



Good practices and lessons learnt from innovative horticultural farmers for enhancing profitability and sustainability

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ABSTRACT

New innovations and best practices are the key to success, growth and sustenance of horticulture. Research has shown that farmers are a rich source of indigenous knowledge and practice; they experiment, adopt and innovate continuously, therefore documentation of the same may provide insight and role model for the other farmers as well as scientists. Study was framed to document and analyse the best practices of innovative horticultural farmers. A total 35 innovative farmers from ten agro-climatic zones of Karnataka were selected. Data were collected through personal interview of the farmers and participant observations by the researcher. The net returns of farmers ranged between ₹ 1.44 lakh to 277 lakh per annum. The B:C ratio of the enterprises was higher than 1.7, indicating sufficiently higher returns. Farmers had integrated 3 to 6 enterprises, viz. crop husbandry, floriculture, vegetables, fruits, dairy and livestock rearing for efficient use and recycling of farm resources. To increase economic viability of the farms, farmers had integrated production with post-harvest processing, value addition and marketing of the products. The study found that irrespective of farmers' socio-economic backgrounds and agro-ecological conditions, agriculture can be economically viable and sustainable by their innovations; integration of technologies and enterprises; adoption of new technology and overcoming false beliefs. Thus, cases of innovative farmers have shown that innovations, information seeking behaviour, experimentation, new technology adoption, enterprise integration, post harvest processing, market intelligence and marketing linkages were the key factors in making these farmers more successful. Therefore more number of such innovative farmers should be involved in the farmer led extension approach.

Key words: Best practices, Case studies, Innovative farmers, Profitability, Sustainability

Conventionally farmers have been looked upon as passive recipient of knowledge. They are placed at the end of research-extension-farmers linkage (Roling 1988). However, paradigm shift started with the concept of 'farmers first and last' which envisages role reversal of learning and location (Chambers 1986). This concept involves systematic process of scientists learning from, and understanding the farmers, their resources, needs and problems. The main locus of research and learning is the farm and farmer, rather than the research station and the laboratory which is necessary for development of location specific and need based technologies to the farmers which are suitable to their socio-cultural and agro-ecological situations.

There is increased realisation that farmers have valuable knowledge, wisdom and experience to bring to the process of agricultural research, and as the end users of technology,

they should be active participants in all stages of this process (Chambers 1986). This led to a gradual shift away from the linear transfer of technology model, towards 'innovation systems' approaches (Roling 1988), which view innovation as an interactive process involving a range of actors with different knowledge and skills. At the same time, the understanding of innovation has broadened from a sole focus on technologies, to include socio-economic, cultural and institutional changes - with the understanding that the technical aspects of innovation are also social (FAO 2012).

The horticulture sector has become a key driver for economic development of the country and it contributes 30.4 per cent to GDP of agriculture, which calls for technology-led development (ICAR 2015). Under this scenario, new innovations are key to success, growth and sustenance of the sector. Researches over a period of time have proved that farmers especially the resource poor farmers, continually experiment, adapt and innovate the technology (Rhoades 1987, Chambers 1986, Gupta 1996). Identification and documentation of these horticultural innovations, best practices of the farmers will help in identifying farmers as not just recipients of technology but also as experimenters or innovators through their innovative practices on the farm (Rhoades 1987).

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The same concept has been envisaged here giving more emphasis on successful farmers who have made innovative contribution in the field of horticulture. These unsung heroes of farming, with their own capabilities or by training and hard work have made substantial achievements. The innovativeness of these farmers need to be documented and analysed in order to learn lessons from their experience, best practices, ability to plan and manage the farm as an enterprise. Further such an approach would also help the success of the farmers to be integrated into what the World Bank phrases it as the innovation systems concept.

Considering this scenario in mind, study was conducted to study successful horticultural farmers from Karnataka state of India with objectives as to document innovations and best practices in farming, to study economic viability of the enterprises for enhancing profitability and to delineate lessons learnt from innovative horticultural practices.

MATERIALS AND METHODS

The study was conducted in Karnataka state of India, because records about progressive and innovative farmers were readily available with the government. Study covered 10 agro-climatic zones of Karnataka by dividing them into four strata having similar conditions of rainfall, soil conditions and cropping pattern. The state is situated approximately between the latitudes 11.5° and 18.5° N and the longitudes 74° and 78.5° E. Climate of Northern Karnataka is dry, semi arid type while in south region it is sub-humid. Average annual rainfall of the state is 1248 mm. The major crops grown in the state are rice, ragi, jowar, maize, and pulses besides oilseeds and number of cash crops. Coffee is the principal plantation crop while cashew, coconut, arecanut, cardamom, chilies, cotton, sugarcane and tobacco are also grown.

A triangulation approach using both qualitative and quantitative methods was followed. The database of awardees and achiever farmers from the State Department of Agriculture, Directorate of Extension of the UAS Bangalore, Directorate of Extension of UAS Dharwad, NGOs like American Spring and Pressing Works Pvt Ltd (ASPEE) foundation and other private agencies were pooled together and the most unique cases of innovative practices or ideas were selected purposively. From four strata unique 35 successful farmers whose contribution was recognized and rewarded by the government were selected from the above list. Efforts were made to cover best practices related to horticulture. A systemic and ethical protocol was followed to ensure proper representation of the farmers and reliability in the data set (Singh *et al.* 2011).

Data were collected through personal interview of the farmers and participant observation of the researcher. A well structured interview schedule with both close end and open end questions was constructed in order to facilitate data analysis. This was pre tested with non sampling population in order to avoid ambiguity in the response. Information related to socioeconomic condition, innovations and best practices was elicited by asking question to farmers as well

as through personal observations in the field. Information provided by the farmers was also validated with KVK personnel's working in the area and other fellow farmers.

As most of the data were qualitative in nature, general analytical strategy was used to guide the decision regarding what will be analysed and for what reason (Yin 1994). Using this, different perspectives, viz a) new innovations, b) new technology adopted, c) post production operation were given due importance were studied. Farmers were grouped into different categories considering the major innovation/reinvention they had made/adopted related to horticulture which has been labeled as the Best Practice in that particular category. However, this organization is not water tight and one farmer can be categorized in various other sections also. Cost of various inputs, labour charges and profit from the enterprise were used to calculate B:C ratio of the enterprises.

RESULTS AND DISCUSSION

Results of the study are presented and discussed under the broad headings of adoption of new technology by farmers, important post production operations in horticulture, cases where post production operation has been given due importance, economic viability of the enterprises for enhancing profitability, best practices of innovative farmers and lessons learnt from these best practices.

Adoption of new technology by farmers

In this perspective, farmers had adopted improved varieties which are given in Table 1. Venghurla, a improved variety of cashew nut (developed by BSKKV Dapoli) whose nut size is larger; hence yields more compared to 'Ullal' series, was adopted by innovative farmers. Similarly, Chowghat Orange, an improved variety of coconut which yields more nuts per tree and more returns was adopted by innovative farmers. In cases of new technology adoption, it is important to know the source of information of new technology. Chi *et al.* (2002) in their study also found that progressiveness of farmers was the major determinant of adoption of new technologies by the farmers. The main information sources were fellow farmers (16.7%), followed by input dealers (13.1%), radio (13%), TV (9.3%), and newspapers (7%). In most of the cases wherein new technology was adopted by farmers had relied on field tour and literature as the main source of information. It indicated the importance of 'seeing is believing' and publications with regard to successful agriculture practices. Further the successful farmers had improved access to KVK and information from other farmers also. Similar findings were also reported by Sharma *et al.* (2008) wherein they found that personal localite sources like neighbours, friends, progressive farmers and opinion leaders played important role in transfer of message relating to new technology.

Some farmers had relied on a combination of different sources rather than on single source. The farmer to farmer extension has played significant role here hence farmer associations and their linkage to scientists becomes an

Table 1 New technologies adopted by the innovative farmers

New Technology adopted from existing knowledge	Characteristic of the technology	Source of information
Adoption of improved cashew nut variety of Venghurla	Size of the nut is larger and hence yields more compared to Ullal series adopted by other farmers	Field tours
Adoption of improved varieties of coconut (Chowghat Orange)	COD yields more nuts per tree and hence more returns	Litreature, KVK

important aspect. One such case where there is collaboration between farmers and scientists has been followed in the Mahatma Phule Krishi Vidyapeepth (MPKV), Rahuri through Farmers-Scientists Forum (Kokate 2009).

Important post production operations in horticulture

Farmers showed keen interest in the post production operations including processing, contract farming, exporting and developing marketing linkages to reduce number of middlemen. One progressive farmer had developed direct linkages with nearby star hotels for marketing of coloured capsicum grown under protected cultivation, enabling him to reduce middlemen in marketing channels and get more price and profit from the capsicum (Table 2). Some farmers had contract with the companies to reduce risk of price fluctuation. Some farmers exported their pomegranate with the help of 'Phaldaavi' foundation. These method used by the farmers helped in fetching good price to their produce and more profit per unit area as compared to their other counterpart.

Innovative farmers had developed links with different markets in other cities enabling them to get better profits as compared to those who sold their produce locally. Farmers had developed their own pineapple processing plant where they were processing it by purchasing from other farmers. It is often said that India's Agribusiness is more supply driven than market driven. This myth has been broken down by these successful farmers who have been catering their produce to different markets and making it more market driven.

Economic viability of the enterprises for enhancing profitability

The B:C ratio in all the cases was found to be above 1.7, indicating the profitability of the enterprises (Table 3). Net returns of various farmers ranged between ₹ 1.44 lakh to 277.4 lakh per annum. It is to be noted that the financial viability of the farms under study was mainly because of the successful integration of various enterprises including diverse annual crops, horticultural crops, floricultural crops, crops grown under protected cultivation, dairy and vermicompost unit. The farmers had integrated 3 to 6 enterprises. Hence, it could be concluded that adoption of integrated farming system was the common feature for

Table 2 Important post production operations in horticulture adopted by innovative farmers

Best practice/Innovation/Crop	Post production operation
Cocoon deflossing machine.	Sale to other farmers in the area
Coloured capsicum under protected cultivation	Contract with local star hotels
Organic cultivation of cardamom, sapota and mango and cultivation of mango, mosambi and banana.	Contract farming
Pomegranate	Agreement with Phaldaayi foundation- for export of pomegranate
Vegetables	Well-established links with middlemen in cities like Mumbai
Papaya cultivation	Direct purchase by contactors from Mumbai and other metro cities.
Banana, pineapple, coffee and arecanut cultivation	Processing by themselves

majority of the farmers. Some farmers had also integrated production with post-harvest processing, value addition and marketing of the products to increase economic viability of the farms. This was found to be crucial and common factor behind the economic viability of all farms.

BEST PRACTICES OF INNOVATIVE FARMERS AND LESSONS LEARNT

Protected cultivation in integration with market intelligence: A farmer with medium size land holding (6 acre land) from Mysore district of Karnataka state convinced and proved that agriculture is profitable and should be pursued by the youth. Inspired by the field visit, he used scientific techniques such as mulching, use of poly house to ensure minimal dose of moisture and protect the crops from pest damage respectively for cultivation of different crops.

Best practice: Best practice followed by the farmer was vegetable farming under poly house cultivation. Regular cultivation of watermelon by the farmer using mulching sheets to conserve soil moisture and growth of weeds reduced the cost of cultivation. Use of poly houses for developing the seedlings enabled farmer to get a good quality harvest and hence a good price in the market. He grew tomato based on market demand for the crop.

Lessons learnt: Case shows how observational learning and orienting self with the successful farmers, kindled inner motivation to move towards new direction with hope. Further, this is the case of how technical Institutes have transformative effect in the lives of ordinary young farmers to manage scientific farming. Government should promote linkage between private retailers and farmers so that there can be direct contact between the two and hence the producer and the consumer both will be in advantage. Such ideas can be experimented on a small scale basis and result assessed to implement it on a large scale. This shows ability to think beyond farm and foresee how farming can be made more successful.

Table 3 Economic analysis of enterprises of innovative horticulture farmers

Innovation/ re-invention /crops	Enterprises (Number of enterprises)	Area (Acres)	Net returns (₹)	B:C ratio
Use of plastic mulch sheet in watermelon	Areca nut, water melon, tomato, banana (4)	10	144600	1.78
Papaya cultivation, organic farming	Sugarcane, red gram, chickpea, sunflower, papaya (5)	102	15558360	3.74
Cultivation of mosambi (sweet lime), sapota and banana	Mosambi, sapota, banana, paddy (4)	34	2086000	2.17
Banana, pineapple, coffee and areca nut cultivation	Banana, pineapple, coffee, paddy, areca nut (5)	205	27748000	4.45

Commercial horticulture cum organic farming

Organic farmer and an agri-preneur; a matriculation passed farmer having more than 20 years of farming experience cultivated sugarcane, redgram, sunflower, papaya etc crop on his 26 acres of owned land and 80 acres of leased land and marketed produce to states like Maharashtra and Andhra Pradesh.

Best practice: Regular checking of quality of water to ensure that there was no contamination through ground water pollution. He had planted papaya in the entire eighty acres of leased land with the variety Taiwan 786. He was harvesting from the seventh month of crop since last five years subsequent to the first one. After every six harvests, he removed the entire plants and replanted after rejuvenating the soil with proper nutrients. He felt this as an important aspect to ensure soil fertility before replanting and planting any other crop.

Lessons learnt: Through this case one can understand that farming can be very successful if one is able to use the market information for profit. Traits like continuous hard work and understanding the new techniques and incorporating the same in the field is demonstrated as part and parcel of the farmers' life. In order to survive in this era one needs to adapt himself to the current scenario. Accordingly, one should plan activities properly by discussing with fellow farmers and direct all energy towards the achievement of the goal.

A doctor with successful marketing strategies becomes a successful farmer

A medical science graduate by planning and hard work, was able to convert waste land into a fertile land. He emphasised on marketing strategy and developed his own network of market intelligence so that he could market his produce wherever he wanted rather than depending on the middlemen. He owned 34 acres of land and major crops grown in his field were mosambi (sweet lime), sapota, banana and paddy.

Best practice: The farmer was pioneer in horticulture farming especially in mosambi and sapota. He had established marketing channels in other states where many companies had taken up contracts with him for picking of produce. It was more economical since he did

not have to pay for the transportation cost and moreover he got a very good price, much higher than any other farmer. The quality of the produce was also maintained properly by timely application of nutrients and other farmyard manures.

Lessons learnt: This case emphasised on marketing strategy and development of network of market intelligence rather than depending on the middlemen. The farmer gave emphasis on efficient management of inputs. His experience shows how perseverance is important in a monsoon dependent profession like agriculture; failures are the part and parcel of life and one should not be dejected by it and rather use it as a stepping stone for success.

From a laborer to successful large farmer

A school dropout was motivated by one of the farmers in the village to cultivate his own land rather than work in other farmer's field for a petty income. He started motivating other farmers to cultivate pineapple and started buying the produce from them and marketed it to other states like Maharashtra and Andhra Pradesh which helped in increasing the income.

Best practice: Integrated farming system was one of the best practice adopted by the farmer along with the pine apple processing unit. Innovative methods were used to get higher yields in pine apple by using drip irrigation to shorten the cropping month and also applied the fertilizer through drip irrigation only. The farmer had also been successful in experimenting with G-9 variety of banana. According to him to grow banana all that is to be done is treatment of suckers before plantation and a spacing of 7 × 4 × 3 ft and the yield would be more than 30 kg/plant. He had also set up a processing plant of pine apple, for which he purchased the produce from other farmers to cater to the need of unit.

Lessons learnt: Through this case, self-learning and networking for an enterprise acting as core point of success has been proven. Innovative farm technologies like sprinklers would help farmers in keeping farming viable for all seasons giving more profit and success to the farmers. Spirit of co-operatives which can be a solution to many problems of the farmers today can be exhibited by involving progressive farmers as well as giving information to fellow farmers.

Overall lessons learnt from cases on horticulture

By using inductive approach, generalizations can be made from these specific cases of innovative farmers to delineate the lessons learnt. a) Diversification of agriculture is critical to achieve sustainable production and horticulture crops are most suitable to diversify agriculture. b) Horticulture crops are highly productive and remunerative and hence have a tremendous potential to make quantum jump in farm income which is evident from high BC ratio. c) Horticulture crops, especially fruits crops are perennial and have potential to be grown under organic farming method and hence can be used as master key for sustainable production. d) Simple technologies like use of mulch can be highly profitable as it controls both weed growth and moisture loss. Plastic mulch used by some farmers in watermelon was an evidence of this. e) Horticulture, apart from being highly economical is aesthetically rewarding. Hence farmers should equally consider going for aesthetical value adding horticultural crops. f) To ensure income throughout the year, different short duration horticulture crops should be grown in crop rotation. g) Horticultural crops like aonla and ber can be grown in arid and semiarid region and hence horticulture is a profitable strategy to be followed when uncultivable lands are made available. In fact some of the medicinal and aromatic crops can be taken in remote lands and undulated topography. Horticulture can be profitable even in non-conventional growing areas.

Study revealed that the pressing need to curtail the labour cost and drudgery, need for location specific and problem specific mechanization equipments, diversity and ingenuity of farmers. Farmers should always keep their focus on both production and marketing of the output in order to develop a profitable agribusiness. Almost all the cases studied implied that to have more income one has to choose enterprise wisely and adopt new techniques of production. There is need of effective information dissemination systems among the farmers as well as uncompromising information seeking behavior and conducting own version of experiment in the farm to acquire more confidence. The most prominent lesson of the study was that “need is the mother of innovation”.

Gap between what is and what ought to be, is the factor that motivates farmers to innovate.

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