

Adoption of raised bed technologies with heat & drought tolerant wheat varieties in drought prone areas: A miracle success in Bangladesh

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Introduction

Tillage practices contribute greatly to the labor cost in any crop production system (Limon *et al.* 2006). Intensive tillage systems result in increased soil compaction and decreased soil organic matter (Singh *et al.* 2003) and biodiversity (RWC-CIMMYT *et al.* 2003). Reduced tillage practices, such as bed planting, can offset the production cost and other constraints associated with environment and socio-economic conditions. Raised bed planting of different crops helps achieve good plant establishment, save water, seed, production cost and increases input efficiency, and increases yields in rice-wheat systems (Sayre *et al.* 2000). The present study examined adoption of raised beds should be needed for farmer's income and livelihood in drought prone areas.

Materials and Methods

On farm raised bed demonstration trials were conducted from 2003-04 to 2014-15 on 13,250 farmer's fields on 6,325 hectares in Rajshahi, Natore, Chapai and Pabnadistricts. In Durgapur Upazila of Rajshahi district no support was given to the farmers except training. The demonstration trial started from wheat season in 2003 in that area and farmers are very much motivated to bed planting. Land preparation, seed sowing, furrow making and leveling were completed by both machine and hand. There were two level of tillage options bed and farmers practice was used in the whole demonstrations in 4 districts. Three wheat varieties like Shatabdi, Bijoy and Prodip were used in the farmer's field. Specify how the farmer adoption statistics were gathered.

Results and Discussion

In Rajshahi (Table 1), farmers used Prodip and Shatabdi varieties in their own field on raised beds and got higher yield over the conventional tillage practice. Yield increased by 13.5-15.5% in bed over farmers' practice. In Natore, farmers used Prodip, Bijoy and Shatabdi and achieved 11.3-12.5% yield increase over the conventional tillage practice. In Pabna and Chapai where Prodip, Shatabdi and Bijoy varieties were grown yield advantage was 13.5-18.0% on raised beds relative to the conventional tillage practice. Yield advantage was more due to get more border effect, efficient N uptake and water use efficiency (Lemon *et al.* 2005).

From 2003 to 2014, 13,250 farmers used raised bed systems and they covered 6,325 hectares of land (Table 2). All dissemination trials compared with farmers' own technology. Among them, all trials were significantly higher grain yield from farmers' own practices. Grain yield of wheat was 10-20 %, lentil was 15-25%, mungbean 15-25%, maize 12-20% higher yield over farmers practice and other crops were at least 5-10% higher yield over farmer's own technology. Some of these experiments are permanent while some were conducted for at least 5 seasons. Crop growth and performance of trials were good and farmers were expecting clear benefits from raised bed technology with kept residue in their field.

Reference

- Kumar K, Goh KM (2000) Crop residue management, effects on soil quality, soil nitrogen dynamics, crop yield and nitrogen recovery. *Advances Agronomy* 68: 197-319
- Limon-Ortega AL, Sayre KD, Francis CA (2000) Wheat nitrogen use efficiency in a bed planting system in Northwest Mexico. *Agron J* 92: 303-308
- Sayre, KD, Limon A, Govaerts B (2005) Evaluation of Permanent Raised Bed Cropping Systems in Asia, Australia and Mexico. *ACIAR Proceedings No. 121*, pp. 12-25.
- Singh, Y. 2003. Crop Residue management in rice-wheat system. 2003. Addressing Resource Conservation Issues in Rice-Wheat Consortium for the Indo-Gangetic Plains. CIMMYT, New Delhi, India, p. 153.
- Timsina, J., Connor, D.J. 2001. Productivity and management of rice-wheat cropping systems: issues and challenges. *Field Crops Research* 69, 93-132.

Table 1. Effect of raised bed planting on wheat grain yield on farmers' fields in districts of Rajshahi Region

Location District	Number of farmers	Tillage options	Varieties	Yield (t/ha)	% yield increase over farmer's practice (FP)
Rajshahi	3750	Raised bed	Prodip	4.20	15.5
			Shatabdi	4.45	
			FP Prodip (Check)	3.80	
Natore	550	Raised bed	Prodip	4.10	13.5
			Bijoy	4.40	
			FP Shatabdi(Check)	3.60	
Pabna	380	Raised bed	Prodip	4.50	18.0
			Shatabdi	4.20	
			Bijoy	4.20	
			FP Shatabdi(Check)	3.80	
Chapai	250	Raised bed	Prodip	4.20	13.5
			Shatabdi	4.60	
			FP Prodip(Check)	3.70	

Table 2. Crop wise area (ha) coverage under bed planting system from 2003 to 2014 in districts of Rajshahi region

Crops	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Wheat	6	25	180	375	785	1250	2275	3150	3345	3545	3925	4260
T. aman	6	15	45	110	165	225	185	225	235	210	160	160
Mung	6	25	75	120	155	225	375	875	925	945	995	1050
Maize		10	45	120	210	240	350	550	640	665	820	1025
Sesame				2	5	15	25	30	40	45	50	60
Jute				1	4	9	25	50	62	67	70	70
Okra						1	3	5	15	21	30	35
Radish						4	5	5	8	12	15	15
Lentil					1	1	2	2	15	20	30	40
Total	18	75	345	728	1325	1970	3245	4892	5274	5485	5850	6325