Participatory crop improvement in salt-affected areas of Patala district in Punjab State, India

Source
FAO Strategic Objective 5 – Resilience, in FAO

Keywords
Participatory approaches, zero tillage, seed priming, salt licks

Country of first practice
India

ID and publishing year
4592 and 2006

Sustainable Development Goals
Zero hunger, good health and well-being, and sustainable cities and communities

Summary
Farmers’ participatory varietal evaluation of wheat and rice was conducted for three consecutive years from 1999 to 2002, in the Punjab, India. Farmers adopted new varieties that better met their needs and enabled them to break their monoculture dependence. They also made use of seed priming and zero tillage, a technology with which they were not familiar, to improve yields and reduce costs.

Description
In the traditional systems adopted by agricultural research institutions in India, responsible for developing and releasing of new crop varieties, farmers’ involvement and preferences were practically negligible. Whatever material was recommended for cultivation the farmers had to try because of a lack of alternative choices for a specific area or environment. A few high yielding crop varieties were developed and recommended for general cultivation over the state of Punjab although there were large differences between growing environments and plant pest and disease risks. For example, Pusa44 was released although it was highly susceptible to bacterial leaf blight. This variety also takes long time to mature, adds to the worsening of already scarce water availability and leads to deterioration in soil health. Nor were improved varieties promoted with consideration of the differing socio-economic conditions of the farmers who were intended as the end users. No serious efforts had been undertaken to involve farmers in varietal improvement for area specific and needs based crops.

To address some of these constraints more directly, it was important to involve farmers at various stages of variety development, release and spread/adoptions, and provide them with different choices of planting material. In the Punjab, varietal choice in crops such as wheat and rice was very limited.

Baseline surveys showed that, due to a wheat-paddy long duration rotation, soil health was deteriorating and water levels were going down. It was necessary to make farmers aware of and allow them access to the new genetic material, by identifying high yielding, short duration paddy varieties. Introduction of these types would enable the farmers to take advantage of pulse crop/green manuring, which would not only improve soil health and check declining water tables but also increase...
total production. This would stabilize grain prices and also contribute positively to food security and employment opportunities for poor people.

1. Research outcomes

1.1 Rice and wheat participatory variety selection

A search for varieties and their seed acquisition was done. Eleven released and pre-released varieties of paddy were evaluated under field conditions in 12 different villages during Kharif 1999. In Kharif 2000 to 2001, farmers managed on-farm trials and evaluated the performance of experimental varieties against local grown rice cultivars. The preferred variety (IR64) was identified and an initiative was taken to diffuse the variety through local seed systems. Of the 11 varieties tested which researchers considered the best, farmers selected only IR64. The selection and introduction of this variety into a farming system where farmers were previously growing only one local variety (Pusa44) helped the farmers to grow an additional legume crop between paddy and wheat. Increasing farmer’s access to varieties of their preference resulted in better speed of diffusion through farmer-to-farmer seed exchange. IR64 was highly resistant to bacterial leaf blight and white plant hopper. It was lodging resistant, had superfine grains relative to the existing cultivars of the area and was of short duration. This provided an alternative choice to the farmers for a more diverse rotation in addition to greater return per unit area.

None of the wheat varieties out yielded the check variety PBW343 except HD2687 and UP2382. Farmers placed overwhelming emphasis on yield performance, while other traits of economic importance as well as for the longevity/sustainability of the variety in the field took second place. Though the variety HD2687 showed an impressive field stand and yielded more than PBW343, it showed higher susceptibility to yellow rust. Due to this weakness, it was dropped from further evaluation. Variety UP2382 was selected for further assessment in 2000 to 2001 along with seven other varieties freshly selected from other sources for field trials. When averaged over three rabi years, UP2382 gave higher yields than the check PBW343. Adoption of this variety would not only decrease the dependency of farmers on one genotype but also increase genetic diversity in the field.

1.2 Zero tillage

To benefit the farming community, especially small and marginal farmers, a new innovation, zero tillage (ZT) cultivation, was popularized through demonstrations at a large number of locations. Zero tillage was accepted by the farmers with no reluctance and gave them savings of Rs 600 to 1 000 per acre depending upon the soil conditions. It also helped to reduce weed infestation by Phalaris minor (Little Seed Canary Grass), thereby cutting expenditure on weed killers, saved sowing time by 50 to 60 percent, saved 60 to 70 percent on diesel costs, reduced lodging, reduced or eliminated the problem of yellowing of wheat after the first irrigation and permitted early sowing by seven to ten days. Zero tillage was useful in areas with late harvesting of paddy crop. For sowing wheat, ZT became common practice among the farmers of the target villages.

2.1 On-farm seed priming

In addition to the varietal performance and evaluation, 55 trials were conducted
to evaluate the advantage of seed priming versus non-priming in wheat during the year 1999 to 2000, using HD2687 and PBW343 wheat varieties. The standard method of seed priming was followed. The on-farm seed priming trials were designed to enhance seed germination, establish a good root system leading to a better stand of the crop in the early stages, early maturity and assist in escaping the adverse effects of dry spells during terminal growth stages of plants.

2. Health and safety
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3. DFID disclaimer
This technology is an output from the Renewable Natural Resources Research strategy funded by the UK Department for International Development (DFID), for the benefit of developing countries. The views expressed are not necessarily those of DFID.

4. Acknowledgements
The technology was selected and the record was compiled from the original project documentation by Natural Resources International Ltd, with funding from DFID’s Central Research Department (Communications). Implementing and advising on this process were: Karen Wilkin and Tina Rowland (joint project leaders), Andy Frost, Vino Graffham, Jody Sunley, Liz McVeigh, RNRRS programme staff, FAO’s Research and Technology Development Service, FAO’s LEAD programme, DFID’s Central Research Department, Ken Campbell, Graham Farrell (Plant Clinic), Simon Eden-Green, Peter Golob, John Esser, Liz Betser (360˚ Responsibility). Validation domain reviewed by the Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), Simon Eden-Green and Peter Golob. Uploading by Random X Solutions Ltd. For more information, please contact Karen Wilkin, NR International Ltd or Tina Rowland, Random X Solutions Ltd.

5. Further reading

6. Agro-ecological zones
• Tropics, warm

7. Objectives fulfilled by the project
7.1 Resource use efficiency
Different choices of planting material allowed for increased and higher quality yields.

7.2 Pro-poor technology
Adopting new varieties suited better farmer needs and reduced monoculture dependence. The technology also improved yields, reduced costs, contributed positively to food security and employment opportunities for poor communities.