

Farmers as Breeders – Participatory Plant Breeding



Photo: Anja Christinck

Seeds - the First Element in the Food Chain

For more than 5,000 years men and women farmers have been domesticating various plant species and developing a wide range of crop varieties that fit their specific needs and respective environmental conditions. Only in the last 100 years has specialized plant breeding undertaken by formal institutions emerged. Today most farmers still prefer their own seed where formal breeding and seed systems fail to supply planting material of suitable quality and diversity in a timely manner and at accessible prices. In developing countries, 60 to 90% of the planting material is supplied by the informal sector, i.e. farm-saved seed/propagating material. In some regions, and for some locally important food crops, this can even be the only source of seed. A typical aspect of local seed systems is that they maintain a wide diversity within and among varieties or landraces. Since farmers know best which materials meet their needs and are enthusiastic seekers of new varieties, "participatory plant breeding" represents a promising approach to enhancing agrobiodiversity, while also sustaining food security and alleviating poverty.

What Is Participatory Plant Breeding?

Participatory Plant Breeding (PPB) is based on the idea that farmers as well as professional plant breeders have important knowledge and skills that could complement one another. PPB is broadly defined here as a range of approaches that involve a mix of actors (including scientists, breeders, farmers and other stakeholders) in plant breeding stages.

Other terminology has been used to describe such approaches, depending on the stage of the breeding process at which collaboration between farmers and formal breeders starts. For example, in Participatory Varietal Selection (PVS) the materials are stabilised, whereas in the narrower sense of Participatory Plant Breeding the material is still segregating. These different approaches are generally subsumed under the term Participatory Plant Breeding (or Participatory Crop Improvement).

Depending on who controls the breeding process (researchers or farmers) and the scale on which the work is undertaken (community-centred or research to extrapolate results) two broad categories are usually differentiated: 'farmer-led' and 'formal-led' PPB.

Source: PRGA Programme

Whose Word Carries Most Weight?

Where PPB is initiated by or under the primary leadership of formal sector institutions such as national plant breeding programmes or international research centres (formal-led PPB), it is expected to complement the formal research system and to improve its effectiveness. Formal-led PPB mainly seeks to give more attention to farmer preferred quality traits and local environmental conditions, as well as to reorient general breeding directions and to reach a broader range of potential users and stakeholder groups – including women and the poor.

Development agencies often support formal-led PPB or disseminate breeding products. However, the major interest of development agencies tends to be directed towards supporting farmers' own systems of crop development, i.e. 'farmer-led PPB'. In a development context, farmer-led PPB is most commonly considered as a strategy that:

- ◆ supports in situ conservation of traditional crops while also improving germplasm. Many cases seek to increa- ▶



Photo: Kirsten Probst

- ▶ se the competitiveness and productivity of landraces. This can prevent farmers from abandoning such crops, and provides wider access to a choice of diversity for targeting micro-niches. Such PPB may particularly focus on 'minor' crops that are not covered by private or public sector programmes, e.g. crops typically cultivated by women in home gardens, such as indigenous vegetables or varieties with specific characteristics.
- ◆ contributes to the empowerment and self-reliance of farmers.

Empowerment may be achieved through enhancing farmers' capacity in breeding and crop development; improving their access to and control over germplasm development, supply and information; as well as raising their critical awareness of policy arenas (e.g. regarding seed laws, intellectual property rights, etc.).

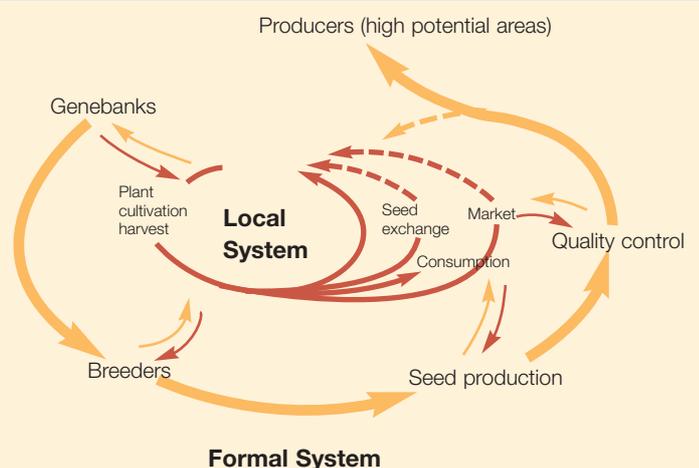
Obviously, PPB - particularly farmer-led approaches - can serve as a conceptual element not only in agricultural research, but also in rural development and natural resource management programmes, as well as in longer-term post-disaster adjustment initiatives (e.g. in combination with seed production).

Participatory Plant Breeding – Breaking New Grounds

In development cooperation, support to farmer-led PPB is still a new area, and few projects as yet refer to it as a strategic element. German technical cooperation has been working on seed sector development programmes in many African, Asian and Latin American countries for more than 30 years. These programmes have contributed to the development of an institutionally pluralistic formal seed sector, the establishment of seed companies, policy and legislation, and networking. At the same time NGOs, extension services, farmer associations and small local seed companies have contributed to strengthening local capacity. The SADC/GTZ project on the promotion of Small Scale Seed Production by Self-help Groups (SSSP) is just one example of this. The project's main activities are the development and implementation of training programmes for farmers and extension workers. PPB (i.e. Participatory Variety Selection) is promoted as one conceptual element among other measures, such as community biodiversity registers, seed fairs, seed gardens for off-season seed production, etc.

Various NGOs have spearheaded farmer-led PPB as part of their community development and biodiversity conservation programmes, such as the Foundation for the Promotion and Study of Andean Products (PROINPA) in Bolivia, the Local Initiative for Biodiversity, Research and Development (LI-BIRD) in Nepal, and the South East Asia Regional Initiative for Community Empowerment (SEARICE). The latter is involved in the Community Biodiversity Development and Conservation Programme (CBDC), a global initiative developed by 14 governmental and non-governmental organisations. Participatory plant breeding activities play a major role in the CBDC programme, with the aim

Local and Formal System for the Management of Plant Genetic Resources



Source: Almekinders & Boef (2000)

of enhancing crop genetic diversity in farmers' fields by selection and breeding efforts in which farmers are the major actors, particularly in rice, maize, beans, quinoa, and root and tuber crops.

Experiences reveal that most work has been undertaken with staple food crops. Initiatives often start with Participatory Variety Selection (PVS), i.e. with stabilized materials, whereby farmers can access finished products more quickly and the learning process is easier. Though to date PPB has been applied mainly within marginal, basically subsistence-oriented production environments, an increasing number of experiences are unfolding in more favourable market-driven contexts (e.g. India, Bangladesh and the Netherlands). These take place where user preferences are not fully met by conventional breeding, where more organic products or intra-crop varietal diversity are sought, or when farmers want to gain more control over the breeding process.

Supporting Contexts for PPB

The conditions and factors that tend to enhance farmers' interest in breeding, and thus the success of PPB, are as follows:

- ◆ Situations where farmers will not be served by formal (private or public) breeding and seed supply, e.g. in unfavourable or heterogeneous regions where modern varieties have little impact; in cases when poor infrastructure prevents seed or inputs from reaching farmers; and in the case of most minor/underutilized crops
- ◆ Factors that generally support innovation, e.g. situations where novel combinations of traits are desired; where a crop is economically important or where detailed folk-taxonomies and knowledge exist about a crop.
- ◆ Biological factors, e.g. the existence of genetic diversity that offers variation that can be manipulated; the visibility of diversity to farmers; the fact that maintenance is easier in the case of self-pollinated crops such as rice, beans and barley.

Obstacles to PPB

In most countries, the production and distribution of seed is regulated by seed laws, phytosanitary laws and plant variety protection. While these are primarily made to regulate certified seed production and importation, they may also restrict the local promotion of unreleased varieties and non-certified seed production. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) prescribes the inclusion of an intellectual property rights (IPR) system in the national laws of WTO member states. As IPRs may also restrict the use of protected materials in PPB, organizations supporting local crop development activities should acquaint themselves with the respective national regulations.

Since current legal frameworks do not address jointly developed material and knowledge, PPB generally lacks a legal definition. Therefore setting up a PPB protocol which describes the different roles, mechanisms for making the process transparent and credit-sharing arrangements is recommended, as well as strategies for making the product more widely available.

Photo: S. Al-Janabi



Important Steps

The organisation of PPB, i.e. 'who does what, when and how' is an important issue in the debate on its implementation. The CGIAR System-wide Programme on Participatory Research and Gender Analysis (PRGA) has developed guidelines for PPB which discuss options and share insights from practitioners. Major steps are outlined - from an overall diagnosis and analysis of the context, to setting objectives, technology generation and the dissemination of innovations. A participatory diagnosis of the seed system can help identify constraints and the potential starting points with the aim of stimulating PPB. In many societies, women are responsible for seed management, and men and women often have different varietal preferences due to differentiated gender roles along the food chain and different priorities.

Development projects can support farmer-led PPB through four broad types of interventions:

- 1) Germplasm support to increase farmers' access to diversity (using fixed or segregating, local or external materials), combined with testing new material, and supporting seed systems (community seed banks)
- 2) Skills support in breeding, testing or seed production (either new skills or extending local best practices)
- 3) Support in forming links and networks to exchange material or information
- 4) Indirect support to confront barriers to farmer-breeding (e.g. restrictive seed laws), or help promote PPB in other ways, such as market development.



Photo: S. Al-Janabi

Further Information

Almekinders, C., de Boef, W. (eds) (2000): Encouraging Diversity: The Conservation and Development of Plant Genetic Resources. IT Publications, London.

McGuire, S., Manicad, G., Sperling, S. (1999): Technical and Institutional Issues in PPB - From a Perspective of Farmer Plant Breeding. Working Document No. 2. PRGA Program, CI-AT, Cali, Colombia.

Vernooy, R. (2003): Seeds that Give: Participatory Plant Breeding. IDRC, Canada. <http://www.idrc.ca/seeds>

PRGA inventory of cases, reports, books, workshop reports: <http://www.prgaprogram.org>

Guidelines for developing PPB programmes: http://www.prgaprogram.org/publica.htm#ppb_wd

Experiences and cases:
<http://www.ileia.org/2/nl15-34.html>
<http://searice.org>
<http://www.cbdcprogram.org>

GTZ Publications:
<http://www.gtz.de/agrobiodiv/download/seed.pdf>

GTZ (2001): Seeds Are Life. Seed Sector Projects in German Development Cooperation.

Promising Results

So far, the evidence of PPB's potential to support the conservation of agrobiodiversity - both by delivering a greater range of varieties to fit niches, and by adding value to local germplasm through selection and crossing - is encouraging. However, the relationships and trade-offs between crop improvement and the conservation of diversity are only starting to be explored. Additional well-documented case studies and inquiries are needed to assess the effects of PPB on biodiversity, food security and local livelihoods.

This document is a preliminary working paper. Making use of your comments and the experience you have gained, we would like to expand the paper step by step.

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Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) GmbH
Sector project "People and Biodiversity in Rural Areas" (Unit 4411)
Postfach 5180, 65726 Eschborn, Germany
Text: Dr. Kirsten Probst
Editor: Yvonne Mabille
Contact: Astrid Ostrowicki, Media Company Berlin

Contact: Annette von Lossau, Dr. Rolf Mack
e-mail: annette.lossau-von@gtz.de
homepage: <http://www.gtz.de>

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