Session: Technology Transfer and Social Concerns

# Impact of farmers' participatory research through sustainable resource management in potato

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## Introduction

Sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. There are several dimensions of sustainable agriculture covering the technological, economic, social, political and environmental facets of sustainability. These dimensions are: technological appropriateness, productivity, renewability, economic feasibility, economic viability, environmental soundness, temporal stability, resource-use efficiency, equity and social acceptability.

As such, the environmental, social and economic impacts of a sustainable agricultural strategy are very important. Potato is one of the most important food crops both in the developed as well as the developing world. This crop is of special significance to the developing countries since it has high production potential per unit area per unit time and has high nutritional value to sustain burgeoning population and ward off malnutrition and hunger.

## Methodology

In an attempt to assess the impact of farmers' participatory research in potato, on-farm trials were conducted in Shimla, Patna and Shillong districts of Himachal Pradesh, Bihar and Meghalaya states, respectively. These three states have peculiar problems and prospects with regard to potato cultivation. The trials were conducted with farmers' participatory research approach involving community-based extension methodology.

Participatory trials were conducted in the above-mentioned locations pertaining to balanced fertilizer use, late blight management and healthy seed potato production during 2005-08. A total of 30 trials were conducted on each of the aspects at farmers' fields with an area of 200 sq.m. under each trial in all the three locations.

## Results and Discussion

The participatory rural appraisal indicated 40-60 per cent gap in adoption of potato technologies at different locations (Table 1). As far as different technology components of potato are concerned, highest technological gap was found in case of insect-pest management in Bihar and Meghalaya whereas, in Himchal Pradesh highest technological gap was found in case of disease management. Highest overall technological gap was found in Bihar whereas, lowest was in Himachal Pradesh.

**Table 1: Technological gap at farmers' fields**

| Sl. No. | Technological aspects | Average percent technological gap | | |
|---|---|---|---|---|
| | | HP | Meghalaya | Bihar |
| 1. | Seed management | 32 (VII) | 80 (I) | 51(VI) |
| 2. | Planting operation | 39 (IV) | 50 (IV) | 73 (II) |
| 3. | Nutrient management | 42 (III) | 55 (III) | 63 (IV) |
| 4. | Inter-culture operations | 38 (V) | 50 (IV) | 72 (III) |
| 5. | Disease management | 49 (I) | 75 (II) | 62 (V) |
| 6 | Insect-pest Management | 47 (II) | 80(I) | 86 (I) |
| 7 | Harvesting & Post harvest operation | 35 (VI) | 30(V) | 38 (VII) |
| **Overall technological gap across all the technologies** | | **40.28** | **60.00** | **63.57** |

The demonstrations/ on-farm trials reduced the late blight incidence from 55 per cent to 12 per cent in leaves and from 20 per cent to 10 per cent in the tubers (Table 2). Similarly, the infestation of white grubs in HP and Meghalaya hills also reduced significantly. The demonstration on balanced fertiliser application improved the percentage of large size tubers. A significant improvement in the seed health was recorded with almost zero virus incidence in the demonstration plots.

Demonstration on HYV of potato

Harvested tubers of HYV potato

The demonstrations/ on-farm trials also led to an improvement in average potato yield from 140 q/ha to 230 q/ha in 3 years period (Table 3). Highest improvement in yield was found in case of high yielding varieties in Meghalaya followed by balanced fertiliser application in Himachal Pradesh.

**Table 2: Technical impact of interventions**

| Sl. No. | Technologies | Technical Impact | |
|---|---|---|---|
| | | Farmers' plot | Demo plot |
| 1. | Improved seed | 15-20% off-type plants<br>10-20% virus incidence | 0% off-type plants<br>0-1% virus incidence |
| 2. | Balanced fertilizer | Tuber size-<br>Large-10%<br>Medium-75%<br>Small-15% | Tuber size-<br>Large- 30%<br>Medium- 45%<br>Small- 25% |
| 3. | Late blight management | 80% incidence<br>20% incidence in tuber | 63% incidence<br>10% incidence in tuber |
| 4. | White grub management | 8% damaged tuber | 2.4% damaged tuber |

**Table 3: Economic impact of interventions**

| Sl. No. | Intervention | States | Yield (q/ha) | | Yield advantage (%) |
|---|---|---|---|---|---|
| | | | Farmers' plot | Demo plot | |
| 1. | HYV (K. Giriraj) | Meghalaya (n=5)<br>Bihar (n=5) | 90<br>183 | 262<br>241 | 191<br>32 |
| 2. | TPS (92-PT-27)<br>Seedling tuber (92-PT-27) | Bihar (n=5)<br>Meghalaya (n=5) | -<br>95 | 128<br>125 | -<br>32 |
| 3. | Demo on application of balanced fertilizer | Bihar (n=5)<br>HP (n=5) | 189<br>59 | 208<br>137 | 10<br>132 |
| 4. | Demo on management of white grub<br>Demo on management of cutworm | HP (n=5)<br>Bihar (n=5) | 112<br>185 | 123<br>220 | 10<br>18 |
| 5. | Demo on management of late blight | HP (n=5)<br>Bihar (n=5)<br>Meghalaya (n=5) | 76<br>185<br>118 | 85<br>220<br>187 | 12<br>63<br>58 |

Simultaneously, other extension methods were employed like training, *kisan gosthi*, supply of supportive literature, and potato programmes on All India Radio and Doordarshan. All these activities resulted in improvement of farmers' average knowledge level w.r.t. potato from 42 per cent to 68 per cent. These approaches were highly result-oriented and could be extrapolated to other similar situations for effective dissemination of potato technologies.


Field day in the adopted village

Demonstration on Bordeaux mixture preparation

## Conclusions

The globalisation of economy and population pressure on agricultural resources have posed an immense challenge on us. The largely agrarian economy of India is in crisis with production and productivity having reached a plateau and the area under agriculture declining rapidly. Potato has an important role to play in meeting this challenge by way of improving the agricultural productivity in a sustainable manner. It has vast potential in ensuring food security to millions of people in developing countries including India. In order to facilitate this role, appropriate interventions are required in constrained areas of potato development so as to make it a viable enterprise.

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