Uptake and impact of the promotion of chickpea following rainfed rice in the Barind area of Bangladesh

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(adapted and summarised by Dave Harris, CAZS).

ABSTRACT

PSP has funded R7540 *Promotion of chickpea following rainfed rice in the Barind area of Bangladesh* since 1999, building on earlier diverse crop-based initiatives to improve the livelihoods of poor farmers in the High Barind Tract (HBT) of Bangladesh. Chickpea was promoted as a suitable crop for farmers to grow on residual moisture, i.e. without irrigation, following the harvest of transplanted main season (*aman*) rice. A good combination of agronomic practices had been developed but the principal constraint remained the difficulty in establishing a reasonable crop stand once the surface layers of the soil had dried out. 'On-farm' seed priming had been developed elsewhere in other PSP-funded projects (R6395, R7438) and was tested for chickpea in the Barind.

A study was made in 2001/2002 of the uptake and impact of chickpea technology, including seed priming, by project- and non-project farmers. Survey results indicate that the project interventions have contributed positively in many ways to the socio-economic development of the farmers of the HBT. Most of the farmers in the project intervention areas recognize chickpea as a low-cost, highly profitable crop that can be cultivated without irrigation. Fifty-five percent of the respondents practiced seed priming in 2001-02 and, on average, they sowed 60% of their chickpea crop using primed seed. The overall average additional yield due to use of seed-priming technology was 230 kg ha^{-1}, which is about 44% higher than non-primed plots that yielded an average of 600 kg ha^{-1}.

Location-wise benefit/cost analysis showed that chickpea is a very profitable crop in comparison to other major competing crops in almost all situations. The overall average income of the respondents from chickpea was Tk 7134, which is about 12% of the average reported farming income. Contribution of chickpea to incomes was higher in project intervention areas and was proportionally more important for small- and medium level farmers.

The conservatively estimated return of seed priming alone indicates that, single-season benefits in this one year were 1.35 times the total project investment over three years.

INTRODUCTION

The elevated, undulating dry and least fertile part of the Barind area of Bangladesh is known as the High Barind Tract (HBT). It is situated in the northwest and includes substantial areas of Rajshahi, Chapai Nawabganj and Naogaon districts. Its total area is about 1600 km^2, with an average annual rainfall of 1300 to 1400 mm. In general, and in the northern part in particular, with the cessation of monsoon rain, the soil moisture quickly dries out and the soil becomes very dry and hard, making sowing and establishment of rainfed *rabi* crops such as chickpea, linseed, mustard, and barley difficult. Consequently, most fields remain fallow during the *rabi* season (Fig. 1). Sharecropping is widespread and most farmers of the area are poor because of the low productivity of the soil, resulting in a low yearly income per unit area. Nevertheless, these large areas of rice fallow represent a considerable untapped potential for rainfed agriculture. Chickpea, in particular, is attractive in this context because of its ability to yield well on residual moisture, its low input requirements and its high market price.

In 1999, as a follow-up to earlier diverse initiatives for livelihood improvement of HBT farmers, project R7540 "*Promotion of chickpea following rainfed rice in the Barind area of Bangladesh*" was implemented by ICRISAT, in collaboration with the On-Farm Research Division of the Bangladesh Agricultural Research Institute (OFRD-BARI) and the NGO Peoples' Resource-Oriented Voluntary Association (PROVA). The project sought to understand the factors affecting adoption of chickpea production technology and to promote expansion of chickpea cultivation, catalyzed by seed priming technology. An impact assessment study (Saha, 2002), summarized here, was undertaken to analyse critically the effect of the project on the livelihoods of poor rural households in the HBT.

Approach used

Through individual farm survey and participatory learning exercises (PLE)/ participatory rural appraisals (PRA), necessary data were gathered from about 20 farmers, selected more or less randomly, in each of the dispersed, selected sites that had had different project exposure durations (0, 1, 2, 3 years). The study locations were selected taking geographical, ecological conditions and project exposure time into consideration. The total sample size for the individual household survey was 80 out of which 75 households were surveyed individually.

Data from DAE on the extent of chickpea cultivation were checked by sub-sampling among blocks in several sub-districts (Godagari, Tanore, Nawabganj Sadar, Nachole).

RESULTS

The project interventions have contributed positively in many ways to the socio-economic development of the farmers of the HBT. Increasingly, more farmers are adopting chickpea cultivation, which is positively impacting on their livelihoods. Most of the farmers in the project intervention areas recognize chickpea as a low-cost, highly profitable crop that can be cultivated without irrigation. Chickpea is proving to be an important commercial crop and is being increasingly adopted by the farmers of the HBT due to effective promotion and large economic benefits (Table 1 and Fig. 2).

Farmers were quite aware of the usefulness of seed priming in chickpea cultivation. About 55% of the respondents practiced seed priming in 2001-02 and they primed 60% of their chickpea crop. Farmers are adopting priming for satisfactory germination, good seedling growth and good crop establishment on a rapidly drying seedbed, along with recently released improved chickpea varieties. The overall average additional yield due to use of seed-priming technology was 230 kg ha^{-1}, which is about 44% higher than non-primed plots of 600 kg ha^{-1}.

The farmers in the project intervention areas were more aware, knowledgeable and more concerned about chickpea than those in the non-intervention areas. In the location-wise benefit/cost analysis chickpea was a very profitable crop in comparison to other major competing crops in all situations (Table 1).

***Table 1*. Net returns and benefit/cost ratios for *rabi* crops suitable for landowners and sharecroppers in the Barind.**

	Net return (own land) Tk / acre	**Benefit / cost ratio (own land)**	**Net return (shared) Tk / acre**	**Benefit / cost ratio (shared)**
***Boro* rice (irrigated)**	3632	1.41	870	1.08
Wheat (irrigated)	2092	1.41	-286	0.99
Linseed (rainfed)	1459	2.40	591	1.30
Chickpea (rainfed)	4340	2.98	2067	1.44

Notwithstanding the sensitivities and uncertainties surrounding the use of income data reported by farmers, cultivation of chickpea increased the total farming income of all categories of farmers except the landless (Table 2). The absolute level of reported incomes confirms the widely held view of the Barind as a poor region within Bangladesh. The overall average income of the respondents from chickpea was Tk 7134, which is about 12% of the average reported annual farming income. The contribution of chickpea to farming income was markedly higher in project intervention areas (13.1%) than in non-intervention areas (3.5%) so the project has had a positive impact on farming income of the respondent farmers.

Landless and marginal farmers derive a much smaller proportion of their (also smaller) total income from farming (Table 2) than do richer farmers, so it is to be expected that any returns from agricultural interventions would have less impact on these two categories. Nevertheless, it is of concern that the landless respondents reported no benefits at all from chickpea. The original survey data are being re-checked to see if there have been errors of interpretation in this regard. Sharecropping is widespread in the Barind and the survey identified a number of different share arrangements with landlords. A priority for future studies is to investigate the effects of these arrangements in more detail. Nevertheless, Table 1 shows that chickpea remains the most profitable *rabi* crop, even for sharecroppers.

Table 2. **Estimated contribution of chickpea to income for landowners and sharecroppers in the Barind.**

Category of farmer (landholding, acres)	Reported farm income (Taka)	Farm income as % of total income	Proportion of land used for chickpea (estimated,%)	Contribution of chickpea to farm income (%)
Landless/sharecropper only (0<0.5 acre)	2500	11.9	-	-
Marginal (0.5<1 acre)	14025	38	0.13	7.7
Small (1<2.5 acre)	29667	67	0.22	14.0
Medium (2.5<5 acre)	50286	78	0.13	10.8
Large (5< acre)	924697	70	>0.19	11.4

Note: all incomes are based on verbal returns from farmers and are subject to both systematic and random errors.

The increased income from growing chickpea is significant but perhaps less than might be expected. Estimates of the average land area used by each category of farmer to generate the reported incomes from chickpea (Table 2) suggest that, although many farmers are growing chickpea, the area per farmer is relatively small at the moment. This is a consequence of the scarcity of chickpea seed in the area and the fact that not all land is considered by farmers to be suitable for growing chickpea. These are issues that need to be addressed in future work.

Not all benefits of chickpea cultivation are monetary. Household chickpea production has had some positive effect on household consumption and hence nutrition. On average, farmers consumed about 7% of their chickpea grain and use of young chickpea shoots as a green vegetable (*shak*) is widespread. There is also a more diffuse impact on nutrition in the community as casual "grazing" of green pods by passersby, particularly children, is common. Nevertheless, most produce (about 72%) is sold immediately after harvest as grain, about 10% is kept as seed for next year and about 11% was sold as seed. Other seed flows (gifts, barter, etc.) were not recorded but will be investigated in future years.

It is not possible to attribute all the benefits from the cultivation of chickpea in the Barind to the project. Yet it is clear that chickpea is a valuable crop for the farmers of this impoverished area. The estimated 9950 hectares of chickpea grown in 2001-2002, assuming net benefit of Tk 8137 ha^{-1} (the mean of values from Table 1, i.e. assuming 50% is sharecropped and thus probably an underestimate of benefits) would have produced Tk 80.9 million (£920,000). Within this total, seed priming is estimated to have generated about £113,800 of additional income for farmers, which is directly attributable to the project. Thus, in one year, benefits to farmers in the Barind have exceeded, by at least 1.35 times, the total cost of the project. The overall benefit/cost ratio of the project and intangible benefits such as the influence of participatory approaches on social capital, etc., are difficult to estimate and attribute accurately but the project has clearly benefited, and continues to benefit, many farmers and the Barind as a whole.

***Figure 1*. Land laying fallow after the harvest of t. *aman* rice.**

***Figure 2*. Chickpea (right) is more profitable than wheat (left).**