

Farmer Participatory Varietal Selection in Groundnut – A Success Story in Anantapur, Andhra Pradesh, India

SN Nigam^{1*}, R Aruna¹, D Yadagiri¹, TY Reddy², K Subramanyam², BRR Reddy³ and KA Kareem³
(1. ICRISAT, Patancheru 502 324, Andhra Pradesh, India; 2. Agricultural Research Station, Acharya NG Ranga Agricultural University (ANGRAU), Anantapur 515 001, Andhra Pradesh, India; 3. Accion Fraternal, Rural Development Trust, Anantapur 515 001, Andhra Pradesh, India)

*Corresponding author: s.nigam@cgiar.org

Anantapur is a drought-prone district in Andhra Pradesh, India. It falls in a rain-shadow area. The average annual rainfall is not only low (522 mm) but also highly variable and erratic in distribution. The district experiences prolonged dry spells of 45–50 days with an average of 36 rainy days in the rainy season. During the last 12 years (1993–2004), there were only four ‘good’ years with better rainfall distribution during the cropping season and eight were ‘drought’ years. The soils in the district are predominantly light textured, gravelly, shallow Alfisols with depths varying between 30 cm and 60 cm and are low in nutrients and water-holding capacity. Smallholdings (<3.0 ha) dominate (60%) the district. Despite frequent droughts, over 70% of the cultivated area of the district (1.04 million ha) is sown to groundnut (*Arachis hypogaea*) each year due to its ability to survive long dry spells and also for its cash value. Further, it provides valuable fodder for livestock during dry years or in case of crop failures. The groundnut yield during ‘good’ years averages between 800 and 900 kg ha⁻¹ and during ‘drought’ years between 300 and 400 kg ha⁻¹. There are instances of farmers getting yields up to 1500 kg ha⁻¹ in ‘good’ years.

Current cultivar options

Despite many improved groundnut varieties (ICGS 11, ICGS 44, ICGS 76, RSHY 1, Tirupati 2, K 134, DRG 12, Kadiri 4, JCC 88 and others) released for Andhra Pradesh during the last 20 years, the old varieties, TMV 2 (released in 1940, covers 75–80% area), JL 24 (released in 1978, covers 15–20% area) and Pollachi Red (a landrace) continue to dominate farmers’ fields. Some of the factors responsible for limited area sown to new varieties are new varieties falling short of farmers’ expectations, non-availability of their seeds, reluctance of groundnut processors

and millers to adapt their machinery to new varieties and consequent price discrimination by the traders in the local markets.

The Anantapur farmers prefer the following traits in a groundnut variety: high pod yield, high shelling outturn, early maturity, small-medium seed size, high haulm yield and resistance to drought, peanut bud necrosis, peanut stem necrosis and foliar fungal diseases. New varieties should have substantial improvement in pod and haulm yields (about 30%) to ensure their high adoption by the farmers.

Farmer participatory varietal selection

Despite the State government promoting other dryland crops in the district, the farmers are unwilling to give up groundnut cultivation. From the past experience, they realize that groundnut can withstand long dry spells much better than the other crops and can revive itself even with little rains after the dry spells. Further, in case of complete crop failure, it still yields some fodder for livestock. Therefore, for better livelihoods of small and marginal farmers, it is essential to stabilize groundnut productivity and production in the district by introducing farmer-preferred improved varieties and low cost/cost-saving production technologies.

Under the aegis of the IFAD Technical Assistance Grant 532-ICRISAT project, an on-farm farmer participatory varietal selection (FPVS) program was launched in 2002 in Anantapur in collaboration with the Rural Development Trust [a non-governmental organization (NGO)] and Agricultural Research Station, Acharya NG Ranga Agricultural University (ANGRAU) and active participation of farmers in partner villages to find a replacement for the traditional groundnut variety TMV 2 (ICRISAT 2002–2004).

FPVS trials. Five FPVS trials, each with nine improved varieties (eight from ICRISAT and one from ANGRAU) and a local control, TMV 2, were conducted in the 2002 rainy season in two representative villages of the district, Dhanduvaripalli and Rekulakunta. The partner farmers managed the trials. Soon after sowing in the first week of August, a dry spell of 45 days followed. After a couple of good rains during mid-September, there was again a dry spell of 25 days. The total rainfall received during the year was less than 400 mm, which was far below the average of the district. The farmers and scientists together visited these trials at different crop growth stages to observe the performance of new varieties. None of the

new varieties gave significantly higher pod yield than TMV 2 in both the villages. However, the farmers were impressed with the new variety, ICGV 91114, which gave higher fodder yield (1460 kg ha⁻¹ as compared with 1355 kg ha⁻¹ of TMV 2) with more green leaves, and comparable pod yield (385 kg ha⁻¹ as compared with 305 kg ha⁻¹ of TMV 2) and larger seed size despite severe drought conditions in the cropping season. Another variety, ICGV 89104, also looked promising to them because of its comparable pod yield and better shelling outturn than TMV 2.

These two varieties along with TMV 2 were evaluated in the 2003 rainy season in larger plots (0.21 ha) in five farmer holdings in West Narsapuram (new partner village) and Rekulakunta. Only 227.1 mm rainfall was received in 23 rainy days during the year. Despite severe drought, ICGV 91114 produced significantly higher average pod yield (507 kg ha⁻¹) and haulm yield (1391 kg ha⁻¹) than TMV 2 (453 kg ha⁻¹ and 1111 kg ha⁻¹, respectively). The new variety also recorded a higher average shelling outturn and number of pods plant⁻¹ than the latter; ie, 59% and 2.9 as compared with 55% and 2.4 of TMV 2, respectively. Impressed with the performance of ICGV 91114 during two drought years (2002 and 2003), a woman farmer of West Narsapuram village multiplied the seed of this variety on a 1.5-acre (0.63 ha) land during the 2003/04 post-rainy season with irrigation and produced 1200 kg pods (1920 kg ha⁻¹). She sold the produce to other farmers in the village as seed for the 2004 rainy season.

In the 2004 rainy season, 26 farmers in West Narsapuram,

25 farmers in Shivapuram (new partner village) and 33 farmers in Rekulakunta sowed their on-farm trials/seed production plots of ICGV 91114 with the onset of sowing rains during 10–12 July. Soon after, there was a dry spell of 36 days (30 July–3 September). Of the total annual rainfall of 495 mm, the crop received only 302 mm. ICGV 91114 again performed better than TMV 2 for pod yield in all the three villages but the yield differences were significant only in West Narsapuram and Shivapuram. While the haulm yield of ICGV 91114 was significantly higher in West Narsapuram, it was similar in Shivapuram and significantly lower than TMV 2 in Rekulakunta (Table 1). The average 100-seed mass of ICGV 91114 was 41 g as compared with 36 g of TMV 2. The oil content in ICGV 91114 was comparable to that of TMV 2 across farmers' fields and seasons.

Seed production of ICGV 91114. Convinced of its better performance, 111 farmers in 23 villages (10 *mandals*) of Anantapur and one village each in adjacent Kurnool and Chittoor districts undertook seed production of ICGV 91114 in the 2004/05 post-rainy season in 48.04 ha under irrigation.

Large-scale adoption of ICGV 91114. Considering the better performance of ICGV 91114 in three consecutive drought years (2002–04), the farmers of the partner and neighboring villages collectively decided to adopt ICGV 91114 on a large scale in the 2005 rainy season. During these three years, not a single seed of ICGV 91114 was sold as commercial produce in the open

Table 1. Comparative performance of ICGV 91114 and TMV 2 in on-farm farmer participatory varietal selection trials in Anantapur, Andhra Pradesh, India, rainy season 2004.

Village/Variety	Average pod yield ¹ (kg ha ⁻¹)	Average haulm yield ¹ (kg ha ⁻¹)	Shelling outturn (%)
West Narsapuram			
ICGV 91114	1524	1557	75
TMV 2	1336	1375	75
t-test	*	*	
Shivapuram			
ICGV 91114	1502	1691	73
TMV 2	1313	1665	75
t-test	*	NS	
Rekulakunta			
ICGV 91114	1730	2666	74
TMV 2	1651	2907	73
t-test	NS	*	

1. * Significant at $P = 0.05$; NS = Not significant.

market. The farmers saved their produce as seed for the next season and the excess produce was sold to other farmers only for seed purpose. The total area under ICGV 91114 in the 2005 rainy season in 41 villages (18 *mandals*) is estimated to be 285 ha. It is also being grown in one village in the neighboring state of Karnataka.

Farmers were also made aware of the results of controlled feeding trials of Deccani sheep at ICRISAT, Patancheru where ICGV 91114 gave higher live weight gain day⁻¹ and nitrogen accretion indicating better digestibility of its haulm than the other varieties released for Andhra Pradesh (Vellaikumar et al. 2004).

The farmers in partner villages (West Narsapuram, Shivapuram and Rekulakunta) are now promoting ICGV 91114 in the district by sharing their produce with their relatives and neighbors. They have developed a sense of ownership over this variety. For large-scale adoption participation of farmers, NGOs, government agencies and traders will be essential.

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