Participatory evaluation by farmers of on-farm seed priming in Wheat in Assam, India

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Abstract

Poor crop establishment is a major problem in many wheat growing areas of the eastern India, particularly for subsistence farmers in rainfed and poorly irrigated environments. The results of three years' on-farm farmer managed, participatory trials of seed priming in wheat in Assam, India during the 2002-05 *rabi* (post-monsoon) seasons revealed that the mean time for 50% emergence at about 20 ?C of 6 Indian wheat (*Triticum aestivum*) cultivars was reduced to one third, from 6 days to 2 days, by soaking seed in water for 12 h prior to sowing. Yield benefit from priming in these trials averaged 12% but constituted an extra 236 kg/ha grain at little or no cost. Participating farmers reported that priming wheat seed overnight resulted in faster emergence, more uniform crop establishment, darker green appearance, longer ear head, better grain filling, earlier maturity and higher yields. Seed priming was popular with farmers, most of who showed their interest to prime wheat seed the following year. An impact assessment study in the project villages revealed that the area under seed priming rose from 1% in 2002-03 to 15% in 2004-05.

Key Words

On-farm seed priming, wheat, crop establishment, grain yield, farmers' perception

Introduction

Large scale wheat cultivation started in Assam from 1972. The present area under wheat in Assam is about 0.1 million hectare. The average productivity of the crop is quite low i.e.1046 kg/ha as against national average of 2470 kg/ha. There are a number of reason behind the low yield of wheat in Assam. One is poor crop establishment due to low residual soil moisture after rice harvest. For the resource-poor wheat farmers of Assam, good stand establishment is of paramount importance because patchy stands result in low yields and, often, crop failure. Unpredictable and erratic rainfall, poor soils, low-quality seed and limited availability of labour or draft power all contribute to a situation in which good crop establishment is often the exception rather than the rule (Harris,1996). On-farm priming of wheat seeds has been found as a means to promote rapid germination and emergence and to increase seedling vigour and yield (Harris *et al.,* 2001).

Previous research in India showed that, particularly for wheat, soaking seeds in water before sowing often resulted in higher yields (Sen and Misra, 1984; Bathi and Rathode, 1986). The idea of soaking seeds before sowing is not new. However, seed priming of wheat is not a common practice in Assam, although seed soaking (sprouting) is done for rice and vegetable seeds for sowing in the nurseries. In the light of the effectiveness and popularity of on-farm seed priming with farmers in rice and some annual vegetable crops, it was decided to assess its potential with wheat. There is very little information available about performance of different wheat varieties for priming and non-priming conditions. An attempt was made under DFID funded project to find out the agronomic advantages of priming the seeds of different wheat varieties in a range of on-farm conditions in Assam.

Methods

On-farm participatory, farmer-managed trials were used to assess the performance of seed priming in wheat. The on-farm trials were conducted in the three villages of the Central Brahmaputra Valley (CBV)

Zone of Assam in 2002-03 and 2003-04 and in four villages during 2004-05. The farmers were selected on the basis of their willingness to try priming for themselves after group discussions.

Each farmer was given a quantity of 2 kg seed of each of 5-7 improved wheat varieties (Table 1) and a local check, Sonalika and asked to prime half (1kg) in water overnight(12 h), surface-dry them and sow them along with a local check variety using his normal practices. Farmers were also asked to sow primed and non-primed seed at the same time in adjacent plots into the furrow behind a plough and to cover the seed with planking. A fertilizer dose of 60:45:42 NPK kg/ha was used by each farmer. The crop received 1-2 irrigations from shallow tube well during the crop season. The days to 50% emergence was recorded for each plot (80m^2). Grain from each plot was harvested and threshed separately by the farmers and weighed and recorded by researchers. The data has been analysed by ANOVA for 2 factors RBD.

Farmers Perception

Farm walks were conducted twice during the crop season in each village to promote discussions amongst farmers about the advantages and disadvantages of the technique. Farm walks were followed by focus group discussions (FGDs) involving a total of 18-24 farmers (6 farmers from each village) in which they were asked about the merits/ demerits of seed priming relative to their normal practice.

Impact study

The impact of the seed priming on wheat was assessed during 2004-2005, in the target villages involving 50 farmers (participating and neighbouring), where the experiments were actually carried out.

Results

On-farm seed priming was found to be effective in increasing yields in all the years of testing.
The results (Table 1) revealed that the mean time for 50% emergence at about 20 ?C of 6 Indian wheat (*Triticum aestivum*) cultivars was reduced to one third, from 6 days to 2 days, by soaking seed in water for 12 h prior to sowing. Significant differences were found between primed and non-primed treatments for grain yield. There were significant differences among varieties but all varieties responded similarly to priming as the treatment x varieties interaction was not significant in case of grain yield (Data not shown). On average, seed priming increased grain yield by 12% with a range from 6 to more than 24% depending on the wheat variety, location and year. Seed priming also benefited the farmer with a monetary gain of Rs. 975/- to Rs. 2665/- over non-priming.

Table 1. On-farm trials of seed priming in wheat, 2002-05

Year	Days to emergence (50%) at 20?C		Yield (t/ha)		Yield difference (t/ha)	LSD (P=0.05)	Yield increase due to priming (%)	Monetary gain (Rs/ha)*
	Priming	Non-priming	Priming	Non-Priming				
2002-03[1]	-	-	2.50	2.35	0.15	0.06	6.38	975
2003-04[2]	2	6	2.07	1.66	0.41	0.18	24.6	2665

2004-05[3]	2	6	2.14	1.99	0.15	0.06	7.53	975

Note: Superscripts are villages involved; parentheses are varieties grown *1US$= Rs. 45.6
[1] Khaigarh, Kanuamari and Kapahera (HUW 468, HUW 234, Raj 3765, PBW 343, PBW 443, K 8027, K 9107 and Sonalika)

[2] Khaigarh, Duoni and Manipuri tup (PBW 443, HUW 468, HUW 234, HW 2045, DBW 14 and Sonalika)
[3] Khaigarh, Duoni, Manipuri tup and Kadamguri (HD 2733, HUW 468, HUW 234, HW 2045, DBW 14 and Sonalika

Farmers Perception

During focus group discussions in farm walks, farmers perceived many positive effects of priming. They opined that seed priming led to faster emergence, better and uniform crop establishment. Farmers also reported a wide range of other effects on their crops. However, Figure 1 summarizes the responses of sample farmers in the four project villages. According to these farmers, primed crops appeared a darker green, produced longer ear head, had better grain filling, and matured earlier to give higher yield than those of non-primed crops. The primed crops with its early and vigorous growth, perhaps utilized nitrogen more efficiently to show a darker green appearance which is in conformity with the findings of Harris *et al* (2001). All farmers wanted to continue with seed priming in the next year.

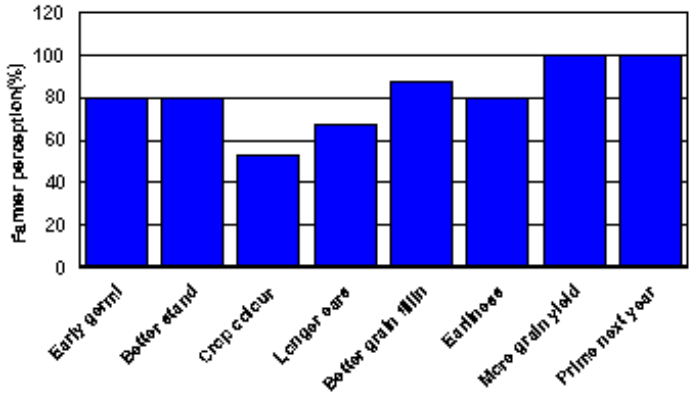

Fig. 1. Per cent farmers perceiving the positive effects of seed priming for various traits. Twenty four farmers from four villages in Assam (India) were interviewed

Impact assessment study

The impact assessment study indicates that farmers of the project villages have been benefited by the participatory seed priming activities. The area under priming rose from 1% in 2002-03 to 15% in 2004-05.

Seed soaking has become popular with the farmers who carried out the trials, along with their friends and neighbours, because it is simple, cheap and extremely effective. Farmers were encouraged to experiment with soaked and dry seeds. They visited each others fields to compare the performance of seed soaking over various soil types, levels of management and micro farming situations. By participating in the trials, the farmers were able to develop and adopt the seed priming technique and to appreciate its effects.

Conclusion

Seed priming has the potential to benefit wheat farmers in many ways. Being a very simple, low cost and effective method for early establishment of wheat after rice priming of seeds may be a viable resource conservation technology that may increase and stabilize the yield for the resource-poor farmers of Assam.

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