

FINAL TECHNICAL REPORT

R7324

Participatory plant breeding in finger millet in India. Phase 1

Dr A Seetharam
University of Agricultural Sciences
GKVK, Bangalore 560 065

Dr D. S. Virk
Centre for Arid Zone Studies
University of Wales, Bangor
Gwynedd LL57 2UW

Executive Summary :

The project operated in 7 villages (Katihalli, Jalikatte, and Erajjanahatti in Chitradurga *taluk*; Maddheru, Kumminagatta in Holalkere *taluk*; and S. Roppa and Bansihalli in Hosadurga *taluk* in Karnataka. A participatory household survey conducted in May to July 1999 with 150 farmers in 7 seven villages revealed that farmers wanted new varieties with higher grain and fodder yield, blast resistance and drought tolerance. On the basis of farmers' requirements six varieties were selected for testing with farmers. Three of these are released varieties viz., GPU 26 (a pre-release variety at the time of testing but released for Karnataka in 1999); GPU 28 (released for Karnataka in 1998 but farmers were not aware of it) and VL 149 (All India release). Three other varieties viz., VL 305, GPU 46 and 9002 chosen were promising entries in All India Co-ordinated trials. These six varieties were tested with 150 farmers in Farmer Managed Participatory Research (FAMPAR) trials in *kharif* 1999. The 150 farmers were divided into six batches of 25 farmers each and each batch of farmers grew one new variety across 7 villages alongside the local variety (PR 202) for comparison. Four new varieties significantly yielded more than the local variety PR 202. The other two varieties also yielded more but non-significantly. Variety GPU 28 was highest yielding with 51% higher grain yield than the local variety. Grain yield was not the only criterion to judge

the performance of varieties. Farmers' perceptions were also recorded in focus group discussions (FGD). FGDs revealed that farmers' prefer varieties for multiple reasons. Variety GPU 28 was the most preferred one for normal sowing in the second week of July and GPU 26 for late sowing in August when monsoons are delayed. Variety VL 305 was preferred as a short duration second crop (85 days) after sesame and cowpea.

Background :

In vast dryland areas, (where 95% of the finger millet is grown) the growing situations differ from the ones prevailing on the research station. As a result, the probability of an improved variety performing well in research stations and not performing upto expectations in farmers field is high.

One way of overcoming this lacunae is by encouraging greater farmers involvement from the initial stages of varietal evaluation and selection itself rather than after identification and release of the variety.

Participatory Research is increasingly being employed in some of these areas where real farm situations are likely to be different from that of research stations. In one of the DFID funded KRIBHCO project in western India, it has been demonstrated that farmers could select a cultivar of their choice when a 'cafeteria' approach was followed providing a number of varieties to choose from. The successful adaptation of 'Kalinga III' a rice variety (officially not released in that area) is one such instance of demonstrating the efficacy of farmers participatory varietal selection.

Project Purpose :

Participatory methods for varietal selection and breeding developed and tested

Research Activities :

The project objectives centred around using Participatory Varietal Selection (PVS) as a means for identifying farmers preferred varieties in finger millet. The project was operated in seven villages of Chitradurga district, where finger millet is the mainstay for a large section of farmers in rainfed areas. With a view to get a deeper insight on the specific needs with reference to varieties as well as varietal characteristics a participatory household survey in the form of PRA / RRA was

conducted in the beginning of the project involving 150 farm families in seven villages representing all the socio economic classes. The survey revealed that the farmers still grew old varieties which were highly susceptible to blast disease and considered as one of the serious maladies of finger millet. Keeping this and other characters the farmers would normally look for in a preferred variety; six varieties namely, GPU 28, GPU 26, GPU 46, VL 149, VL 305 and 9002 were selected for testing with farmers. These selected varieties were evaluated in 150 Farmers Managed Research Trials (FAMPAR) during *kharif* 1999. These six varieties were divided and distributed to a group of 25 farmers for comparing along with local variety.

Outputs :

- The project provided new varieties that were preferred and adopted by farmers, i.e., GPU 28 for normal sowing in the second week of July, GPU 26 for late sowing in August and VL 305 as a second crop after sesame or cowpea.
- The participating farmers completely replaced their old local varieties (PR 202 and Indaf 5) with the new varieties in two crop seasons. Adoption of short-duration variety VL 305 would provide new options to farmers.
- New PVS varieties have increased food security since GPU 26 yields 30 % more than the local variety PR 202 and GPU 28 50% more. The new varieties are resistant to blast and provide alternatives to the most susceptible local variety, PR 202 and Indaf 5. This has increased on-farm diversity and provided stability to production.

Table 1 : Mean performance of six FAMPAR varieties over five locations

Sl. No	Varieties	Grain yield tons/ha					Mean	% increase over local
		Cluster 1 (Katihalli)	Cluster 2 (Jalikkatte & Errajjanahatti)	Cluster 3 (Maddheru)	Cluster 4 (Kumminaghatta)	Cluster 5 (Bansihalli & S. Roppa)		
1.	GPU 28	5.52 a	5.21 a	5.85 a	5.46 a	4.91 a	5.39	50.5
2.	GPU 26	4.82 bc	4.76 ab	4.10 cd	4.82 b	4.66 abc	4.63	29.3
3.	GPU 46	5.34 ab	4.34 bc	4.80 b	4.58 bcd	4.75 ab	4.76	33.0
4.	VL 149	4.15 d	3.94 cde	3.87 cde	4.21 de	3.74 de	3.98	11.2
5.	VL 305	4.29 cd	3.88 cde	3.41 e	4.25 cde	3.70 de	3.91	9.2
6.	9002	4.72 cd	4.12 cd	4.12 c	4.68 bd	4.11 d	4.35	21.5
7.	Local	3.44	3.41 e	3.41 e	3.57	4.05 de	3.58	-
	LSD (t/ha)	0.61	0.55	0.55	0.44	0.53	-	-

Note : Values with the same letter do not differ significantly with each other.

- The UAS Bangalore and the Karnataka State Department of Agriculture will popularize varieties identified by PVS, which are incidentally already released. The unreleased varieties identified by PVS such as VL 305 will be further tested in the niche – specific environment for facilitating its release and popularization.

Contribution of Outputs :

1. Four new varieties significantly yielded more than the local variety PR 202. Two varieties yielded more but non-significantly. Variety GPU 28 was the highest yielder with 51% higher grain yield than the local variety.
2. Grain yield was not the only criterion to judge the performance of varieties. Farmers' perceptions recorded in focus group discussions (FGD) helped in understanding of the various criteria used by farmers where a combination of characters viz., grain yield, stover yield, grain size, grain density and colour, ear type, cooking quality, maturity period and disease resistance are used in judging varieties.
3. FGDs revealed that farmers' prefer varieties for multiple reasons. Variety GPU28 was the most preferred for normal sowing in the second week of July and GPU26

for late sowing in August when monsoons are delayed. Variety VL305 was preferred as a short duration second crop (85 days) after sesame and cowpea. However, variety VL 305 did not yield significantly more than the local variety. Farmers did not show interest towards the other two varieties GPU 46 and 9002 as well as to VL 149 which is a released variety at the National level.

4. Varieties preferred by farmers have been adopted by participating farmers quickly. By the second year in 2000 there was near 100% replacement of PR 202 with new varieties. Farmers saved seed from FAMPAR trials in 1999 for growing in 2000 or procured from other farmers or purchased from the State Department of Agriculture as the variety was already a released one.
5. The first phase has been successful in identifying farmer's preferred PVS varieties. It justifies that the project should continue in second phase and build on PVS and move on to PPB. One potential cross to be attempted in the second phase is between farmers' variety PR 202 and the best PVS variety GPU 28. PR 202 is a widely adapted variety with stable performance with moderate yield, but susceptible to blast. GPU 28 is the most recent cultivar that has been preferred by farmers as it is blast resistant and has high yield potential besides drought tolerance. This is likely to help in combining favorable attributes of both PR 202 and GPU 28 in the new cultivar.