



PPB CREATING A VALUE CHAIN FOR BREEDING NEW PLANT VARIETIES IN MEETING FARMERS' NEEDS AND SUPPORTING ON-FARM CONSERVATION

*Course topic: Involving actors of the value chain
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**Participatory Plant Breeding and Resilient Seed System Development:
Options for Stakeholder Engagement and Benefit Sharing**

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Participatory Plant Breeding (PPB): Setting Context

What is PPB?

- Participation of and decision making by farmers/consumers and other actors in the breeding process
- Collaboration between formal breeder and users of the new plant varieties (farmers, consumers and other actors)
- Combines science and practices of conventional breeding with knowledge and practices farmer breeding
- Value addition to the existing varieties and mechanism for value chain development



Participatory Plant Breeding (PPB): Setting Context

✚ Why PPB?

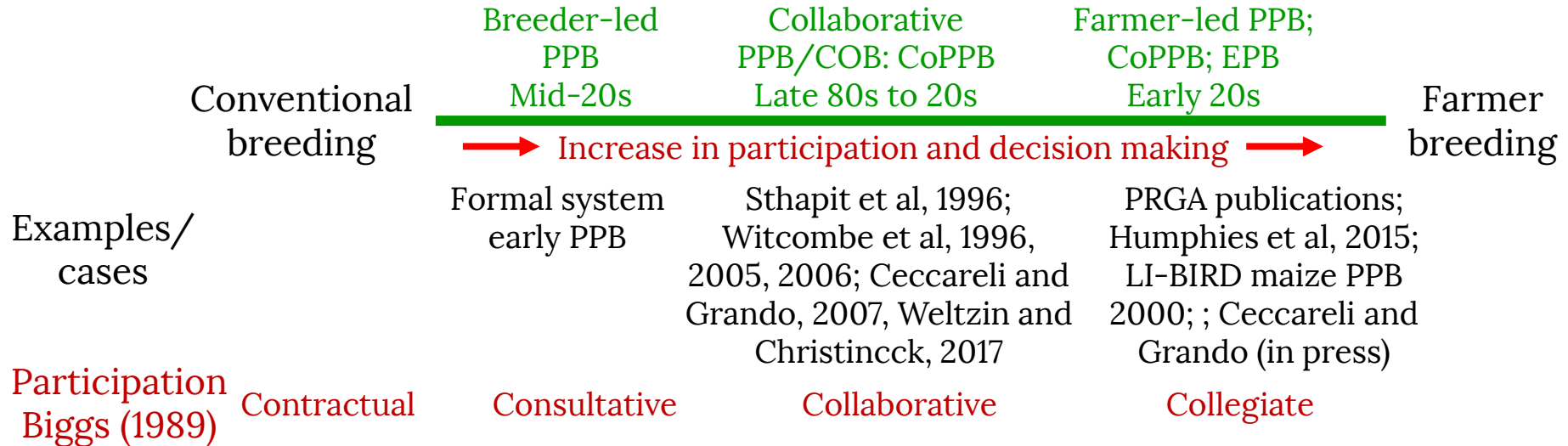
- Increase breeding efficiency – enhance economic traits (agronomic/production traits, post-harvest traits, market traits etc)
- Address farmers/consumers needs and preferences, including varieties for diverse production environments
- Promote crop/seed diversity and conservation
- Strengthen farmers' seed systems



Participatory Plant Breeding (PPB): Setting Context

✚ Evolution and typology of PPB

- PPB has evolved over time into different typologies due to different factors



PPB Creating Value Chain for New Plant Varieties

PPB and value chain framework (Adapted from Witcombe et al, 1996; Gyawali et al 2010)

Value chain/ product innovation stages	Stages in the PPB or crop improvement program	Purpose/ role of farmers and other actors
1. Product design	Setting breeding goal (variety specification)	Identify needs of farmers and other actors (variety specification)
2. Product development	Using exiting diversity (a) or generating new diversity (b) a. Identifying variety for improvement b. Choosing parents and making cross Selection for desired traits a. Selecting in the existing diversity b. Selection in the segregating generation	Selection of germplasms for breeding that best meets the needs of farmers and other actors - Selection of varieties/parents for breeding
3. Product testing	Testing varieties with farmers/consumers in the target environment/production systems	- Participate in testing new breeding lines - Provide varietal performance feedback
4. Product marketing	Seed production and supply/marketing through both formal and farmer seed system	Engage in seed production and exchange/marketing
5. Customer feedback	Outcome assessment and feeding back to new breeding program	Feedback from farmers, traders and consumers maintain seed quality

PPB Value Chain Cases



Case 1: PPB for Jethobudho dhan landrace enhancement

Location: Pokhara valley, Nepal

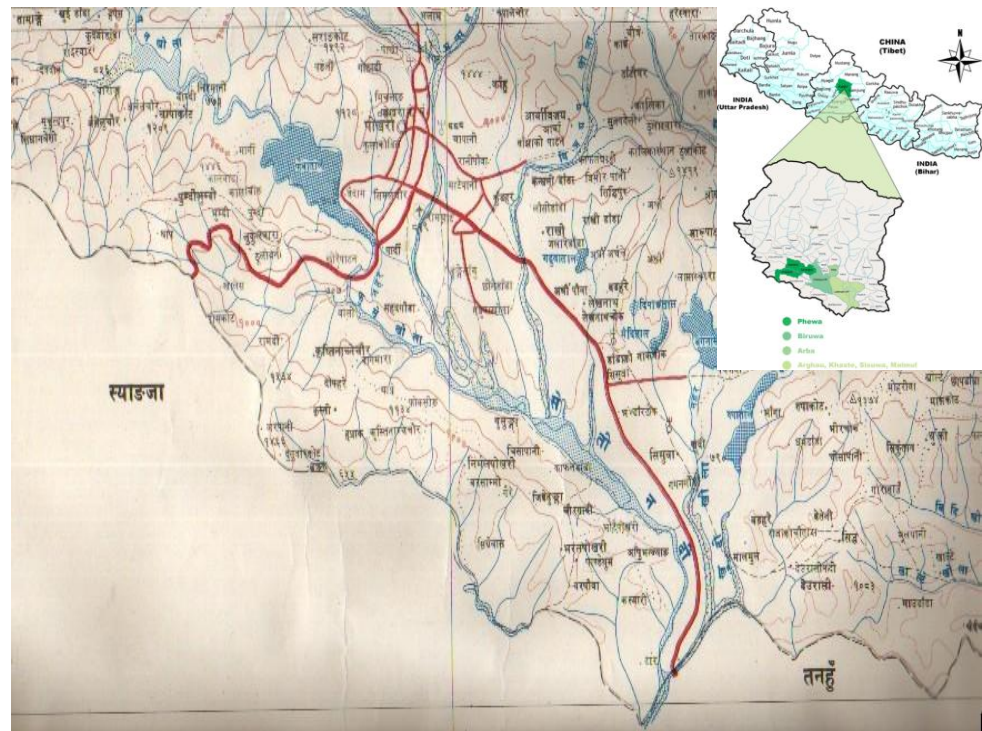
Initiated by: Jointly by LI-BIRD NGO breeder and farming communities in 1999

Other actors:


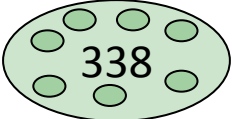








- Fewa Seed Producer Group
- Grain traders (millers, whole seller, retailers)
- District Agricultural Development Office
- National Rice Research Program
- Agricultural University

Stakeholders' agenda and alignment:

- Farmers: enhanced yield and milling recovery
- Traders: Retention of original quality traits and milling recovery (market traits)
- Breeder: traits of preferred by farmers and traders
- Agenda aligned/ no conflict



Collection sites of Jethobudho dhan
(5 panicles per HH, 50 sites and 338 accessions)

Year	Farmer's JB	Accessions	
1999		 338	Preferred trait analysis and collection of 338 accessions from 7 villages at harvest time
2000		 183	Screening for blast, lodging, height, seed characteristics, yield and yield components
2001		 143  46	Consumer and market survey to determine original quality traits and screening for these traits; Consumer survey for cooking and eating quality
2002		 6	Screening for post-harvest quality traits (quality and milling recovery) and SSR evaluation for aroma
2003		 Bulk	Agronomic and post-harvest traits (quality and milling recovery) evolution
2004		 EJB	PVS and community-based seed production (CBSP)
2005		 EJB	PVS and community-based seed production (CBSP), and field visit by variety release committee
2006		 EJB	Release of enhanced Jethobudho dhan and CBSP
	Enhanced JB (EJB)		

Case 1: PPB for Jethobudho dhan landrace enhancement

PPB and value chain for enhancement of Jethobudho (Gyawali et al 2010)

Value chain/product innovation stages	Stages in the PPB or crop improvement program	Purpose/role of farmers and other actors
1. Product design	Setting breeding goal (variety specification)	Identify needs of farmers and other actors (agronomic, post-harvest and market traits)
2. Product development	Using exiting diversity for enhancement of population <ul style="list-style-type: none">- Assess diversity within with <i>Jethobudho</i> for desired traits- Selection for improved agronomic, post-harvest and market traits	<ul style="list-style-type: none">- Selection of local <i>Jethobudho</i> variety with high economic value (production and market)- Identify key traits characteristic of original good quality <i>Jethobudho</i>
3. Product testing	<ul style="list-style-type: none">- Testing enhanced <i>Jethobudho</i> with farmers (on-farm and farmer management)- Assess for desired traits	<ul style="list-style-type: none">- Participate in assessing enhanced <i>Jethobudho</i>, provide feedback and make joint decision on the performance of new variety
4. Product marketing	Seed production and supply/marketing through both formal and farmer seed system	Engage in seed production and exchange/marketing
5. Customer feedback	Outcome assessment and feeding back to new breeding program	Feedback from farmers, traders and consumers to help maintain seed quality

Case 2: Bean PPB and Release of Don Ray in Honduras

Location: Honduras

Initiated by: EAP-Zamorano (Panamerican Agricultural School) and FIPAH NGO

Other actors:

- Local Agricultural Research Committee (CIAL)

Stakeholders' agenda and alignment:

- Agenda aligned/ no conflict

PPB process:

Product design: EAP-Zamorano with feedback from FIPAH/CIAL

Product development:

- Crossing between Paraisito (landrace) x Carrizalito (improved) by Zamorano in 2003
- Reinaldo Funez (Don Ray), a CIAL member and his wife received the variety in 2008 and selected a popular variety
- Nationally released as Paraisito Mejorado 2 (PM2-Don Ray)



Case 3: Wheat PPB in Canada

Location: Canada (6 Provinces: BC, Alberta, Saskatchewan, Manitoba, Ontario and Quebec)

Initiated by: SeedChange (NGO) with the University of Manitoba

Other actors:

- Canadian International Grain Institute (CIGI)

Stakeholders' agenda and alignment:

- Agenda aligned/ no conflict

PPB process:

Product design: UofM with feedback from SeedChange

Product development:

- University of Manitoba made cross in 2010 from the local wheat varieties grown by organic farmer for bread
- Segregating population given to farmers for selection meeting their needs and production environment (organic production)
- Selected lines have good quality traits (milling and baking) similar to registered varieties
- Issue and policy dialogue initiated for variety registration



Case 4: Conservation-oriented PPB, Nepal

Location: Pokara, Nepal

Initiated by: LI-BIRD NGO with Nepal Agricultural Research Council (NARC)

Other actors:

- PPB Farmers' Group; District Agricultural Office

Stakeholders' agenda and alignment:

- Agenda aligned/ no conflict

PPB process:

Product design: LI-BIRD and NARC breeder with farmers

Product development:

- Cross between Mansara (landrace) x Khumal 4 (improved registered variety) in 1999
- Selection by PPB Farmer Group for drought and low fertility tolerance and market quality traits (fine grain and quality)
- Farmers selected lines with desired traits and disseminated through farmer exchange
- No registration due to some disease issue

Background of genetic materials:

Parents used: Mansara landrace x Khumal-4

Origin of Mansara:

Landrace found in the valleys and lower hills of Nepal

Origin of Khumal-4:

Parentage: IR28 x Pokhareli

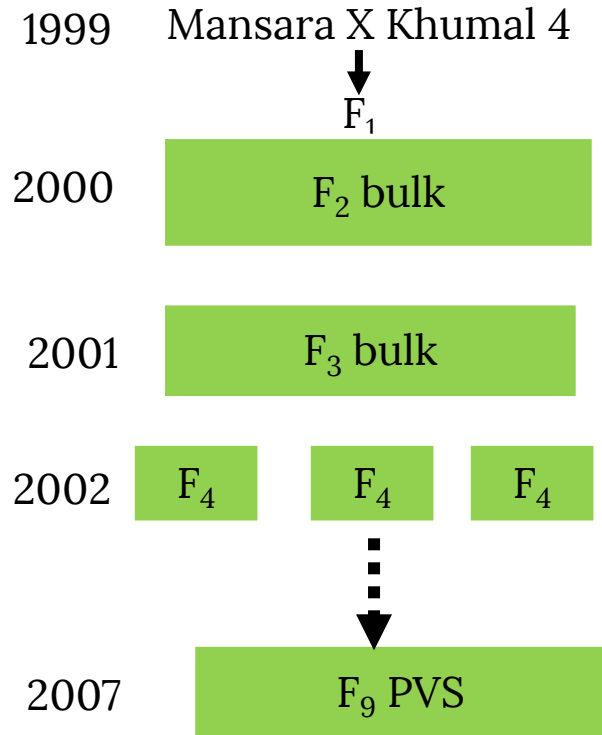
Masino (landrace)

Released in Nepal in 1987

Status:

Not registered due to some disease issues but many farmers in the adopting the variety

Case 4: Conservation-oriented PPB, Nepal



Mansara (landrace):
Low yield
Moderately drought tolerant
Low fertility requirement
Poor eating quality

Khumal 4 (Improved):
High yielding
Highly adapted to hills
Fine grain
Good eating qualities



Lessons, Challenges and Issues

Key lessons/learning:

- PPB that uses value chain approach, i.e. include needs and preferences of farmers and other actors early in the breeding process ensure development of new varieties readily adopted by the farmers
- Participation of and decision making by farmers and other actors in different stages of breeding process is key for the success of PPB
- It provides varietal options/choices to meet farmers diverse needs: varieties for diverse agro-climatic niches; food, nutrition and income (market); cultural; seed diversity and conservation
- Involvement of formal institutions help registration/release of varieties, which is critical for legal production and marketing of seeds
- It also provides ways for production and local marketing/exchange of non-registered varieties through community seed production mechanism

Lessons, Challenges and Issues

Key challenges and recommendations:

- Maintenance of breeder seed and production of foundation seeds requires long-term collaboration between farmers and breeder beyond project funding; building farmers' technical and institutional capacity is critical in this regard
- Maintaining quality of seeds produced by farmers' groups – requires strong internal mechanisms for internal quality control and testing systems
- Challenges of registration of variety developed through farmer-led PPB due to multiple trial and heavy technical data requirement constraining commercial seed production and marketing; need for PPB friendly seed policy and law
- Value chain PPB requires breeders who are socially-oriented and open to learning which is quite challenging as their number is rapidly declining
- Lack of investment in PPB in general and community/farmer institutions in particular is a big challenge for sustainability of PPB

Lessons, Challenges and Issues

✚ Key issues/ discussion points:

- Inadequate and reduced support/investment in PPB
- Declining number of plant breeder in general and PPB breeder in particular
- Sustainability of PPB – requires long-term collaboration, investing in community institutions and public support
- Aligning seed policy and law to the needs of PPB
- Lack national, regional and international platform for PPB
- Need for strong social movement to re-establish PPB at all levels





Thank You