Prospect of Farmers in Generating Additional Income Through Organic Vegetable Farming: A Case Study in Kathmandu Valley and Chitwan District of Nepal

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Abstract

Deteriorating environmental services from irrational and long-term use of chemical fertilizers and pesticides and market demand reinforced the movement of organic farming in Nepal. With growing market it is to be expected that organic farmers are comparatively earning more income. This study was conducted to see if such assumption holds true for all the farmers involved. It focuses particularly on organic vegetables as they are considered cash generating crops and have been in growing demand. Kathmandu valley has a more vibrant organic market whereas in Chitwan district the momentum of organic farming is growing through group conversion. Thus, these two areas were chosen for the study. The study was being conducted in two phases: in late-2011 and mid-2012, by interviewing 60 farmers from each area through semi-structured interview. Selection was done through snow-ball and random sampling method. Relevant information was also gathered through key-informant interview and group discussion. Study showed that market was still based on community trust and certification seems to play minor role in ensuring premium price for organic vegetables. In order to improve income from organic vegetables, developing market mechanism is primarily deemed necessary followed by group conversion, research and development and generating more awareness among general public.

Key words: Organic vegetables, certification, premium price, market mechanism.

1. Introduction

Agriculture is a backbone of Nepalese economy, contributing 35% to Gross Domestic Product (GDP) and forming the source of income and employment for 65% of the population (MoE, 2011). It being the source of food, income and employment for majority of the people, Nepal government has always emphasized in this sector for dealing with key issues of poverty alleviation and economic development. Among others commercialization of agriculture has been deemed necessary to bring much needed changes in economic growth of Nepal. Improving agricultural productivity through increased use of chemical fertilizers, pesticides and high yielding varieties are the main concern for government which has been prioritized in 20 years Agriculture Perspective Plan (1995-2015) as well. Besides that national education, research, extension and communication systems are mainly concentrated in high input agriculture system (Tamang et al., 2011). However despite efforts to uplift this sector, agricultural productivity growth rate remains lower compared to other countries (Samriddhi, 2011) and now it has been stated that the long-term effect of chemical fertilizers and pesticides have started to affect through declining yield and its haphazard use has also been frequently reported in Nepal (Shrestha & Neupane, 2002). Realizing such negative consequences many alternatives to conventional farming have been

initiated, one of them is organic agriculture. In 2007 the government also passed the bill for 'National Standards of Organic Agriculture Production and Processing, 2064' which follows the definition given by IFOAM 2002 Basic Standards as "a whole system approach based upon a set of processes resulting in a sustainable ecosystem, safe food, good nutrition, animal welfare and social justice. Organic production therefore is more than a system of production that includes or excludes certain inputs" (FAO, 2002).

Today there are number of outlets selling organic products and some restaurants offering organic food for their customers, and both are seemingly to be in increasing trend (Aryal et al., 2009; Bhatta et al., 2010a, 2010b). Some of the organic products like tea, coffee, honey, large cardamom, ginger and medicinal herbs are already traded in international market as well (DoAE, 2006; Pokhrel & Pant, 2009; Tamang et al., 2011). Thus, with this scenario it is to be expected that organic farmers are to generally benefit from the tendency of niche market. This study has been conducted to find out if such assumption holds true for all the farmers involved. The study focuses mainly on organic vegetable farmers as organic vegetables are one of such products that are in growing demand in urban areas with escalating number of consumers who are more educated and aware about consuming safe food for healthy living (Bhatta et al., 2010a, 2010b). Given the present state, it becomes ever more necessary to study organic vegetable sector to thrive it further for the benefit of farmers and others involved. In doing so, it assesses farmers' income, the expansion and stability of which is imperative for any farmer who is involved in commercial activities, with respect to two main possible factors: yield and premium price. Farmers' perception on yield after the conversion with respect to various factors such as farm characteristics, experience and sources of income other than farming has been assessed. Finally the income effect is analyzed in relation to the perceived yield and access to premium market, irrespective of whether or not the farmers possess the title of certification.

2. Literature review

2.1 Organic farming in Nepal

Out of the total area of 147,181 sq km, only 21% of the land is cultivable in Nepal (CSRC, 2012). Having an agricultural productivity level lower than South Asian standard (main staple food crops in Nepal such as wheat, maize, rice, and potato were estimated to be short of about 50 percent from the maximum attainable yield) has further exacerbated the food insecurity situation in the country (Shively et al., 2011). Even though agro-chemical input is comparatively lower than other countries (Sharma et al., 2012), in accessible areas unbalanced use of fertilizer is rampant which has increased soil acidity, and deteriorated soil physical condition and underground water quality (Shrestha, 2010). Besides that it has also resulted in environmental pollution, increase in pest resistance, resurgence of new plant pests, forest area degradation, flooding, erosion, drought and decline in overall productivity of major food commodities as well (Bhatta, 2010; KC, 2006). Now the importance of sustainability in farming has been realized and as a part of which organic farming has been getting special consideration. Besides with the view of reviving declining soil fertility, deteriorating environment and health of farmers from irrational and long-term use of chemical fertilizers and pesticides; reinforcement of market demand towards healthy consumption also drove the organic movement (Bhatta & Doppler, 2010; Weiss, 2004). The history of organic farming in Nepal is relatively shorter which is said to have initiated only in 1986 (Sharma, 2005; Nepal, 2011) but has been growing gradually ever since (Adhikari, 2011). The potentiality of organic farming has been mentioned in numerous literatures. In high mountain and middle mountain areas farmers still rely on traditional knowledge and locally available resources and are largely claimed as 'organic by default' (Pokhrel & Pant, 2009) which means that they have not used modern farming inputs like chemical fertilizers and pesticides from reasons such as lack of fund, no accessibility due to poor infrastructure or simply because they have chosen to follow what their forefathers had done for many years.

In figure it is said that more than 70% crops are cultivated without using chemical fertilizer and pesticide in Nepal (KC, 2006). Thus, it would not take much of an effort to convert their land as organic and by introducing organic principles the production can further be boosted by enhancing soil structure and fertility through nitrogen fixing legume crops, improving composting techniques and practicing self-made bio-fertilizer and bio-pesticides. Besides that ecological richness has given Nepal with another advantage of producing quality organic fruits, vegetables, tea, coffee, cardamom, vegetable seeds, mushroom, honey and medicinal plants and herbs. Some of the organic products like tea, coffee, honey, large cardamom, ginger and medicinal herbs are already exported as well (DoAE, 2006; Pokhrel & Pant, 2009; Tamang et al., 2011). After Nepal became a member of World Trade Organization, it has further increased the prospective in international market as 'organic produce' are identified as potential export crop (Bhandari, 2006; Pant, 2006). It is known that more than 80 non-governmental organizations (NGOs) and private-sector organizations are involved in promoting organic farming, particularly in peri-urban areas (Ghimire, 2005). In 2008, 8,498 ha of land is said to be under organic management constituting 0.20% of total agricultural land and managed by 1,424 producers in Nepal (Fibl & IFOAM, 2010).

2.2 State of organic vegetable sector in Nepal

Vegetables are considered cash generating crops that takes short period for getting marketable yields and is considered to generate more income than other crops, especially in areas that have easy access to market. Due to its features like making best use of available land, all form of labor force round the year, health benefits through nutritional supplement and finally having potential to upgrade living standard, the Eighth Five Year Plan of Nepal clearly stated that vegetable cultivation can contribute towards meeting most of the development objectives (NPC, 1992). Vegetable farming area increased by 23% in 2003/04 compared to 1991/92 level and its yield (kg/ha) also increased by 36% within a same period (MoAC, 2005).

In Nepal, the average chemical fertilizer and pesticide consumption is low compared to its neighboring countries like India, Pakistan, Bangladesh and Sri Lanka and are used mainly in commercial production irrigated area mainly in Tarai and mid–hill regions (Aryal, 2006). Among other crops, irrational use of agro-chemicals and pesticides in vegetable cultivation is stated to be more acute (Jha & Regmi, 2009). Increasing number of pests and diseases led to simultaneous increase in use of synthetic pesticides. Studies have shown that certain section of consumers who are aware of the harmful effects of pesticide residues are willing to pay more for organic products especially vegetables which have huge daily demands in urban areas and are mostly met by peri-urban growers in the valley (Bhatta, 2010). Factors such as price, income, education and labeling has been fundamental aspects in purchasing organic vegetables and consumers are willing to pay 10-20% more for labeled organic vegetables (Bhatta et al., 2008). Consequently there is growing number of farmers in peri-urban areas who are practicing organic partially specifically for income-generating crops like vegetables to benefit from such niche (premium) market (Bhatta & Doppler, 2011). However, none of the vegetables are certified as organic and most of the organic vegetable production and marketing is done unsystematically, basically on the basis of community trust in Nepal. Producers, processors, distributors and consumers are mainly interlinked through loose marketing networks (Sharma, 2005). At present Nepal is exporting fresh vegetable to Tibet, Bangladesh and Arabian countries (Aryal, 2006) thus making organic vegetables another potential crop for exporting.

2.3 Potential of improved income through organic farming

In an organic system it is the probability of getting price premiums that makes this endeavor a profitable one than conventional farming. In many scenarios incomes improve through improved yields along with the combination of reduced costs. But it is the premium that attracts farmers to move to organic farming and usually make up for any yield or productivity losses that may incur during the transition (Giovannucci, 2005). There are various reasons as to why organic food is more expensive than conventional food. According to FAO (2012), certified organic food supply is less compared to demand, greater labor inputs per unit of output increases the production cost, greater diversity limits achieving economies of scale, and expensive post harvesting procedure of small quantities of organic food which mandates segregation of organic and conventional produce, especially for processing and transportation. This in addition to limited volume and inefficient distribution chains and market structure has forced up the price of organic food. In case of non-certified organic food, which are usually prevalent in developing countries and sold at the same price as their conventional counterparts, it is the productivity of the total farm agro-ecosystem and exclusion of purchasing external inputs that helps improve their income. Since non-certified organic food is often sold in a local market, farmers save up from reduced transportation cost as well. Rodale Institute (2011) estimates the net worth of organic food and beverage sales at $26.7 billion in 2010, up from $1 billion in 1990 suggesting that there is a growing tendency of buying organic all over the world. Similarly irrespective of the slow economy, sales of organic fruits and vegetables increased by 11.8% in 2010 from 2009 level. Since its farm trial that began in 1981, it has come to the conclusion that ‘organic systems were nearly three times more profitable than the conventional systems’. Even without a price premium, it is the lower input cost that makes organic system competitive with conventional system. This shows that there is a strong potential of organic production being an income enhancing option for farmers. Based on several studies, the average price premium ranged from approximately 20-30% in organic system. Although it is the market abroad that offers the highest prices and premiums, in some cases emerging domestic market has also provided opportunity, though the premiums are usually small and market channels difficult to access. Even though this partiality also can no longer be generalized as some are getting considerable success in domestic market as well given that consumers are being more accustomed to organics, and local manufacturers and retailers are actively involving themselves to fill this profitable niche (Giovannucci, 2005).

3. Methodology

Kathmandu valley (KV) and Chitwan district (CD) were selected purposively as the study sites. Demand for organic vegetables is growing inside the valley and thus farmers especially in peri-urban areas are also starting or increasing their share of organic farming to meet this emergent market. The presence of organic farming is more vibrant in the valley as can be seen in number of

specialized markets, restaurants and other retailers asserting themselves to selling only or partly organic. Among others, organic vegetable market is also ever-increasing (Aryal et al., 2009; Bhatta et al., 2009). Chitwan district is also the major supplier of vegetables in the country. Recently there has been growing number of farmers practicing organic vegetable farming (Kafle, 2011) and expectantly growing number of consumers make this area a potential one for studying. Besides NGOs are actively involved in supporting farmers' associations in adopting organic methods of crop production and inspection, and product certification and marketing (Pokhrel & Pant, 2009), particularly in peri-urban areas (Ghimire, 2005).

This study had been conducted in two phases. The first visit was made in October 5, 2011 till November 26, 2011 and the second in June 9, 2012 till 30 June, 2012. In the first visit, 60 organic growers from each study areas were interviewed using semi-structured questionnaire. In the absence of proper information availability, farmer respondents were selected using snow ball sampling method. During the survey, besides individual farmers, groups of farmers usually associated to farmers' cooperative were also found. To make the sampling technique unbiased respondents were selected randomly from among the list of farmers' group and it was made sure that the samples were within a range of 20-25% from any particular farmers' cooperative. The information was also gathered from key informant interview, group discussion and participant observation during first as well as second visit. To supplement the data, various published and unpublished secondary sources were also taken into consideration.

4. Results and discussions

4.1 Land characteristics and yield of organic vegetables

The details of land characteristics of farmer respondents are presented in Table 1 which indicates that on average farmers were practicing organic farming in 0.4 hectare (ha) of land. More than 80% of farmers had been practicing it on a small scale, i.e. in less than 1 ha of land ranging from minimum 0.01 ha in Kathmandu valley to maximum 3.92 ha in Chitwan district. It was found that not all farmers have converted 100% of their farm land into organic and the reason was balancing for the lower yield from organic farming. They were of the opinion that organic yield is generally lower, usually for the period of 3 years or more after the conversion. Similar statement has been cited in various studies that conversion to organic can result in lower yield in initial years if

Table 1. Land characteristics of farmer respondents (sample households)

Land characteristics	Kathmandu valley (n=60)	Chitwan district (n=60)	Total (n=120)	P-value
Average organic landholding (ha)	0.41	0.44		0.157
% of land under organic				
100%	35 (58.33)	37 (61.67)	72 (60)	0.468
Less than 100%	25 (41.67)	23 (38.33)	48 (40)	
Change in area				
Increased	7 (11.67)	7 (11.67)	14 (11.67)	0.214
Decreased	3 (5)	0 (0)	3 (2.5)	
No change	50 (83.33)	53 (88.33)	102 (85)	
Change in area (ha)				
Increased	1.5025	2.169	3.6715	
Decreased	2.293	0	2.293	
Ownership of organic land				
Own	43 (71.67)	54 (90)	97 (80.83)	0.011**
Leased	17 (28.33)	6 (10)	23 (19.17)	
Ownership of organic land (ha)				
Owned	11.8	21.07	32.87	
Leased	12.68	1.371	13.386	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
** Significant at 5% level of significance

the land had been exposed to chemical fertilizers intensively or for a long period; but can produce better results as well if farmers had been practicing traditional farming before conversion (Aragona, 2012; Bouagnimbeck & Ssebunya, 2011; Halberg et al., 2006; Halweil, 2006).

In this case, some had even changed the land area in later years and few among them were also trying to gradually increase the area under organic cultivation. They opined that instant conversion of farm from conventional to organic will affect the yield dramatically, so it is better to change gradually by decreasing the proportion of chemicals used and increasing that of organic inputs. For those farmers in Kathmandu valley who had decreased the land area (2.293ha in total) said that they faced production loss during initial years of conversion and was compelled to switch part of their land to inorganic practice to be economically sustainable. Thus, it is clear that farmers, especially during the phase of transition, needs some support so as to be able to sustain themselves without having to constrict their organic land area.

Besides few felt that in Kathmandu, being the capital city, using land for other purposes than farming brings them more income and so turned some part of their farm for other uses. On the other hand, there were those who chose to do it only on small scale, particularly for growing vegetables to make it more manageable (due to outside intervention some farmers were learning to do organic farming by cultivating only vegetable crops), as well as in case of Kathmandu valley to benefit from the growing niche market. Also, not all farmers owned the land in which they were practicing organic farming[1] which was found to be more intense in case of Kathmandu valley. This also signifies the fact that farmers in Kathmandu valley are grabbing the opportunity of emerging organic niche market through land leasing as well.

Table 2 gives information on farmers' perception towards yield after conversion to organic farming:

Table 2. Farmers' perception on change in yield after the conversion

Perception on change in yield	Kathmandu valley (n=60)	Chitwan district (n=60)	Total (n=120)	P-value
Increased	24 (40)	16 (26.67)	40 (33.33)	0.048**
Same	16 (26.67)	29 (48.33)	45 (37.5)	
Decreased	20 (33.33)	15 (25)	35 (29.17)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
** Significant at 5% level of significance

Yield in organic farming has always been a controversial issue. Some are of the opinion that feeding through organic agriculture comes with a huge cost of increasing land area and making available enough organically acceptable fertilizer (Trewavas, 2002; Meisner, 2007) whereas some have argued based on their studies that it indeed can be a solution to growing food demand and preserving environment at the same time given proper consideration is taken to fix microbial activities in soil and following intensive natural remedies to boost the production (Leu, 2011; Brandt, 2007). In this survey, 40% and 27% respondents perceived yield increment; 27% and 48% perceived unchanged while the remaining 33% and 25% perceived yield reduction in Kathmandu valley and Chitwan district respectively. With such mixed response that has similar number of respondents across all categories, it is difficult to generalize and come to the conclusion that organic farming in fact leads to lower or higher production. Thus, it has been associated with various other factors to see if there exists any significant relation that can explain such phenomenon.

Table 3 shows the relation between perception on change in yield and farm characteristics. Land size showed somewhat significant relation to change in yield however it is difficult to indicate if it has positive relation to yield. From the table, we can observe that area of land under organic did not have any significant pattern to changing yield which leads us to imply that more than the size of land, other management practices that determines land quality could have impact on yield perception. Land ownership on the other hand did not have any significant impact on the perceived yield which implies that effect of land tenure on organic yield is not considerable at this point which is contradictory to FAO (1999) which suggest that tenureship and investment to improve yield in organic farming are related inversely.

Likewise the issue of buffer zone is also important to protect organic field from areas that can contaminate the crop with prohibited substances (COG, 2001). According to National Standards of Organic Agriculture Production and Processing (2064), there should be at least a distance of 4 meters if in case there lay a road between any two farms, otherwise 5 meters distance should be maintained as a buffer zone. Crops grown on the area meant as a buffer zone cannot be sold as organic (MoAC, 2008). From the survey it was found that more than 40% and 60% of farms in Kathmandu valley and Chitwan district respectively had at least one of its sides surrounded by conventional farm. Thus, it becomes problematic particularly in a situation where organic land is as

small as 0.01 ha or when more than one of its sides is surrounded by conventional farm (which means allocating more area as a buffer zone). Another matter that is of concern is the problem farmers were facing as a result of such land placement through water-logging, and infestation of weeds and pests. They argued that unlike in conventional farming, they cannot use pesticides that have instant reaction and instead had to rely on natural remedies which often react slowly, leaving ample time for crops to be destroyed by such infestation. Due to dispersed organic fields and as discussed earlier, farmers' hesitancy to turn all of their land into organic had left them with disadvantages of having a conventional farm alongside.

Table 3. Relation between perception on change in yield and farm characteristics

Sites	Farm characteristics	Perception on change in yield			Total	P-value
		Increased	Decreased	Same		
	% of land under organic					
KV (n=60)	0≥25%	6 (25)	2 (10)	7 (43.75)	15 (25)	0.079*
	25%≥50%	4 (16.67)	0 (0)	2 (12.5)	6 (10)	
	50%≥75%	2 (8.33)	1 (5)	1 (6.25)	4 (6.67)	
	75%≥100%	12 (50)	17 (85)	6 (37.5)	35 (58.33)	
CD (n=60)	0≥25%	0 (0)	5 (33.33)	9 (31.03)	14 (23.33)	0.040**
	25%≥50%	1 (6.25)	3 (20)	4 (13.79)	8 (13.33)	
	50%≥75%	0 (0)	1 (6.67)	0 (0)	1 (1.67)	
	75%≥100%	15 (93.75)	6 (40)	16 (55.17)	37 (61.67)	
	Ownership of farm land					
KV (n=60)	Own	16 (66.67)	17 (85)	10 (62.5)	43 (71.67)	0.258
	Leased	8 (33.33)	3 (15)	6 (37.5)	17 (28.33)	
CD (n=60)	Own	13 (81.25)	14 (93.33)	27 (93.10)	54 (90)	0.395
	Leased	3 (18.75)	1 (6.67)	2 (6.90)	6 (10)	
	Farm surrounded by conventional farm					
KV (n=60)	No	12 (50)	14 (70)	8 (50)	34 (56.67)	0.115
	1 side	2 (8.33)	2 (10)	5 (31.25)	9 (15)	
	2 sides	7 (29.17)	1 (5)	1 (6.25)	9 (15)	
	3 sides	3 (12.5)	3 (15)	2 (12.5)	8 (13.33)	
CD (n=60)	No	4 (25)	4 (26.67)	12 (41.38)	20 (33.33)	0.277
	1 side	9 (56.25)	5 (33.33)	6 (20.69)	20 (33.33)	
	2 sides	2 (12.5)	2 (13.33)	6 (20.69)	10 (16.67)	
	3 sides	1 (6.25)	4 (26.67)	5 (17.24)	10 (16.67)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
** Significant at 5% and * at 10% level of significance

Farm experience of farmers did not have any significant relation to their perception on yield, except in case of Chiwan district where farmers who had experience of 5 years or more is more inclined to having perception of increasing yield after the conversion and vice-versa (see Table 4). Besides farming (which can be organic and conventional), more than half of the farmers relied on other sources of income. During the period of conversion, subsistence farmers might be tempted to shift back to old technique for getting benefit in a short-run. In that case income from other sources may act as a safety net especially during such initial years of difficulty. It suggests that besides converting only a portion of their land into organic, many farmers had clearly diversified their source of income into other sectors that can support them during difficult times in (organic) farming. Although having source/s of income other than farming did not show any significant relation with the perception on change in yield, indicating that having income from non-farming sector might not necessarily mean that farmers are or effectively investing in improving yield from organic management.

Table 4. Relation of perception on change in yield with farmers' experience and income sources from non-farming sector

Sites	Factors	Perception on change in yield			Total	P-value
		Increased	Decreased	Same		
	Experience					
KV (n=60)	5 years and less	10 (41.67)	3 (18.75)	6 (30)	19 (31.67)	0.306
	More than 5 years	14 (58.33)	13 (81.25)	14 (70)	41 (68.33)	
CD (n=60)	5 years and less	5 (31.25)	19 (65.52)	12 (80)	36 (60)	0.015**
	More than 5 years	11 (68.75)	10 (34.48)	3 (20)	24 (40)	
	Source/s of income other than farming					
KV (n=60)	Yes	16 (66.67)	14 (87.5)	12 (60)	42 (70)	0.182
	No	8 (33.33)	2 (12.50)	8 (40)	18 (30)	
CD (n=60)	Yes	10 (62.5)	20 (68.97)	10 (66.67)	40 (66.67)	0.908
	No	6 (37.5)	9 (31.03)	5 (33.33)	20 (33.33)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
** Significant at 5% level of significance

4.2 Income from organic vegetables and some influencing conditions

Income derivation by households from organic farming and how it has changed hitherto has been presented in Table 5. All the farmers in Kathmandu valley were involved in trading their organic vegetables. It is apparent that with a fairly organized market, farmers were moving ahead to reap the benefit from such niche market. On the other hand, 12% of the respondents from Chitwan district said they used it for self-consumption only. It was learnt that some farmers in Chitwan district started practicing organic farming only since the last couple of months after an intervention by an NGO and had increased it to no more than home gardening.

Table 5. Income from organic farming and changes over time

Components	Kathmandu valley (n=60)	Chitwan district (n=60)	Total (n=120)	P-value
Income from organic farming				
Self-consumption only	0 (0)	7 (11.67)	7 (5.83)	0***
Less or equal to 50%	40 (66.66)	45 (75)	79 (65.83)	
More than 50%	8 (13.33)	3 (5)	5 (4.17)	
100%	12 (20)	5 (8.33)	29 (24.17)	
Income changed				
Increased	30 (50)	16 (30.19)	46 (40.71)	0.003***
Same	12 (20)	27 (50.94)	39 (34.51)	
Decreased	18 (30)	10 (18.87)	28 (24.78)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
*** Significant at 1% level of significance

The income varied greatly between two study areas. Farmers deriving all of their income solely from organic farming were more in Kathmandu valley (20%) compared to Chitwan district (8%). Availability of niche market could have been a driving force where more farmers in Kathmandu valley could exclusively rely on organic farming for their livelihood. As expected 50% of farmers from Kathmandu valley said their income has increased after they switched to organic farming but it was only 30% in Chitwan district.

Table 6 shows if there exist some significant relation between perception on change in yield and change in income. Change in

income and perception on change in yield were highly significant in both the areas. Almost 80% in Kathmandu valley who perceived yield in organic farming to be in increasing trend also acknowledged that their income indeed has improved. Alternatively more than 90% in Chitwan district said that the yield remained same but income decreased over time. Lack of niche market compelled these farmers to sell organic vegetables at same price as others. But besides this, the physical appearance of organic vegetables which respondents found to be poor - that are usually disfigured, dull colored with less brightness/shine, smaller in size and even having small holes from pest attack also added to difficulty in selling. Although some said that if enough fertilizer is used, the size of production is not different and some had the opinion that smaller size might be the result of growing vegetables during off-season. This in addition to lack of awareness, information dissemination and finally knowledge among consumers have left these farmers with no option but to sell their vegetables often at lower price than usual. Organic vegetables and food in general are considered safe mainly because of no or less pesticide residue (Imus, 2012). However, consumers at large are still price oriented and lack awareness on health benefits of consuming organic and so organic selling is still limited to only a small section of consumers (Bhatta et al., 2009).

Table 6. Relation between perception on change in yield and change in income

Sites	Factors	Perception on change in yield			Total	P-value
		Increased	Decreased	Same		
	Income changed					
KV (n=60)	Increased	19 (79.17)	7 (43.75)	4 (20)	30 (50)	0.000***
	Decreased	2 (8.33)	2 (12.50)	14 (70)	18 (30)	
	Same	3 (12.50)	7 (43.75)	2 (10)	12 (20)	
CD (n=60)	Increased	16 (100)	2 (6.9)	0 (0)	18 (30)	0.000***
	Decreased	0 (0)	0 (0)	14 (93.33)	14 (23.33)	
	Same	0 (0)	27 (93.1)	1 (6.67)	28 (46.67)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
*** Significant at 1% level of significance

Surprisingly none of the farmers in Kathmandu valley had certified their land as organic (information on farmers having organic certification is presented in Table 7). Organic certification is the 'production process certification' by which a third party guarantees that a product complies with a certain set of standards, from the stage of production till distribution. Thus, it includes inspecting fields, equipment, buildings, neighboring land, records of management practices, seed sources, harvesting methods, storage, composting, transportation, and sales practices including product labeling (Bhat, 2009). National Standards of Organic Agriculture Production and and Processing, 2064 (2007) defines organic product as having '95% or more organic ingredients', the criteria if fulfilled will allow producers to sell their product instantly as organic.

Table 7. Farmers having organic certification

Certification	Kathmandu valley (n=60)	Chitwan district (n=60)	Total (n=120)	P-value
Organic	0 (0)	3 (5)	3 (2.5)	0***
In-conversion	0 (0)	21 (35)	21 (17.5)	
No	42 (70)	36 (60)	78 (65)	
Used to	18 (30)	0 (0)	18 (15)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
*** Significant at 1% level of significance

Some of the respondents who used to have their land certified said they did not experience any benefit with such label. Despite of being situated in Kathmandu valley, due to long distance to the centre market, poor transportation and limited amount and varieties of vegetables, it was not feasible for some farmers to trade actively. Some farmers even complained that vegetables

are selected based on their physical appearance and thus sometimes end up selling at a lower price instead. Certification was done with the financial support of an NGO which needed to be renewed every year. But being unable to reap benefit, farmers did not find it reasonable to renew certification, which they deemed expensive if it is to be done at their own expense. This shows that not all organic farmers are able to benefit despite the fact that there is market for their products or that they have the privilege of being certified. On the other hand some farmers in the valley did not feel the necessity to certify or renew their certification because of the already established consumer or middlemen relation where they have been getting premium price solely based on mutual trust. Mutual trust here implies that without any written agreement or law to back the communicated information, consumers solely base their trust about the authenticity of organic vegetables according to their close contact/relation with the seller. Moreover, labeling vegetables was not found in practice as in Nepal there is tendency of selling vegetables without packaging. In farmer's market, sellers used business card, pamphlets, and pictures to convince consumers. In rare cases, some vegetable products, even though not certified, were sold as organic with a label that had the contact information of the producer presumably to gain consumer's trust on its authenticity.

In Chitwan district however 5% respondents claimed that their land is certified as organic. Agencies basically divide certification into two categories. A farm is said to be organic certified when it satisfies all the necessary conditions of the related agency. On the other hand a farm is said to be in the process of conversion, which means it has already discontinued the use of chemical fertilizers or other restricted inputs but requires certain time for a soil to be fully organic. In Chitwan district 35% of farmers had their land certified as 'in conversion'. Majority of the farmers in both Kathmandu valley (70%) and Chitwan district (60%) had never certified their land as organic.

Table 8. Relation between income change and organic certification in Chitwan district

Income changed	Land certification		Total (n=120)	P- value
	Yes	No		
Increased	11 (44)	19 (54.29)	30 (50)	0.000***
Same	11 (44)	1 (2.9)	12 (20)	
Decreased	3 (12)	15 (42.81)	18 (30)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
*** Significant at 1% level of significance

Relation between organic certification and change in income in Chitwan district has been presented in Table 8. In Chitwan district, only 44% of the respondents had access to premium market but was restricted to selling only cereal crops[2]. Thus, those whose income had increased are mainly attributed to selling cereal crops at premium which again according to farmers is not huge in quantity and regular enough to improve their income significantly. The reason for not including vegetables for export was due to its easily perishable nature. Given poor infrastructure and absence of a cooling system, the quality of vegetables worsens till it reaches its final destination. Thus, organic vegetables were mostly sold at local market without any premium.

Table 9 shows inter-relation of price received by farmers and destination where they sold their vegetables. It was found that 42% of farmers sold organic vegetables at same price as others in Kathmandu valley despite having relatively better market. The improper supply chain also compelled smallholder farmers to opt for self-selling at local market without any premium. Narrow profit range and late payments discouraged them to rely on middle-men. However, some were of the opposite opinion. They had been getting premium price (about 20% higher than the price quoted at Kalimati fruits and vegetables market, which is one of the main centre of vegetable market in the capital city) from these middlemen.

In addition to that, lack of consistency in supply and limited variety of vegetables from a particular source also led to differences between farmers and middlemen. With better options to sell, more than half of the respondents in Kathmandu valley were privileged to get higher price even without certification whereas in Chitwan district, the benefit of certification was mainly limited to selling cereal crops. As can be seen from the table above, more farmers in Kathmandu valley had access to high-end markets besides local market and acquaintances such as hotels, organic outlets, embassies and middlemen who in turn connect to these specialized markets.

Relation between change in income and destination where these vegetables are sold at has been presented in Table 10. From the table, it can be seen that change in income and destination of sell was highly significant in Kathmandu valley whereas in Chitwan district it failed to show any considerable relation. Thus, it is clear that due to availability of specialized markets in Kathmandu valley, farmers from that area were able to reap more benefit.

Table 9. Price and destination where organic vegetables were sold at in Kathmandu valley and Chitwan district

Components	Kathmandu valley (n=60)	Chitwan district (n=60)	Total (n=120)	P-value
Selling price				
Same	25 (41.67)	51 (85)	76 (63.33)	0***
10%-20%	27 (45)	8 (13.33)	35 (29.17)	
21%-30%	5 (8.33)	1 (1.67)	6 (5)	
31%-40%	1 (1.67)	0 (0)	1 (0.83)	
41%-50%	1 (1.67)	0 (0)	1 (0.83)	
More than 50%	1 (1.67)	0 (0)	1 (0.83)	
Sold at				
Local market	36 (42.35)	48 (81.36)	84 (58.33)	0***
Acquaintances	17 (20)	8 (13.56)	25 (17.36)	
Hotel	5 (5.88)	1 (1.69)	6 (4.17)	
Other cities	0 (0)	1 (1.69)	1 (0.69)	
Organic outlet	14 (16.47)	0 (0)	14 (9.72)	
Embassy	2 (2.35)	0 (0)	2 (1.39)	
Middlemen	11 (12.94)	1 (1.69)	12 (8.33)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
*** Significant at 1% level of significance

Table 10. Relation between income change and selling destination

Sites	Change in income	Sold at							Total	P-value
		Local market	Acquaintances	Hotels	Other cities	Organic outlet	Embassies	Middlemen		
KV (n=60)	Increased	11 (30.55)	9 (52.94)	5 (100)	-	9 (64.28)	1 (50)	10 (90.91)	45 (52.94)	0.00 ***
	Same	6 (16.67)	0 (0)	0 (0)	-	5 (35.72)	1 (50)	0 (0)	12 (14.11)	
	Decreased	19 (52.78)	8 (47.06)	0 (0)	-	0 (0)	0 (0)	1 (9.09)	28 (32.94)	
CD (n=60)	Increased	12 (25)	4 (50)	0 (0)	1 (100)	-	-	1 (100)	18 (30.51)	0.40
	Same	26 (54.17)	2 (25)	1 (100)	0 (0)	-	-	0 (0)	29 (49.15)	
	Decreased	10 (20.83)	2 (25)	0 (0)	0 (0)	-	-	0 (0)	12 (20.34)	

Source: Field survey (2011)
Note: Figures in parenthesis indicate column percentage
*** Significant at 1% level of significance

5. Conclusion and recommendations

Vegetables play a significant role in income generation and supplementing with nutritional requirements. Within these also organic vegetables has been successful to some extent, at least in Kathmandu valley, in positioning itself as a distinct product. Given the growing demand, organic vegetable farming has potential to improve farmers' income although there are many drawbacks as uncovered from this study, that are holding them back from doing so. One of the issues is most of the farmers were doing organic farming only on a small scale. Small scale (scattered) organic farming poses problems of water logging, pest and disease infestation from a nearby conventional farm. In this regard group conversion can play a vital role in solving these problems to some extent. Thus, government and development agencies should encourage group conversion by providing support through crop insurance, relief or credit facilities, subsidy in organic seeds, ensuring price premium, etc. especially during the transition phase.

Crop insurance, in this case, could be implied in two terms: crop yield insurance and crop revenue insurance. The former is the one used for protection against lower yield and the latter for failing to receive the fair value than usual due to some unforeseen event. In case of organic farming, as farmers perceived that yields are comparatively lower during initial years, it is essential that they are protected from such difficulties as a result of adopting organic farming during the conversion phase. Similarly relief and credit facilities in the form of free seeds or free participation to farmers while holding organic food fests for instance, facilitating credit at minimized rates for purposes related to organic farming, etc. can add further to lessen farmer's burden in addition to crop insurance.

Organic vegetable market in the study areas was strongly based on mutual trust and so far certification seemed to play a least role in assuring price premium. In this context developing market mechanism should be the priority. Developing market mechanism is the most sought area to be worked on as unveiled from this study that in Chiwan district even though many of them had their land certified, they are not being able to sell at premium. It was also true for some areas in Kathmandu valley as their land lie in the periphery of the centre city. Producers complained of absence of market for their vegetables. This means that there are some restrictions in transferring organic vegetables from the area of production to area of consumption. One of such bottlenecks as uncovered by this study is the perishable nature of vegetables which due to poor infrastructure and lack of cooling system deteriorates its quality till it reaches its destination of sell. Thus, arranging for cold storage in a short-term and developing proper infrastructure in a long-term is deemed necessary for smooth supply of (organic) vegetables. Besides poor knowledge among consumers regarding the appearance of vegetables and being price-oriented itself obstructs the market growth. In this regard, generating awareness among consumers of the appearance and health benefits of organic vegetables through no or minimal pesticide residue is necessary so that they see spending more in present as an investment for a healthy future. As for gaining consumers' trust, the promotion tools such as issuing business cards, pamphlets, pictures of farm/farmers or even allowing/encouraging consumers to make a farm visit could be more efficient at this stage than having to certify the land, which farmers considered expensive.

Organic vegetables were being produced well by some farmers but some still faced lower yields. There should be study in areas of production inputs and other factors that could be responsible for improving yield. Market should be developed by identifying which crops can be grown better under organic management in which areas, develop proper collection mechanism, and finally establishing selling centers/market areas so that there is less distance between farmers and consumers. In this aspect, group conversion again helps to make the collection mechanism more effective by minimizing the earlier problems of inconsistency and limited variety of vegetables supplied from a particular source.

Endnotes

[1] Land tenure is one of the vital factors for the adoption of organic farming. In the absence of some assurance of land accessibility in the later years when the actual benefit of organic production materializes, it is highly unlikely that tenant farmers would invest to the optimum to sustain during the difficult conversion period (FAO, 1999). Comparatively in our study, Kathmandu valley has a greater number of tenure farmers. It is beyond the scope of this paper and clearly more in-depth study needs to be conducted in this facet to perceive role of land-tenure guaranteeing system in growth and development of organic sector.

[2] An access to exporting cereal crops such as rice, wheat, buckwheat, paddy, beans and lentils has contributed to increase farmers' income after certification in Chitwan district. These are sold in other cities from where farmers can get 20% premium, although the demand was found quiet low and unstable. Late payment through such medium was also one of the concern farmers shared during the survey.

References

Adhikari, R. K. (2011), Economics of organic rice production, *The Journal of Agriculture and Environment*, 12, 97-103.

Aragona, F. (2012), Organic v. conventional: The yield debate. [Retrieved from Holistic Management International: http://holisticmanagement.org/blog/organic-v-conventional-the-yield-debate/ on August 15, 2012].

Aryal, K. P., et al. (2009), Consumer's willingness to pay for organic products: A case from Kathmandu valley, *The Journal of Agriculture and Environment,* 10, 12-22.

Aryal, S. (2006), Concept, status, prospects and opportunities of organic farming in Nepal, *Proceedings of a First National Workshop on Organic Farming*, Kathmandu, Directorate of Agriculture Extension, 27-34.

Bhandari, D. R. (2006), Community level organic vegetable production program: An experience of Kathmandu district, *Proceedings of a First National Workshop on Organic Farming*, Hariharbhawan, Lalitpur, Nepal, Directorate of Agriculture Extension, 82-95.

Bhat, B. R. (2009), Opportunity and challenge of organic certification system in Nepal, *The Journal of Agriculture and Environment*, 10, 124-128.

Bhatta, G. D. (2010), Stakeholder and spatial perspectives of organic farming in Nepal, Deutschland, LAP LAMBERT Academic Publishing.

Bhatta, G. D., & Doppler, W. (2011), Smallholder peri-urban organic farming in Nepal: A comparative analysis of farming systems, *Journal of Agriculture, Food Systems, and Community Development,* 1 (3), 163-180.

Bhatta, G. D., & Doppler, W. (2010), Socio-economic and environmental aspects of farming practices in the peri-urban hinterlands of Nepal, *The Journal of Environment and Agriculture*, 11, 26-39.

Bhatta, G. D., et al. (2010a), Preference modeling of urban consumers towards organic vegetables at Kathmandu Metropolis, Nepal, *Conference on International Research on Food Security, Natural Resource Management and Rural Development*, Stuttgart, Germany, Universität Hohenheim.

Bhatta, G. D., et al. (2010b), Urban demand for organic tomatoes in the Kathmandu valley, *Middle-East Journal of Scientific Research*, 5 (4), 199-209.

Bhatta, G. D., et al. (2009), Potentials of organic agriculture in Nepal, *The Journal of Agriculture and Environment*, 10, 1-11.

Bhatta, G. D., et al. (2008), Consumer's awareness and willingness to pay for organic vegetables in the Kathmandu Valley, *Green Field Journal of Himalayan College of Agricultural Sciences and Technology*, 6 (1), 52-61.

Bouagnimbeck, H., & Ssebunya, B. (2011), African organic agriculture training manual: A resource manual for trainers, Switzerland, FiBL, Research Institute of Organic Agriculture.

Brandt, K. (2007), Organic agriculture and food utilization, United Kingdom, Newcastle University.

COG. (2001), Organic certification and standards, *Organic field crop handbook*, Ontario, Canadian Organic Growers.

CSRC. (2012), Land reform monitoring indicators, Nepal, Kathmandu, Nepal, Community Self-reliance Centre (CSRC).

DoAE. (2006), Proceedings of a first national workshop on organic farming, Hariharbhawan, Lalitpur, Directorate of Agriculture Extension, 1-194.

FAO. (2012), Organic agriculture. [Retrieved from www.fao.org: http://www.fao.org/organicag/oa-faq/oa-faq5/en/ on August 5, 2012].

FAO. (2002), Organic agriculture, environment and food security, N. E.-H. Scialabba, & C. Hattam, Eds., Rome, Food and Agriculture Organization of the United Nations.

FAO. (1999), Organic agriculture, Rome, Food and Agriculture Organization of the United Nations.

Fibl, & IFOAM. (2010), The world of organic agriculture: Statistics and emerging trends, France, NGO Publishing.

Ghimire, M. (2005), Organic agricultural product certification in Nepal: Process and practices, *Proceedings of workshop on organic agriculture and food security*, Kathmandu, Nepal.

Giovannucci, D. (2005), Organic agriculture and poverty reduction in Asia: China and India focus, International Fund for Agricultural Development.

Halberg, N., et al. (2006), The impact of organic farming on food security in a regional and global perspective, N. Halberg, H. F. Alroe, M. T. Knudsen, & E. S. Kristensen, Eds., *Global development of organic agriculture: Challenges and prospects*, Cambridge, USA, CABI Publishing, 277-316.

Halweil, B. (2006), Can organic farming feed us all?, *World Watch Magazine*, 19 (3).

Imus, D. (2012), Study examines benefits of organic foods. [Retrieved from http://www.foxnews.com: http://www.foxnews.com/health/2012/09/10/study-examines-benefits-organic-foods/ on October 25, 2012].

Jha, R. K., & Regmi, A. P. (2009), Productivity of pesticides in vegetable farming in Nepal, Kathmandu, Nepal, Centre for Rural

Development and Self-Help (CRDS).

Kafle, B. (2011), Factors affecting adoption of organic vegetable farming in Chitwan District, Nepal, *World Journal of Agricultural Sciences*, 7 (5), 604-606.

KC, G. K. (2006), An idea on organic agriculture system in Nepal, *Proceedings of a First National Workshop on Organic Farming*, Kathmandu, Directorate of Agriculture Extension, 10-26.

Leu, A. (2011), Scientific studies that validate high yield environmentally sustainable organic systems, Mossman, Australia, Organic Federation of Australia.

Meisner, C. (2007), Why organic food can't feed the world. [Retrieved from Cosmos online: http://www.cosmosmagazine.com/features/online/1601/why-organic-food-cant-feed-world on October 29, 2011].

MoAC. (2008), National technical standard realted instructions on organic agriculture production and treatment system (Amendment 2008), Kathmandu, Nepal, Ministry of Agriculture and Cooperatives.

MoAC. (2005), Statistical information on Nepalese agriculture, Kathmandu, Nepal, Ministry of Agriculture and Cooperatives.

MoE. (2011), Status of climate change in Nepal, Kathmandu, Nepal, Ministry of Environment, Government of Nepal.

Nepal, A. P. (2011), Study on the microbial additive compost for organic farming system, Japan, Interdisciplinary Graduate School of Agriculture and Engineering, University of Miyazaki.

NPC. (1992), Eighth five year plan (1992/93-1996/97), Nepal, National Planning Commission.

Pant, K. P. (2006), Policies and strategies of Nepal government to promote organic farming in the context of Nepal's membership to WTO, *Proceedings of a First National Workshop on Organic Farming*, Hariharbhawan, Lalitpur, Nepal, Directorate of Agriculture Extension, 170-178.

Pokhrel, D. M., & Pant, K. P. (2009), Perspective of organic agriculture and policy concerns in Nepal, *The Journal of Agriculture and Environment*, 10, 89-99.

Rodale Institute. (2011), The farming system trial, Kutztown, Nacci Printing Inc.

Samriddhi. (2011), Commercialization of agriculture in Nepal, Kathmandu, Nepal, Samriddhi - The Prosperity Foundation.

Sharma, D. R., et al. (2012), Use of pesticides in Nepal and impacts on human health and environment, *The Journal of Agriculture and Environment*, 67-74.

Sharma, G. (2005), Organic agriculture in Nepal: An analysis into status, policy, technology and psychology, Kathmandu, Nepal, Paper presented at the National workshop on organic agriculture and food security.

Shively, G., et al. (2011), A review of food security and human nutrition issues in Nepal, Indiana, USA, Purdue University.

Shrestha, R. K. (2010), Fertilizer policy development in Nepal, *The Journal of Agriculture and Environment*, 11, 126-137.

Shrestha, P. L., & Neupane, F. P. (2002), Socio-economic contexts on pesticide use in Nepal, *Landschaftsökologie und Umweltforschung*, 38, 205-223.

Tamang, S., et al. (2011), Status and scope of organic agriculture in Nepal, Lalitpur, Nepal, Food and Sustainable Agriculture Initiative, Forestaction.

Trewavas, A. (2002), Malthus foiled again and again, *Nature*. 418, 668-670.

Weiss, J. (2004), Global organics. [Retrieved from http://newhope360.com/agriculture/global-organics on March 16, 2012].