Study of Organic Cultivation in Sikkim

By

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Foreword

Organic Farming is recommended for being a more sustainable form of agriculture. With increasing hazards caused by the use of chemicals in present day farming, alternative methods are the need of the hour. Organic farming utilizes simple techniques, with barely any harmful consequences to the environment while reducing health risks to consumers. Organic farming is gaining popularity worldwide and there is a mounting demand for organic products in the market.

Sikkim is the first State of India to officially announce adoption of Organic Farming in the year 2003 and the only State of India to convert entire State into organic (other north eastern States are in the process of converting to organic). Organic farming has been a traditional way of farming in Sikkim adopted by farmers since ages. Sikkim is rich in biodiversity with abundant plant species because of which the soil is rich in organic matter content and makes the conversion easier.

The present Study on organic cultivation in Sikkim, which was conducted by Shri. B Sathish Rao, Faculty Member of NBSC has come out with recommendations for StateGovernment, farmers, banks and NABARD. The report has made recommendations on the need for encouraging organic farming in other select States/ districts.

We hope that the study findings will be of use to various stakeholders in Sikkim who are involved in propagation of organic farming. The implementation of the action points will facilitate further development/ spread of organic cultivation in the State.

Dr. P J Ranjith
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Contents

Disclaimer

This Study Report has been prepared by B Sathish Rao, Faculty Member, National Bank Staff College (NBSC), Lucknow based on the field study conducted by him from 27 to 31 March 2017 in Sikkim. The views expressed in the report are that of the author. It does not necessarily represent or reflect the policy or view of National Bank Staff College (NBSC) or National Bank for Agriculture & Rural Development (NABARD). NBSC and NABARD accept no financial liability or any other liability whatsoever to anyone using this report as also for the accuracy of facts and figures quoted in the report.

Executive Summary

India is the second most populous country in the world. With the increasing population, the cultivable land resource is shrinking day by day and the demand for land from other sectors is also continuously increasing. Further, to meet the food, fibre, fuel, fodder and other needs of the growing population, the productivity of agricultural land and soil health need to be improved and this needs concerted efforts.

In India, only 30% of total cultivable area is applied with fertilizers where irrigation facilities are available and in the remaining 70% of arable land, which is mainly rain-fed, negligible amount of fertilizers is being used. Farmers in these areas use organic manure as a source of nutrients that are readily available either in their own farm or in their locality. The North Eastern Region (NER) of India (also many backward tribal hilly areas) provide considerable opportunity for organic farming due to least utilization of chemical inputs. It is estimated that 18 million hectare of such land is available in the NE, which can be exploited for organic production. With the sizable acreage under naturally organic/default organic cultivation, India has tremendous potential to grow crops organically and emerge as a major supplier of organic products in the world organic market.

Organic agriculture with low-cost of production will have direct impact on Indian agricultural trade in global market. The application of resource conservation technology for the reduction in input application without sacrificing the yield should be the future target in technology development and its demonstration. The technology for converting waste into compost has been developed but it needs refinement and large-scale verification for which provision of funds is required. This step would help in organic farming, reducing the cost of cultivation and improving the soil health. For increasing the productivity of cropping systems, integrated use of fertilizers and Farm Yard Manure (FYM) is one of the better options. However, plant

breeder would have to develop varieties which respond to the integrated use of FYM, green manuring, fertilizers etc.

Sikkim is the first State of India to officially announce adoption of Organic Farming in the year 2003 and the only State of India to convert entire State into organic (other north eastern States are in the process of converting to organic). Organic farming has been a traditional way of farming in Sikkim adopted by farmers since ages. Due to unavailability of assured irrigation, farmers practice rain-fed farming system with an integrated approach and Integrated Farming System is predominant in the State with agriculture, horticulture and animal husbandry in perfect coordination. Sikkim is rich in biodiversity with abundant plant species because of which the soil is rich in organic matter content and makes the conversion easier. The total geographical area of the State is 7, 29,900 hectares out of which farming is done in about 74,303 hectares. The main crops are maize, rice, buckwheat among cereals, black gram & rice bean among pulses, soybean and mustard among oilseeds. The main horticultural crops are orange & pears among fruits, ginger, cardamom, turmeric and cherry pepper among spice crops, cole crops, peas & bean, tomato, potato among vegetable crops. Besides, production of potato & pea seeds at high altitude and off season vegetables cultivation is done extensively. Of late, cultivation of flowers like cymbidium (boat orchid), rose, gerbera, and anthurium is generating good income to farmers and a large number of farmers have adopted floriculture as a commercial venture.

Government has initiated various measures like Internal Control System (ICS) development through Service Providers, certification through APEDA accredited certification agencies, incentives for adoption of Organic Farming, on farm production of Inputs, off farm certified inputs, large scale awareness and training programmes, market linkage development and branding with logo.

There are number of issues related to organic which confront its adoption like low yield compared to traditional methods, incidence of pest and disease infestation, certification and profitability, etc. However, the situation in Sikkim is different as compared to other States in the plains with regard to prevalent cultivation practices prior to launching of the programme. It has certain inherent advantages like average fertilizer consumption is just 7 kg/ha and negligible pesticide consumption, soil is

rich in organic matter content which ranges from 2-7 % organic carbon, more than 15,000 ha area is under cardamom with forest cover where fertilizer and pesticides have never been applied, agricultural operations are carried out only in 10.20 % of the total geographical area and 89.80% of the area has not been touched and affected by chemicals.

In view of the unique features of organic farming in Sikkim, a study was undertaken.

Based on the study findings, following suggestions are made for different stakeholders:

StateGovernment Policies

i. There is a need to introduce the crops consumed by the local community (like buckwheat, millets, etc.) and this will help both farmers and the local consumers.

ii. Organic cultivation without dairy is not a sustainable proposition. The StateGovernment may encourage dairy activities. In due course, organic milk can be sold outside the State with premium.

iii. Every farmer may be provided with a portable plastic bio-gas unit and this may take care of manure, septic tank for toilets and cooking gas requirements.

iv. Each farmer may be provided with minimum two kilogram of earthworms so that he can convert all organic wastes to vermi-compost and use the manure without much loss of nutrients.

v. The StateGovernment should invite private organic manure and bio- pesticide suppliers to the State so that farmers can get the required supply of inputs (on commercial basis).

vi. There is a need to introduce more number of crops in different regions depending on suitability. In new crops, the Government may buy the produce (either for seed material or marketing the produce). This will boost the confidence of farmers. There is a need to introduce contract farming in non-traditional crops and allied activities.

vii. As on date, the farmers are not able to use the certification for getting premium. They may get better premium, if the produce has organic certification and is sold outside the State.

viii. In tourism sector, organic dishes and Sikkim organic produce also should be popularised through advertisements.

Farmer

(i) The farmers need motivation to grow different crops and sell them outside for better realisation of value.

(ii) If new crops (like pulses, millets, etc.) are introduced, the local community may get balanced nutrition. Similarly, other vegetables (like broccoli,iskus, etc.) may also be introduced to make available these vegetables to the local community.

(iii) As there are more of small and marginal farmers, to make viable commercial units, some of the activities (application of bio-pesticides, marketing, etc.) may have to be done on group basis.

(iv) There is a need to promote seed villages to increase the area under specific crops. This may help to improve quality of seed material.

Government agencies

a) Dairy and other livestock need to be encouraged on a large scale. This will address the issue of manures and also supplementary income to farmers.

b) There are issues of toilets in rural areas. Provision of toilet with plastic bio-gas units may help to recycle the human, animal and plant waste.

c) The concerned agencies (KVK, Agriculture and Horticulture Depts.) should address the problems of diseases and pests through organic approved modes. The organic bio-pesticides should be made available on cluster basis.

d) Organic cultivation require proper crop rotation, multi- cropping and diversification. The concerned agencies may have to plan and train farmers accordingly.

e) There is good scope for introducing more number of crops in the categories of tubers, spices, fruits, vegetables, etc.

NABARD

(i) The organic cultivation provides scope for helping some of the MPCSs(Multi Purpose Credit Societies) to construct storage facilities, initial processing facilities, etc., so that farmers can wait for better price.

(ii) There is need for processing the produce as value added products fetch better price. NABARD and StateGovernment may work together for promoting value addition. The StateGovernment may route the subsidy through banks and NABARD may help institutions like MPCS, FPOs, etc., get bank credit (even through NABKISAN).

(iii) SIMFED can be supported through NIDA for creating infrastructure for collection centres, storage facilities, processing facilities, etc. This is profit making subsidiary of the StateGovernment.

Marketing

a. There is a need to encourage the agricultural produce consumed by the local community to reduce the expenditure on non- local food items.

b. The StateGovernment may purchase the produce (like ginger, turmeric, etc.) during the harvesting season and later can auction to the non- local buyers.

c. The farmers may be encouraged to form SHGs, JLGs and Producer collectives and they may be given support for collecting, cleaning and grading of the produce.

d. SIMFED may set up more outlets outside the State to sell Sikkim organic produce. SIMFED may be provided support for collection, aggregation and transport of organic produce from villages.

e. The StateGovernment may encourage contract farming and bring big players (including exporters) to the State.

Storage, processing and value addition

a. There is need to construct cold storage facilities at block level so that the farmers or aggregators can store the produce for some time.

b. There is also need for rural godowns to store foodgrains (like buckwheat, maize, etc.) for reducing the losses.

c. Farmers/ JLGs/ SHGs may be encouraged to go for primary processing (like washing), grading and packing. The StateGovernment may create infrastructure and the concerned group may maintain by charging minimum charges from farmers.

d. Processing units in private sector should be encouraged for processing, packing, branding and marketing, both within and outside India.

The study shows that farmers are happy with the decision of StateGovernment. However, there is a need for backward integration (for supply of organic manures and bio-pesticides) and forward integration (especially marketing outside the State for premium price for organic produce). Further, there is need for value addition and processing, leading to better realisation of organic value and local employment. There is also a need for introducing more crops and crop diversification. Multi-cropping may help the farmers in reducing risk. There is need to involve banks, farmers, farmers organisations and Government agencies in decision making process. Sikkim may provide a lot of insights to other StateGovernments, who are interested to be declared as organic States.

I. INTRODUCTION

Need for Organic Agriculture

India is the second most populous country in the world. With the increasing population, the cultivable land resource is shrinking day by day and the demand for land from other sectors is also continuously increasing. Further, to meet the food, fibre, fuel, fodder and other needs of the growing population, the productivity of agricultural land and soil health need to be improved and this need concerted efforts. Green revolution in the post-independence era has shown path to developing countries for self-sufficiency in food but sustaining agricultural production against the finite and dwindling natural resource base demands shifting from the “resource degrading” chemical agriculture to a “resource protective” biological or organic agriculture. Green revolution technologies such as greater use of fertilizers and pesticides, adoption of nutrient-responsive, high-yielding varieties of crops, greater exploitation of irrigation potentials etc. have boosted the production output in most cases. However, continuous and indiscriminate use of these high energy inputs led to decline in production and productivity of various crops as well as deterioration of soil health and environments.

Need for Organic Vegetable Cultivation

The vegetable crops have been well advocated in solving the problem of food security and balanced nutrition. They are rich source of minerals, vitamins, fibre (preferred by many health conscious consumers) and contain a fair amount of protein as well as carbohydrates. In addition to local market demand, vegetables have the potential for both domestic and export market. The vegetable production of our country before independence was merely 15 million tonnes and the same was about 162.96 million tonnes during 2013-14 (Horticultural Statistics at a Glance 2015, GoI). Due to

increase in population and improvement in living standards, the demand for vegetables is ever-increasing. The solution for feeding the population is in vertical expansion, multi- layered cropping or by increasing the productivity per unit area per unit time as the full potential of available land and water resources and of technology still remain unexploited. Our strategy should be to produce more vegetables from less land, less water with less pesticides which will be less detrimental to soil, environment and consumers. Organic vegetable cultivation offers one of the most sustainable farming systems with recurring benefits. As some of the vegetables are eaten without cooking, many consumers with awareness of pesticide residues prefer organic vegetables over normal vegetables. Market for organic products is growing at faster rate (20%) as compared to conventional ones (5%). This growth rate is highest in Japan, USA, Australia and EU. Export potential for organic vegetables offers great scope to India which has inculcated the art of organic farming (especially by tribal farmers) since time immemorial.

Basics of organic cultivation

The basic concepts behind Organic farming are:

i. It concentrates on building up the biological activity and fertility of the soil so that the crops take the nutrients they need from the steady turnover within the soil Nutrients produced in this way are released in harmony with the needs of the plants.

ii. Control of pests, diseases, and weeds is achieved largely by the development of an ecological balance within the system and by the use of bio-pesticides and various cultural techniques such as crop rotation, mixed cropping and cultivation practices like summer ploughing.

iii. Organic farmers recycle all wastes and manures within the farm but the export of the products (like low- priced produce, crop residues, cow-dung, etc.) from the farm results in a steady drain of nutrients. This is good taking into account climate change issues.

iv. In a situation, where conservation of energy and resources is considered to be important, community or country should make every effort to recycle all

urban, rural and industrial wastes back to agriculture and thus the system would need only small dose of inputs of new resources to “top up” soil fertility

Characteristics of Organic Farming Systems

Management of Organic farming is focused on the whole farm system and its interactions with climate, environment, society as well as economic conditions, rather than considering the farm as an independent enterprise. The key characteristics of Organic Farming include:

i. Protecting the long-term fertility of soils by maintaining organic matter levels, soil biological activity and careful minimum mechanical intervention.

ii. Nitrogen self-sufficiency through the use of legumes and biological nitrogen fixation, as well as effective recycling of organic materials, including crop residues and livestock wastes.

iii. Weed, disease and pests control relying primarily on crop rotation, natural predators, crop diversity, organic manuring, use of resistant varieties and limited thermal, biological and chemical intervention. Supplementing crop nutrients, where necessary, by using nutrient sources which are made available to the plants indirectly by the action of soil micro- organisms (Phosphobacteria, Azospirillum, etc.,) and chemical reactions in the soil.

iv. The extensive management of livestock, paying full regards to their evolutionary adaptations, behavioural needs, and animal welfare issues with respect to nutrition, housing, health, breading and rearing.

v. Careful attention to the impact of the farming system on the wider environment and the conservation of wildlife and natural habitats.

Options in Organic Farming:

There are three options going for Organic Farming to alleviate the problems caused by conventional inorganic farming systems. They are:

a. **Pure Organic Farming**: This accounts complete exclusion of inorganic fertilizers and pesticides, but advocates the use of organic manures and biological pest control methods.

b. **Integrated Green Revolution Farming**: Under this option, the basic trends of the green revolution such as intensive use of external inputs, increased irrigation, development of high yielding and hybrid varieties as well as mechanizations of labour are retained with much greater efficiency on the use of these inputs with limited damage to the environment and human health. For this purpose, some organic techniques are developed and combined with the high input technology in order to create Integrated Systems such as, "Integrated Nutrient Management" (INM), "Integrated Pest Management" (IPM) and biological control methods which reduce the need for chemicals.

c. **Integrated Farming System**: This option involves low input organic farming in which the farmers have to depend on local resources and ecological processes, recycling of agricultural wastes and crop residues. Hence, improving the quality of life and ensuring the reduction in depletion of natural resources in farming system, results in viable and sustainable agriculture production.

Organic Farming in India

In India, only 30% of total cultivable area is applied with fertilizers where irrigation facilities are available and in the remaining 70% of arable land, which is mainly rain-fed, negligible amount of fertilizers is being used. Farmers in these areas use organic manure as a source of nutrients that are readily available either in their own farm or in their locality. The North Eastern Region (NER) of India (also many backward tribal hilly areas) provide considerable opportunity for organic farming due to least utilization of chemical inputs. It is estimated that 18 million hectare of such land is available in the NE, which can be exploited for organic production. With the sizable acreage under naturally organic/default organic cultivation, India has tremendous potential to grow crops organically and emerge as a major supplier of organic products in the world organic market.

Technologies for Organic and Low Cost Agriculture

Organic agriculture with low-cost of production will have direct impact on Indian agricultural trade in global market. The application of resource conservation technology for the reduction in input application without sacrificing the yield should

be the future target in technology development and its demonstration. The technology for converting waste into compost has been developed but it needs refinement and large-scale verification for which provision of funds is required. This step would help in organic farming, reducing the cost of cultivation and improving the soil health. For increasing the productivity of cropping systems, integrated use of fertilizers and FYM is one of the better options. However, plant breeder would have to develop varieties which respond to the integrated use of FYM, green manuring, fertilizers etc.

• Application of weedicides has to be stopped in organic farming. The effect of weedicides on soil health has been totally ignored which is causing serious changes in soil ecology. Herbicide resistant management needs to be effectively done otherwise it will become a major factor for yield losses as well as a major factor for failure of diversification. However, in India weedicide use is very less compared to developed countries.

• Biological control of weeds can be highly effective. However, under Indian conditions; this approach has to be evolved.

Organic cultivation in Sikkim

Initiatives of Government of Sikkim with regards to organic cultivation

Sikkim is the first State of India to officially announce adoption of Organic Farming in the year 2003 and the only State of India to convert entire State into organic (other north eastern States are in the process of converting to organic). Organic farming has been a traditional way of farming in Sikkim adopted by farmers since ages. Due to unavailability of assured irrigation, farmers practice rain-fed farming system with an integrated approach and Integrated Farming System is predominant in the State with agriculture, horticulture and animal husbandry in perfect coordination. Sikkim is rich in biodiversity with abundant plant species because of which the soil is rich in organic matter content and makes the conversion easier. The total geographical area of the State is 7, 29,900 hectares out of which farming is done in about 74,303 hectares. The main crops are maize, rice, buckwheat among cereals, black gram & rice bean among pulses, soybean and mustard among oilseeds. The main horticultural crops are orange & pears among fruits, ginger, cardamom, turmeric and cherry pepper among spice crops, cole crops, peas & bean, tomato,

potato among vegetable crops. Besides, production of potato & pea seeds at high altitude and off season vegetables cultivation is done extensively. Of late, cultivation of flowers like cymbidium (boat orchid), rose, gerbera, and anthurium is generating good income to farmers and a large number of farmers have adopted floriculture as a commercial venture.

Government has initiated various measures (after establishment of Sikkim Organic Mission) like Internal Control System (ICS) development through Service Providers, certification through APEDA accredited certification agencies, incentives for adoption of Organic Farming, on farm production of Inputs, off farm certified inputs, large scale awareness and training programmes, market linkage development and branding with brand logo.

Sikkim Organic Mission

Main objectives of organic mission in Sikkim are:

- to promote Sikkim as an organic State
- to outline measures to discourage use of artificial fertilizers and pesticides and gradually substitute plant nutrients by organic manures and fertilizers as well as to control diseases and insect pests by biological means.
- to set up basic infrastructure and statutory development, pre-requisite to initiation of actual organic farming in Sikkim.
- to create or develop markets for organic food produce along with the evolvement of related strategies.
- to formulate a policy of organic farming in Sikkim.

The package of practices for organic system of cultivation to be developed for 5 major crops that have huge potential for organic market. These crops are ginger, turmeric, chillies, corn and mustard.

Interventions made

Subsequent to the feasibility study, an intervention programme was sanctioned by Department of Science & Technology, Government of India during 2007-08. This programme benefitted over 3000 farmers.

- From the study, it was revealed that farmers are ignorant of production technologies. There is need to prepare integrated package for organic technologies for crop production, farmers training, certification and market linkage.
- To provide training on fertility management practices by utilizing biofertilizers, biopesticides and other organic inputs.
- To take utmost economic advantage of all waste, agriculture residues and cowdung in the best productive manner through science and technology intervention.
- To form groups of registered farmers.

Linkages Developed

The implementation team (Sikkim Organic Mission) signed an MoU with Sikkim State Cooperative Supply and Marketing Federation Ltd (SIMFED) which is promoted by Sikkim Government to join hands for providing marketing linkage to the certified farmers. SIMFED started to procure the produce from farmers and supply to authorized marketing agencies.

Replication Potential

Farmers started taking keen interest in organic farming after the initial reluctance. The above facts became the platform for initiating the following programmes.

- The State Departments of Agriculture and Horticulture initiated an extensive campaign in 2009 to support farmers to adopt organic farming practices.
- The interest of convinced farmers and other stakeholders ultimately led to declaration of the entire State as ‘organic’ and decision was taken by the Government to convert 50000 ha land into ‘organic’ by 2015.
- The State also created ‘Sikkim Organic Mission’ in 2010 as a Nodal Agency at State level to implement and monitor the programme. The mission had chalked out three years action plan to cover the targeted 50000 ha land into ‘organic’ by 2015.

- The State has taken very liberal view to invite all leading organizations of the country to participate in the above mission-mode programme.
- Success of Organic cultivation may help other StateGovernments to implement their organic cultivation policies without much hurdles in the beginning.

Sikkim- Issues in Organic cultivation:

There are number of issues related to organic which confront its adoption like low yield compared to traditional methods, incidence of pest and disease infestation, certification and profitability. However, the situation in Sikkim is different as compared to other States in the plains with regard to prevalent cultivation practices prior to launching of the programme. It has certain inherent advantages like average fertilizer consumption is just 7 kg/ha and negligible pesticide consumption, soil is rich in organic matter content which ranges from 2-7 % organic carbon, more than 15,000 ha area is under cardamom with forest cover where fertilizer and pesticides have never been applied, agricultural operations are carried out only in 10.20 % of the total geographical area and 89.80% of the area has not been touched and affected by chemicals.

II. Objectives of Study and Methodology

Study Objectives

Keeping in view the issues discussed above, the present study on 'Organic cultivation in Sikkim' was proposed to be undertaken with the following objectives:

The broad objectives of the study were

(i) To make a comparative study of the advantages/ disadvantages of organic cultivation versus traditional cultivation in terms of cost, yield, marketing, etc.

(ii) To study the factors affecting implementation of organic farming in the State

(iii) To assess the feasibility of organic farming for replication in other areas.

Methodology & Approach of study

Study Area

Out of four districts, the study covered two districts (South and East Sikkim) keeping in view the progress made under Sikkim Organic Mission. Field visits were also undertaken to KVK, MPCS, FPO and farmers' fields in selected villages.

Data Collection

Both primary and secondary data were collected for the study. Secondary data about the progress made under the mission was collected from the Mission Directorate. Primary data from the selected organic farmers on production and marketing aspects of crops covering, inter alia, operational holding, cost and returns for the area put under organic crops through interview method, using the schedules designed for the study. Discussion were held with the growers on various aspects related to availability of inputs, credit, extension services, marketing, etc. and constraints thereof. Discussions were also held with all the stakeholders (Sikkim Organic Mission, Horticulture Department, Agriculture Department, Lead Bank, Co-operative Bank, Sikkim State Co-operative Supply and Marketing Federation Limited-SIMFED, Krishi Vigyan Kendra- KVK and FPO) of the organic mission to

ascertain the issues related to implementation aspects.A copy of the Questionnaire is given in Appendix-I.

Study Team

The study was undertaken by Shri B. Sathish Rao, Faculty Member at National Bank Staff College, Lucknow. Shri. Tempa Choda Bhutia, DDM, South Sikkim joined the study during South Sikkim visits. Shri. T. K. Ganesh Kumar, DGM, Sikkim RO was involved with discussions with Sikkim Organic Mission at Gangtok. RO coordinated visits to villages and FPO. The study was conducted from 27 to 31 March 2017.

III. Field Observations

Major observations of study

The major observations of the study focussing major stakeholders are summarised below:

Sikkim: Unique Features, StateGovernment Policies and Initiatives

i. Sikkim is having undulating terrain and majority of the farmers are small and marginal farmers. There is no perennial irrigation. Due to rainfed farming, use of fertilizers and pesticides was minimum. Hence, it was easy for both famers and Government to move towards organic cultivation.The details of cultivation of major crops in the State of Sikkim are given in the following table:

Area, Production and Productivity of foodgrains, pulses and oilseeds in Sikkim- 2015-16

Crop	**Area (000' hectares)**	**Production (000' tones)**	**Productivity (kg./ha)**
Rice	10.67	19.69	1845.25
Wheat	0.32	0.35	1071.21
Maize	38.96	68.31	1753.56
Finger Millet	2.85	2.91	1020.33
Barley	0.45	0.47	1055.93
Buckwheat	3.57	3.47	972.27
Pulses	5.67	5.38	948.85
Oilseeds	6.94	6.31	909.75
Total	**69.4**3	**10**6.89	

(Source: ENVIS Centre, State of Environment and Related Issues, Government of Sikkim)

ii. The StateGovernment was supplying fertilizers (sometimes free) to the farmers and majority of the farmers were depending on Government agencies

for fertilizers. Hence, when Government stopped supply of chemical fertilizers, farmers accepted the policy. Only a few of the farmers were purchasing from private fertilizer dealers. Now, the Government has stopped supply of fertilizers and also cancelled the fertilizer licence issued to the dealers. Hence, chemical fertilizers are not available in the State. However, the supply of organic inputs (like vermi-compost, farm yard manure, green manure crops, etc.,) was not given equal importance.

iii. The StateGovernment has made chemical fertilizer, chemical pesticide possession and use as a criminal offence. Punishment could be 3 month in jail and or fine of maximum Rs.100,000. This has discouraged purchase of fertilizers from adjoining cities (like Siliguri, Kalimpong, etc.).

iv. The StateGovernment (Horticulture Department) has constructed poly-houses (both rudimentary and improvised) in identified villages. The Department gives training and then provides seeds of vegetables and flowers in those clusters. Farmers cultivate the given vegetables, flowers and sell in the local market.

v. The StateGovernment has supplied rainwater harvesting devices like storage tanks, pipelines, etc., to farmers to provide protective irrigation but these are not sufficient for commercial cultivation.

vi. The StateGovernment has done the certification of organic cultivation on individual basis through agencies accredited by APEDA (Agricultural and Processed Food Products Export Development Authority). During 2016, the StateGovernment started Sikkim State Organic Certification Agency (SSOCA), a specialised agency for certification.

Farmer

(i) The farmer generally does not have marketable surplus. They get their staple food (rice and wheat) through public distribution system (PDS). Other daily food necessities are sourced from local markets. They are happy with the available sources of food and vegetables.

(ii) Due to organic cultivation, farmers feel that their health has improved. It may be due to not using chemical fertilizersand pesticides in crop cultivation.

(iii) In general, organic farming has reduced cost of cultivation. Indicative cost of cultivation of maize under normal and organic conditions is given in Annexure. There was reduction in cost of cultivation per acre by 36 % in case of organic cultivation

The cost of cultivation per acre for ginger both under normal and organic cultivation is given in the following table:

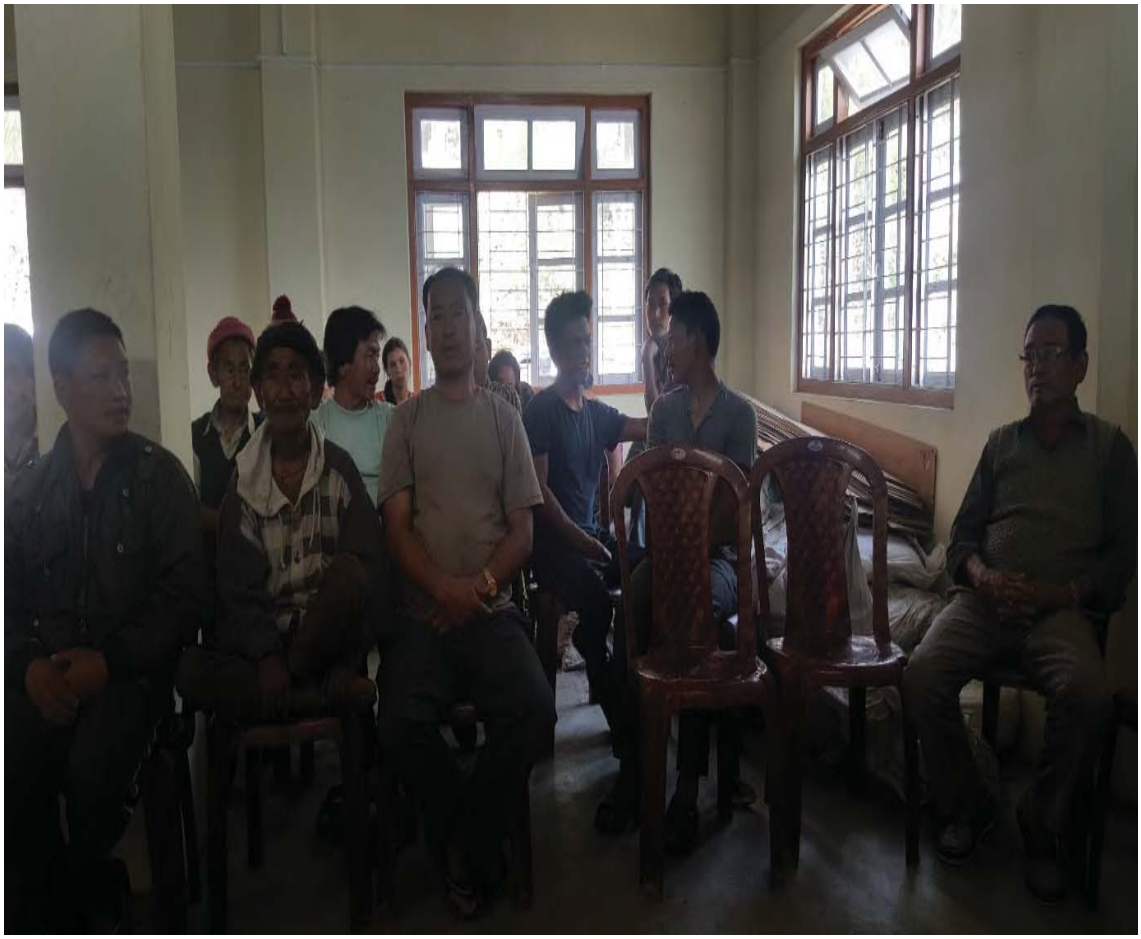
Amount in Rupees per acre

Sr. No	Items of Expenditure	Normal cultivation	Under Organic conditions
1	Field preparation	5000	2500
2	Nursery and planting/ sowing (800kgs in normal cultivation and 600 kg in organic cultivation @Rs.40 per kg	32000	24,000
3	Fertiliser/ manures	10,000	5000
4	Weeding	6000	3000
5	Plant protection	8000	1000
6	Wage	10000	4000
7	Miscellaneous expenditure	4000	1500
	Total	**75,000**	**41,000**

Shri. Deoprasad Mangar (Salghari, Upper Dorab Block, South Sikkim) has been cultivating ginger for over a decade in his marginal less fertile land. The organic cultivation has reduced cost due to savings in fertilizers and pesticides.

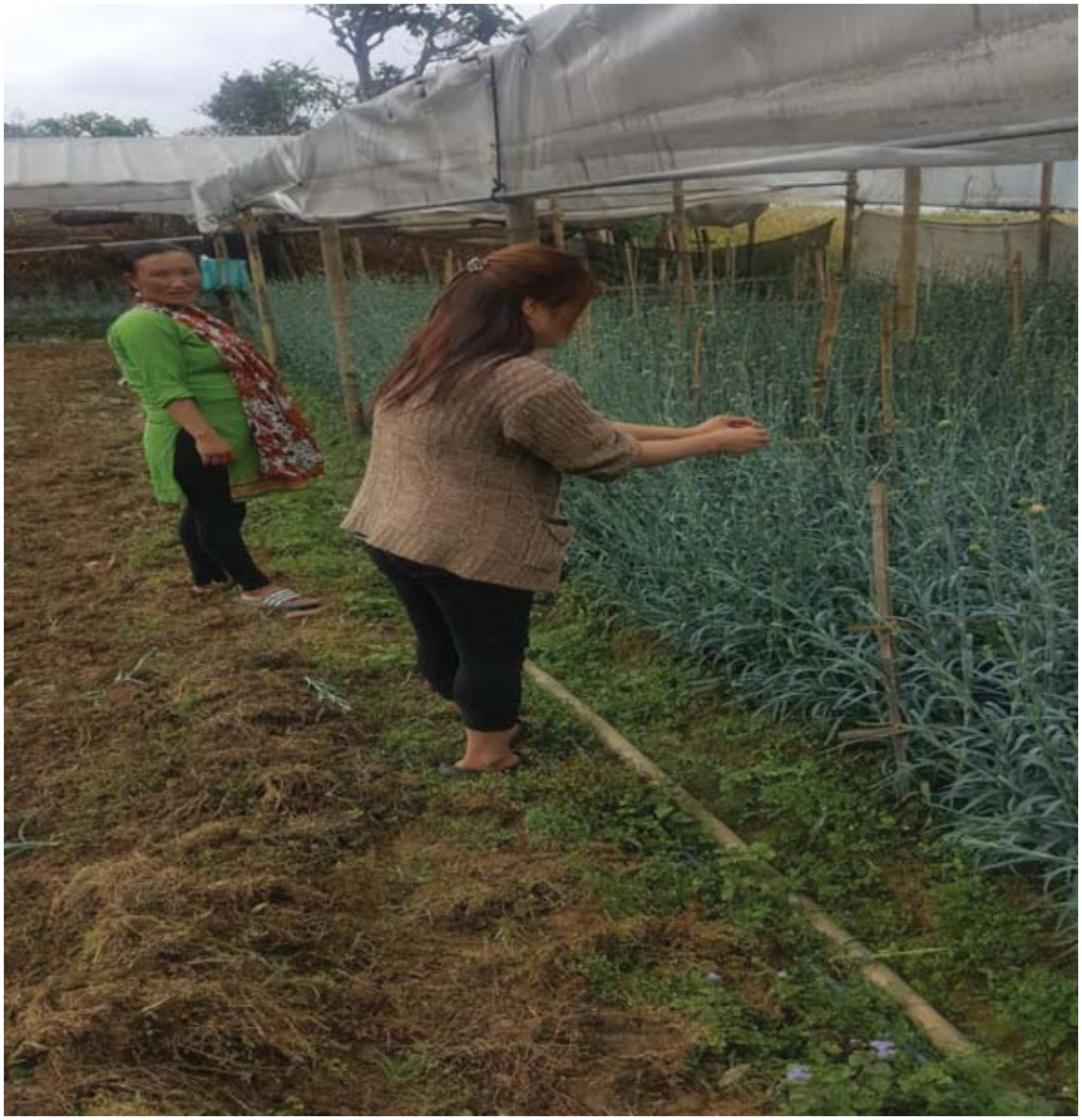
Ginger- Harvesting in Salghari

(iv) In general, farmers depend on StateGovernment agencies for free seed and inputs. This was the case both earlier and also now. The StateGovernment departments arrange training and then distribute seed material to the selected farmers. Earlier they were distributing the seed material based on village – wise beneficiary list. Now, the departments are distributing seed material on cluster basis (like ginger cluster, maize cluster, etc.).



Training under progress in Lower Assangtong, South Sikkim

(v) SHGs are also cultivating vegetables and flowers. StateGovernment agencies distribute power tiller on group basis. One SHG in Thingyem Gram Panchayat in Rumtek in cultivating flowers (lily and gerbera) and one member is marketing the stick in Gangtok and the rate fixed by the buyer is Rs.7/- per stick, which included transport cost of Rs.2 per stick.

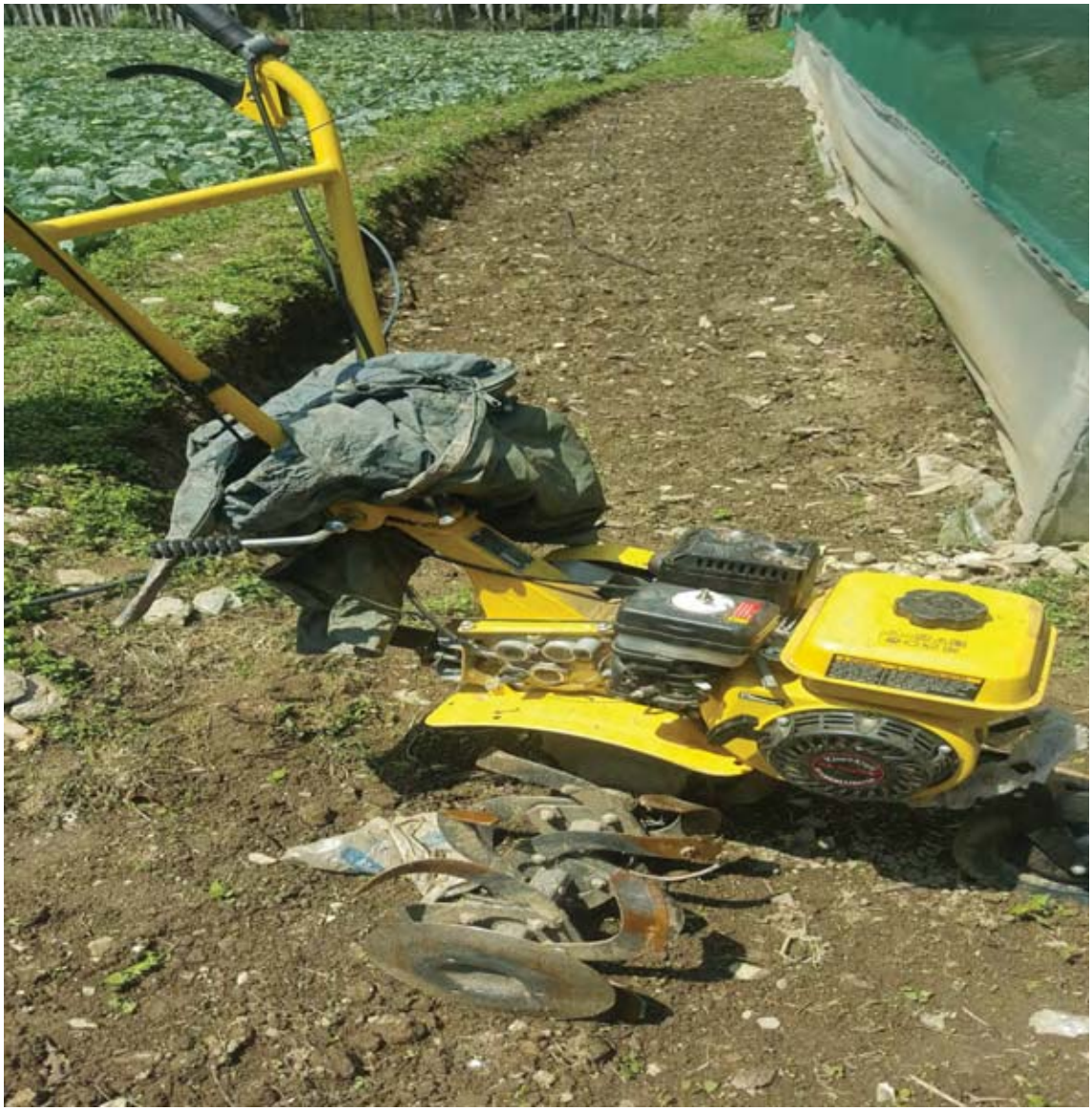


SHG members in Thingyem in their poly-house with Carnation

Government agencies

a) The StateGovernment is a welfare State and farmers are given maximum subsidy (upto 100 %) on inputs and seeds.

b) The concerned departments (like horticulture and agriculture) provide funds for infrastructure (poly-houses and power tillers by horticulture; water tanks and pipes by agriculture department) and concerned farmer only provide unskilled labour, if required.



Mini- Power tiller given to SHG in Sajong, East Sikkim

c) Production of vegetables is given importance in organic cultivation programme. However, there are no concerted efforts to provide permanent irrigation facilities to farmers. There is good scope for diversion of water from the spring of hillocks if there are storage facilities. In some villages which are located at higher altitude, there may be need for lift irrigation. Then only farmers can get the full benefit by supplying vegetables in market throughout the year.

d) In some cluster villages (like Sajong, Thingyem, etc.), flowers are being cultivated in poly-houses and farmers are using the diverted water from the

springs. Many a times, there are damages to pipes, drying of sources, leading to losses to the farmers.

e) Organic cultivation need regular replenishment of nutrients through organic sources. There is a need to encourage livestock activities. There are well established milk route in majority of the villages. However, dairy is not an integral part of organic cultivation.

f) Vermi-composting help in replenishment of soil nutrients and also reduce loss of nutritional value of manure. The Government has not given importance to this activity.

g) Green manure crops (subabul, glyricidia, sun hemp, etc.) help to improve the soil fertility. However, much effort was not given in popularising these crops.

h) Farmers need organic pesticides to protect the crops. The concerned agencies (Sikkim Organic Mission, Agriculture Department, SIMFED, and HorticultureDepartment) have not made available (on commercial lines) or provided the organic pesticides leading to losses (due to red ant in case of cabbage, rhizome rot in ginger, cardamom leaf blight, etc.) to the farmers.

i) There is also a need to take remedial action (like bio- pesticide sprays) on cluster basis to reduce the crop losses.

j) Under "Mission Organic Value Chain Development for North Eastern Region" (***MOVCD***-NER), inputs are provided free on cluster basis.

k) There is a need for crop rotation and diversification to reduce the incidence of pests and diseases. The concerned agencies (KVK, Agriculture and Horticulture Depts.) need to introduce more crops and varieties (resistant) to reduce the diseases.

KVK- Namthong, South Sikkim

Banks

a) Organic cultivation and provision of inputs by StateGovernmenthave resulted in low demand for bank credit in agriculture. However, some of the villages are still not covered through Kisan Credit Card (KCC).

b) However, there is a need and demand for credit for allied activities (like dairy, poultry, etc.) and this is required for local production of organic manures.

c) StateGovernment has issued smart card for monitoring subsidy. Routing StateGovernment subsidy through banks may help in better monitoring.

d) There is a need for promotion of collectives (like JLGs, SHGs, Producer organisation) and these institutions may require working capital limits.

e) Better value can only be realised if organic produce is processed at local level and if it is stored for some months. Hence, there may be requirement for credit for establishing processing units by entrepreneurs and Co-operatives and producer organisations.

Marketing

a. Organic certification should help the farmers to sell their produce directly or indirectly (through SIMFED) to get premium for their organic produce. However, farmers were not in a position to market organic produce with a premium as they were not able to sell the produce in the local market due to

lower demand than the supply and could not garner full exploitation of potential created due to organic certification.

b. Farmers are getting lower yield due to inadequate application of organic manures.

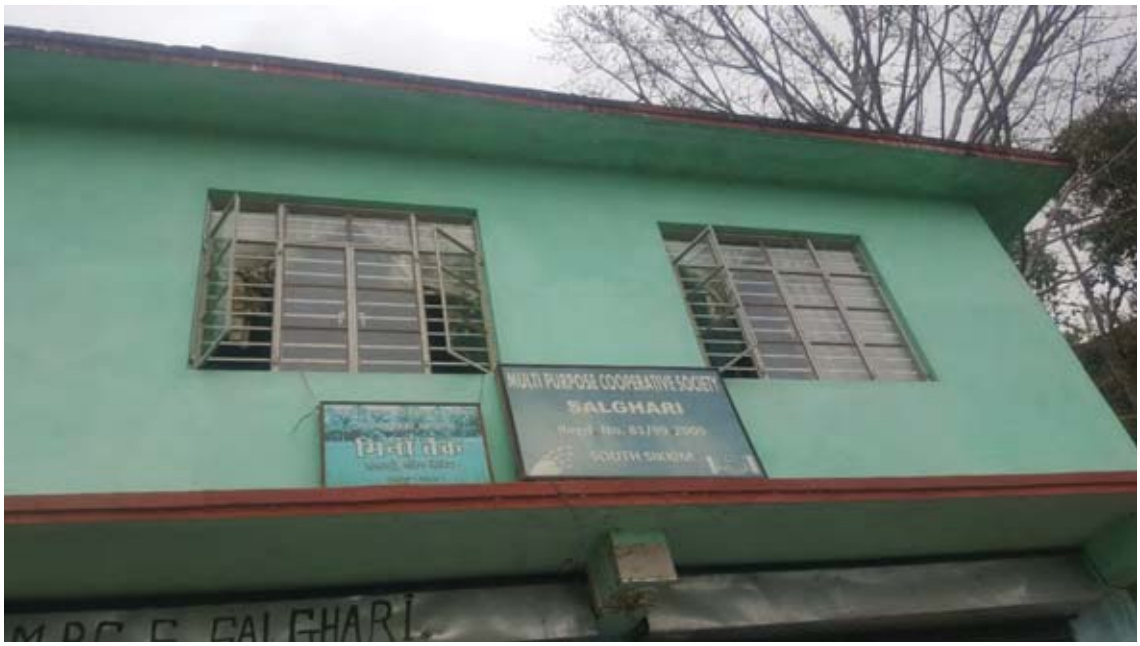
c. Farmers have to pay higher price for the food items they purchase from the market. In case of ginger, they are compelled to sell the produce at the lower price (as low as Rs.40 per kg). This is due to lack ofmarket tie- up outside the State, lack of storage facilities and lack of processing facilities (a ginger processing unit is established in West Sikkim whereas production areas are located in South Sikkim).

d. There is no separate market for organic produce. Only in Gangtok Lal Bazar, there is a separate section for organic produce. In other local markets, people are not in a position to separate the local organic vegetables and other vegetables (inorganic) coming from Siliguri. This leads to mixing of organic and normal vegetables resulting in local farmers not getting due premium for their organicproduce.

Organic cabbage in the marginal land of Sajong, East Sikkim

e. As farmers are producing in small quantities, they are not in a position to send the produce outside Sikkim.

f. There are no strong local institutions (like producer companies or co-operatives) for aggregation and primary processing. Hence, farmers are not in a position to realise higher returns.



Multi- Purpose Co-operative Society(MPCS), Salghari, South Sikkim

g. The StateGovernment has no major plans to sell the Sikkim organic produce outside the State. SIMFED has outlets in Siliguri and New Delhi. They are not in a position to procure the required minimum quantum to sell outside the State. This needs concerted effort including aggregation, grading, packing, etc.

Storage, processing and value addition

a. During peak harvest season of ginger and turmeric, the prices collapse and farmers have to sell the produce at throw-way price. The StateGovernment has not taken steps to procure the produce at reasonable price.

b. There is no scientific storage facility for the organic produce. Traders mix the organic produce with their other produce (in Siliguri market) and sell to agencies outside the State.

c. There is good potential for initial processing, grading and packing.

d. Processing help better realisation of value and storage may help to realise optimum price realization throughout the year.

IV. Recommendations

StateGovernment Policies

i. Cultivation of vegetables without assured irrigation is a risky venture. There is a need to provide suitable irrigation facilities (either through diversion channel, drip, lift irrigation schemes)in the areas identified for vegetable cultivation. This is the problem expressed by all the farmers.

ii. There is a need to introduce the crops consumed by the local community (like buckwheat, millets, etc.) and this will help both farmers and the local consumers.

iii. In tourism sector, organic dishes and Sikkim organic produce also should be popularised through advertisements.

iv. Organic cultivation without dairy is not a sustainable proposition. The StateGovernment may encourage dairy activities. In due course, organic milk can be sold outside the State with premium.

v. Every farmer may be provided with a portable plastic bio-gas unit and this may take care of manure, septic tank for toilets and cooking gas requirements.

vi. Each farmer may be provided with minimum two kilogram of earthworms so that he can convert all organic wastes to vermi-compost and use the manure without much loss of nutrients.

vii. The StateGovernment should invite private organic manure and bio- pesticide suppliers to the State so that farmers can get the required supply of inputs (on commercial basis).

viii. As on date, The StateGovernment is supplying seeds and farmers fully depend on the StateGovernment in case of vegetables. The subsidies may be reduced over a period of time for existing crops. Farmers may be encouraged to produce the quality seed material for their future and other farmers' use.

ix. There is a need to introduce more number of crops in different regions depending on suitability. In new crops, the Government may buy the produce (either for seed material or marketing the produce). This will boost the

confidence of farmers. There is a need to introduce contract farming in non-traditional crops and allied activities.

x. As on date, the farmers are not able to use the certification for getting premium. They may get better premium, if the produce has organic certification and is sold outside the State.

xi. There is a need to popularise Sikkim Organic Produceamong tourists, both within and outside theState.

Farmer

(v) The farmers need motivation to grow different crops and sell them outside for better realisation of value.

(vi) There is good scope for increasing area and productivity of buckwheat. The area, production and productivity of buckwheat is given in the following table:

Area, Production and Productivity of Buckwheat in Sikkim

	Year	**Area (000' hectares)**	**Production (000' tones)**	**Productivity (kg./ha)**
1.	2003-2004	2.01	1.55	771.14
2.	2004-2005	2.01	1.56	776.00
3.	2005-2006	2.01	1.64	815.92
4.	2006-2007	2.04	1.79	877.45
5.	2007-2008	2.04	1.79	877.45
6.	2008-2009	5.54	5.35	965.52
7.	2009-2010	5.54	5.07	915.16
8.	2010-2011	4.39	4.06	924.03
9.	2011-2012	5.00	4.72	945.00

10.	2012-2013	3.56	3.38	949.44
11.	2013-2014	3.63	3.49	961.57
12.	2014-2015	3.27	3.16	961.58
13.	2015-2016	3.57	3.47	972.27

(Source: ENVIS Centre, State of Environment and Related Issues, Government of Sikkim)

Local community is preferring use of buckwheat and this is not available under PDS.

(vii) If new crops (like pulses, millets, etc.) are introduced, the local community may get balanced nutrition. Similarly, other vegetables(like broccoli,iskus, etc.) may also be introduced to make available these vegetables to the local community. Other suitable crops are given in the following table:

Tuber crops, spices, fruits, and vegetables

Sl. No.	**Types of Crops**	**Crops**
1	Tuber Crops	Potato, Sweet Potato
2	Spices	Large Cardamom, Ginger, Chilli, Turmeric, Coriander
3	Fruits	Mandarin, Passion fruit, Banana, Guava, Papaya, Jack fruit, Litchi
4	Vegetables	Brocoli, Onion, Brinjal, Carrot, Iskus, Pumpkin, Radish, Tomato, Tree Tomato, Cabbage, Cauliflower

(Source: ENVIS Centre, State of Environment and Related Issues, Government of Sikkim)

(viii) Due to non- use of fertilizers and pesticides, the cost of cultivation has come down. Along with that, the yield has also come down. There is a need to introduce more of organic manures either through local production or sourcing from outside the State.

(ix) Farmers are convinced of utility of organic cultivation. Farmers are eager to cultivate any suitable crop, if there is a market or buy-back arrangement. Organic Mission should facilitate such arrangements.

(x) As there are more of small and marginal farmers, to make viable commercial units, some of the activities (application of bio-pesticides, marketing, etc.) may have to be done on group basis.

(xi) There is a need to promote seed villages to increase the area under specific crops. This may help to improve quality of seed material.

(xii) The StateGovernment may create separate section in all the local markets for selling organic local produce and inorganic non- local produce. This may boost confidence of consumers over long run.

Government agencies

a) Due to budgetary constraints, free supply of inputs and seeds may not be feasible for all farmers and will delay the expansion of crops to other areas. Hence, there is a need to reduce subsidy on traditional crops over a period of time. This will help in targeting of subsidies (reduction of subsidies to some farmers) and expansion of clustersat a faster rate.

b) Normally, the yield reduces during conversion period (first three years) in organic cultivation. Later, if nutrients are not replenished to the soil, the yields may not stabilise. There is a strong case for introducing organic manures on a large scale (both local and non-local sources).

c) Dairy and other livestock need to be encouraged on a large scale. This will address the issue of manures and also supplementary income to farmers.

d) There are issues of toilets in rural areas. Provision of toilet with plastic bio-gas units may help to recycle the human, animal and plant waste.

e) The concerned agencies (KVK, Agriculture and Horticulture Depts.) should address the problems of diseases and pests through organic approved modes. The organic bio-pesticides should be made available on cluster basis.

f) Organic cultivation require proper crop rotation, multi- cropping and diversification. The concerned agencies may have to plan and train farmers accordingly.

g) The existing tuber crops, spices, fruits, vegetables and ornaments plants are given in Annexure III. There is good scope for introducing more number of crops in these categories.

NABARD

(i) The organic cultivation provides scope for helping some of the MPCS to construct storage facilities, initial processing facilities, etc., so that farmers can wait for better price.

(ii) There is need for involving institutions (like MPCS, FPOs) for aggregation, collection and grading the produce so that they can sell these outside the State. NABARD may consider organising training programmes for improving the capabilities of these organisations.

(iii) There is need for processing the produce as value added products fetch better price. NABARD and StateGovernment may work together for promoting value addition. The StateGovernment may route the subsidy through banks and NABARD may help institutions like MPCS, FPOs, etc., get bank credit (even through NABKISAN).

(iv) SIMFED can be supported through NIDA for creating infrastructure for collection centres, storage facilities, processing facilities, etc. This is profit making subsidiary of the StateGovernment.

Marketing

a. Farmers are not in a position to market organic produce with a premium. They are getting lower yield due to less use of organic manures and pesticides.

b. There is a need to encourage the agricultural produce used by the local community to reduce the expenditure on non- local food items.

c. The StateGovernment may purchase the produce (like ginger, turmeric, etc.) during the harvesting season and later can auction to the non- local buyers.

d. The farmers may be encouraged to form SHGs, JLGs and Producer collectives and they may be given support for collecting, cleaning and grading of the produce.

e. SIMFED may set up more outlets outside the State to sell Sikkim organic produce. SIMFED may be provided support for collection, aggregation and transport of organic produce from villages.

f. The StateGovernment may encourage contract farming and bring big players (including exporters) to the State.

Storage, processing and value addition

a. There is need to construct cold storage facilities at block level so that the farmers or aggregators can store the produce for some time.

b. There is also need for rural godowns to store foodgrains (like buckwheat, maize, etc.) for reducing the losses.

c. Farmers/ JLGs/ SHGs may be encouraged to go for primary processing (like washing), grading and packing. The StateGovernment may create infrastructure and the concerned group may maintain by charging minimum charges from farmers.

d. Value addition should be considered in all crops and value addedproducts may be sold outside the State. This may reduce transport cost and also help in realising higher value.

e. There is a need to promote local institutions (like SHGs, JLGs, and co-operative and producer organisations) and they can work as collecting agents in those villages.

f. Processing units in private sector should be encouraged for processing, packing, branding and marketing, both within and outside India.

V. Conclusion

The study shows that farmers are happy with the decision of the StateGovernment. However, there is a need for backward integration (for supply of organic manures and bio-pesticides) and forward integration (especially marketing outside the State for premium price for organic produce). Further, there is need for value addition and processing, leading to better realisation of value and local employment. There is also a need for introducing more crops and crop diversification. Multi- cropping may help the farmers in reducing risk. There is need to involve banks, farmers, farmers organisations and Government agencies in decision making process. Sikkim may provide a lot of insights to other StateGovernments, who are interested to become organicStates.

Annexure

Cost of cultivation per acre of Maize under normal and organic cultivation

(Amount in Rupees)

Sr. No	Items of Expenditure	Normal cultivation	Under Organic conditions
1	Field preparation – three ploughing for normal cultivation and two ploughing for organic cultivation @ Rs.2500 per ploughing	7500	5000
2	Seed (8 kg per acre @ Rs.25 per kg) and sowing (two labours and one pair bullocks @250 per labour and Rs.750 per bullock pair)	1450	1450
3	Fertiliser/ manures @ 70: 30: 30 kg of NPK per acre in case of normal cultivation (N- Rs.13 per kg; P- 29 per kg: K- 29 per kg) and two labour (@ 250 per day) for application. Organic cultivation- two tonnes of Farm Yard Manure (FYM) @ Rs.500 per tonne and one labour for application	3210	1250
4	Weeding- 3 weeding (2 labourers @ 250) for normal and 2 weeding in case of organic cultivation	1500	1000
5	Plant protection (one spray- Chemical -250 and labour one @ 250 per day	500	-
6	Harvesting- 6 labours @ 250 per labourer	1500	1500
7	Miscellaneous expenditure	1000	500
	Total	**16660**	**10700**

Appendix

Sikkim Organic study- Questionnaire for farmer

	Name of the farmer					Village			District			
Pre- organic Culitvation							**Organic cultivation**					
a)	Land Use pattern (acreage)						a)	Land Use pattern				
b)	**Crops being cultivated vis-a vis yield /ac**						b)	**Crops being cultivated vis-a vis yield /acre**				
	Crops	Cost per acre	Yield	Market value/ton	Approx Income (Rs)			Crops	Cost per acre	Yield	Market value/to n	Approx Income (Rs)
i							i					
ii							ii					
iii							iii					
iv							iv					
v							v					
vi							vi					
vii							vii					
c)	Crop rotation						c)	Crop rotation				
d)	Nearby market						d)	Nearby market				
e)	Availability of bank loan		Amt	Activity	Reasons		e)	Availability of bank loan		Amt	Activity	Reasons
	Informal sources							Informal sources				
	Formal sources		Bank branch	Amt	Activity			Formal sources		Bank bran	Amt	Activity
			Name	Distsance						Name	Distsanc e	
	Nearest CB							**Nearest CB**				
	Nearest CCB							**Nearest CCB**				
	Nearest MFI							**Nearest MFI**				
f	**Any migration for labour**							**Any migration for labour**				
	No of people		No of months of migration	Period				No of people		No of months of migrati on	Period	
g	**Any agri-infra created/purchased**							**Any agri-infra created/purchased**				
	Items							Items				
	With/withou t subsidy							With/witho ut subsidy				
i	**Any change in status/income/standard of living due to organic cultivation**											
	Reduction in cost of cultivation	Marketi ng support	Higher crop acreage	Chanage of crop	Tech adoptio n	Traning / better extensi on activity	Subidiary occupation/ actvity (AHD/ Fishery/IFS)					
J	Any issue you wuld like to discuss (problems/impediments/non-cooperation/distance factors)											

Addl data on farmers

1	**No of farmer households covered in the village /total number of villag**
2	**Total acreage under organic cultivation in the village**
3	**Total area under cultivation in the village**
4	**Total acreage newly brought under organic cultivation**
5	**Any benefit/special mention on a/c of organic cultivation (specify):**
6	**Any issue/problems due to banks/deptts//NGO**
7	Any other issue:

Appendix- Continued			
Allied Activties			
Income		**Expenditure**	
Particulars	**Amount (Rs.)**	**Particulars**	**Amount (Rs.)**
Sale of milk (in case of dairy/ goatry)		Cost of animals	
Sale of dung/ manure		Cost of Shed	
Sale of calves		Equipment (Chaff cutter/ feeding pail/ milking pail/ other equipment)	
Sale of animals		Concentrated Feed	
Sale of skin		Green fodder	
Sale of gunny bags		Veterinary care	
Any other		Cost of labour (including family labour)	
		Insurance	
		Miscellaneous (Please specify)	