Evaluation of Short-, Medium-, and Long-duration ICRISAT Pigeonpea Cultivars in Mpumalanga, South Africa

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Pigeonpea (*Cajanus cajan*) is not grown widely as a field crop in South Africa. A few stands of long-duration, unimproved pigeonpeas are usually grown singly or as a hedge plant in home gardens or around sugarcane (*Saccharum officinarum*) fields in several provinces such as Kwazulu-Natal, Mpumalanga, and Northern and Eastern Cape Provinces in South Africa. The green peas are used as vegetable and the dry whole seeds for making soup mixed with or without meat.

Pigeonpea has a crucial role in sustaining agriculture in rainfed and semi-arid farming systems. Therefore, studies were initiated during 1998/99, to evaluate the performance of improved pigeonpea cultivars developed by ICRISAT in India and Kenya, under rainfed conditions in Mpumalanga Province for possible inclusion in the dryland farming systems in Lowveld.

Sixteen cultivars with varying maturity periods were evaluated in two separate trials, one with 8 short-duration (SD) cultivars and the second one with 5 medium-duration (MD) and 3 long-duration (LD) cultivars in randomized complete block design with 4 replications. The trials were located at Malekutu (25°12′ S 31°12′ E and 350 m above sea level) in Nsikazi District of Mpumalanga Province. The soils are predominantly sandy loams with a pH of 4.2. No fertilizers were applied to the trial plots. Both the trials were planted during the middle of December, and grown under rainfed conditions. A total of 576 mm of rain was received during the cropping season from planting to harvesting of the pigeonpea trials. The growing period temperatures varied from 17.8°C to 28.2°C. The plot size was 3 rows of 6.3 m long spaced at 90 cm in the MD and LD trial and 50 cm in the SD trial. The seeds were sown 10 cm apart in the SD trial. Two plants at each station at 70 cm apart were retained within rows after thinning in the MD and LD trial. Three sprayings with Karate® (cyhalothrin) were carried out in the SD trial plots and one spraying in the MD and LD trial. The data were analyzed using the MSTAT-C program.

In the MD and LD trial, the cultivar ICP 8863 was the earliest to reach 50% flowering by 115 days after planting (DAP) followed by ICPL 87119. None of the LD cultivars had started to flower by that time. The plant height at flowering was significantly lower in ICP 8863 than all the other cultivars evaluated (Table 1). Harvesting of the main crop was completed 193 DAP in

Table 1. Performance of ICRISAT medium- and long-duration pigeonpea cultivars in Mpumalanga, South Africa, 1998/99.

Cultivar	Crop duration	Plant height at flowering (cm)	Plants flowered[1] (%)	Days to maturity	Grain yield (kg ha^{-1})	100-seed mass (g)
ICPL 87051	Medium	180	25.72	193	978	14.8
ICPL 87119	Medium	162	44.46	193	966	12.3
ICEAP 00068	Medium	200	4.40	193	951	16.8
ICP 6927	Medium	205	40.16	193	802	17.3
ICP 8863	Medium	145	69.98	193	709	11.0
ICEAP 00053	Long	225	0.0	231	918	15.8
ICEAP 00040	Long	207	0.0	231	866	19.5
ICEAP 00020	Long	238	0.0	231	736	19.5
Mean		195	23.09		866	15.8
CV%		8.89	53.48		21.74	4.95
LSD (P = 0.05)		25.54	18.16		NS[2]	1.15

1. At 115 days after planting.
2. NS = Not significant.

Table 2. Performance of ICRISAT short-duration pigeonpea cultivars in Mpumalanga, South Africa, 1998/99.

Cultivar	Days to 50% flowering	Days to maturity	Grain yield (kg ha^{-1})	100-seed mass (g)
ICPL 88039	67	127	1823	10.0
ICPL 85010	68	129	1525	9.0
ICPL 87	80	133	1429	11.0
ICPL 84031	77	128	1411	10.3
ICPL 87091	84	140	1299	12.3
MN 5	64	130	1228	8.3
ICPL 87105	83	133	1212	12.3
ICPL 151	76	130	1149	12.3
Mean	74.75	131	1384	10.7
CV (%)	3.99	2.76	31.61	3.64
LSD (P = 0.05)	4.39	5.31	NS[1]	0.57

1. NS = Not significant.

MD cultivars and 231 DAP in LD cultivars. No significant yield differences between the cultivars were observed (Table 1). The cultivar ICPL 87051 (MD) recorded the highest grain yield of 978 kg ha^{-1} followed by the MD cultivars ICPL 87119 and ICEAP 00068. Among the LD cultivars, ICEAP 00053 gave the highest grain yield of 918 kg ha^{-1} followed by ICEAP 00040. The average grain yield of the LD cultivars was lower than the MD lines. The planting of the rainfed summer crops in this region normally commence with the advent of the rainy season in October. The overall yield was low, probably due to late planting in December. Pigeonpea grain production is directly associated with biomass production (Chauhan et al. 1995). Being photo- and thermo-sensitive, the MD and LD cultivars produce more biomass when planted early. The MD cultivars ICP 8863 and ICPL 87119 recorded significantly lower seed size compared to all other cultivars. All the plants were cut to a height of 40 cm after the final round of harvest, in September, for ratooning.

In the trial with SD cultivars, the cultivar MN 5 was the earliest and achieved 50% flowering in 64 DAP while ICP 87091 took 84 days. Picking was completed in 127 DAP in the cultivar ICPL 88039 and 140 days in the cultivar ICPL 87091. The cultivar ICPL 88039 gave the highest yield of 1823 kg ha^{-1} but differences between cultivars were not large enough to be statistically significant (Table 2). The cultivar MN 5 had a significantly lower seed size than all the other cultivars.

The preliminary results clearly showed the possibility of successfully growing pigeonpea in the Lowveld areas of Mpumalanga to increase profitability of local farming systems. Preliminary investigations showed that about 120–150 tons of "oil-dhal" is imported from Malawi each month at R 600,000 (US$ 75,000) to R 750,000 (US$ 94,000) to meet the ever-growing demand for dhal by the large Asian community in South Africa. Substantial amounts of foreign exchange could be saved if pigeonpea production is successfully introduced in South Africa. Exporting the grains to countries where periods of short supply occur can also generate additional income. However, there is an urgent need to popularize the crop, develop sustainable production practices, provide adequate training to farmers especially on value addition by processing, and organize efficient markets before commercialization of pigeonpea could commence.

To begin popularizing the crop, a pigeonpea interest group of farmers and extension officials was formed in Nsikazi District in May 1999. The group, during a field visit to the trial with MD and LD cultivars, showed their preference for ICEAP 00040 and ICEAP 00053 based on visual observations on the growth habit of plants and pods. The small seeded ICPL 87119 was the least popular. At a later meeting, the group tasted five local preparations made from the dry whole seeds. Over 80% of the participants considered the taste of pigeonpea as similar to that of beans (*Phaseolus* spp) and cowpea (*Vigna unguiculata*). Twenty per cent preferred its taste and none disliked it.

The trials will be repeated in the coming season before conclusions could be made. A few volunteer farmers will be given selected cultivars to grow in their own gardens in the coming season as part of popularizing the crop among the local population.

Reference

Chauhan, Y.S., Johansen, C., and **Saxena, K.B.** 1995. Physiological basis of yield variation in short-duration pigeonpea grown in different environments of the semi-arid tropics. Journal of Agronomy and Crop Science 174:163–171.