

Farmers' participatory quality seed production of field crops-A case study

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ABSTRACT

Seed is the most important input to harvest a good crop. The potential yield of crop depends on the quality of the seed used for cultivation of crop. Use of quality seeds alone can enhance the crop productivity by 15-25%. One of the main reasons for low productivity of crops is unavailability of reliable quality seeds in the local markets. To enhance productivity, seed should be of high quality, which will express full potential yield of the genotype under favourable cultivation environments. Therefore, there is urgent need to establish quality seed sources at least for major crops of northern part of West Bengal. Considering the importance of quality seeds of crops, Uttar Banga Krishi Viswavidyalaya started Farmers' Participatory Seed Production Programme since 2006. Initially, leading farmers were selected for seed production in two villages, namely Kharikabari (Unishbisha, Mathabhanga-2) and Petlanepra (Chotosalbari, Sitalkuchi) of Cooch Behar district. First two years (2006 and 2007), the farmers were trained on seed production technologies of major field crops of northern part of West Bengal. The farmers of Sitalkuchi and Unishbisha who involved in seed production under the guidance of UBKV were brought under one umbrella forming a Self Help Group - Suphala Beej Swanirbhar Gosthi in June 2008, and registered under District Rural Development Cell, Cooch Behar in 2008. The SBSG is producing Certified and Foundation seeds of different varieties of rice, potato, pulses and mustard. The seed is being registered and certified by the West Bengal Seed Certification Agency on satisfaction of the quality of the produced seeds. The SHG sell the seeds in the brand name of Shyamali. The quantity of Certified Seeds production in the 2010-11 of rice and potato were 53 t and 75 t, respectively and subsequently the quantum of rice seed production increased to 186.1 t in Kharif-2011. Local farmers of Sitalkuchi and Mathabhanga blocks of Cooch Behar district get certified seeds of major field crops, particularly rice at reasonable price through this Farmers Participatory Seed Production programme of Uttar Banga Krishi Viswavidyalaya.

Keywords: Farmers participatory seed production, field crops, self help group

The major field crops of northern part of West Bengal are rice, potato and jute. There is also considerable crop coverage under other field crops, namely maize, wheat, mustard/rape and vegetables. The seed replacement rate (SRR) of these crops is not up to the mark, for example, SRR of rice is about 30% in West Bengal, 26% in jute and for potato it is very poor- 3% only. The present level of SRR for field crops in India is just 5-70% (Roy, 2011), further the SRR is very low in case of oilseeds and pulses (Table 1). There is urgent need to increase SRR for recently released high yielding varieties and 100% for hybrids. The low seed replacement rates reflect the use of sub-standard seed by the farmers for crops cultivation in West Bengal. The farmers of northern parts of West Bengal are less aware regarding advantage of quality seeds in agriculture production system as compared to southern parts of West Bengal. There is shortage of Certified Seeds of desirable crop as well as variety. The cost of certified seed of certain crops is very high, particularly for potato and jute. The rate of potato seed tuber varies from Rs. 30 to 45 per kg and jute from Rs. 80 to 250 per kg of seeds. Here, the traders enjoy the maximum profit out of the monopoly as well as scarcity of quality seed/ seed materials.

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Farmers Participatory Seed Production in India is one of the few countries (Chowdhury *et al.*, 2010) where the seed sector has advanced in parallel with the agricultural productivity. However, availability of quality seed of improved varieties and hybrids is grossly inadequate and is one of the major constraints for enhancing production. High volume-low value seeds (most of the field crops come under this category), predominantly the farmers are using farm saved seeds resulting in about 80% of the area sown with farm saved seeds of old and obsolete varieties. It is more so in crops like potato, elephant foot yam, groundnut, soybean, chickpea etc. as seed cost alone accounts for 50% of the total cost of cultivation (Roy, 2012).

During last 10 years, a number of varieties/hybrids have been developed in different field crops which have shown 10-40% yield superiority over local cultivars and some possess better resistance to insects and diseases. With the exception of high value-low volume seeds, the seed production of low-volume high-value crops is primarily left with public sector due to the bulky nature of most of the self pollinated crops, more investment on infrastructure and less remuneration.

Participatory seed production

To boost the productivity of such low value-high volume crops, farmers need to have access to improved seeds of the right type, at the right time, at the right place and at a reasonable price. For the supply of such seeds, the informal seed sector (namely, farmer managed seed, seed village programmes, Farmers' Participatory Seed Production and farmer seed distribution system systems) and the formal seed system (seed enterprises) have a great role to play. The informal seed sector is found to be effective in quickly reaching out to the difficult, inaccessible, small holder

pockets and would be a sound alternative for entrepreneurs to gradually evolve into the formal enterprises. Farmers can produce quality seeds of some self-pollinated crops, such as, rice, wheat, mustard, and vegetative propagated crops, namely, potato seed tuber, elephant foot yam, *Arachis pintoii* (Neef *et al.*, 2004) etc. at their own farm for 2-3 generations, provided they are trained the package of practices to maintain genetic purity. Therefore, there is urgent need to set up informal seed production system involving local farmers.

Table 1: Seed replacement rates of important crops in India (Roy, 2011)

Crop	Seed replacement rate					
	2001	2002	2003	2004	2005	2006
Cereals						
Rice	19.22	19.31	19.16	23.28	24.35	25.10
Wheat	13.04	13.00	13.00	16.48	17.64	18.03
Ragi	17.50	18.00	17.36	19.10	-	-
Maize (variety)	20.98	21.35	24.41	31.35	35.39	36.23
Jowar	18.36	18.78	26.71	20.87	-	-
Bajra	45.92	48.47	51.02	44.90	55.36	56.12
Pulses						
Bengal gram	4.17	4.23	7.09	9.87	9.41	9.54
Black gram	16.55	17.06	20.48	17.24	15.70	16.21
Green gram	13.47	13.48	19.48	12.34	12.50	12.82
Red gram	8.71	8.84	13.60	9.80	10.48	10.88
Oil seeds						
Groundnut	5.20	5.50	11.00	7.11	6.89	7.03
Soybean	12.44	12.45	15.58	27.00	28.88	32.34
Sunflower	13.73	15.69	19.61	60.15	67.67	69.17
Commercial Crops						
Cotton	21.21	21.86	19.84	20.73	21.78	22.27
Jute	28.77	30.14	27.40	26.03	26.03	26.03

The experimental capacities of farmers confirm findings of other authors suggesting that farmers' participation in scientific experimentation and seed production has a much more formal character than often expected by scientists, and that combining station-based experiments and farmer-managed trials can provide valuable synergetic effects (Sumberg *et al.*, 2003; Neef *et al.*, 2004). The objective of the programme was to find a mechanism to set up village-based seed enterprise which will provide small-scale farmers with affordable, quality seed of improved and adapted varieties and also popularization of improved varieties/production technologies among the local farmers.

MATERIALS AND METHODS

Formation of Self Help Group

For implementation of seed production under Farmers' Participatory mode, village with high potential of production were selected. To begin with, leading farmers were selected for seed production in two villages, namely Kharikabari under Unishbisha Gram Panchayat, Mathabhanga-2 block and Petlanepra under Chotosalbari Gram Panchayat, Sitalkuchi block, Cooch Behar district of West Bengal. First two years (2006 and 2007), the farmers were trained on seed production technologies of major field crops of northern part of West Bengal. Initial guidance

was provided by Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar in collaboration with Department of Agricultural, Government of West Bengal. Finally, dedicated, sincere and well skilled 10 farmers from Sitalkutchi and Unishbisha who involved in seed production under the guidance of UBKV were brought under one umbrella forming a Self Help Group - **Suphala Beej Swanirbhar Gosthi** (SBSG) in June 2008, and registered under District Rural Development Cell, Cooch Behar. The SBSG sell the seeds in the brand name of *Shyamali*. Application has been submitted for registration of the brand name under Trade Mark Act, 1999 [Act No. 47 of Year 1999 dated 30th. December, 1999] (<http://www.indialawinfo.com>).

Seed production system

The land area of the members of SBSG is not sufficient to produce enough seeds to meet the demand of the local farmers. Mainly foundation seeds are being produced in the farms of the members of SBSG. For production of certified seeds, others local farmers of Kharikabari (Unishbisha) and Petlanepa (Chotosalbari, Sitalkuchi) are also selected based on the land area of the farmers and their interest on seed production. Foundation seeds of respective crops and varieties are distributed among the selected farmers based on the area of the crop to be grown for seed production.

The seed production plots are regularly inspected by the trained members of SBSG, scientists from Uttar Banga Krishi Viswavidyalaya and team from West Bengal Seed Certification Agency to maintaining the field and seed standards. The trained members of SBSG guide the farmers to maintain genetic purity through maintain isolation distance, vigorous roguing and appropriate stage of harvesting. The seed produced by the farmers, other than the members of the SBSG, are **bought-back** by the SBSG on satisfaction of quality of the seeds as per the requirement for certification at 10-15% higher rate than the prevailing rate at the local markets. The buy-back seeds are again processed at the processing unit of SBSG before bagging and sealing.

Hands on training

The selected farmers are being trained by the UBKV scientists for all aspects of seed production technology of the particular crop. A total of three trainings (pre-sowing, before flowering and before harvesting) are being arranged per crop per season. During training the farmers are supplied with

reference materials, the package of practices of the particular crop in local language. Since the scientists are visiting the villages regularly, the problems faced by the farmers in the crop production of other crops are also addressed.

Post harvest management

Suphala Beej Swanirbhar Gosthi is responsible for all aspects of seed production, processing, and storage, as well as for seed quality assurance. They will also market the produced seeds, both to other farmers in the community and beyond. This is done either directly or through village traders and NGOs.

Sources of breeder and foundation seeds

Breeder seeds of rice are collected from Andhra Pradesh Rice Research Institute and Regional Agricultural Research Station, Acharya N.G. Ranga Agricultural University, Maruteru, West Godavari District, Andhra Pradesh; Central Rice Research Institute (Indian Council of Agricultural Research), Cuttack; Directorate of Rice Research (Indian Council of Agricultural Research), Hyderabad; and West Bengal State Seed Corporation. Sources of Foundation Seeds for SBSG are Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar; Cooch Behar Krishi Vigyan Kendra, UBKV, Pundibari, Cooch Behar; District Seed Farm, Cooch Behar; Block Seed Farms of Cooch Behar and Jalpaiguri districts; and Gotra Krishi Samabay Samiti, Ghetugachi, Nadia, West Bengal.

Seed certification

Seed quality assurance is the utmost priority in this system of seed production involving farmers. The produced seeds are being certified by the West Bengal Seed Certification Agency only after satisfying the field and seed standard as per the specification of the Indian Minimum Seed Certification Standard, 1971 (<http://seedtamilnadu.com/imscs.htm>) and revised Indian Minimum Seed Certification Standard, 1988 (Tunwar and Singh, 1988).

Mission of SBSG

The mandates of SBSG may be classified as-

- Quality seed production of major field crops of North Bengal
- Collection and conservation of local genotypes of rice
- Organization of training programmes for the local farmers to improve crop production technologies

Participatory seed production

To assist Department of Agriculture to implement different crop and seed production programmes, such as Seed Village on rice and mustard, Zero Tillage Techniques for cultivation of rice and wheat etc.

Social works, like tree planting etc.

RESULTS AND DISCUSSION

Quantum of seed production science its inception

This SBSG is producing Certified and Foundation seeds of different varieties of rice, pulses, mustard and potato seed tuber. The seeds produced by the farmers under Farmers' Participatory Seed Production of the SBSG since inception is being given below.

Recognition of the SBSG

Certificate from Block Development Officer, Sitalkuchi Block, Cooch Behar District of West Bengal

Selected for Implements Hub in Cooch Behar, West Bengal district under RKVY 2008-09

Selected for Vermi-compost unit from Department of Agriculture, West Bengal

Recognized by Directorate of Rice Research (Indian Council of Agricultural Research), Hyderabad, India (<http://rkmp.co.in/content/farmer-participatory-seed-production-of-rice>)

Participated in TV programmes of Jalpaiguri Door Darshan

Table 2: Quality seed production since inception of sbsg

Year	Crops	Variety	Class	Production (Q)
2007-08	Rice	G-S-1, G-S-3	TLS	182.00
		MTU 7029, MTU 1010, Annada, Khandagiri, Satabdi, MTU 7029, MTU 1010, MTU 1001	CS	282.00
	Cowpea	PB-4	TLS	0.15
	Potato	Kufri Joyti, Kufri Kanchan	CS	572.00
2008 -09	Potato	Kufri Joyti, Kufri Chandramukhi	CS	409.00
		Kufri Joyti, Kufri Pokraj, Kufri Chip Sona	FS	23.50
	Mustard	B-9	CS	3.00
	Rice	MTU 7029, MTU 1010, MTU 1001, Annada, Khandagiri, Satabdi, Lalat, Sabita, IET 5656, IET 4786, IR 36, IR64	CS	411.00
		KMR-3	TLS	2.00
Gontra-Bidhan -1		TLS	5.00	
2009-10	Mustard	B-9, NC-1	CS	9.00
	Rice	MTU 7029, MTU 1010, Annada, Satabdi, Masuri, IET 5656	FS & CS	544.00
2010-11	Rice	MTU 7029, MTU 1010, MTU 1075, Annada, Satabdi, IET 5656	FS & CS	1860.00

FS: Foundation Seed, CS: Certified Seed, TLS: Truthfully Labeled Seed

Socio-economic implications

- There is shortage of certified seeds or quality seeds of desirable crop varieties. The farmers of the Mathabhaga blocks of Cooch Behar District get quality seed at a reasonable price and at appropriate time.
- The Seed Replacement Rate of rice is about 30% in West Bengal. The Farmers' Participatory Seed Production programme by SBSG will help in increasing SRR, which is one of the major objectives for improvement of crop productivity.

- Helps in Farmers' Participatory Variety Selection (Nigam *et al.*, 2005) and popularization of recently released varieties.
- This programme generated employment opportunities for the rural youths, farm workers, farm women as seed production is skill oriented work. Skilled oriented farm works include transplanting, harvesting, threshing, drying and winnowing. A huge number of farm workers and farm women are being involved for the above mentioned farm works. Next steps of seed production include

seed storage, processing, bagging, transporting and finally marketing. Here also a huge number of farm workers, rural youths, and women are being employed. Thus, this programme helps in decreasing the rural unemployment pressure as unemployed rural youths will be getting opportunity to work.

- e) The farmers, other than the members of SBSG who involve in seed production of different crop varieties get higher rate during selling of their produce as compared to the prevailing rate in the local markets. The SBSG buy-back the seeds from the farmers on satisfaction of the seed quality at 10-15% higher rate than the rate prevailing in the local markets.
- f) Socio-economic status of the farmers improving due to generation of additional income through seed production against grain production.
- g) The additional income earned through seed production helping the farmers to start other enterprises and opening avenue for further development of farming community.
- h) It will also help in crop diversification.
- i) The SBSG arranges trainings for the local farmers on crop cultivation aspects with help of scientists from Uttar Banga Krishi Viswavidyalaya and extension workers from Department of Agriculture, Government of West Bengal. Till date, they have organized or assisted Uttar Banga Krishi Viswavidyalaya and Department of Agriculture to organize more than 50 training programme on different aspects of crop cultivation.

Improvement in socio-economic status of the members of SBSG

Assets value the SBSG is about Rupees 15 lacs.

Three members purchased motor bike. Shri Ramkrishna Barman, and Shri Bharat Barman purchased motor bike using the profit earned as share from SBSG.

Now all the members use mobile phone. Some of the member of SBSG (namely Bharat Barman, Ramen Barman) had no mobile phone during formation of the SBSG.

The local farmers consult SBSG for any problems related to crop cultivation.

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