Chickpea

Breeding

Dilaji: A New Chickpea Variety for Hills Zone of Assam, India

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Chickpea (*Cicer arietinum*) is a new pulse crop in the Hills Zone of Assam (India) comprising two hilly districts namely Karbi Anglong and North Cachar Hills. Shifting cultivation (locally known as *jhum*) is the predominant practice carried out in the hilly slopes of the region. Chickpea can be grown successfully in the plains and also in the slightly slopy lands (up to 20% slope) of the region.

Twenty chickpea advanced lines and controls were evaluated for various quantitative and qualitative traits including yield during 1991/92 to 1997/98 at the Regional Agricultural Research Station, Assam Agricultural University, Diphu, Assam. Diphu is located at 25°50' N, 90°30' E, and 180 m above mean sea level under rainfed conditions. Of the lines tested, ICCV 89314 was more promising for seed yield than control varieties C 235 and PBG-1.

ICCV 89314 performed better than both the controls, C 235 and PBG-1, in the multilocational trials conducted at three locations of the Hills Zone during rabi

Table 2. Fusarium wilt incidence and pod borer reactions of chickpea variety Dilaji during 1992/93 to 1994/95 in Diphu, Assam, India.

	Fusarium wilt (%)		Pod borer damage (score)[1]	
Year	Dilaji	C 235 (control)	Dilaji	C 235 (control)
1992/93	30	30	5	3
1993/94	34	37	5	5
1994/95	22	28	5	5

1. Recorded on 1–9 scale where 1 = no damage or resistant, and 9 = 100% damage or susceptible.

Table 1. Performance of chickpea variety Dilaji in various trials in Diphu, Assam, India during 1992–98.

			Yield (t ha^{-1})		
Name of trial	Year	No. of trials	Dilaji	C 235 (control)	PBG-1 (control)
Varietal Trial (Research center)	1992/93 to 1994/95	3	1.59	1.11	1.12
Agronomic Trial (Research center)	1996–98	3	0.84	–	–
Adaptive trial (Department of Agriculture Farm)	1995/96	3	1.13	0.34	0.76
Adaptive trials (Farmers' fields)	1995/96	29	1.54	1.13	–
Frontline Demonstration	1996/97	3	1.57	1.24	–
Weighted mean			1.46	1.07	0.94

Table 3. Mean performance for agronomic traits of chickpea variety Dilaji and control varieties during 1992/93 to 1994/95 under rainfed conditions in Diphu, Assam, India.

Variety	Days to maturity	Plant height (cm)	Primary branches plant^{-1}	Pods plant^{-1}	100-seed mass (g)	No. of seeds pod^{-1}	Protein content (%)
Dilaji	126	52	2–5	95	16.78	1.1	19.0
C 235	132	61	2–4	77	13.36	1.0	18.2
PBG-1	129	60	2–4	62	13.82	1.0	18.5

(postrainy season) 1996/97. On the basis of results of both on-station and on-farm trials ICCV 89314 was recommended for the zone and has been released by the State Variety Release Sub-committee as 'Dilaji'. This line was developed from the cross ICCL 80074 × ICCC 30 at ICRISAT, Patancheru, India using bulk-pedigree method and its selection number was ICCX-810098-BP-BP-77P-BP. The flower is pink; the seed is brown and angular. Anthocyanin pigmentation is present in the stem, branches, and leaves.

The yield performance of Dilaji was evaluated in various trials conducted in the zone. Dilaji produced an average yield of 1.46 t ha^{-1} while C 235 gave 1.07 t ha^{-1} and PBG-1 produced 0.94 t ha^{-1} (Table 1).

There was no significant difference in fusarium wilt incidence and pod borer reaction of Dilaji and the control variety (C 235) (Table 2). But Dilaji was promising for other quantitative traits. The protein content of Dilaji was high (19.0%) (Table 3). Therefore, this new desi variety offers a better opportunity to the farmers of the Hill Zone for adopting double cropping to augment their economic growth and also increase the total pulse production of the region.

Development of a Short-duration Chickpea for the Subtropics

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The success of short-duration chickpea (*Cicer arietinum*) varieties in tropical environments in India and Myanmar could be repeated in subtropical regions if short-duration genotypes are developed which tolerate/escape major abiotic and biotic stresses prevalent under these environments (Kumar et al. 1996). Saxena et al. (1997) described various abiotic stresses of chickpea in tropical and subtropical environments. A super early chickpea ICCV 96029 was developed at ICRISAT (Kumar and Rao 1996). This genotype was tested for two years (1997/98 and 1998/99) along with long-duration controls C 235 and Pant G-114 at ICRISAT, Patancheru (18° N) and CCS Haryana Agricultural University, Hisar (29° N), India respectively. The weather at Patancheru is warmer than at Hisar; this resulted in acceleration of development and crop maturity at Patancheru. The crop was planted in mid-October at Patancheru and in the beginning of November at Hisar.

The phenology data indicate that the super early genotype ICGV 96029 flowered 37 and 40 days earlier and matured 30 and 27 days earlier than controls at Patancheru and Hisar respectively (Table 1). The large difference between flower initiation and pod setting at Hisar is due to very low temperature (<5°C). Also, ICCV 96029 might have some mechanism of cold tolerance so that it was able to produce pods even in January as compared to Pant G-114 which started podding only in February. The duration of reproductive phase of ICCV 96029 is 7–13 days longer than the controls, which helped it to develop better sink that resulted in higher harvest index. The productivity in terms of seeds produced per unit time was also high in ICCV 96029 because of its short maturity duration.

ICCV 96029 may produce relatively high yields in subtropical environments represented by Hisar by escaping end-of-season stresses such as drought, pod borer damage, and leaf diseases. Kumar et al. (1996) suggested such an approach to realize increased productivity in subtropical environments. At Hisar, ICCV 96029 matured in mid-March when the weather was comparatively cooler (which helps in better sink development), and there was low incidence of pod borer. Pant G-114 matured under much warmer temperature in mid-April. The development of the short-duration, super early genotype ICCV 96029 could be useful for planting land vacated by late-maturing