

CHAPTER 7

SUMMARY, CONCLUSIONS AND SUGGESTIONS

7.1 Summary

India has made impressive strides on the agricultural front during the last three decades. Development in agriculture has made India self-sufficient in food grains and a leading producer of several agricultural commodities in the world. Much of the credit for this success should go to the several million small farming families that form the backbone of Indian agriculture and economy. Policy support, production strategies, public investment in infrastructure, research and extension for crop, livestock and fisheries have significantly helped to increase food production and its availability. During the last 30 years, India's food grain production nearly doubled from 102 million tones in the triennium ending (TE) 1973 to nearly 203 million tones (mt) in the triennium ending 2000. Virtually all the increase in the production resulted from yield gains rather than expansion of cultivated area. Availability of food grains per person increased from 452 gm/capita/day to over 476 gm/capita/day, even as the country's population almost doubled, swelling from 548 million to nearly 1000 million.

The increase in productivity may be attributed to the introduction and adoption of HYV seeds, proper irrigation, fertilizer application, plant protection measures, multiple cropping etc. The green revolution in crops, yellow revolution in oil seeds, white revolution in milk production, blue revolution in fish production and golden revolution in horticulture bear an ample testimony to the contribution of agricultural research and development efforts undertaken in the country. During the year 1999-2000, as many as 47 varieties of different crops were released. (Indian Economic Survey, 2000-01). Therefore, agricultural researches have shown immense possibilities for increasing the productivity of agricultural commodities. India is, now, by no longer an exporter of traditional agricultural commodities like tea, jute and coffee, but a large varieties of agricultural commodities like cereals, spices, tobacco, cashew, oil meals, marine products and many other are being exported from

India and earning valuable foreign exchange. Development of agriculture, particularly during the green revolution and post-green revolution is very much impressive. Between 1947-50 and 1997-98, index (base 1980-81) of agricultural production increased from 4.9 to 176, index of food grains from 52 to 161 and non-food grains from 45 to 201. Index of per hectare yield (all crops) increased from 74 to 149. Between 1950-51 and 1994-95 gross cropped area increased from 132 million hectares to 188 million hectares implying a rise in cropping intensity from 111 to 132. Gross irrigated area went up from 23 million hectare to 71 million hectares.

Between 1950-51 and 2001-02, distribution of improved seeds increased from negligible to 65 lakhs quintals. Fertilizer use increased from only 69 thousand tones to 19,306 million tones with per hectare fertilizer use going up from negligible to 95 kgs. Pesticides use increased from 2.4 thousand tones to about 60 thousand tones. Consumption of electricity in agriculture went up from 15200 million KWH in 1981-82 to about 86000 million KWH in 2001-02. Institutional credit (Cooperative Societies, Commercial Bank and Regional Rural Banks) was 28653 crores in 1996-97 as compared to 66,771 crores in 2001-02. (Source: Economic Survey, 2002-03 and Agricultural Statistics at a Glance, Govt. of India, 1998).

Despite the tremendous development in agricultural sector, there is still ample scope for agricultural produce to get expanded. For stepping up agricultural production, new agricultural technology must be developed and diffused to the farmers so that they may accept it and make use for enhancing agricultural productivity. It has, however, been observed that agricultural innovations like HYV seeds, chemical fertilizers, irrigation, plant protection measures etc. are not adopted by the farmers belonging to different strata of holdings like small, medium and large to the same extent. It has been observed that it is the large farmers who are found in advantageous position in adopting agricultural technology to a considerable extent. But still rate of adoption of new agricultural technology even by the large farmers has not been uniform across the states within the Indian territory. Adoption rate is fairly high in green revolution regions than the non-green revolution regions. State

of Assam, where green revolution is yet to have its full scale start, lagging behind in terms of adoption of new technology in agriculture even by the large farmers. Agricultural technology to be a total success requires its adoption by all types of farmers. But it has been observed that farmers belonging to scheduled tribes (i.e., tribal farmers) who also constitute a sizable portion of Indian agricultural community is lagging behind very much in the race of adoption of technology in agriculture. It is also observed that small and marginal farmers who constitute bulk of the farming community in India are lagging behind in the adoption of modern technology in agriculture than the large farmers. The main factors that stand on the way of adopting new innovation in agriculture are: small operational holdings, low income, lack of assured irrigation, lack of education, lack of institutional credit to purchase agricultural inputs, low price of agricultural produces etc.

The average size of holdings in India is only 1.31 ha. More than 76 percent of holdings own less than 2 ha. each. It is the small and medium farmers who share this small holdings but they constitute more than 70 percent of farming community. Small farmers with their small holding size and meagre income cannot afford to adopt fully improved agricultural technologies in their farming operations. Since agricultural inputs like HYV seeds, chemical fertilizers, pesticides, modern agricultural implements all are costly, their incomes fall short of purchasing these inputs. Moreover, small farmers find their holding size uneconomical in using many agricultural inputs like machines and tools which are important for modernization and mechanization of agriculture. It has been found that economic status and education level of farmers, irrigation facility, credit facility, other infrastructural facility, healthy market system are the main determinants of the adoption of new technology in agriculture. Poor economic condition and low education level along with institutional credit constraints, irrigation constraint, power constraint, low price constraint, market constraint, extension service constraint, cold storage constraint, knowledge constraint etc. create high cost of production for most of the farmers especially for small and the medium farmers. Large farmers as well as some medium farmers who have marketable surplus are also hard hit by fluctuating agricultural

prices and more pronouncedly by low prices and by paucity of labour during the peak season. Due to the existence of these constraint factors, adoption of technology by tribal and non-tribal farmers in the district of BARPETA has been slow and interrupted and the degree of adoption of new technology has been different among large, medium and small farmers.

7.2 CONCLUSIONS

On the basis of results of present investigation, the following conclusions may be drawn:

- (a) Most of the farmers, including of course small and medium farmers, are increasingly adopting new technology in agriculture. Income of the farmers, after adopting new culture practice has increased significantly than before. The farmers of the district under investigation are greatly influenced by modern technology and on the other hand, their dependence on modern technology has been increasing day by day. Most of the farmers, particularly non-tribal farmers, had the favourable attitude towards the adoption of new agricultural practices. Majority of them are acquainted with the components of new agricultural technology such as HYV seeds, irrigation, fertilizer, plant protection measures, modern agricultural implements like power tiller, pumpsets, spraying machine etc.
- (b) Though most of the farmers in the study area are increasingly becoming modern agricultural technology minded, rate of adoption of technology by tribal farmers is much more lower than their non-tribal counterparts. It is the traditional outlook, illiteracy, lack of effective extension service about latest technology among the tribal farmers and comparatively larger holding size of majority of tribal farmers that are found working as impeding forces to adoption of modern agricultural technology.
- (c) This study revealed that most of the farmers belonging to all categories in BARPETA district were increasingly using HYV seeds for which production of rice and vegetable has increased manifold in recent years. This investigation

in Barpeta district found that use of fertilizers and irrigation was becoming a popular practice among the farmers of all categories. Not to speak of large farmers, even some small farmers were found having some agriculture machines and implements like pumping sets, spray machines etc. During field investigation, many farmers were found to begin using pumping sets as source of irrigation and this reduced their dependence on govt. irrigation which is insufficient and inconvenient for beneficiary farmers. After this investigation it can be concluded that all group of farmers are in the way of adoption of new technology though some strong socio-economic problems are present there.

- (d) Lastly, we may conclude that since modernization and mechanization of agriculture through adoption of new agricultural practices is the only way to stepping up agricultural production, farmers irrespective of their caste, land size, income and level of education should leave traditional agriculture practices and should and must resort to improved agricultural practices to the extent possible for them.

7.3 SUGGESTIONS

On the basis of above analysis, the following policy measures can be suggested for adoption of new agricultural technology:

1. High yielding variety (HYV) seed is the first and basic component of new agricultural technology. Therefore, better quality of HYV seeds should be made available to the farmers through government agencies as well as private dealers at affordable prices. Sometimes, many private dealers are found selling inferior quality of seeds assuring the purchasing farmers of better results. But use of such seeds proves to be low productive and as such using farmers suffer losses. In such cases, government should take exemplary punishment against such dealers so that they do not get involved in such immoral practices in future. Of course, farmers, themselves should be

aware of such practices on their own and should report about such practices for proper steps.

2. The major cultivable area in Barpeta district is rain-fed area and water logging is common event particularly in rainy season. Sometimes crops of dwarf variety are submerged under water rendering crop fields unremunerative. Hence attempt should be made to evolve and supply tall variety of HYV seeds suitable for rain-fed area.
3. HYV technology for its success depends on inputs like fertilizer, irrigation, plant protection chemicals and some modern implements. Adequate arrangement should be made to supply these inputs well before the on set of the season at a reasonable rate or at a subsidized rate especially for poor farmers.
4. Modern agricultural technology is designated as seed-cum-fertilizer technology. In fact, HYV seeds can give higher yields only when recommended dose of fertilizer is used. But many illiterate farmers do not know about the dose to be used. Therefore, efficacious and judicious use of fertilizer should be initiated through extension worker and various media for the farmers. In this respect N.G.O.s can be made involved to educate the farmers about proper use of HYV seeds and fertilizer.
5. Assured irrigation is a must for HYV technology and it comprises an important part of modern agricultural technology. Recent experiences show that government canal irrigation has failed and it is shallow-tube well, pump set irrigation which is increasingly being used by farmers of all categories as source of irrigation. But small and marginal farmers can hardly afford to purchase costly pumpsets due to their poor economic condition. Therefore, arrangement should be made to supply pumping sets at subsidized rate especially at high subsidy for small and marginal farmers.
6. Hours of electricity supply to tube-wells and pumping sets in the villages should be increased at the convenience of farmers.

7. Supply of electricity to tube-well and pumping sets is inadequate and erratic. Most of the farmers using pumping sets have to use diesel as fuel. But due to high price of diesel, many farmers particularly small farmers cannot afford to purchase the required amount of diesel for fueling their pumpsets (as was reported by many farmers during field survey). It may be suggested that a differential pricing system favouring the farmers should be introduced.
8. In addition to the use of chemical fertilizers, farmers should be encouraged to use organic and compost manure. It is the organic and compost fertilizer and not the chemical fertilizers that can retain the original fertility and productivity of land. India is endowed with various forms of naturally available organic forms of nutrients in different parts of the country. These include green manure, crop residues, farmyard manure, biogas slurry, animal and human excreta, compost, vermin compost bio-fertilizer etc. Village level extension worker with necessary training should take responsibility of educating the farmers about organic and compost manure.
9. Field investigation revealed that excessive and non-judicial use of plant protection chemicals has resulted in environmental pollution. Residue of DDT, aldrine, lindane etc. have been found in different food samples (Bhattacharya and Bihari, 2003). Having taken cognizance of hazards associated with pesticides, emphasis should be given on biological pest management. This can be done either through cultural, biological or organically accepted chemical alternatives.
10. The concept of food quality has changed during the recent years. Increasing number of consumers in developed and developing countries are becoming more health conscious. They have been spending on greener, healthy and natural food products. The international market for organic foods are expanding specially in U. S. A., Europe and Japan. Our country is uniquely placed for organic cultivation due to various agro-climatic regions. Assam being a rain-fed area has good opportunities to take up production of organic food for export and consumption locally.

11. To minimize the harmful impact of rain-fed farming, making forecast of rainfall and fore warning of pests and diseases to the farmers, as suggested by the Swaminathan Committee (2003), may be beneficial to the farmers.
12. To uplift the economic conditions of the poor farmers, their investment needs for modern agricultural technology shall have to be fulfilled through institutional finance. Some more branches of Commercial Banks are to be opened particularly in rural areas to minimize the number of population covered by each branch. Efforts should be made to enhance the present poor credit deposit ration in the survey area by extending more credit to the people. Attempt should be made to prompt delivery of the loan amount to the applicants by simplifying the loan formalities. The existing credit facility is more or less asset based and many farmers having no collateral are denied credit facilities. Therefore, a procedure of need based and asset free credit facilities should be introduced on preferential basis.
13. There are several programmes sponsored by government to promote adoption of improved technologies such as watershed development programme, artificial insemination programme, drought prone area programme etc. But many farmers do not have the information of these programmes. Therefore, effective measures should be taken for disclosing those programmes to the farmers.
14. Adoption and efficient utilization of technology depends upon the knowledge and education of the farmers. Majority of our farmers are still ignorant and illiterate and to a considerable extent they are governed by traditional belief. Government should provide more education facilities on the preferential basis for the farmers.
15. A special cell should be established at the village level to look into the socio-economic problems of small and marginal farmers and to make all efforts to raise the standard of living of the unviable farmers.

16. The actual reasons for slow spread of adoption of agricultural technology is that new innovations are not communicated properly to the farmers and interior villages. Field investigation showed that almost cent percent tribal small and medium farmers were not aware of new innovations, i.e., new innovations are not disseminated among them. Many farmers particularly tribal small farmers reported that they had not even heard the name of village level extension workers. The main reason as was found during field investigation, of slow adoption of new agricultural technology by the tribal farmers is lack of effective dissemination of new agricultural technology. Demonstrations of improved agricultural technology should be made broad based and that small and medium farmers rather than large ones should be selected for demonstration. Village level trained extension worker should be made responsible for carrying out practical work in these decentralised demonstration. Recently some NGOs are seen to have formed in some villages. NGOs with necessary training can also be made involved to disseminate new innovations among the farmers of their respective areas.
17. There is need to establish proper coordination among all the extension agencies working for the welfare of the farmers so that all the isolated efforts are pooled together in a more effective manner.
18. As many other fields of development, in the field of agricultural marketing also, we find ourselves in a vicious circle. Since agriculture in this region has been still more or less at a subsistence level with small surplus for sale, agricultural marketing system has not properly developed. But, unless an efficient marketing system comes about, it will be difficult to lift the region's agriculture above the existing subsistence level and commercialization of agriculture can never be promoted. An efficient marketing system has direct bearing on the growth and diversification of agricultural products.
19. Creation of proper storage facilities has a greater dimension in the context of post harvest loss of some agricultural products like food grains, vegetables etc. The percentage of post-harvest loss of food grains in the North Eastern

Region is believed to be higher than the estimated national average of 9.33% due to frequent natural calamities and absence of proper warehouses (Das, 1989). Therefore, provisions of storage/cold storage facilities for food grains and vegetables should receive greater attention. As the vegetables are highly perishable in nature, apart from careful handling and quick transportation, these need good storage facilities. Commercial cultivation of vegetables with refrigerated storage and processing facilities and scientific marketing would go a long way in encouraging the commercial vegetables growers to produce more to meet domestic requirement.

Marketing reform ought to be an integral part of any policy for economic development. Marketing is as important for better performance in agriculture as production effort itself, since only through adequate marketing facilities, producers will be encouraged to produce surplus for sale. For generating investment in agriculture and other sectors, there is need for saving in the rural sector. Unless there is surplus for sale, it will be difficult to ensure savings to generate investment in rural sector. Only through provision of efficient marketing facilities, it will be possible to sell the surplus produce at remunerative prices. And in this context, it will be appropriate to quote a few lines from Dr. Dubhashi: “ after all, mere increase in agricultural production is neither the goal of the planner nor of the producer. Indeed production is not complete till it reaches the consumer and agricultural producer will not be rewarded unless the consumer buys it and pays an adequate price for it. The process of production ends only with final consumption and it is marketing which provides a link between production and consumption.”

We can hope that if the suggestions offered are followed farmers will be benefited to a great extent through the accelerated growth of agricultural productivity.