On-farm performance of non-puddled Boro and Aman season rice

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Introduction

Continuation of soil puddling for rice transplanting will negate the benefits of minimum soil disturbance practiced in other crops in the rotation (e.g. see Singh et al. (2011) for rice–wheat system). Generally, the methodology of non-puddled transplanting of rice seedlings is the same as for puddled transplanting except for the absence of soil puddling (Haque et al., 2016). Several hundreds of farmers have adopted non-puddled rice cultivation methods where the technologies were demonstrated earlier in Bangladesh. However, the acceptance and profitability of the technology when managed by farmers was not well understood. The aim of the present study was to understand acceptance and profitability of farmers managed non-puddled transplanted rice.

Materials and Method

A total of 150 on-farm studies on non-puddled aman and boro season rice were conducted in eight locations during 2013, 2014, and 2015 in different Agro-ecological Zones of Bangladesh. Focus group discussions were also held over three successive years to elicit farmers' opinions about the suitability of the strip tillage non-puddled transplanting and how their perceptions changed over time. In on-farm experiments, two tillage treatments were arranged in a farmer's field with each field treated as a replicate for both tillage types. Treatments consisted of two rice establishment methods i) conventional-puddled transplanting (CP) and ii) non-puddled transplanting of rice seedlings (NP). Farmers in aman season used a range of rice cultivars. During boro seasons in all locations, they used only cv. BRRIdhan-28. Depending on rice varieties, 25- to 36-day-old seedlings were transplanted in aman seasons, whereas, 35- to 55-day-old seedlings were transplanted in boro seasons. Data on input uses, yield contributing characters, grain and straw yields, and economics were collected and analyzed by MSTAT-C.

Results and Discussion

Between NP and CP no significant differences were observed on the total labour cost for aman season rice cultivation during 2013 and 2014; but significantly higher ($P<0.01$) cost for total labour uses was recorded in 2015 in CP (Table 1). Significantly higher total labour cost for boro season rice cultivation was reported for CP than NP during 2013, 2014, and 2015 (Table 1). The interaction effect between location and treatments was observed in the boro season of 2015 where highest ($P<0.05$) grain yield (6.10 t ha^{-1}) was recorded in NP. During the aman and boro seasons of 2015, significantly higher straw yield was recorded for NP than CP (Table 1). In aman season, 53 out of 66 farmers who practiced NP reported higher net returns than in CP while 49 out of 66 farmers reported higher yield with NP (data not shown here). In boro season of 2013, 2014 and 2015, the net return was higher in 90 - 92 % of cases in NP than with CP while 75 % had the same or higher grain yield (data not shown here). During the boro season of 2013, about 55 % of farmers reported that the adoption of NP could reduce land preparation cost, but after 6th season (aman season of 2015) that perception increased up to 92 % (data not shown here). While 50 % farmers in the boro season of 2013 reported higher grain yield that increased to 70 % of farmers at the end of aman season of 2015. Farmers'

perception and experience on the negative aspects of NP declined over time at Alipur, Choighati and Digram locations (data not shown here).

Conclusions

From 150 farmer-managed comparisons in both aman and boro seasons during 2013, 2014, and 2015, we conclude that transplanting of rice seedlings in non-puddled soils following strip tillage was feasible, reduced cost of rice cultivation, and increased gross margin. Within three consecutive years comprising six rice seasons, there was generally no significant yield difference between NP and CP; however, in the boro season of 2015 NP produced significantly greater grain and straw yield of rice than CP. In farmers' fields, strip tillage, flooding soils for 24 hours and then transplanting rice into non-puddled soil could be an option for rice establishment under conservation agriculture systems.

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References

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Table 1. Total labour cost, grain yield, straw yield, and net return on NP vs CP for on-farm aman and boro rice cultivation in Bangladesh

Year	Total labour cost (hired +family labour) US$ ha^{-1}			Grain yield (t ha^{-1})			Straw yield (t ha^{-1})			Net return (US$ ha^{-1})		
	NP	CP	LS	NP	CP	LS	NP	CP	LS	NP	CP	LS
Aman												
2013	181	192	NS	3.97	3.96	NS	4.13	4.16	NS	109	108	NS
2014	276	278	NS	4.75	4.60	NS	5.09	4.89	NS	108	88	NS
2015	168b	184a	***	4.54	4.45	NS	4.92a	4.77b	***	-60a	-139b	***
Boro												
2013	167b	179a	***	5.58	5.34	NS	5.85	5.69	NS	411a	317b	***
2014	163b	178a	***	4.97	4.85	NS	5.26	5.13	NS	82a	-22b	***
2015	170b	184a	***	5.36a	5.07b	***	5.65a	5.39b	***	408a	281b	***

NP = Non-puddled transplanting of rice seedling; CP = Conventionally-puddled transplanting of rice seedling; LS = Level of significance [*** mean significant at 1 %]; NS = Not significant; US$1 = Tk. 78. Values with the same small letter in a column for means of the transplanting methods are not significantly different by DMRT.