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STUDIES ON INNOVATIVE FRUIT GROWERS TO DRAW ATTENTION OF MARGINAL FARMERS

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Contributions of marginal farmers play a very crucial role in sustainable agricultural growth, food security and poverty alleviation of our country because of Indian agriculture is characterized by small farm holdings. According to Agricultural Census 2010-11, there are an estimated 117 million small and marginal holdings out of around 138 million total land households. The average farm size is only 1.10 ha with 93 % of farmers have less than 4 ha, and they cultivate nearly 55 % of the arable land (Agriculture Census 2010-11; Hazra, 2001). During 2005-06 the share of small and marginal farmers in landholdings was 83% (Chand *et al*, 2011). Therefore one of the best ways to upgrade their livelihood is by the introduction of high-value crops that have good prospects and market demand in our country. This thought is getting wind beneath its wings because rising income, urbanization, socio-demographic factors and increased awareness about the health benefits of fruits and vegetables have changed dietary preferences and major market drivers for the growth of high-value agriculture (Ruzlan*et al*, 2010).To encourage these peasants success stories and potentialities of some high-value fruit crops like strawberries and "Wonder fruit of 21st century" i.e. dragon fruits are discussed here.

Strawberry cultivated widely under protected and open condition of temperate and subtropical countries in plains as well as in hills. Among all different types of berries, strawberry gives the quickest return in a shortest possible period (Lyngdoh, 2014).

Dragon Fruit, a most cultivated edible fruit-producing genus of the family Cactaceae is a xerophytic vine crop, requires minimum manpower, spartan pesticides and it is of drought-resistant in nature(Le Belle*et al*, 2006) with a long survival span of more than 20 years (Rao and Sasanka, 2015). In the best dry climate condition, one plant can produce up to four to six cycles of fruits per year (Nurliyana*et al*, 2010). It has a good prospect in India

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because out of total geographical area 69.6% is dry land (Desertification & Land Degradation Atlas of India, 2007). Its robustness, as well as wide adaptability to different environmental condition, made it compatible with the different edaphic climatic condition and a good option for unfavourable areas (Mizrai*et al*, 2002; Telzur*et al*, 2004)

These antioxidant-rich fruits are already showing high demand in the Indian market; on the other hand, farmers are attracted towards these fruit crops due to their fast return potential which makes these crops more preferable than other fruit crops. So, it is necessary for the extension personnel to popularise these crops among farmers through sharing these success stories by organizing field day or by the campaign.

Strawberry growers

1. **The journey of a farmer to become president of "Strawberry Growers Association"**

With the help of Krishi Vigyan Kendra (KVK), Jammu, some farmers started strawberry growing in the district. One of them started his journey with strawberry from the year 2004 with 2 kanals (1 Kanal = 125 acres) of land and since he never looked back. In 2011-12 he had planted runners in 24 kanals of land and earned a net profit of Rs 2.5 lakhs. Similarly, in 2012-13 he earned a net profit of 2.7 lakhs from 20 kanals which increased to 5.6 lakhs in 2013. From 2004 onwards, his net profit was moved from Rs. 2500to Rs 5.6 lakhs in 2013-14 (Gupta*et al*, 2014). After practising for five years, he realized the potential of strawberry cultivation and formed a society under the banner of "Strawberry Growers Association". Based on his performance he was nominated as the president of the society.

2. **Strawberry cultivation leads to a horticultural revolution in Sohliya and Mawpran villages in Meghalaya**

Under the initiative of Technology Mission for the Integrated Development of Horticulture in the Northeastern Region and Government of Meghalaya, Centre of Excellence in collaboration with Horticulture Department farm ofDewlieh, in Umsning and active participation of the Ribhoi Strawberry Growers Association (RBSGA), Sohliya village located in Ribhoi district which is about 30km from Shillong, selected as a hub of strawberry cultivation in Meghalaya. The success of Sohliya village provided a momentum and East Khasi Hills leading the way by initiating 2 hectares clustered cultivation of the crop in

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Mawpran village which is about 58 km from Shillong. In Sohliya the total production was initially 125 Metric tonnes in 2009 had gone up to around 250-300 Metric tonnes annually in 2012-2013. Whereas in Mawpran village, strawberry cultivation was initiated only in 2008-2009, presently its production is about 10-20 Metric tonnes annually (Lyngdoh, 2014). Besides this, Indian Institute of Entrepreneurship (IIE) Guwahati and active cooperation of Ribhoi Strawberry Growers Association (RBSGA) a Horti-Eco Adventure Tourism project was launched that results in further diversification of job opportunities in the village.

3. A farmer aims to transform his village as "The strawberry village"

Farmers of the village Wanihama in Srinagar suffered from the ill associated with smallholdings and other inputs. A farmer of that village changed the fortune of his fellow men by showing the economic viability of strawberry cultivation. In 2004, he met the HorticultureOfficer working under technology Mission for the Integrated Development of Horticulture in North-Eastern states and hilly states. With the advice and all requisite inputs, he planted 1 kanal of his land with Chandler variety of strawberry under a poly house in March 2004 and that yielded an unexpected result of Rs. 50,000which encouraged him to expand the cultivation in 8 kanal system, and that resulted in Rs. 4.4 lakhs (Kumar, 2010). He has now set on a new mission to transform his village as "The strawberry village".

4. 'Strawberry Icon' of India

With scientists of CIPHET, Abohar, a farmer dared to take strawberry cultivation as a commercial venture. Now, his whole production from an area of 500 acres(Tapa, Bareta in Mansa districts; Viryamkhera in Abohar, Saharwa in Hisar) is taken by Mother Diary 'SAFAL' agency. Looking into the benefits and prospects, many farmers have started growing strawberry in Punjab, Haryana and Chandigarh. "Strawberry Icon" of the farming community earned Rs. 6 lakh ha^{-1}extra income by intercropping high-value crops like capsicum and yellow-fleshed watermelons on the residual nutrients applied for the strawberry crop. Now he started producing quality runners in biodegradable pouches that reduced runner mortality to 2–3% under poly-houses and low tunnels; to get disease-free planting materials because strawberry cultivation involves 25–30% cost on runners. Looking into the success, NHB has taken hi-tech nursery as a component of their scheme and started giving subsidy. Now he developed his own brand of strawberry fruits, "Arvind's Strawberry" (Ashrey, 2013).

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Dragon fruit growers

1. Dragon fruit plantation in drought-affected areas

ATMA introduced plantation of dragon fruit as an alternative crop for the drought-affected barren areas of Sangli district in Maharastra. The economic return generated from this fruit crop has augmented the income of the beneficiaries. Dragon fruit is introduced in 125 droughts prone villages of Sangli district in Maharashtra; small, marginalized farmers, women and disabled farmers have successively adopted the crop as an alternative livelihood source for income augmentation (Anonymous, 2014).

2. Dragon fruit in hilly Dediapada region

A tribal farmer with a large landholding in Dediapada region of Gujarat planted as many as 5,000 dragon fruits. Observing suitability of this fruit in that region and high market demand he decided to go for it and brought plants from a nursery in Kolkata as earlier, fruits were imported from other counties to India. Farmers from Dediapada and Nandodtalukas in Narmada district said they were confident that the quality of the fruit in their farm would be among the best in the country. This is the first time that farmers in the state have planted dragon fruit on a commercial basis. Narmada's Deputy Director of Horticulture is also very much hopeful about the crop (Kumar, 2014).

3. South Gujarat is gaining popularity in Dragon fruit cultivation

About 15,000 plants of dragon fruit have been planted in Surat, Tapi and Baruch districts. A farmer, who spends Rs. 2,75,000 per acre on dragon fruit plantation, can expect seven tonnes of fruits after two years. A farmer from the Bharuch district imported seeds from Thailand, after 18 months, he has nearly 5,000 dragon fruit plants. Another farmer told that red variety sells for Rs. 300 per kg and white one for Rs. 150 per kg. Assistant Director of Horticulture of the Gujarat Government hoped that it can be a good cash crop for many farmers and can pick up in south Gujarat where the region can aspire to be a major producer of it (Mohan, 2016).

Bottlenecks: Imperative for fruit growers

There are many drawbacks for smallholding of farmers across India. According to NCSUS (NCEUS, 2008), these are "some of the general issues that confront marginal-small

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farmers as agriculturalists are: imperfect markets for inputs/product leading to smaller value realizations; absence of access to credit markets or imperfect credit markets leading to sub-optimal investment decisions or input applications; poor human resource base; smaller access to suitable extension services restricting suitable decisions regarding cultivation practices and technological know-how; poorer access to 'public goods' such as public irrigation, command area development, electricity grids; greater negative externalities from poor quality land and water management, etc". Other than that education and skills are important for improving farming practices, investment and productivity. Even in a state like Andhra Pradesh small and marginal farmers depend upon 73% to 83% of their loans on informal sources (Dev, 2012). Increasing globalization has added to the problems faced by smallholding agriculture. Water scarcity, climate change are major challenges for agriculture, food security and rural livelihoods for millions of people including the poor in India. The adverse impact will be more on smallholding farmers.

Table 1. State-wise Area and Production of Strawberry

Area in '000 ha
Production in '000 Tonne

SL. No.	States/UTs	2012-13		2013-14		2014-15 (2nd Adv. Est.)	
		Area	Production	Area	Production	Area	Production
1	Mizoram	–	–	0.00	0.02	0.15	2.90
2	Meghalaya	0.10	1.04	0.10	0.74	0.11	0.82
3	Kerala	–	–	–	–	0.04	0.70
4	Himachal Pradesh	0.06	0.35	0.05	0.48	0.05	0.49
5	Jammu & Kashmir	0.02	0.00	0.05	0.37	0.19	0.30
	Total	0.17	1.40	0.21	1.61	0.55	5.21

Source: Horticulture Statistics Division, DAC&FW.

Table 2. Area and Production of Strawberry for Major Producing Districts

Area in '000 ha
Production in '000 Tonne

State	S. No.	Districts	2012-13	
			Area	Production
1.Himachal Pradesh	1.1	Sirmour	0.038000	0.342000
	1.2	Kangra	0.005000	0.004000
	1.3	Solan	0.002000	0.001000
2.Nagaland	2.1	Kohima	0.050000	0.070000
	2.2	Mokokchung	0.030000	0.042000
3.Meghalaya	3.1	Ri-Bhoi District	0.000021	0.000386
	3.2	West Garo Hills	0.000065	0.000136
	3.3	East Khasi Hills	0.000006	0.000131
	3.4	East Garo Hills	0.000002	0.000011

Source: State Departments of Horticulture/Agriculture.

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Prospects

Despite the above challenges, there are ample technological and institutional innovations which can enable small farmers to raise agricultural productivity and increase income through diversification and high-value agriculture. Both these crops discussed here are loaded with nutrients and surely fetch high demand and market price in domestic as well as international markets. High levels of vitamin C in dragon fruit stimulate the activity of other antioxidants in the body (Duarte and Lunec,2005; Rastalland Gibson, 2006). It's also packed with phosphorus, calcium, fibre and B vitamin group (B1, B2 and B3). Vitamin B2 acts as multivitamin and aids to recover loss of appetite (Cheah*et al*, 2016). It's a potential source of prebiotics that improve host health by promoting certain beneficial bacterial colony (Sharmaand Jain, 2011), glucose found in Dragon fruit helps in controlling the blood sugar level for diabetes patients (Wee and Wee, 2011). Strawberries also contain many important dietary components including vitamins, minerals, folate, fibre, manganese and are a rich source of phytochemical compounds mostly polyphenols. It is one of the richest natural sources of essential micronutrients (Francesca*et al*, 2016). Strawberry intake can be beneficial in Alzheimer's disease and other forms of dementia (Khatun, 2013)and with these, organic cultivation can put an extra benefit to growers as in California, Organic strawberries rank sixth among all organic fresh commodities, with over 160 organic strawberry growers registered with the California Organic Program (Telzur*et al*, 2004) even dragon fruit also showed good response with organic culture especially cow dung manure in Bangladesh (Kumar, 2014). The exotic dragon fruit with its xerophytic nature and drought-tolerant capacity can be adapted to an area where farmers face problems like water scarcity. Data presented in table1 and 2 clearly shows the increasing area and production of strawberry ever since it entered as a commercial crop in our country. But in the case of dragon fruit, it just only entered our country and shows huge scope to extend further. Many experts left their views on high potentiality of these crops in India like, Director of Trikaya Agro, said, "Nearly 60% to 70% of our dragon fruit is consumed through the shop peddling". The company started planting Trikaya Agro dragon from six years ago, currently produces 30-35 tonnes per year of the dragon. It began to be commonly consumed in urban areas, especially in southern India. According to the Vietnam Fruit and Vegetables Association, India is only open to import Vietnam dragon since early this year, but this is a huge consumer market. However, businesses need competitive bids by Thailand also put this item on the Indian

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market (Joseph *et al*, 2009). In Central Island Agriculture Research Institute, a Field Day was conducted with 52 farmers from different villages of South Andaman. The visiting farmers relished the dragon fruits organically produced at the Institute and learnt the growth and development of the crop. They were highly fascinated by the new fruit crop and showed lots of enthusiasm for learning the technical know-how of this fruit crop. *Even* exploring the climatic suitability in the tropic and sub-tropic region of Rajasthan, the government is taking an initiative to cultivate dragon fruit in 5,000 sqm in Rajasthan.

Way forwards

- To cope with globalisation farmers can go for organic cultivation of these nutrient-rich high-value fruit crops to fetch high returns.
- Climate change is a big issue for agriculture nowadays and strawberry would a great option for that. Fruit crops like strawberry can be easily adaptable in different agro-climatic situations due to its wide range of varieties falls under different groups like a short day, long day and day-neutral along with this proper selection of varieties can contribute to year-round production. So, farmers can go for protected cultivation with cost-effective polytunnels, selection of proper varieties suitable for that region. In some places where water scarcity is a problem growers can go for dragon fruit cultivation with providing minimum water requirement.
- As labour requirement is minimal, women can involve which will give an opportunity to earning an additional income consequently leads to economic upliftment.
- Cooperative marketing society could be formed for providing credit facilities to the needy ones for the cultivation of crops.
- As these crops are less popular among the marginal farmers, so it should the role of extension personnel to popularising these crops through highlighting on these success stories and convey the message through conducting field day, leaflets distribution.

Conclusion

India is the hometown of small and marginal farmers; their contribution to the farming sector cannot be overlooked as they play a crucial role in sustainable agricultural growth, food security and poverty reduction. Being the driver of our society, improvement of their livelihood through the incorporation of high-value crops in cropping pattern is needed. In these regards, nowadays fruit crops as if Strawberry and Dragon fruit create a place in

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farmers' hearts for minimum input requirements, high return potential, abundant nutrition and as a good earning opportunity from the small piece of land. Few farmers dared to cultivate strawberry and now proudly sharing their success with other farmers of their surroundings; similarly, a few innovative farmers took an initiative and confidently cultivating dragon fruit in their farms. So, it is necessary for the extension personnel to popularise these crops among their locality through sharing these success stories by organizing field day or by the campaign.

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