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*Full Length Research Paper*

# Boosting barley (*Hordium vulgare*, L.) production through crop technology demonstration in transitional plain of inland drainage zone of Rajasthan (India)

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***B*arley (*Hordium vulgare*, L.) is cultivated since ancient times for several purposes like food grain, feed and fodder for cattle and breweries. Non adoption of recommended package of practices and improved varieties are major causes of low productivity of barley in the transitional plane of inland drainage zone of Rajasthan state. The present study was undertaken to assess the efficacy of recommended package of practices to augment yields on farmers' fields in Jhunjhunu district of Rajasthan during 2009-10 to 2011-12. The improved cultivation package comprises high yielding variety, application of fertilizer and micronutrient, control of insect-pest and diseases by use of insecticide and fungicide at economic threshold level. The findings revealed that the adoption of the improved cultivation package improves yields by 13.89 to 21.66 % as compared to conventional cultivation practices. Technology and extension gap in cultivar RD 2552 was 8.50 and 5.10 q/ha and in RD 2660 was 6.50 and 8.10 q/ha, respectively. Yield gaps can be further minimized by crop technology demonstration. Data on technology index reduced from 18.00 % in 2009-10 to 12.50 % in 2011-12 exhibited the feasibility of the technology demonstration.**

**Key words**: Barley, extension gap, technology demonstration, technology index, technology gap.

## INTRODUCTION

Since ancient times, in different parts of the world, barley (*Hordium vulgare*, L.) is cultivated for several purposes like food grain, feed and fodder for cattle and breweries. Its use in the food and industrial consumption is increasing. Barley is an important cereal crop of India due to its multipurpose uses, which play a major role in the barley producing countries. Ranking of barley is next to the maize, wheat and rice both in acreage and in production of grain.

Barley occupies 0.46% of the total cropped area, 0.62% of the food grains and 0.76% of the cereals in the country. Similarly, it contributes 0.86 of the total production of cereals and 0.81% of the food grains in India. There has been steady shortfall in the area and production of the crop since 1960-61 onward with the beginning of the Green Revolution. Its area has decreased from 32.23 lace hectares in 1960-61 to 6.93 lace hectares in 2002-03 recording an average annual decline of 1.87 percent. Similarly, the production has fallen down from 28.66 lac tones in 1960-61 to 14.06 lac tones in 2002-03 at an average annual rate of 1.21 per cent. This decline is mainly, due to the transfer of the barley area to wheat cultivation (Anonymous, 2003).

In India the major states growing barley are U.P., Rajasthan, Punjab, Haryana, M.P., H.P., Bihar, Uttaranchal, Jharkhand and Jammu and Kashmir (Singh, 1983). Rajasthan is the second largest producer of barley accounting for 27.71 per cent of the total area and 31.79 per cent of the total production of the crop in the country. Here main producers are Jaipur, Ganganagar, Sikar Bhilwara, Hanumangarh, Alwar, Udaipur, Nagour, Ajmer, Jhunjhunu, Rajsamand, Dausa, Chittaurgarh, Tonk, Pali, Bharatpur, Boikaner, Dungarpur, Sirohi and Banswara districts. The area under barley has declined from 4.1 lac hectares in 1980-81 to 1.92 lac hectares in 2002-03 (decrease of 53.17%). The production has witnessed shortfall from 5.21 lac tonnes in 1980-81 and 4.47 lac tonnes in 2002- 03 (decline of 14.2%) (Anonymous, 2009).

**Table 1.** Practices used in farmers' practices and crop technology demonstration.

| Cultivation practices | Farmars practices | Improved cultivation package |
|---|---|---|
| Use of seed | Local seed | Seeds of improved & recommended varieties |
| Seed treatment | No seed treatments | Seed treatment with chlorpyriphos, PSB and Azotobacter |
| Fertilizer application | Used lower doses | Recommended doses of NPK were applied |
| Micro nutrient application | No use | 25 kg/ha ZnSO4 applied. |
| Control of insect-pest and disease | No measures used | Application of chlorpyriphos four l/ha in standing crop for termite control. |

**Table 2.** Performance of barley in crop technology demonstration.

| Year | Variety | No. of demo | Area (ha) | Yield (q/ha) | Yield in farmer's practices (q/ha) | Yield increase over farmer practices (%) | Potential Yield (q/ha) | Technology index (%) |
|---|---|---|---|---|---|---|---|---|
| 2009-10 | RD-2552 | 150 | 60 | 41.00 | 36.00 | 13.89 | 50.00 | 18.00 |
| 2010-11 | RD 2552 | 50 | 20 | 42.00 | 36.80 | 14.13 | 50.00 | 16.00 |
| 2011-12 | RD 2660 | 50 | 20 | 45.50 | 37.40 | 21.66 | 52.00 | 12.50 |
| Total / average | - | 250 | 100 | 42.83 | 36.73 | 16.61 | 50.67 | 15.50 |

Keeping in view, Crop Technology Demonstrations on barley were conducted at farmers' field of district Jhunjhunu in transitional plane of inland drainage zone to popularise barley and its improved production technology to increase area and production.

Barley Demonstrations Program is Central Sector Scheme under which 100 percent Government of India assistance is being provided. This scheme has been sub-summed under the Macro Management of Agriculture since October, 2000. Under this scheme, incentives to the farmers are provided for certified seeds and other inputs components were provided through field demonstrations organized as a part of technology transfer.

## MATERIAL AND METHODS

The Crop Technology Demonstration were carried out by Extension Department, district Jhunjhunu during the Kharif season 2009-10 to 2011-12 (3 years) in the farmer's fields of district in transitional plain of inland drainage zone IIa of Rajasthan. In total 250 demonstrations in 100 ha area in different villages were conducted. The improved cultivation package comprises (Table 1) high yielding variety, application of fertilizer and micronutrient, control of insect-pest and diseases by use of insecticide and fungicide at economic threshold level. The soils of the district are generally sandy loam in texture which is low in nitrogen, low to medium in phosphorus and medium to high in potash. Soils were low in Zn (0.50 ppm).

The demonstrations were conducted to reduce the gaps between potential and demonstration field, extension gap and technology index. Data on yield were collected from demonstration plots and plots where farmers use his conventional practices. Different parameters as suggested by Yadav et al. (2004) were used for calculating gap analysis. Technology gap, extension gap and technology index were calculated using the following formulas-

Technology gap = Potential Yield – Demonstration Yield (1)

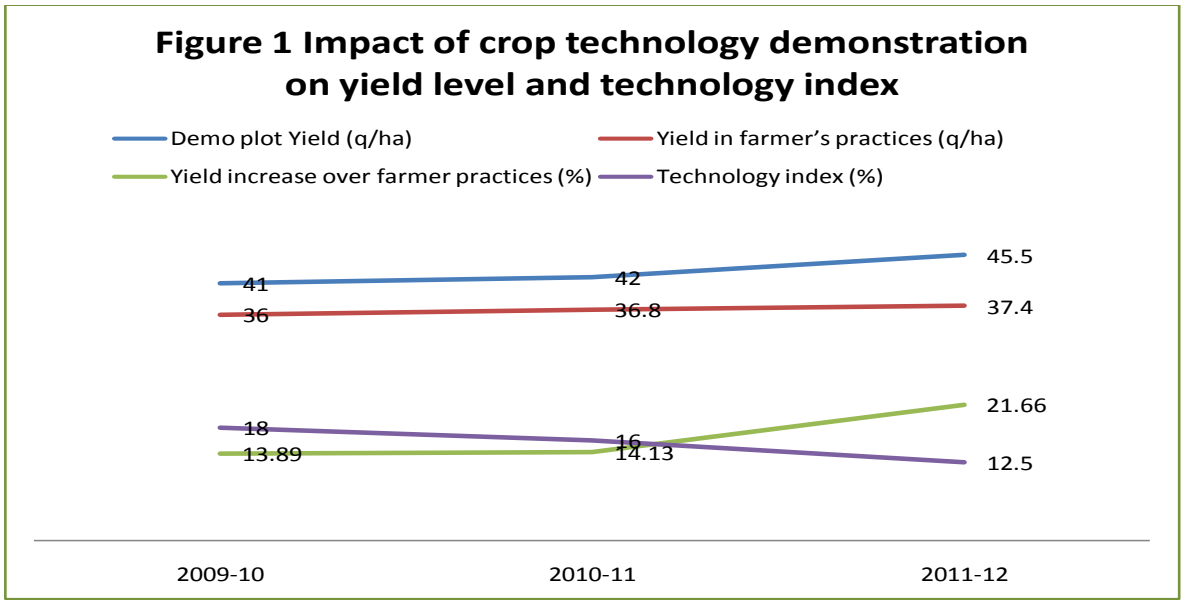
Extension gap = Demonstration Yield – Yield under farmers practice (2)

Technology index (%) = ((Potential Yield – Demonstration Yield) / Potential Yield) × 100 (3)

In demonstration plots critical input viz. seed, balanced fertilizer and micronutrient and agrochemicals were provided on subsidized rates. The demonstration farmers were facilitated by the extension functionaries in conducting field operations.

**Table 3.** Yield of barley varieties, yield gaps and technology index.

| Variety | No. of demo | Area (ha) | Yield (q/ha) | | | Increase over Farmer Practices (%) | Technology Gap (q/ha) | Extension Gap (q/ha) | Technology Index (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Potential | Demo | Farmer Practice | | | | |
| RD-2552 | 200 | 80 | 50.00 | 41.50 | 36.40 | 14.01 | 8.50 | 5.10 | 17.00 |
| RD 2660 | 50 | 20 | 52.00 | 45.50 | 37.40 | 21.66 | 6.50 | 8.10 | 12.50 |




## RESULTS AND DISCUSSION

Results of 250 demonstration conducted during 2009-10 to 2011-12 in 100 ha area on farmer's field of Jhunjhunu district as presented in Table 2 indicated that use of high yielding variety (RD 2552 AND RD 2660), balanced application of fertilizer and micronutrients and control of insect & disease at economic threshold level gave average of 16.61 % more yield of barley compared to farmer practices (36.73 q/ha). The result indicated that the crop technology demonstration has given a good impact over the farming community as they were motivated by recommended technology applied in the demonstration fields. Data further indicated that yield of barley in the following years increased successively. This clearly suggests the positive impact of demonstration over farmer's practices. Similar impacts of demonstration were also observed by Chandra (2010), Dayanand et al., (2012), Gurumukhi and Mishra (2003), Haque (2000) and Kher (1992) in various crops in varied socio-economic conditions.

Data on yield of barley variety used in demonstrations are presented in Table 3. Data indicated that technology gap, extension gap and technology index were 8.50 q/ha, 5.10 q/ha and 17.00 % in RD 2552 and 6.50 q/ha, 8.10 q/ha and 12.50 % in RD 2660, respectively.

The higher value of extension gaps and technology gap 5.10 to 8.10 q/ha and 6.50 to 8.50 q/ha, respectively during 2009-10 to 2011-12 emphasized the need to educate the farmer's through various means for the adoption of improved / recommended production technology to decrease the gaps.

The technology index (Table 2 and Figure 1) shows the feasibility of the evolved technology at farmer's field. Lower the value of index more is the feasibility of technology. Data on technology index reduced from 18.00 % (2009-10) to 12.50 % (2011-12) exhibited the feasibility of technology demonstration.

By conducting crop technology demonstration of recommended technologies, yield of barley can be increased to its potential yield. This will substantially increase the income as well as lived hood of the farming community. There is need to further conduct such demonstration of recommended technology in Jhunjhunu district in transitional plain of inland drainage zone of Rajasthan (Dayanand et al. 2012).

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