



Research article

Prospects of organic farming in hill farms of Nepal

Sabita Aryal Khanna

Kathmandu University, School of Science, Department of Environmental Science and Engineering, Nepal

*Corresponding Author: sabita@ku.edu.np

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Abstract: Agriculture is the most important industry contributing about 37.0% to national GDP and provides livelihood for over 65.7% of the population of Nepal. Chemical based agriculture has destroyed the ecosystem, declined natural resource base, provided diminishing returns, reduced food self-sufficiency, forced for migration, disrupted food security and export opportunities. The landscape with diversified flora, fauna, ecosystem, and manpower availability gives opportunity to organize movement of organic agriculture thus some products of Nepal like tea and coffee have already been certified as organic products and have good export returns. The practice of producing organic vegetables, fruit, milk, meat, fishes and their product are also increasing. Thulodurlung VDC of Lalitpur district is the one which is becoming popular for producing organic coffee. Hence the study is conducted at this site and also at nearby village Chamranbesi VDC of Kavre district. The study was aimed to examine the existing status of farming as well as prospects of other organic crops including vegetables, cereals and dairy products. Different approaches such as PRA, FGD, Household survey and Key informants' interviews were used to collect the information. Data collected were analyzed quantitatively and qualitatively. The overall findings showed that organic farming can be successfully done in both sites. However, it is easier to achieve the result in Thulodurlung as compared to Chamranbesi. There is a growing attitude of sound biological and livestock based farming. Lack of functional road, unavailability of irrigation water, disease and pest infestation on crops are major challenges. On a commercial scale, apart from organic coffee, other farm and organic dairy products such as ghee, cheese, butter need to be marketed. There is an instant need of attention on sound marketing strategies, technology of processing the harvest and overall improvement in the capacity of farmer to produce organic crops.

Keywords: Agriculture - Livelihood - Natural resources - Commercial scale production - Nepal.

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INTRODUCTION

Agriculture is the primary source of nutrition for the global population. Almost three quarters of the population in developing countries subsists on agriculture. It is one of the major aspects of human development. Agriculture is most important for Nepal as it provides livelihood resources for over 65.7% of the population and contributes about 37.0% to the national GDP (Factfish 2015). In the past decades, green revolution has brought some significant changes in the world's food production systems such as increased food production and productivity, income from agriculture has risen and employment opportunities have been diversified in both developed and developing countries (Joshi *et al.* 2007). At the same time the green revolution has also brought several agro ecological consequences. (Tilman *et al.* 2002, Pretty *et al.* 2011) It has had less impact on resources poor farmers (Rosset *et al.* 2000); it has contributed in natural resource declination (Espinel 2015) thus having created several environmental problems (Singh 2000, Tilman *et al.* 2001). It has shown diminishing returns in intensive agricultural areas (Naylor 1996). This has helped to widen the gap between rich and poor. It has greatly contributed in reducing food self-sufficiency for most of the poor people and resource less countries.

With this realization, the organic movement was started and widened in 1972 in Europe and USA in the global context (Raynolds 2000). In Nepal, the organized movement of Organic agriculture was started in 1986 (Paudyal 2015). In the present context, this concept is gradually increasing and some products of Nepal like tea

and coffee have been already certified as organic products. But those crops which have daily consumption like vegetables, cereals are yet to be declared as organic food. Through the practice of producing organic vegetables, fruit, milk, meat, fishes and their product have existed for more than twenty years in some places of Nepal like Gamcha of Bhaktapur and Fulbari of Chitwan. There are also some other emerging places where farmers have started doing organic farming (Tripathi & Khanna 2010). Unless the valued crop production with the approach of organic farming is promoted in these areas the land will remain unattended. Nepal being a mountainous country, having an area of 1,47,181 km² out of which only 42,590 km² is used for agricultural practice. Moreover the fortune of integrated small scale subsistence farming using only traditional agriculture practices and its virginity towards chemicals add more scope of valued production.

Thulodurlung VDC is the one which is becoming popular for producing organic coffee. Hence the study is conducted at this site to examine the prospects of other organic crops including vegetables, cereals and dairy products. In addition, the nearby village of Chamranbesi is also selected for the same purpose.

Objectives:

- To know the current status of farm activities.
- To examine the possibility of prospective crops and products.
- To investigate the prospects of organic farming.

MATERIAL AND METHODS

Different approaches such as participatory rural appraisal (PRA), focus group discussion, household survey and key informant's interviews were used to collect the required information.

PRA tools such as resource/social mapping, ethno history, pair matrix and seasonal calendar used to collect qualitative information to fulfil the research objectives. PRA tools were exercised among groups of both men and women (at least 25) in the selected sites.

Key informants were voluntarily chosen, to facilitate participatory exercise, particularly to undertake written participation. Only that information came through group consensus was considered as findings. For this exercise, researcher helped participants as a facilitator. In focus group discussions, all the participants were allowed free discussion and valuable information was picked up and recorded.

A household survey was also conducted to collect quantitative information on demographic characteristics and their farming activities. 30 samples were taken in each site through random sampling. Questionnaires were prepared and the data were taken through direct interviews.

Data analysis and interpretation: Data collected from household survey were analysed through X-cel and interpreted in average. All the information collected from PRA, household survey and focus group discussion were put together and qualitatively analysed to produce concrete results.

RESULTS AND DISCUSSION

Demographic characteristics

Thulodurlung VDC covers 300 households and Chamranbesi covers 312 households. Detail of the household ethnicity wise is given in table 1. In both sites agriculture is the main source of livelihood. Apart from this occupation few people are involved in teaching services, business, overseas employment and other services as secondary source of income.

Table 1. Education status of Thulodurlung and Chamranbesi.

Study Sites	Gender	Literacy (%)				Number of schools			
		Illt.	Lit.	Sec.	Hig.	Prim.	Low. Sec.	Sec.	Hig.
Thulodurlung	Male	33.3	100	25	33.3	2	1	1	-
	Female	66.7	0	75	66.6				
	Total	29.6	29.6	33.3	7.4				
Chamranbesi	Male	25	87.5	44.4	50	3	1	1	-
	Female	75	12.5	55.5	50				
	Total	55.6	18.5	14.8	11.1				

Note: Illt. = Illiterate, Lit. = Literate, Prim. = Primary (5th), Low. Sec. = Lower secondary (6th – 8th), Sec. = Secondary (9th–10th Class), Hig. = High school (10th).

The education status of these VDCs is improving. Education of male is better than female with higher literacy % as compared to female. Most of the female groups above 25 were illiterate. In present context, children go to school in their own village but due to lack of higher schools, many of them stopped their further education which is especially prevalent among female groups. Some of them continue their studies either nearby schools in Banepa, Panauti or in Kathmandu.

Land under cultivation

Durlung and Chamranbesi VDCs comprise both upland and lowland type of farming area. Generally farmers have their own land for cultivation (Table 2). However, in Durlung, about 7.7% and 15.38 % are cultivating on leased lands of upland and lowland respectively. The average upland area under cultivation is comparatively more than area of lowland in both VDCs. Between two VDCs, upland area owned by the households is more in households of Chamranbesi (96.3 %) and lowland is more in Thulodurlung (61.5%).

Table 1. Area and type of land under cultivation in Thulodurlung and Chamranbesi.

Study Sites	Attributes	Upland	Lowland
Thulodurlung	Own (% households)	84.61	92.3
	Lease(% households)	15.38	7.7
	Average land area / household (ropani)	16.12 (range: 4-28)	4.4 (range:2-12)
	% households	92.3	61.5
Chamranbesi	Own (% households)	100	100
	Lease(% households)	0	0
	Average land area / household (ropani)	7.55 (range:2-27)	3.46 (range:1-9)
	% households	96.3	48

Livestock

In both places, livestock normally included buffalo, cow and goat along with their young ones (Table 3). Likewise, they have also bulls for ploughing purpose which is more in Thulodurlung. Normally people like to keep more buffaloes than cows as the buffalo milk contains more fat than cow milk. The average number of buffalo in sampled households is 3.36 in Thulodurlung and 3.24 in Chamranbesi. In Thulodurlung, almost all have kept goat that are sold for meat purposes. About 30.76 % households keep hens in Thulodurlung; which is comparatively a big size than in Chamranbesi (7.4).

Table 3. Livestock in Thulodurlung and Chamranbesi VDCs

Site	Attributes	Cow/Bull	Buffalo	Goat	Hen
Thulodurlung	Avg no. / household	2	3.36	9.8	4.7
	% of owned household	54	96	100	30.76
Chamranbesi	Avg no./ household	1.3	3.24	4	5.5
	% of owned household	37	98.15	88.9	7.4

Crops, crop productivity and cropping pattern

Maize and Rice are the main crops of people in both VDCs and these crops are mainly grown for living but most of the households find it insufficient for year round. Apart from these they also grow finger millet, wheat and different seasonal vegetables. But wheat is not found in Thulodurlung. Generally vegetables are grown in small area only for home consumption in most of the households as they have no transportation facilities for marketing. Among different vegetables, cauliflower, onion, garlic, gourds are the major ones. Besides these, some portion of the people in both VDCs generate additional income from broom grass.

The average rice productivity of Thulodurlung and Chamranbesi is 2.27 (range: 1–6) t/ha and 3.57 (range: 1.9–7) t/ha respectively. As compared to the national average (2.7t/ha), the productivity of rice is more in Chamranbesi whereas it is lower in Thulodurlung. From this survey it was also noted that the productivity of maize (1.02t/ha) of Chamranbesi is higher than in Durlung (0.65t/ha) but this productivity is lesser than the national average *i.e.* 2.03 t/ha. This might be due to the disease like blight which has appeared in maize since three years in almost all the area of both VDCs.

The main cropping pattern in Durlung involved two crops in a year in case of lowland whereas in Chamranbesi it included three crops in a year.

Thulodurlung:-

Lowland: Maize + Rice

Upland: Maize/Finger millet + Coffee or Maize + Finger millet

Chamaranbesi:-

Lowland: Maize-Rice-Wheat

Upland: Maize + Finger millet

Prospective farming

Coffee and silk worm farming are newly introduced farming which are found to have good source of income generation. Coffee production is more popular in Durlung and silk worm in Chamranbesi. There are also several other farming that can raise the livelihood of the people. It includes bee rearing, fish farming, asparagus cultivation, and poultry. The status of these prospective farming is presented briefly in the table 4.

Table 4. Prospects of new farming with their status in Thulodurlung and Chamranbesi VDCs

Farming	Study Sites	Status	Supportive Reasons
Coffee farming	Thulodurlung	<ul style="list-style-type: none"> • First introduced by CDHP in 1985 • Again introduced 5 years back (2003) with an aim of organic production by Cope program of Helvitas, a non-governmental organization • Except ward no. 1, all the area of Durlung comprised coffee production along with other crops • 93% sampled households are involved in this farming • people earning 10,000 to 60,000 rupees annually or even higher • There is a processing unit established • People are totally inclined with organic coffee farming • Four coffee co-operatives existed in ward no. 7, Gumrang 	<ul style="list-style-type: none"> • Suitable climate for coffee cultivation • Less use of chemicals from very beginning; easier to move towards organic production • Good income generating source • High level of farmers' interest
	Chamranbesi	<ul style="list-style-type: none"> • Coffee farming at initial stage; only 12 households of the whole VDCs involved 	<ul style="list-style-type: none"> • Suitable climate • May have good contribution from Durlung (where coffee is already established) in terms of sharing knowledge and source
Silkworm farming	Thulodurlung	<ul style="list-style-type: none"> • Know about silkworm farming but not yet involved 	<ul style="list-style-type: none"> • Suitable climate for mulberry cultivation • The village is very near to Khopasi, the highest cocoon producing area of Nepal • Suitable climate for mulberry cultivation
	Chamranbesi	<ul style="list-style-type: none"> • Started mulberry cultivation from four years ago (2004) • Nawa Jagriti Resam farmers' group established in 2004 with 25 members 	
Bee farming	Thulodurlung	<ul style="list-style-type: none"> • Only 1-2 bee hives in the village; only for home consumption • Promoting people to keep hives in coffee farm by Cope 	<ul style="list-style-type: none"> • Farming about to turn into totally organic • Adequate rearing place including coffee farm

Fish farming	Chamranbesi	<ul style="list-style-type: none"> • 20 households have kept bee hive only for home consumption • Not started in commercial scale 	<ul style="list-style-type: none"> • Adequate rearing place as mustard farms and nearby forests • People are avoiding chemical fertilizers and about half of the households have stopped using chemicals
	Thulodurlung	-	-
Asparagus	Chamranbesi	<ul style="list-style-type: none"> • Not yet started for selling • Good prospects in 9, 2 and 3 ward no. • Farmers involved in planning and discussion for fish farming 	<ul style="list-style-type: none"> • Water resources available especially fresh water streams, ponds and small springs • High market demand in nearby by town and cities viz; Panauti, Banepa, Kathmandu and Lalitpur
	Thulodurlung Chamranbesi	<ul style="list-style-type: none"> • Lots of wild asparagus available in nearby forest • Root part, only used for medicinal value in local level • Not yet cultivated • Has initiated searching asparagus seeds for cultivation 	<ul style="list-style-type: none"> • Favourable climatic condition • Distance between the village to nearby city market is less; very high price and market demand • Farmers' interest
Poultry	Thulodurlung	<ul style="list-style-type: none"> • About 30.7% sampled households involved in keeping poultry 	<ul style="list-style-type: none"> • High demand
	Chamranbesi	<ul style="list-style-type: none"> • About 7.4% of sampled households keeping poultry with them • Social belief; not to keep poultry farming in Brahmins house still existed 	<ul style="list-style-type: none"> • Very high demand of egg and meat; Demand even not fulfilled in the village

Others

Other prospects included strawberry farming and mushroom cultivation. There are many wild strawberry plants growing in most of the areas in Chamranbesi. Likewise, some respondents have thought about mushroom cultivation because of its growing demand in the market in recent times.

Manuring and plant protection

The scenario of manuring practice is different between the two study sites. Almost all used only farm yard manure as a source of fertilizer in both VDCs but in Chamranbesi significant number of households (48.15%) also use chemical fertilizers like urea, DAP and MoP along with farm yard manure according to their own knowledge. However, the trend of using chemical fertilizer is decreasing mainly due to expensive prices, decreasing productivity and higher disease attack. Their growing attitude of keeping more livestock could be better to have sufficient manure rather than buying expensive fertilizers has also made them avoid chemicals. Likewise, some of them are also aware about the harmful effect of chemicals and significance of organic fertilizers.

For plant protection about 40.74 % households in Chamranbesi buy chemical fungicides and pesticides mainly for potato, vegetables, and rice. They use these chemicals either asking with the seller or according to their own knowledge.

Concept of organic agriculture

People of Durlung became familiar with the concept of organic agriculture after the establishment of Cope program under Helvitas. This program was established with an aim of producing organic coffee and people were trained for different practices of organic farming. Since 5 years they have stopped using chemicals in their farm. They have also learnt about making fertilizers and pesticides from the available biological resources. Almost all people are doing organic farming and they are very much interested in this type of farming. They are hoping for certification of their coffee as an organic coffee very soon and also planning to declare their area as an organic village.

In Chamranbesi, about half of the respondents (48.15%) said that they know about organic farming through friends, neighbour and market but they lack doing so due to inadequate knowledge. However, about half of these respondents want to do in future. For this, they need to have special training and some sort of support.

Marketing

People mainly sell some vegetables, milk, khuwa, goat either in their own village or nearby towns like Panauti and Banepa. Milk product for selling includes only khuwa, because farmers are likely to get more profit from this as compared to ghee and curd. In Durlung, normally group of farmers collect their milk in one place where milk is processed into khuwa; whereas in Chamranbesi, they prepare khuwa themselves in their home.

Though agriculture is the main source of livelihood, people are very much disadvantaged with marketing process of their products due to lack of road facilities. Transportation of the products from the production sites to market involves long route of walk which ultimately restricts the marketing of fresh vegetables and fruits. Though they take some amount to the market, they have to bear a huge loss from postharvest spoilage and low return.

Problems related with agriculture

From farming to marketing, people face several problems like irrigation, seed, transportation/marketing, disease, pest, technical ignorance and animals. In Durlung, the greatest problem was irrigation problem followed by marketing and technical ignorance. Due to irrigation problem they couldn't grow vegetables on a commercial scale. Though transportation is also a serious problem, people are hopeful for the road construction which is about to touch their village.

People of Chamranbesi are facing great difficulties in transporting their products to the market. It requires about 4 hours of walk to reach the road. Hence they have to pay much for the delivery of the products. Another major problem faced by the farmers of both sites is lack of technical assistance. They think if they could get technical guidance from technicians, they could improve their production and also get rid of loss caused by various disease and pest attacks.

Available natural resources

Natural resources in two villages comprise land, biodiversity and water resources. These resources are detailed in the socio-resource map. The land under cultivation is already been described.

Biodiversity

In Durlung, there are two community forests, one natural forest and one pine forest. In Chamranbesi, forest has surrounded the Eastern and northern boundary of the village. These forests are rich in medicinal plants, herbs and different kind of trees. Likewise there are several other valuable plants available in the village. Except for medicinal purpose, none of the plants are being used for household and other income generating purposes. Some of the plants available in these areas are:

Siltimur, pipala, khiro, utis, pine, rhododendron, Chiraito, amala, kafal, Harro, Barro, asparagus, lemon grass, bakaino, nigalo, lapsi etc.

Water resources

Both villages are naturally facilitated with water resources. Big and small streams and rivers are flowing inside and outside the villages. These resources are only utilized for drinking purpose in Durlung and they are not benefited for irrigation and other purposes. Irrigation facility has not reached in all areas of Chamranbesi

expect a few. Some years back, people in Chamranbesi had their own electricity supply generated from Sukumkhola hydropower that supplied electricity in 40 households of 9 wards and also shared electricity in 12 households of 4 wards in Durlung. Now the electricity is supplied from Kathmandu; however they still use their own at the time of load shedding. There is also another hydropower of sukumkhola and both of these hydropowers are of 3 KW. Total 85 households are benefited from sukumkhola hydropower.

Supporting organizations

VDC office is situated only in Chamranbesi but in Durlung, the office was destroyed by Maoist during conflict period. People want to have VDC office very much active and should support them both in agriculture and non-agriculture sector.

The current supporting non-governmental organization in Durlung is Helvitas, Nepal, which has changed the livelihood of the people to some extent by promoting organic coffee production and marketing. In 1985, another organization CDHP came here for five years with an aim of improving health status, promoting goat and cattle keeping, and several other developmental activities. Jaldhara, a project that was started in 1995 worked in Durlung for 7 years. This program mainly aimed for the construction of infrastructures like bridge, road, toilet but also brought improved terracing. Likewise, this project was also active in Chamranbesi with similar aims and activities. At present, there are no other organizations that are supporting them in promoting their livelihood except UNICEF.

With regard to agricultural activities, people can raise their livelihood if they can upgrade this occupation from subsistence level to income generating level. Among different perspective of agricultural activities, organic farming can be established in both VDCs in long run. About 88.9 % of the respondents in Chamranbesi and almost all in Durlung were interested in doing organic farming but they need support in terms of skill development and marketing.

Community, Co-operatives and groups

The concept of community formation was first introduced in Durlung by CDHP during 1985–1990. Since then, there are several communities and groups and about 50% households of the total are involved in different groups in Durlung. Basically, Groups and Co-operatives were formed based on similar farming activities like coffee producing group, silk farming group and veterinary group. Their names are presented in Annex 4. Likewise women/mother's group was also formed with an aim of empowering female group in the village in each VDC.

Members of a group are linked with each other through regular meetings, informal discussions and gatherings. Generally, a regular formal meeting is held on a particular date each month. For other meetings, members are informed through direct contact and generally these meetings fail to inform the members living in distant places. During meetings; discussion regarding problems, current situation, and future planning for improvement take place. Members of co-operatives utilize money in farm investment, health treatment and also some kind of household activities.

These groups and co-operatives have strong positive impact upon livelihood of the people that is why almost all love doing farming and other activities in a group.

CONCLUSION AND RECOMMENDATIONS

The study was conducted in two particular VDCs with an aim of finding the prospect of organic farming and marketing of organic products. The overall findings showed that organic farming can be successfully done in both sites. However, it is easier to achieve the result in Thulodurlung as compared to Chamranbesi since this VDC is about to turn into a completely organic village. In spite of chemicals in use, the growing attitude of avoiding chemicals and keeping livestock has added the prospect of organic farming in Chamranbesi. In addition, the available biological resources and farmers' interest together contribute the possibility of organic farming in future. Since both of the sites lack road facilities, production of vegetables, cereals and fruits are limited to only home consumption. Problems associated with irrigation and disease have further restricted the farming on a commercial scale. However, there are several aspects that can be considered to improve the farming status of these places. Following recommendations are made to achieve results. On the basis of this study, following points have been recommended,

- According to marketing perspective, apart from organic coffee, other farm products need to be explored in Durlung village.
- Before proceeding for organic farming, people especially in Chamranbesi need to be trained regarding the concept and skill development. Likewise, they need to be aware about the harmful effects of chemical fertilizers and pesticides.
- Special marketing strategies need to be formed or developed to sustain organic farming in the long run. There are several challenges and problems which need to be identified and assessed so as to develop suitable strategies.
- Dairy products like ghee, cheese, butter could be a good source of income generation if the village is facilitated with processing unit.
- The prospective farming described above need to be initiated or expanded for which farmers should be provided with special support in terms of skill development and marketing.
- Modification of high volume fresh vegetables and fruits into small volume processed form can be an opportunity to minimize the problem of road access. For this several processing units need to be established within the village.
- For sustainable management, people should be facilitated with technical guidance at every step of farm activities.

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