

In pursuit of sustainability of small-holder agriculture in India – case studies¹

Partha R DasGupta²

Introduction

The average size of agricultural holdings in India continues to shrink – reaching up to 1.15 hectares, as per the Agriculture Census of 2010-11. The latest ‘Situation Assessment Survey’ of NSSO reports that the annual income of an average farm household is less than Indian rupees 80,000/- (US\$ 1200 approx). With the reduction in the size of holding, the proportionate income from agricultural activities has decreased, and the farmers’ dependence on wage/ salaried income has increased. For those possessing up to one acre of land (0.40 ha) which comprises nearly 70% of all farm households, earn only 37% of their total income from agricultural activities and are pushed to becoming part-time farmers.³ The issue is more serious for the state of West Bengal where the size of holding is below the national average – only 0.77 ha, as compared to 3.77 ha of Punjab. The agricultural household income of the state is less than Rs. 50,000/- per annum, in comparison with Rs. 200,000 of Punjab. Therefore, as the size of landholding gets smaller, the need for practicing highly efficient agronomic techniques becomes more for farming to remain viable, i.e., techniques different from those normally followed by big and medium farmers. The main aim for small and marginal farmers should be to generate more value from less land surface. This article attempts to examine, through two case studies presented below, as to what extent some of the special hi-tech farming options can actually increase the incomes of smallholders so that their livelihoods can be secured through agriculture alone.⁴

A. Bankura Project⁵

This project site is situated in a backward pocket of Bankura District of West Bengal where small size of holdings, lack of capital and perennial

¹ Text of paper published in Souvenir of National Seminar on ‘Resource-based Inclusive Agriculture and Rural Development: Opportunities & Challenges’, 15 – 16 January 2016, organised by Faculty Centre of Integrated Rural Development and Management (IRDM), Ramakrishna Mission Vivekananda University (RKMVU), pp. 54 – 59.

² Agriculture Development and Seed System Consultant, and Advisor Emeritus, Syngenta Foundation for Sustainable Agriculture. Email: partha.dasgupta68@gmail.com

³ ‘Key Indicators of Situation of Agricultural Households in India’, NSS 70th Round (Jan – Dec 2013), National Sample Survey Office, Govt. of India, 19 Dec ’14.
http://mospi.nic.in/mospi_new/upload/KI_70_33_19dec14.pdf

⁴ The experiences from the projects are shared by the courtesy of Syngenta Foundation India. <http://www.syngentafoundation.org/index.cfm?pageID=182>

⁵ The project was supported, guided and hand-held by Syngenta Foundation India.

source of irrigation were the major constraints, besides inadequate access to technology. The main objective of the project which began in 2006 was to test various ways of raising farm productivity through use of advanced technology and show to the farmers that these could substantially increase their income opportunities. In the beginning the interventions relied on farmers training and field demonstrations. Primary focus was on growing high-value vegetables since it had higher income-generating potential than field crops. The training conducted by senior experts also covered improved agronomic practices for rice since it was main staple crop of all farmers. Among the feedbacks received from the farmers was the problem of non-availability in the local stores of some of the recommended inputs e.g., seeds and plant protection products. Since the use of the right inputs was the key to the success of the technology, the project took necessary steps to make these available to the local farmers.

After a year of the project's interventions, encouraging results started showing as several farmers achieved significantly higher yields and thus earned more income, more so from growing high value vegetables. A small but remarkable feat achieved was that by a marginal tribal couple who earned a net income of Rs. 10,000/- by growing hybrid tomato on just 5 cottahs (337 m²) of land (equivalent to Rs. 300,000 approx per hectare). Results like that showed what could be achieved through proper adoption of technology. In the following years, the project activities extended to more number of villages, as increasing number of farmers showed interest in growing vegetables in the way shown by the SFI project. Increased awareness to technology led to the rise in demand for quality seed, so much so that it prompted the local NGO partner of the project, Shamayita Math⁶ to get into the production and distribution of certified seed through participation of local farmers in the process.⁷

By 2009-10, the project activities had spread to more than 100 villages across 8 Blocks of Bankura and outreached nearly 5000 farmers. As more farmers got into growing vegetables its overall production increased and they encountered new challenges of marketing. In the markets controlled by traders and middlemen, the farmers had to settle for the prices lower than what they had expected, because of the perishable nature of the produce. Also, in the absence any producers' organisations, individual farmers had little choice but to settle for the prices offered by the

⁶ Shamayita Math, Ranbahal, Amar Kanan, Bankura. www.shamayitamath.org

⁷ In 2014-15, 'Shree Rohi Seeds' unit of Shamayita Math had handled more than 300 metric tons of certified rice seed and various quantities of seeds of pulses, oilseeds, onion, etc.

traders. This situation led the operators of the project to consider two new approaches i.e., a) aggregating vegetable growers into a common-interest group for producing and selling collectively, and b) engaging farmers in specialized activities where the produce would be of higher value and not perishable. The first idea gave rise to formation of “farmers hubs”⁸. The second one evolved in the shape of hybrid vegetable seed production which until then was an activity confined to the states of Karnataka, Maharashtra, Gujarat and Andhra Pradesh. The following account states how this activity was successfully brought to Bankura.

Hybrid vegetable seed production

The first step taken in this direction was of gathering the basic knowhow needed for hybrid seed production. Tomato was the first crop of choice since was widely cultivated in the project area. Training was first obtained from an independent expert in actual seed production fields in Maharashtra. Thereafter, a pilot program was initiated on the campus of Shamayita Math. It was then that the actual process of acquiring the requisite skills began – from building of net house, to the ways of handling the parent lines, emasculation, pollination, harvest, seed extraction and quality assurance. It was also borne in mind that the operations had to be cost effective so that the seed produced could be sold at a remunerative price. The pilot operation was also used for demonstrating to local farmers what it was all about and convincing them to take up this kind of production.



Emasculation

Pollination

Production in net house

First year’s seed yield was not high but it met the highest standards of quality i.e., genetic purity and germination. Some local farmers showed interest but were cautious about taking up this operation, as the investment and the risks were higher than that for growing fresh vegetables. In the second year only one grower joined with Shamayita Math in undertaking contract production against an order received

⁸ For various reasons this initiative had to be discontinued after trying for a few years.

from a seed company. With further innovations applied in the following years, higher yields of seed were obtained and its quality also improved. On seeing the net gains of the first grower, others gradually came forward in the subsequent years. Of course there were problems faced on the way, relating to diseases, soil management, etc. One such was of the bacterial wilt disease which made sudden appearance and caused significant crop damage. In consultation with experts, suitable preventive measures for were communicated to the growers. As several of them got engaged in hybrid tomato seed production, they came to the conclusion that no other agricultural operation known to them had such high income-generating potential. Of course, a major prerequisite for this operation was the capital for investing into net house, drip irrigation, plastic mulch, staking, etc. The project partners assisted some farmers in securing bank loans for this purpose. The table below shows the actual results obtained in 2014-15. As one can see, a cumulative total net income of Rs. 1.11 million was generated from just 2.02 hectares of land. That is far higher than what is expected from growing high-value fresh vegetables. It was also proved that this operation which is based on specialized skills is sustainable. Currently about thirty smallholders of Bankura are engaged in hybrid seed production for different seed companies. Besides tomato hybrid seed production is also undertaken now of capsicum and okra, and the total production target at present is 500 kg.

Results of 2014-15

Case No.	Total area under production (ha)*	Qty. of seed produced (kg)	Cost of prodn. (Rs.)	Gross income (Rs.)	Net income (Rs.)	Income per ha. (Rs.)
1	0.81	131	8,85,932	13,45,913	4,59,881	5,67,754
2	0.71	116	7,07,682	10,96,490	3,88,808	5,47,617
3 [#]	0.50	70	2,25,000	4,90,000	2,65,000	5,30,000

* Total area is covered by a group of farmers growing seed of a particular hybrid.

[#] Seed of this particular hybrid was grown in the open hence, its cost of production was lower than the other two grown under net houses.

B. Kalahandi project⁵

The project in Kalahandi, District of Odisha was also started in 2006, in partnership with a local NGO 'KARRTABYA'⁹, initially in Dharamgarh. Its

⁹ At/ P.O. Chhoriagarh 766 023, via Mahichala, Dist. Kalahandi
<http://www.indiamapped.com/ngo-in-orissa/bhawanipatna/karrtabya-22291/>

objectives were very similar to those of Bankura. The farmers of this project area were also disadvantaged but not exactly in the same way as in Bankura. Here it was not about the size of holdings being too small nor, the farmers lacked the money to buy agri-inputs. Here the crop yields were sub-optimal mainly because local farmers had little knowledge of advanced technology and its applications. As the process of transfer of technology launched by the project progressed, crop yields started to rise and its news spread also to other nearby areas. Keen interest among farmers to access and adopt productivity-enhancing technology, led to the virtual coverage area of the project to spread beyond the District of Kalahandi. Rice being the major staple crop of the area, intensive training and field demonstrations motivated large number of farmers to practice 'SRI' (system of rice intensification) and achieve very high yields.¹⁰ Vegetable growing also proved to be highly profitable and its area increased. However, the increase remained somewhat limited primarily because unlike in Bankura there were no large urban markets within 200 km radius of Dharamgarh. By 2009-10, around 3000 farmers had directly benefited by participating in various activities of the project. However, it was realized that the process of development was bound to reach a plateau by solely depending on productivity-enhancing interventions.

Seed production hybrid field crops

There was a need for proper diversification in agriculture so that its development becomes sustainable. Introduction of seed production of hybrid field crops was seen as one such possibility. Careful study of climatological data of Kalahandi indicated that the area could be suitable for seed production of hybrid maize, sunflower and rice. Until that time production of these seeds was confined to Andhra Pradesh, Karnataka and Maharashtra. Besides the climate, Kalahandi had the additional advantage of good soil and irrigation available in the dry season. In its pilot phase carried out in 2010-11, all three crops were tried out on a limited scale.¹¹ The necessary technical knowhow and practical guidance were provided by experts from a leading seed company.¹² Among the three, the production of hybrid rice seed involved more intricate processes. For achieving high success rate it was important for the field operators to master the techniques like roguing of pollen-shedders, application of gibberellin (for panicle

¹⁰ Reported in a reputed journal.

¹¹ These were a part of seed production research ('SPR').

¹² The process was catalysed by Syngenta Foundation India.

elongation) and achieve good nicking, besides just crossing male with female lines.

Hybrid rice

The results of the trials with hybrid rice seed production in Kalahandi were most impressive in terms of yield and seed quality as compared to those of the traditional production areas. Secondly, the area under hybrid rice cultivation was fast expanding the seed companies were on the lookout for alternative production areas for meeting the growing demand for seed. Therefore, going for commercial production of hybrid rice seed was the imminent choice for Kalahandi. In the beginning the activity was supported by a single seed company. With the seed yields and farmers' incomes increasing as the years passed by, the area under its production also kept going up. By 2013-14, the news of its all-round success spread to different parts of the country and it attracted leading scientists and government officials to go to Kalahandi see some of the standing crops. By that time, the area under hybrid rice seed production had spread to over 80 hectares in which 200 farmers were engaged. The total seed production was nearly 150 metric tons and the average yield was 2.5 metric tons per hectare – equal to the optimum in the traditional belt of Andhra Pradesh.



Hybrid maize seed field Cross pollination in rice Visitors in hybrid rice field

Although the production of hybrid rice seed was proven to be a remunerative operation, one of its deterrents for farmers was the high cost of production. This is somewhat true because of the specialized techniques involved in it but gave the impression of high risk to first-time growers. In this respect, the special incentive offered by Odisha government in April 2014, by way of a subsidy of Rs. 25,000/- per hectare, was timely and appropriate. In 2014-15, the area increased by more than three times as 343 farmers participated in this activity. By then four more seed companies had placed their production indents in Kalahandi. Average seed yield was 3.5 metric tons while the highest of 5.33 metric tons was an all-time record for

any production area in India. There was a lot of enthusiasm among the local farmers and in 2015-16, the area was expected to have reached between 600 and 800 hectares. Average gross return from hybrid rice seed production ranged between Rs. 116,000 172,000 per hectare, depending on the hybrid and its potential seed yield. The average net profit was in the range of Rs. 70,000/- per hectare. In contrast, the maximum net income from production of rice as grain was only around Rs. 25,000/- per hectare.

Kalahandi's today is a regular production centre for hybrid rice seed in India. With plenty of irrigation available in the dry season, there is scope for its expansion to 3000 hectares and more with a total production potential of up to 10,000 metric tons. Increased availability of the seed will help the spread of hybrid rice in the country which is national priority.

The Bottom line

It is imperative that for a smallholder to remain gainfully engaged in agriculture, they must adopt different ways of farming – from cultivating staple food crops alone to practicing high-value agriculture, at least on a part of his farmland. However, for carrying out such diversified and profitable operations the farmer should first have access to appropriate technology and capital, and acquire specialized skills of the operation. The case studies discussed in this paper give out a clear message that for such transformation to take place, some external guidance and handholding are necessary i.e., for transfer of knowledge, access to inputs and credit, and connecting farmers to the markets that would assure buy-back of the produce at a remunerative price. In the case of the studies reported in this paper, such support was effectively extended to farmers by Syngenta Foundation India. Clearly, there is scope for many such agencies to come forward and help a sizeable number of Indian smallholder farmers to practice high-value agriculture so that they may lead more others by example. This could become a part of a national mission for sustainable agricultural development.