★PPB provides an entry point for building participants' skills and knowledge in conservation of genetic resources.
★PPB empowers women, rural institutions and small-holder farmers in community-based crop improvement and biodiversity enhancement.
★PPB can be less costly and can result in a benefit–cost ratio higher than that of conventional breeding.
★PPB products have potential as international public goods.
★PPB models and methods can be adapted for use with many different crops anywhere in the world.

Who will benefit?

Resource-poor farmers, especially women, in risk-prone and low-potential environments will benefit from a plethora of new crop lines that better address their specific needs, preferences and conditions, and from new opportunities created by the changes in policy and regulatory frameworks occurring at the national level. These benefits will accrue in the form of skills and experience, reduced risk, better harvests, improved nutrition, diversified livelihoods and improved income.

Plant breeders, other researchers, extensionists and farmers' organizations involved in PPB initiatives will gain capacity in PPB methods and approaches, and in the integration of PPB with seed systems and natural-resources management. The international public goods developed will be accessible to research and development professionals in other countries and in the CGIAR System.

Who are the PRGA Program's Partners?

The PRGA Program seeks to develop partnerships along the breeding chain, from crossing to consumption, among the CGIAR Centers, international and national agricultural research institutions, extension services, universities, NGOs, community-based organizations and the private sector. More specifically, potential partners identified to date include: ICARDA, PABRA, CAZS Natural Resources, Bioversity International, CIAT, CIMMYT, ICRISAT, CIP, IRRI, AVRDC,‡ NARS, NGOs and private-sector organizations in Africa; Central and West Asia and North Africa (CWANA); Asia (Laos, Thailand, Vietnam); and Latin America.

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[Footnotes:]
† Available at ftp://ftp.fao.org/ag/cgrfa/it/ITPGRe.pdf.
‡ CGIAR – Consultative Group on International Agricultural Research; IDCR – International Development Research Centre; ICARDA – International Center for Agricultural Research in the Dry Areas; CIAT – International Center for Tropical Agriculture; CIP – International Potato Center; CIMMYT – International Maize and Wheat Improvement Center; PABRA – Pan-Africa Bean Research Alliance; ICRISAT – International Crops Research Institute for the Semi-Arid Tropics; IRRI – International Rice Research Institute; AVRDC – The World Vegetable Center.

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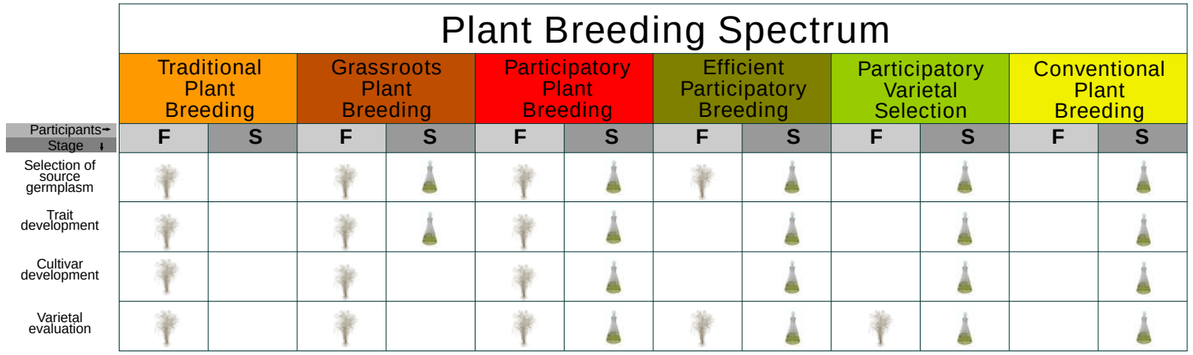
Participatory Plant Breeding

What is Participatory Plant Breeding?

Participatory plant breeding (PPB) is the systematic and regular involvement of farmers as decision-makers in all stages of a plant breeding program. PPB falls within a spectrum of approaches that ranges from traditional plant breeding by farmers, with no involvement of scientists, to conventional plant breeding by scientists with no involvement of farmers.



F= Farmers S= Scientists

Source: Modified from Morris and Bellon (2004)

Farmer involvement in plant breeding can take many forms, including: definition of breeding goals and priorities; selection or provision of germplasm sources; hosting of trials; selection of lines for further crossing; evaluation of results; planning for the following year's activities; suggestion of methodological changes; and multiplication and commercialization of the seed of selected lines.

Participatory Varietal Selection (PVS) is the most familiar form of farmer participation in plant breeding. PVS traces its origin back to the farming systems research of the 1970s, with farmers becoming involved in the breeding process itself in the 1990s. In PVS, farmers are involved in evaluating a range of stable lines and selecting those most appropriate for their own uses for subsequent independent testing. PPB involves a significantly higher and more complex degree of farmer involvement in decision-making at earlier and more fundamental stages of the varietal development process. With this higher level of participation comes much greater potential for farmer empowerment and for bringing about improvements in the livelihoods of rural people.

What are the opportunities, benefits and advantages of PPB?

Since farmers' roles in certifying, multiplying and distributing seed are directly affected by local and national regulations and standard-setting bodies, farmers' interests rarely end with the evaluation of improved materials. PPB and PVS raise farmers' awareness of regulatory frameworks and pave the way for involvement in efforts to influence these, particularly when existing frameworks limit farmers' opportunities to access benefits from the genetic materials that they helped to develop. Participation by women and men farmers in plant breeding programs, and particularly in PPB, offers many important opportunities to safeguard and strengthen farmers' rights. This is particularly relevant in the context of the International Treaty on Plant Genetic Resources and is critically important for poor farmers practicing small-scale agriculture in less favorable environments, and in the context of global climate change.

Examples of opportunities and benefits offered to farmers by PPB include:

★Influence on the development of technologies responsive to the cultural preferences and specific needs of women and men farmers in the context of changing agro-ecological environments. This is critically important to poor small-holders in the context of global climate change, as conventional breeding tends to focus on producing varieties suitable for large-scale farmers in environments with high production potential.
★Influence on decisions related to deployment of financial resources for research and extension.
★Raising the profile of farmers' knowledge and creation of incentives for them to continue using and developing it.
★Contact with professional breeders, facilitating mutual knowledge and technology flows and capacity-building.
★Involvement in registration, seed multiplication, distribution and commercialization of varieties resulting from PPB.
★Influence on the ways seed is produced, selected, saved and acquired, resulting in stronger farmer seed systems.

The International Treaty on Plant Genetic Resources for Food and Agriculture† entered into force in June 2004 and has been ratified by more than 50 countries as the first legally binding international agreement that explicitly recognizes farmers' rights. Article 9 of the Treaty sets the scene for country-level implementation and continued evolution of farmers' rights to save and exchange seed and to earn benefits from the commercialization of farmers' varieties. It paves the way for the adjustment of national seed laws to allow the registration and commercialization of farmers' varieties.

In addition to contributing directly to farmers' rights, PPB has many other benefits and advantages:

★PPB supports the development and maintenance of a more genetically diverse portfolio of varieties.
★PPB, combined with participatory research on the management of natural resources, has potential to increase the resilience and productivity of farming systems in the face of rapid climate change.

The International Treaty on Plant Genetic Resources for Food and Agriculture

In its Article 9, the International Treaty recognizes the enormous contribution that local and indigenous communities and farmers of all regions of the world, particularly those in the centers of origin and crop diversity, have made and will continue to make in the conservation and development of plant genetic resources, which constitute the basis of food and agriculture production throughout the world. It gives governments the responsibility for implementing Farmers' Rights, and lists measures that could be taken to protect and promote these rights:
★The protection of traditional knowledge relevant to plant genetic resources for food and agriculture;
★The right to equitably participate in sharing benefits arising from the utilization of plant genetic resources for food and agriculture; and
★The right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture.

Source: www.planttreaty.org.

World Bank Commentary on PPB

Participatory plant breeding and varietal selection speed varietal development and *dissemination* to 5–7 years, half of the 10–15 years of a conventional plant-breeding program. In the very poor, rainfed rice-growing areas of South Asia that the Green Revolution passed by, participatory plant breeding is now paying off with strong early adoption of farmer-selected varieties that provide 40 percent higher yields in farmers' fields. The approach needs to be more widely tested in the heterogeneous rainfed environments of Africa, where involving farmers, especially women farmers, in selecting varieties has shown early successes for beans, maize, and rice. The cost effectiveness of the approach for wider use also needs to be evaluated.

Source: World Development Report 2008, pp. 160–161.

How Widespread is PPB?

Research conducted by the CGIAR‡ Systemwide Program on Participatory Research and Gender Analysis (PRGA Program) and IDRC‡ revealed that short-term PPB projects were common in many national and international plant breeding programs, with nearly 100 currently being implemented worldwide, by ICARDA, Bioversity International, CAZS Natural Resources, CIAT, CIMMYT and CIP,‡ and by national agricultural research organizations and NGOs. Despite the important range of benefits, opportunities and advantages of PPB, national and international plant breeding programs have been slow to adopt it as a mainstream approach. This is most likely not because PPB needs further technical refinements, but rather because it changes power relationships.

PPB and the PRGA Program

PPB has been a central focus of the PRGA Program since it was launched in 1997. In the Program's third phase, PPB is at the top of an agenda focused on achieving four key outcomes:

1. Widespread application of PPB in national programs and in the CGIAR Centers.
2. An increased number of varieties of crops developed through PPB and grown by poor women and men farmers.
3. An increased diversity of livelihood options among poor farmers, especially women, through greater use of agro-biodiversity.
4. Concrete advances in country-level implementation of farmers' rights to ensure that farmer breeders are able to benefit from their investments of time and resources in varietal development.

There are two key strategies for achieving these outcomes:

1. Implementation of several large-scale, high-visibility PPB programs that will (a) generate a large number of varieties with significant adoption; (b) bring about changes in regulatory frameworks that strengthen farmers' rights; (c) refine PPB processes and respond to questions about the viability of second and subsequent cycles of PPB (using PPB products in further rounds of PPB as parents in crosses), and about the role and potential of PPB as a tool for adaptation to climate change; and (d) add significantly to the body of empirical evidence on effectiveness, efficiency, sustainability and wider impacts of PPB.

Key characteristics of these PPB programs will include the following:

★A focus on the poor, and particularly on benefits for poor rural women.
★A geographical focus in areas where poverty rates are particularly high (Africa and South Asia) and where there is
★potential to conduct integrated participatory research (plantbreeding and natural-resource management).
★An inclusive approach involving a wide range of partners in government, civil society and private sectors.
★Integrating PPB with seed supply systems and markets by linking all the actors in the network from cross to consumption.
★Developing methodologies for impact studies of PPB (impact-assessment methodologies for conventional crop varieties are not appropriate for the products of PPB).
★Integrating PPB with participatory natural-resources research and improved natural-resource management to cope better with the challenges presented to poor small-holder farmers by rapid climate change and declining soil fertility.
★Capacity development of men and women farmers, extensionists, researchers and rural institutions to engage in PPB.
★Development and introduction of new curricula inuniversities and other centers of learning to ensure that future generations of research and development professionals are trained in PPB methods and approaches.
★Rigorous evaluation of impacts on livelihoods and nutrition, especially those of women and children, and on empowerment of women and men farmers.

2. Advocacy and widespread—yet carefully targeted—communication of evidence from the field programs and of methodological resources. The advocacy work will focus on what can be achieved through PPB that conventional breeding cannot do, and on building awareness of the spectrum of breeding approaches and the particular benefits,opportunities and advantages of PPB. Impact assessment data and research findings will feed into the advocacy and communication strategy.