

Technological-Gap of Agro-Horticultural Sector in Darjeeling Hills

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Abstract

For a balanced development of any nation, state or district, the simultaneous upgradation of all the sectors is important. Agriculture still is the mainstay of Indian economy and hence neglecting this sector means economic loss. Keeping with the current development requirements, technology can play a vital role and this calls for application of technology in agriculture. The present paper attempts to connect the relationship between technology and agricultural sector in Indian scenario. The article puts forward some important information on the technologies that are being adopted in Indian Agriculture and also tries to come up with some important suggestive steps for improving the present state of agricultural technology in Darjeeling Hills.

Keywords: Agriculture, Agro-horticulture, Technology, Economy, Commercialization

Introduction

Since the beginning of human civilization, technology has proved to be the most important driver of human advancement in all the walks of life. Technology has affected the lives of the residents across the globe through the way they live, produce, consume and communicate. The passing of time has evinced various technological innovations influencing the socio-economic fabric of any nation, state, region and community by affecting their important existing sectors. In this context, mention may be made of the infusion of technology with the agricultural sector. In many cases technology, whether in its traditional form or in the modern version, has positively affected the agriculture and its allied sectors.

The paper is divided into four main sections. Section one provides a short introduction to the concept of technology in agriculture. Section two presents the recent Indian scenario of agricultural technology. Section three travels into the major thrust of the article i.e. the present state of agriculture of Darjeeling Hills and the need of modern technological methods for its further development. Finally section four comes up with the conclusion.

Technology in Agriculture

The word technology comes from Greek word, techno logia, techne meaning "art, skill, craft", and logia meaning "study of". That aspect of man's endeavors which we now call technology came about as the result of a slow drawing together of the practical skills of the craftsmen and the method of reasoning developed from a systematic investigation of nature i.e. science. This bringing together of practical skills and theoretical science

created applied science, this gradually became synonymous with technology.¹ Technology made its entry into human lives since pre-historic days with the discovery of fire and wheel. Technology was available in the primitive and raw forms and the passage of time converted them into sophisticated and highly advanced versions. Just like any other sector, technology is vital to agriculture and existed in practice centuries ago. The Sumerians, for instance, used sulphur to control insects and mites 5,000 years ago and copper has been used to control fungal diseases for centuries. Technology in agriculture can be seen in the form of traditional ploughing implements, practices and methods of production to the recent mechanized equipments, tractors, revolutionized irrigation, the advanced Information Technology and Bio-technology methods. Modern agricultural technology uses both the lab-sciences and space sciences to reap the optimum benefits. It is quite evident that the efficient and better productivity of agriculture depends on a good and appropriate dissemination of technological knowledge among the farmers. In the era of globalization and modernization, agricultural technology has become the agent of successful farms enhancing their income per hectare. The new technologies have resulted in efficient utilization of agricultural resources and factors of production leading to the cost-effective production. Together with this technological advancement it also contributes in agricultural marketing and transportation systems. The major kinds of present agricultural technology are as follows: Biotechnology, Pre and Post Harvesting Technology, Energy Saving Technology, Information and Communication Technology, GIS (Geographic Information System) and RS (Remote Sensing) technology, Internet/Intranet Technology etc.

Agricultural Technology in Indian scenario

Agriculture is the prime sector of India and one of the main sources of livelihood for the rural part. India holds topmost positions in the world in terms of production of cereals like wheat, rice, coarse grains and also in cash crops. Together with this, India is the number one producer of milk, livestock and certain fruits. The total geographical area of the country is 328.7 million hectares of which 141 million hectares is the net sown area, 190 million hectares is the gross cropped area. Recent data reveal that agriculture sector contributes around 17 percent of the Gross Domestic Product of the economy and constitutes around 52 percent of its workforce.

At the time of independence Indian agriculture was very much backward and subsistence in nature. Thus the Five Year-Plans took various steps to cure these problems in the form of land reform programmes, community development works and major irrigational projects. However the important breakthrough came with the introduction of new agricultural strategy in the mid-sixties that encompassed the use of modern techniques through the use of HYV (High Yielding Variety) seeds, pesticides and irrigation facilities. This led to the introduction of mechanized farming culture and sophisticated farm equipments. The new technology was very much limited to wheat and rice and also was initiated only in parts of Punjab, Haryana and Western U.P. The

1 G. Clews and R. Leonard, *Technology and Production*, New Delhi, Heritage Publishers, 1985, p 1

positive outcome of this initiative led to the Green Revolution whereby the nation witnessed a phenomenal increase in the production and productivity of crops especially in case of wheat and rice. Thus the farmers and policy makers realized the importance of technology in agricultural development. The new technology was extended to more parts of the country and to more areas in the 80s. In the Pre-green revolution period agricultural growth was attributed to area expansion but in the Post-green period the major reason was yield growth. However the major drawback of the green revolution phenomenon is its uneven impact upon the people and regions and crops. Similarly the introduction of BT (*Bacillus Thuringiensis*) technology in Cotton led to the doubling of cotton production from 15.8 million bales in 2001-02 to 31.5 million bales in 2007-08. Thus in recent years Govt. of India has realized the importance of biotechnology and hence more biotech crops are getting ready for the next technological revolution in Indian agriculture. Of late there is a growing realization that technologies should not be considered only in terms of its productivity raising powers but should also be guided by the norms of sustainable agricultural development without depleting the natural resources like soil quality, water table, food quality etc. Keeping in view this very fact, measures have been introduced in the form of Resource Conserving Technologies, Organic farming Systems, Laser Land leveling etc.

Technology also assists Indian agricultural production through the supply of modern infrastructures facilitating marketing and transportation systems. Government has played a supporting role with the introduction of Krishi Vigyan Kendras which are basic institutions for imparting knowledge on recent agricultural technologies and vocational training programmes to the farmers and rural poor. In the last two decades a major breakthrough has come in the form of application of Information Technology (IT). Following the emphasis put forward by the National Agriculture Policy 2000, for the use of information Technology in agriculture, the Department of Agriculture & cooperation (DAC) implemented a Central Sector Scheme for strengthening the agricultural information system. The DAC has developed four portals and 40 websites to provide information and services to the farming community on a number of specific subjects.² In recent years the Central Ministry of Agriculture has been making revolutionary decisions by using space technology in farming. Indian Space Research Organization (ISRO) launched the Village Resource Centres (VRCs) programme in association with the help of reputed NGOs/Trusts and state/central agencies and so far 473 VRCs have been set up in 22 states/union territories. In this scheme, ISRO has provided the necessary infrastructure to the selected organizations/ institutes in the field for video-conferencing of the technical manpower with the people in the rural areas. Farmers can interact with the scientist by interactive video conferencing from their villages. The Central Ministry of Agriculture has tried to establish an institutional mechanism in the form of the Agricultural Technology Management Agency (ATMA) at the district level under the Innovations in Technology Dissemination (ITD) component

2 H. C. Purohit, "Advancement of Information Technology and its impact on Agriculture Productivity", *Kurukshetra*, 57(2009)7, 20-24.

of the National Agricultural Technology Project (NATP) in 28 districts of seven states from 1998 to 2005.³ Thus agricultural technology is continuously getting attention from the Government side, resulting in various schemes and projects even though a lot of work needs to be done in this direction for better coverage and successful implementation.

Need of Agro-Horticultural Technology in Darjeeling Hills

Darjeeling is the northernmost hill district of West Bengal and is famous for its natural beauty. Tea and tourism are the major income earning sectors of the region with a small part of the population engaged in agriculture and its allied sectors,⁴ administrative jobs, military services, education etc. Agriculture and its allied sectors contribute in a very insignificant way and are still under the grip of conventional production patterns which have failed to produce marketable surplus. Nevertheless, this sector has a tremendous potential and possibilities to turn into a remunerative avenue for the population with the help of little upgradation in its production methods.

The total agricultural area of Darjeeling Hills is distributed among eight blocks viz. Bijanbari, Sukhiapokhari, Takdah, Kurseong, Mirik, Kalimpong-I, Kalimpong-II and Gorubathan Blocks. The Gross cropped area is 63,786.00 Hectares and the Net cropped area is 37,102.00 Hectares with the cropping intensity of 171.92%. The major part of the agricultural land is mountainous in nature with the exceptions in the parts of Kalimpong and Gorubathan blocks which is endowed with plain topography. The data collected from the Office of the Deputy Director of Agriculture (Admin) Darjeeling reveals the potential of the region in the agri-horticultural production. The next table shows the details of the area under different crops (measured in Acres) and their corresponding yield or productivity (measured in Quintals/ Hectare).

Area Under different crops in Darjeeling Hills

	Name of Crop	Area in Ha.	Yield (Qtl./Ha.)
Cereal Crops			
1.	Aman Paddy		
a.	H.Y.V.	3335.00	16.6 (clean R.)
b.	Local	666.0	12.0 (clean R.)
2.	Maize	27,380.00	22.0
3.	Millet	11,260.00	12.0
4.	Wheat	688.00	14.94
5.	Barley	507.00	13.0

3 H.R. Gautam and N.K. Bharat, "Lab to Land Initiatives in agriculture can fill technology gap", *Kurukshetra*, 61(2012)3, 45-48.

4 The allied sectors of agriculture include horticulture (including fruits and vegetables, flowers, and medicinal plants); fisheries, sericulture, livestock, dairy and poultry.

Potato			
6.	Winter Potato	1731.00	126.50
7.	Summer Potato	2395.00	102.50
Pulses			
8.	Maskali	625.00	6.25
9.	Soyabean	490.00	6.00
Oilseed			
10.	Mustard	231.00	6.25
Fruits			
11.	Mango	2.00	92.00
12.	Jackfruit	10.00	150.00
13.	Guava	43.00	144.00
14.	Orange	1972.00	157.00
15.	Other citrus fruits	79.00	76.00
16.	Banana	91.50	90.00
17.	Pineapple	33.00	152.00
18.	Other Fresh Fruits	341.00	179.00

Vegetable

Name of Vegetable		Bhadoi Vegetables		Winter Vegetables		Summer Vegetables	
		Area (Ha)	Yield (Qt/Ha)	Area (Ha)	Yield (Qt/Ha)	Area (Ha)	Yield (Qt/Ha)
19.	Brinjal	38.00	84.63	26.50	69.90	50.00	78.80
20.	Lady's Finger	35.00	77.85	20.00	21.75	71.00	54.40
21.	Spinach	15.00	64.66	98.00	115.15	37.00	112.86
22.	Other Leafy Vegetables	37.00	67.00	302.00	114.00	42.00	175.00
23.	Cucumber	43.00	120.90	52.00	173.00	100.00	169.00
24.	Pumpkin	50.00	150.70	100.00	168.00	135.00	125.40
25.	Other Guards	35.00	95.00	80.00	59.25	125.00	140.00
26.	Cauliflower	95.00	74.80	259.00	78.50	205.00	141.21
27.	Cabbage	65.00	76.34	225.00	78.50	205.00	141.21
28.	Khhol-Khol	-	-	21.00	62.33	-	-
29.	Tomato	65.00	53.89	84.00	42.40	43.00	124.21
30.	Beet	06.00	44.00	21.00	87.10	15.00	70.00
31.	Carrot	90.00	43.88	84.00	114.30	145.00	85.86
32.	Turnip	-	-	17.00	129.00	-	-
33.	Radish	160.00	145.31	103.00	88.40	240.00	150.52
34.	Onion	28.50	49.48	31.00	54.40	23.50	79.29

35.	Sweet Potato	15.00	55.00	41.00	43.10	19.00	53.15
36.	Other Root Crops	32.00	43.43	35.00	87.05	10.00	35.00
37.	Garden Pea	43.00	25.27	250.00	89.00	190.00	50.26
38.	Other Green Beans	72.00	80.55	240.00	123.00	155.00	69.35
39.	Other Veg. Flowers	-	-	30.00	122.00	20.00	55.00

Source: Surya Kumar Thapa⁵

From the information provided by the above tables it is quite clear that the region is engaged in the variety of food crops, vegetables and fruits. In case of potatoes, oranges, pineapple, fresh fruits, leafy vegetables, cucumber, garden peas and green beans, the productivity rates are encouraging. However cereals pulses and oilseeds show dismal performances. Compared to other states and districts of India especially the hill districts, the agriculture of Darjeeling District are technologically backward. Nevertheless one can figure out that the region has good possibilities in horticulture sector which if revived properly can prove to be profitable.

The agricultural lands are highly fragmented and marginal in nature and over the years the quality of soil has depleted. Thus in order to improve agro-socio-economic condition in the hills, modified technology is the need of the hour. For a balanced regional development upgradation of all the sectors is indispensable and one way to achieve this is to take help of technology. Over the years, it is quite evident that the number of people engaged in cultivation is fast decreasing as they are not getting enough incentives to carry on their work on farms. As a result one can encounter an increasing number of casual labourers in the rural areas. Another growing trend of the region is mass exodus of people in the working age group in the form of inter-state and inter-nation migration. The only solution is creating employment opportunities in all the sectors and in this connection agriculture too holds a huge potential.

Thus enhancing and developing agriculture through technology can effectively lead to the increase in income generating capacity of this sector in the hills. Central Government has taken various steps for technology dissemination in the district and one such step is the establishment of Krishi Vigyan Kendra for the district in Kalimpong. For further technology transfer in agro-horticulture the following key areas can be focused:

Modern equipments: Farm equipments which are best suited for mountain agriculture can be introduced in the region. Improved ploughing machines, light power tillers, light-weight equipments which matches terrace farming can be supplied at subsidized rates to the farmers.

⁵ Agricultural Technology Assistant, Office of the Deputy Director of Agriculture (Admin) Darjeeling, 26th December, 2012.

Irrigation: There is a need of proper irrigation for the hill farming and hence technologies should be developed for extending micro and medium scale irrigation projects for the hills.

Regional Research Centres: Modern science and technology can become fruitful through the establishment of regional research centres for developing local agricultural, horticultural and medicinal plants which ultimately would result in income raising avenues for the local farmers.

Adopting Biotechnology: Commercialization of agriculture is totally possible if the crops can bear the harshness of nature and protect themselves against pests and insects. Thus introduction of biotech crops, vegetables and flowers which are resistant to these harms can be introduced.

Post-harvest technology: Though the exact figures cannot be presented here but it is quite evident that the hill farming loses a huge percentage of its production of fruits and horticultural items due to poor storage and transportation facilities. This calls for the introduction of technologies that can arrest the post-harvest problems faced by the local farmers and increase their profits.

Adopting Information and Communication technology: The Central Ministry of Agriculture has established agencies like ATMA (Agricultural Technology Management Agency) and FIAC for delivering technology related information to the farmers. These agencies should be empowered and strengthened to function more effectively. Regional radio, television channels and newspapers should be actively used for mediating information. The farmers should be well sensitized on the issues related to soil health; inputs like seeds, fertilizers, pesticides etc; government schemes; credit and market information.

Technology dissemination through regular Workshops, Self-help groups, and NGOs: In order to have the faster rate of technology dissemination, workshops and demonstrations can be conducted at regular intervals. For this, the local Self-help groups, NGOs and other Government organizations can be engaged. These kinds of activities might motivate the farmers to use new technologies for better productivity.

Conclusion

The importance of technology in agriculture cannot be denied and for drawing the full benefit of farming it is indispensable. Allied sectors such as horticulture, floriculture, livestock, dairy etc are turning up as very profitable businesses and since Darjeeling is rich in production of some of the varieties of these items, the filling of technological gap in these sectors is definitely going to improve the district's economy. One major challenge is to identify the main farming areas within the district that has scope of significant improvement and then applying on them the required knowledge and technique for reaping maximum benefits. However the technological development that takes place should be weighted on its sustainable character. Technology if mixed

with right marketing and finance policies can do wonders for the agriculture side reducing cost of production. Finally it will break the widely existing misconception that Agriculture in hills is not happening and the hills will also start telling the successful farm stories.