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Farmer participation in on-farm varietal trials: Multi locational testing under resource-poor conditions

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In 1989-90, the performance of 4 pigeonpea genotypes resistant to Helicoverpa armigera - ICPL 84060, ICPL 332, ICPL 87088, and ICPL 87089 were evaluated in on-farm trials in Medak district, Andhra Pradesh, India. In this part of Andhra Pradesh, 50 to 80% of the pigeonpea's pod production is commonly lost to this pest every year.

Forty marginal farmers from 16 villages were asked to grow the genotypes on large plots (0.2 -2.5 ha) using their own management practices, and to compare them with local pigeonpea cultivars belonging to the same maturity group (medium duration).

Participatory rural appraisal (PRA) methods were used to elicit criteria for comparisons from farmers in semi-structured interviews. All participants were women farmers who play a central role in fuelwood collection and in all aspects of food production, preparation and storage. The PRA methods used were pairwise ranking and direct matrix ranking in the context of semi-structured interviews involving groups of 10-15 women. The outsiders were 4 staff members of the Deccan Development Society and one ICRISAT scientist, and, when shooting the video film sequences, 5 other people (cameraman, director etc). There were several important discussion periods at different times in the agricultural cycle:

- Prior to planting: pest diagnosis and matching the farmer's landraces with improved pest resistant material (3 days).
- Harvest time: preliminary assessments, farm walks (3 days).
- Post harvest evaluation: semi-structured interviews, quantification and ranking techniques, triangulation (6 days).

Throughout the project period NGO staff did provide advice when asked by women farmers.

The range of criteria normally used by ICRISAT scientists are: days to maturity, grain yield, seed size, seed colour, plant height, pest resistance and grain quality (protein content, cooking time). Twelve criteria were identified and used to rank the genotypes in order of preference by use of the direct matrix ranking method. By relying on a range of informants in different villages, farmers' evaluations could be cross-checked by triangulation. The criteria were:

- height of plant and ability to intercrop;
- flower production (flushes);
- young pod production;
- pod production;
- pod filling;
- pest damage by the pod borer;
- grain yield;
- wood biomass;
- quality of wood for palissade and other constructions;
- taste of grain;
- storability; and,
- grain price on local market.

All ICRISAT lines supplied to farmers did better than local cultivars in terms of yield, reduced pest damage, and other agronomic characteristics in the harsh environment of Medak District. Based on their own 12 criteria of evaluation, farmers ranked the genotypes in the following order of preference: ICPL 87089, ICPL 87088, ICPL 84060, and ICPL 332. Local varieties were all severely attacked by H. armigera (55-75% pod damage) and yielded less than ICRISAT lines. Farmers expressed their strong attachment to their land

Source: RRA Notes (1991), Issue 10, pp.3–8, IIED London

races, which are white seeded types (all ICRISAT material was brown seed and thus fetched a slightly lower price on the market). Taste of whole grain was a particularly important criteria along with wood production and price of grain on the local market.

Table 1. Pair-wise ranking (Pigeonpea preferences)

	Local	Improved (ICPL 84060)
Leaf production	4	6
Flower production	3	7 (but much flower drop)
Pod production	6	4
Pod filling	6	4
Pod borer damage (pest susceptibility)	7	3
Seed yield	6	4
Taste	3	7
Wood production and quality	3	7
Market price	7	3
Storability	5	5

Village: Metlakunta, Medak District, Andhra Pradesh, India.
Note: higher figure represents greater preference.

Table 2. Matrix ranking (Pigeonpea preferences)

	Local	ICPL 84060	ICPL 332
Leaf production	3	1	2
Flower production	3	1	2
Green pod production	3	2	1
Pod filling	3	1	2
Pest resistance	3	2 (1)	1
Seed yield	3	2	1
Taste	2	1	3
Wood production and quality	3	1	2
Market price	1	2	2
Storing	1	1	1
If only one available	1	1	3 (reject on account of poor seed taste)

Villages: Ibrahimpur, Hoti-B, Metlakunta, Nagwar, Medak District, Andhra Pradesh.
Note: 1 = most preferred variety 3 = least preferred

Note: women farmers would like to grow both ICPL 84060 and the local variety next year. Local variety would be sold in the market and improved variety eaten locally. Risk minimising in face of uncertain environment was another reason given for broadening the genetic basis of their production system.

Source: RRA Notes (1991), Issue 10, pp.3–8, IIED London

Interestingly, ICPL 332 - which was officially released by the State of Andhra Pradesh in 1989 on the basis of trials carried out with male farmers in better endowed areas - scored well on all-agronomic criteria but was down-graded on account of its bitter-seed taste. Women farmers indicated that they would not grow this variety next year even though it yielded more grain and was less damaged by H. armigera than local varieties. Data obtained (Table 3) from one of the large plots is typical of other situations where on-farm trials were arranged by the farmers. This result suggests that varieties identified for release in coastal Andhra Pradesh (A.P) are not necessarily acceptable to resource poor farming communities in the Telangana region of A.P. where Medak District is located. The diversity of situations in risk-prone, complex dryland environments probably calls for a mosaic of improved varieties rather than a standardised technology (e.g. variety) for all locations.

The 40 farmers involved in this participatory rural appraisal felt that the other three Helicoverpa resistant lines were acceptable within their context. The assessments provided by women farmers, and the data obtained at ICRISAT under controlled conditions (Table 4), therefore suggest that at least three other Helicoverpa resistant pigeonpea genotypes could be considered for official release in Andhra Pradesh.

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Table 3. Comparison of ICPL 332 (Helicoverpa tolerant variety of pigeonpea) with the local variety at Pastapur, Medak District, A.P., during the growing season of 1989/90

Pigeonpea genotypes	No. of pods/plant (30 plants)	Borer damage (%)*	Pod fly damage (%)	Hymenoptera damage (%)	Total insect damage (%)	Sample yield (g)/plant
Local	72	66.5	9.9	1.5	70.9	9.5
ICPL 332	204	41.3	25.4	15.5	57.3	26.6
S.Em ±.	14.1	1.71	0.71	0.73	1.85	2.64
LSD at 5%	40.8	5.0	2.06	2.1	5.4	7.6

*Arcsin transformations were used for analysis

Table 4. Percentage pod damage by H. Armigera and grain yield of four pest resistant genotypes and two controls under insecticide-free conditions at ICRISAT Center, Patancheru, A.P., Inida, 1985-1988 (Personal communication – Jain, K.C., Lateef, S.S. 1990)

	Pigeonpea genotype					Controls
	ICPL 84060	ICPL 87088	ICPL 87089	ICPL 332	BDN 1	C11
Proportion of pod damage by H. Armigera (%)						
1985	8	-	-	12	33	21
1986	10	13	15	23	71	38
1987	39	42	44	47	79	86
1988	23	13	13	19	48	31
Average	20	23	24	25	58	44
Yield (kg/ha)						
1985	1400	-	-	1840	1440	1325
1986	1560	1535	1527	1434	1220	1050
1987	710	590	860	700	120	110
1988	1445	1595	1500	1480	1340	1680
Average	1280	1240	1310	1365	1030	1040

Source: RRA Notes (1991), Issue 10, pp.3–8, IIED London