

## Perspective of Breeders and Farmers towards Participatory Plant Breeding Programme in Punjab

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### ABSTRACT

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 involves breeders/researchers, farmers, extension personnel, agro-industry and rural co-operatives in plant breeding research. The study was conducted in Punjab Agricultural University, Ludhiana and its research stations in different districts. The study comprised of two kinds of respondents viz. Breeders and Farmers. The total sample size was of 100, 50 breeders and 50 farmers who were randomly selected for seeking their perspective towards Participatory Plant Breeding in Punjab. The findings revealed that all the farmers were found to be unaware about the PPB while all the breeders were found to be aware about the PPB. A little less than two-third of the farmers agreed that PPB will be the best kind of breeding suitable under Punjab conditions while more than half of the breeders preferred the conventional breeding in the state. More than two-third of the farmers and a little more than half of the breeders perceived that collaborative form of participation to be best suited under PPB.

**Keywords:** Awareness, Breeders, Farmers, Form, Participatory plant breeding

### INTRODUCTION

Punjab is an agrarian state where majority of the farmers are small and marginal. These small and marginal farmers have to practice farming with limited resources. So, it becomes imperative to identify the crop improvement needs of these small holder farmers who are farming in a low-external input farming system (Smith *et al.*, 2001 and Gyawali *et al.*, 2007). Participatory Plant Breeding (PPB) was developed as part of the response to an alarming erosion of Plant Genetic Resources (PGRs), particularly the loss of traditional varieties in farmers' fields as well as in response to the growing marginalization of farmers in crop improvement and agriculture development. PPB is based on the idea that farmers as well as professional

plant breeders have important knowledge and skills that could complement one another.

It has been widely recognized that conventional plant breeding is more beneficial to farmers in high-potential environments or those who can profitably modify their environments to suit new cultivars as compared to the poorest farmers who cannot afford to modify their environments through the application of additional inputs and cannot risk the replacement of traditional, well known and reliable varieties. As a consequence, low yields, crop failures, malnutrition, famine and eventually poverty still affect a large proportion of humanity. PPB is seen by several scientists as a way to overcome the limitations of conventional breeding by offering farmers the possibility to choose,

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in their own environment, which varieties suit better their needs and conditions (Rhoades and Booth, 1982; Chambers and Ghildyal, 1985 and Ceccarelli and Grando, 2007). PPB involves scientists, farmers, consumers, extensionists, vendors, industry and rural cooperatives in plant breeding research. It is termed 'participatory' because users can have a research role in all major stages of the breeding and selection process. Such 'users' become co-researchers as they can help set overall goals, determine specific breeding priorities, make crosses, screen germplasm entries in the pre-adaptive phases of research, take charge of adaptive testing and lead the subsequent seed multiplication and diffusion process (Sperling and Ashby, 2000; Walker, 2006). Involving farmers in the earlier stages of selecting in plant breeding is a more recent development (Virk *et al.*, 2005). The term PPB was coined at an IDRC workshop in 1995 and the acronym Participatory Varietal selection (PVS) was also introduced at this event. The first joint use of PPB and PVS in the peer reviewed literature took place in *Experimental Agriculture* in the following year (Witcombe *et al.*, 1996). Farmers' participation in goal and selection criteria settings and/or selection by farmers within well-chosen pre released varieties may be enough to increase the rate of adoption of varieties developed through the findings of the study highlights the awareness of the breeders and farmers of Punjab about the PPB programme. It also highlights the kind and form of participation required as anticipated by both the stakeholders, and the extent of farmers' participation required in the different breeding stages.

## METHODOLOGY

The study was conducted in Punjab Agricultural University, Ludhiana and its research stations in different districts. Descriptive survey research designed was employed for this study which comprised of two kinds of respondents viz. Breeders and Farmers. The study sample comprised of 50 breeders and 50 farmers. A list of breeders from the Department of Plant Breeding and Genetics and Regional Research Stations of PAU (Bathinda and Faridkot) was obtained and all the breeders were selected for this study. Also, 50 progressive farmers from the Seed Producers and Nursery Growers Association (SAPNA), Ludhiana

were randomly selected to take their perspective towards various aspects of Participatory Plant Breeding in Punjab. The data were collected by distributing the questionnaire among the farmers and breeders. The questionnaire consisted of statements to elicit the response of breeders and farmers regarding different forms of PPB such as contractual, consultative, collaborative and collegial and levels of participation of farmers in participatory Plant Breeding as well as kind of PPB applicable in Punjab conditions as perceived by the breeders and farmers. Proper precautions were taken to ensure unbiased response of the respondents by providing them necessary instructions after explaining the objectives of the study. In addition, discussions were also held with the farmers and breeders respectively for in-depth probing and understanding their perception about the PPB programme.

## RESULTS AND DISCUSSION

The data in Table 1 revealed that all the farmers were not aware about the concept of Participatory Plant Breeding (PPB). They mentioned that they neither heard anything about PPB nor they have ever been approached by any breeder in Punjab (to participate in any PPB programme). However, all the breeders were aware about PPB though they mentioned that they have never been in any type of PPB programme in Punjab. It may be concluded that there has never been any PPB programme in Punjab. The lack of any research or literature regarding PPB in Punjab also supported this finding.

A perusal of data in Table 2 revealed that nearly two-third of the farmers (64%) perceived that PPB can be very suitable under Punjab conditions followed by 20 per cent of them who opined for conventional breeding. Only 16 per cent of the farmers perceived that farmer-led PPB will be a suitable choice, where

**Table 1: Distribution of respondents according to their awareness about Participatory Plant Breeding**

Response	Farmers (n=50) f (%)	Breeders (n=50) f (%)
Aware	—	50(100)
Unaware	50(100)	—

**Table 2: Distribution of respondents according to their perception regarding kind of PPB suitable under Punjab conditions (n=50)**

Kind of Breeding	Farmers f (%)	Breeders f (%)
Conventional Breeding	10 (20)	27 (54)
Farmer-led Breeding	8 (16)	3 (6)
Participatory Plant Breeding	32 (64)	20 (40)

breeders support farmer's own systems of breeding, varietal selection, seed multiplication and dissemination. The farmers mentioned that PPB can be a good option since they could be equal partners in the breeding programme and get the desired variety of their choice. While more than 50 per cent of the breeders (54%) opined for conventional breeding as the best kind of breeding suitable, more than one-third of them (40%) agreed that PPB can be suitable under Punjab conditions. Only 6 per cent of the breeders perceived that farmer-led breeding can be a suitable option under Punjab conditions.

The data in Table 3 revealed that more than two-third of the farmers (86%) agreed for a collaborative form of participation under PPB that can be sought where task sharing takes place between farmers and the breeders. Less than two-third of the farmers (62%) considered collegial form of participation where sharing responsibility, decision making and accountability can be sought under PPB besides collaborative form of participation. Contractual form in which agreed sharing of resources under a contract takes place and consultative form of participation which is only information sharing was considered by 28 per cent and

**Table 3: Distribution of respondents according to choice in form of participation which can be sought under Participatory Plant Breeding**

Forms	Farmers (n=50) f (%)	Breeders (n=50) f (%)
Contractual	14 (28)	11 (22)
Consultative	7 (14)	23 (46)
Collaborative	43 (86)	26 (52)
Collegial	31 (62)	22 (44)

14 per cent of the farmers respectively. In case of breeders, a little more than half of them also considered collaborative form of participation as the best form that could be sought under PPB in Punjab followed by consultative form of participation considered by 46 per cent of the breeders. More than one-third of the breeders (44%) considered collegial form of participation as the best form besides collaborative and consultative form of participation. The collegial form of participation between farmers and breeders was preferred by 44 per cent of the breeders while 22 per cent of them considered contractual form of participation could be sought under PPB where sharing of resources takes place under a contract. Overall, it can be concluded that maximum breeders and farmers preferred a collaborative form of PPB.

The data in Table 4 revealed that more than two-third of the farmers (70%) preferred collaborative form of participation at stage 1 of PPB where establishing of breeding objectives takes place. At second and third stage, collaborative form of participation for identifying desirable traits and selection of parents was preferred by 74 and 52 farmers respectively. Collaborative form of participation was chosen by majority of the farmers for selection of early generation at fourth stage and screening of advanced lines at fifth stage respectively. Less than half of the farmers (46%) preferred collaborative form of participation for the sixth stage which was about establishing a testing procedure. Contractual form of participation was chosen by 62 per cent and 46 per cent of the farmers for the seventh stage where testing is done and in eighth stage for seed multiplication and distribution respectively. Unlike the farmers, 42 per cent of the breeders preferred consultative form of participation for the first stage of PPB for establishing breeding objectives. Alike farmers, a little more than half of the breeders preferred collaborative form of participation for the second and third stage respectively. Two-third of the breeders (66%) chose collaborative form of participation for the fourth stage of PPB while collaborative form of participation was chosen for the rest of the fifth, sixth, seventh and eighth stages by 54 per cent, 52 per cent, 56 per cent

**Table 4: Distribution of farmers and breeders according to extent of applying PPB at various stages of breeding**

S. No.	Stages of PPB	Farmers (n=50)				Breeders (n=50)			
		Contractual f (%)	Consultative f (%)	Collaborative f (%)	Collegial f (%)	Contractual f (%)	Consultative f (%)	Collaborative f (%)	Collegial f (%)
1.	Establishing of breeding objectives	—	12(24)	35(70)	3(6)	1(2)	21(42)	20(40)	8(16)
2.	Identifying desirable traits	—	12(24)	37(74)	—	—	21(42)	26(52)	3(6)
3.	Selection of parents	7(14)	17(34)	26(52)	—	—	19(38)	25(50)	6(12)
4.	Selection of early generation	—	10(20)	40(80)	—	1(2)	7(14)	33(66)	9(18)
5.	Screening of advance lines	1(2)	6(12)	43(86)	—	1(2)	9(18)	27(54)	13(26)
6.	Establishing testing procedure	—	9(18)	23(46)	18(36)	5(10)	7(14)	26(52)	12(24)
7.	Testing on farmers field	31(62)	10(20)	9(18)	—	5(10)	6(12)	28(56)	11(22)
8.	Seed multiplication and distribution	23(46)	8(16)	—	19(38)	9(18)	5(10)	24(48)	12(24)

and 48 per cent of the breeders respectively. On an overall basis, it was concluded that collaborative form of participation was the most favoured form of PPB as preferred by both farmers and the breeders. The farmers also emphasized on the contractual form of participation for the seed multiplication and distribution so that the participation can take place under a kind of written contract to avoid any problems that may occur in future after the development of the variety. This may be because the farmers perceive that this would reduce the problem of shortage of seeds of new varieties and it becomes difficult for the public seed agencies to fulfill the demand of seed for the entire Punjab state. The breeders preferred consultative form of participation for the first stage of PPB because they said it was best for the breeding programme if the key decisions are made by breeders only in consultation with different stakeholders of PPB.

A perusal of data in Table 5 revealed that all the farmers and only 40 per cent of the breeders showed willingness to participate in a PPB programme. It can be concluded from the results that the farmers showed

**Table 5: Distribution of respondents according to their willingness to participate in a PPB programme**

Response	Farmers (n=50) f (%)	Breeders (n=50) f (%)
Agree to participate	50(100)	20(40)
Disagree to participate	—	30(60)

their willingness to start a PPB programme where both the farmers and breeders can work together for the development of a better variety which can meet the Punjab farmers' requirements. The reason for less number of breeder's willingness in this regard was that they still preferred conventional breeding as it was imperative that for such technical processes, farmers should be trained enough to give their suggestions. Although they also mentioned during informal discussions that farmers are quiet experienced and if properly guided and trained can prove to be very contributing in this regard.

## CONCLUSION

PPB is the answer to a globalized breeding program to once again become local and provide varieties suitable to local environments and fulfilling the needs of the poor farmers who are unable to afford the costly ones. Participation of the farmers in the breeding programs should not be seen as an end in itself. Rather, it should be seen as a means to an end – namely, the production of varieties that are better adapted to the needs of the farmers. Farmers' participation in goal and selection criteria settings and/or selection by farmers within well-chosen pre released varieties may be enough to increase the rate of adoption of varieties developed through PPB. The results of the study showed that none of the farmers were aware about the concept of the PPB while all the breeders were aware about the concept of PPB. A little less than two-third of the

farmers agreed PPB will be the best kind of breeding suitable under Punjab conditions while more than half of the breeders opined for conventional breeding for the same. Collaborative form of participation for PPB was chosen by majority of the farmers for all stages except for stage 7 and stage 8 where contractual form of PPB was chosen. Similar like farmers, collaborative form of PPB was chosen by majority of the breeders for all stages except for stage 1 where consultative form of PPB was chosen. Based on the findings it was recommended that a pilot project on PPB should be initiated to see the feasibility of this approach in Punjab.

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