and phosphorus levels on seed yield and quality and varietal identification in french bean. M.Sc. (Agri.) Thesis, Univ. of Agric. Sci., Dharwad, Karnataka, India, 2003.
9. Pundir RPS, Rao NK, Vandermaesen LJG. Distribution of qualitive traits in the world germplasm of chickpea (*Cicer arietinum* L.). Euphytica. 1985; 34:697-703.
10. Upadhayay RG. Response of growth regulators on flower drop, fruit setting, biochemical constituents and yield of chickpea (*Cicer arietinum* L.) under mid hill conditions of H.P. Legume Res. 2002; 25(3):211-21.