

Does High-Value Agriculture Build Resilient Livelihood? Insights from the Study of Cardamom and Vegetable Farmers of Nepal

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Abstract

The Nepalese agriculture is shifting from subsistence farming of cereal crops to commercial farming of high-value agriculture (HVA) crops. This shift in agriculture for high income have implications in the livelihood of farmers and the farming system. In this paper, we have explored on these two interlinked issues, HVA based livelihoods and the risks in farming. We took two cases, cardamom from Ilam and vegetables from Makwanpur for in-depth study and collected qualitative data from 52 farmers. We interpreted data following the household livelihood resilient framework and the farming system resilient framework. Findings show that income and employment from HVA strengthen financial asset at the beginning and then contribute to build other livelihood assets which re-enforce each other and improve the livelihood condition of farmers. In addition, HVA crops face risks as a result of price fluctuation and climate change which majority farmers have adapted through mobilisation of assets and additional investments. We conclude that HVA can withstand shocks like price fluctuation and climate change and provide base for resilient livelihood of the farmers. As small farmers have lower adaptive capacity than those with large scale farming, HVA policies and interventions should be favorable and reachable to all farmers, particularly those involved in small-scale farming practice.

Key words: Adaptive capacity, climate change, livelihood assets, livelihood resilience

INTRODUCTION

Agriculture sector holds strong significance in Nepal as it provides livelihood base for more than 60 per cent of the population and contributes over one-fourth of the Gross Domestic Product (GDP). Nevertheless, people depending on agriculture and the sectorial contribution to the economy is shrinking over the years (MoF 2019). Records show that the agriculture sector's contribution to the country's GDP declined from 69 per cent in 1974/75 to 31 per cent in 2009/10 (Satyal 2010), and continued to decline to 27 per cent in 2018/19 (MoF 2019). Despite the slump in agriculture sector's share in GDP, farming of high-value agriculture (HVA) has been increasing

over the years due mainly to the rise in its demand in domestic and foreign markets.

The growth in production of HVA products in Nepal is taking place at a much faster rate. Production of vegetables increased by 50 per cent and spice crops by 25 per cent in the past ten years, between 2008 to 2018. Likewise, mushroom, honey, milk and other HVA products has witnessed the same trend in the production (MoALD 2020). Previous studies show that HVA contributes to increased income and employment among farmers at different nodes of value chain (Thapa *et al.* 2018; Pokharel 2019), which is triggered by reduction in

the productivity of subsistence crops. Evidences show that HVA has been playing a crucial role in meeting the household expenses through flow of cash on daily basis (Deshar 2013; Karki *et al.* 2020). But on the other hand, HVA farming is practiced in the context of growing uncertainties from heavy fluctuations in the price, poor access to market infrastructure, i.e., information, roads, price, technology, business service and agricultural inputs and poor competitive capacity of farmers (Amin *et al.* 2020).

Existing literature stress that Nepali farming system is facing multiple challenges triggered by multiple factors including outmigration, feminisation of agriculture, and land abandonment among others (Tamang *et al.* 2014; Ojha *et al.* 2017; Devkota *et al.* 2020; Paudel *et al.* 2020). Agriculture sector has not proven to be lucrative and holds low share in supporting livelihood, the impact of which has been on departure from such practice, shortage in male labor force, and ultimate reliance on aging population or women to sustain the agricultural practices (KC and Race 2020). As a consequence of this, there is increasing trend of leaving fertile land fallow in the hills and mountains of Nepal (Timilsina *et al.* 2019; Karki *et al.* 2020). The three tiers of Government of Nepal have put commercial agriculture in priority that has been reflected in agricultural policies, institutional set up and annual budget. However, these initiatives have not succeeded in addressing youth out-migration and increasing underutilisation of farmland (Ojha *et al.* 2017; KC and Race 2020).

Farmers cultivating HVA crops have also reported issues in terms of degradation of soil quality, water scarcity, incidence of insects, pests and diseases, and ultimately decline in the cash crop productivity and quality (Deshar 2013; Shrestha and Nepal 2016). The changes in pattern of rainfall, long

droughts, damage of crops by unprecedented windstorms and hailstorms have exacerbated the situation (Karki *et al.* 2020). This has led farmers to adopt intensive use of soil and water, changing crop varieties, inter-cropping, use of insecticides, pesticides and fertilizer (Shrestha and Nepal 2016). Not only has this been costly in terms of the over use of resources, it compromises the resilience capacity of the farming system (Amin *et al.* 2020).

The farmers of Hindu Kush Himalayan region, who depend on agriculture for livelihoods, have witnessed similar problems (Wester *et al.* 2019). The government and non-government stakeholders are questioned over their capacity to address farmers' concerns related to production and trading (Dahal *et al.* 2009). Similarly, existing support mechanism to climate vulnerable farmers is not enough for the resilient livelihoods (Joshi and Joshi 2019). Thus, this paper assesses the interlink between HVA based livelihoods of farmers and risks in the farming system in the context of mid-hill region of Nepal. More specifically, this paper assesses how farming HVA crops contributes in livelihood assets building following Household Livelihood Resilience Framework (HLRF) of Quandt (2018). Likewise, resilience capacity of farming system is assessed taking economic, social and environmental risks and farmers' adaptive capacity to respond such risks following Farming System Resilience Framework (FSRF) of Meuwissen *et al.* (2019). For this, we have taken the two prospective HVA crops of Nepal- cardamom from Ilam district and vegetables from Makawanpur district.

We define HVA crops as crops of higher economic importance and produced primarily targeting its sale in the market. HVA crops include crops under category 'cash crops'¹ and 'other crops'² as defined by the Ministry of Agriculture and Livestock Development of the government of Nepal (MoALD 2020). Likewise, resilient livelihood is

1 Oilseeds, potato, sugarcane, jute, rubber, cotton

2 Cardamom, ginger, garlic, chilli, turmeric, fruits, vegetables, tea, coffee, honey, fish, silkworm and others.

the ability of farmers to withstand spontaneously or through planned action when they are at risk (Quandt 2018). This includes livelihood strategies and activities that farmers adopt to cope and manage the impacts of shocks. Resilient livelihoods of farmers are measured taking into account the indicators as farmers' livelihood assets: financial, human, social, physical, and natural and their ability to mobilise these assets at the time of livelihood vulnerability (*ibid.*).

The resilient livelihood of farmers' is founded on the concept of resilient farming system, which can continue to provide vital service such as food production if challenged by severe drought, or by a large reduction in rainfall (Lin 2011). Such farming system can cope with economic, social, and environmental risks through capacities of robustness, adaptability and transformability (Meuwissen *et al.* 2019). In this paper, we focus on adaptability, which means ability of farmers to adopt measures against the experienced or potential risks (Brooks and Adger 2004), and have drawn indicators of adaptation from FAO (2017).

METHODOLOGY

This research adopted qualitative and case study approach (Yin 2014) for data collection and interpretation.

Study Sites

Rong Rural Municipality (hereafter Rong) of Ilam district in eastern Nepal and Thaha municipality (hereafter Thaha) of Makwanpur district in central Nepal were purposively selected for the field work. The rationale for the selection of these two sites were: they are popular HVA production sites where majority people depend on HVA for livelihoods, and both sites have an accessible market within a distance of 3-4 hours' drive. Specifically, Rong is known for commercial production of cardamom, betel nut, tea, broom, orange, milk, honey, and fresh vegetables and exports in domestic and world markets (RRM 2019). Among these, cardamom is highly preferred product in terms of its price per volume and is one of the top agricultural export products of Nepal (MoALD 2020). Likewise, Thaha is popularly known for vegetables, fruits, ginger, turmeric and garlic at scale, wherein cardamom is a newly introduced crop. These products have a good domestic market. Among HVA products in Thaha, vegetables rank top in terms of production volume and farmers dependence on livelihoods. The location of research sites Rong and Thaha is given in Figure 1 below.

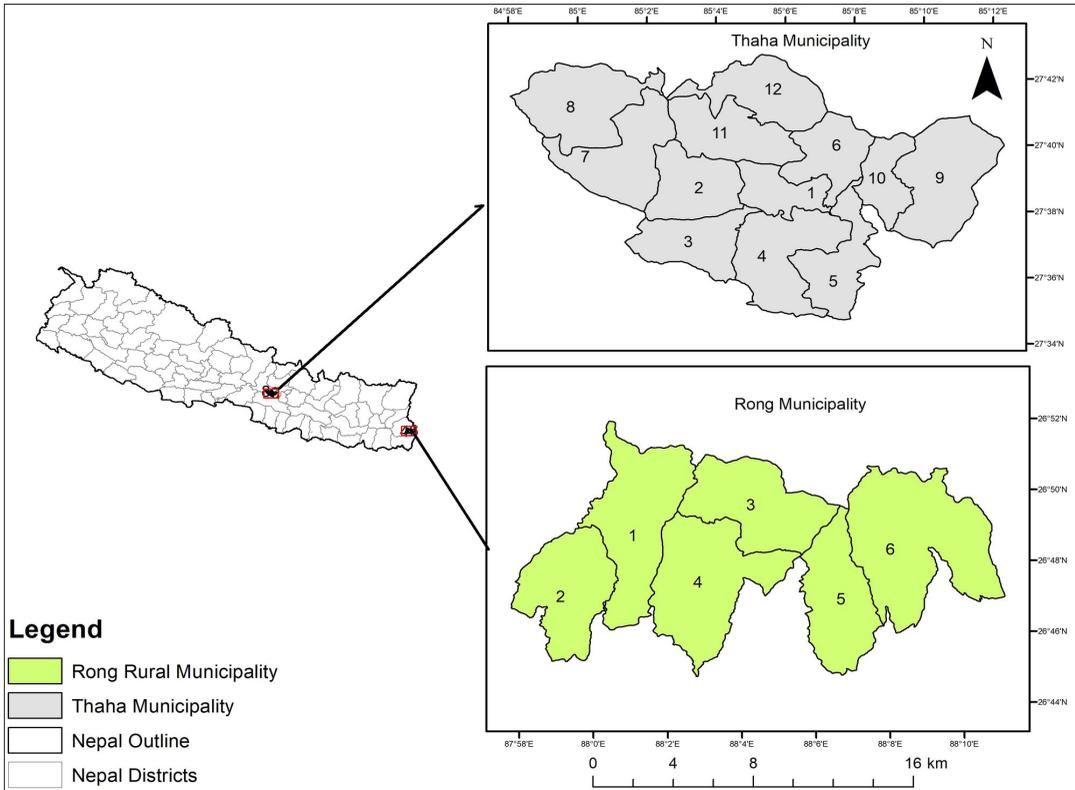


Figure 1: Political Map of Rong RM and Thaha Municipality

Source: Self-developed from Arc GIS 10.3 (Authors 2021)

The selected crops, cardamom and vegetables possess both similar and contrasting features. Common features include: history of commercial cultivation of around 30 years, majority of the farmers are smallholder (farm size below 0.5 ha), grown in almost similar climatic zones, similar context of market accessibility, and priority crops for respective municipalities for the local economy (RRM 2019; TM 2019). Likewise, contrasting features include: seasonality, product life, crop rotation period and market. Vegetable is seasonal, perishable crop with short rotation period whereas cardamom is perennial crop with annual harvest and long product life (retained for 20 years). Vegetable has domestic market whereas cardamom is an export product.

Data Collection

This research followed a qualitative approach to collecting data. Research participants were selected purposively for key informant interviews (KII) and stakeholder consultation. Inclusive criteria were adopted to make the composition of the respondents as representative as possible e.g., gender, ethnicity and farm size. For the purpose of this research, 52 KIIs was conducted with farmers, village intermediaries and input suppliers. In addition, municipal officials, government officials at Agriculture Knowledge Centre (AKC), Cardamom Development Centre (CDC) and Prime Minister Agriculture Modernization Project (PM-AMP) were consulted to draw their views on specific issues concerning agriculture. Primary data

on production and local value addition together with livelihood opportunities, farming risks and adaptation strategies of farmers was collected. The fieldwork was conducted in 2018-19 in Rong and 2020-21 in Thaha.

Secondary information related to case study crops were collected from the municipality profiles, digital data were retrieved from MoALD, and Ministry of Finance (MoF). Additional empirical evidences were accessed digitally from published journal articles, newspaper articles, online news and opinion articles.

Data Interpretation

The paper adopted HLRF framework (Quandt 2018), and FSRF framework (Meuwissen *et al.* 2019) for the data interpretation. To adapt Quandt's HLRF framework in this research, sub-indicators for each livelihood assets were developed. For financial assets, income, employment, and access to loan or credits were considered as sub-indicators. Likewise, knowledge, skills and physical and mental health were considered as sub-indicators of access to human assets; farmers involvement in groups and networks, and benefit from there as sub-indicators of social assets; availability of market infrastructure, production equipment and family assets as sub-indicators of physical assets; and finally, access to land, water and forest products and their ability to mobilise these assets as sub-indicators of natural assets.

Likewise, sub-indicators for social, economic and environmental risks were developed in farming system and their adaptive capacity. Farmers' access to means of production, access to inputs, human labour, market, price and effects of COVID-19 were taken as sub-indicators of economic risks; out-migration, labour availability, and workload to women as sub-indicators of social risks; and effects of climate change and incidence of insect, pest and diseases as sub-indicators of environmental

risks. Finally, ability to utilise available resources to increase production; ability to arrange food and basic livelihood assets; crops diversification; access to credit, insurance and social protection; and context of institutional support as sub-indicators for adaptive capacity of farmers were considered.

RESULTS

Prospects to Livelihoods

This section presents research results on contribution of cardamom and vegetables in the livelihood of farmers through building their livelihood assets. Results showed that farmers have increased financial assets from the income made from cardamom and vegetables, and employment. In Rong, farmers earned Nepalese Rupees (NPR) 60,000 to NPR 270,000 per annum from cardamom while few large producers earned above NPR one million in 2018.

Small farmers who have small piece of land obviously earned less from the sale of cardamom but they got the opportunity to earn from wage labour which complemented their income portfolio. At the same time, farmers have been able to earn from the sales of other HVA crops, for example: orange, betel nut, broom, tea, honey and milk products. Because of this, farmers in both municipalities have intensively used land for HVA cultivation. Municipal data also supported this result that more than 70 per cent people in Rong and 65 per cent people in Thaha considered HVA farming as their main occupation, and cardamom and vegetables as their main agricultural crops.

Likewise, vegetable farmers in Thaha earned on an average of NPR 100,000 - 120,000s per annum in 2020 where few large farmers have earned above NPR two million rupees. High earning farmers were often the returnee migrants and youth farmers. One such farmer, who was also a returnee migrant from South Korea said,

"I have lots of expenses in the farm and registered my own private firm. Though there is high labor input and fluctuation in selling prices from time to time, under no unprecedented incidents I generally have saving of 15-20 lakh annually."

- Interviewee, Thaha, May 2021

In Thaha, farmers were motivated from high earning potential from vegetables, and not only the returnee migrant, but also the farmers from the adjoining villages of Thaha have migrated internally to more accessible parts of the municipality to do vegetable farming. Farmers in Rong equalise cardamom with gold or *ATM* (Automatic Teller Machine), means it can be convertible to cash immediately when needed. Being its ability for assured transaction, small farmers who do not have money at hand but cardamom in the farm feel confident in terms of having money. One woman farmer shared the incident that she needed immediate money for the treatment of her 11-year-old daughter who broke her hand while returning from school. She borrowed some loan from local intermediary and went to Birtamod of Jhapa district for treatment. She paid back the loan following the sale of cardamom. In village, local intermediaries act as *ATM* to farmers and at market, its traders.

Financial asset contributed farmers to build other livelihood assets and then other livelihood assets re-enforced each other to improve the overall livelihood of farmers. Farmers were building human assets by getting technical knowledge on nursery, season and off-season production, safe use of insecticides and pesticides (in case of vegetables). They also got an opportunity to participate in trainings, exposure visits and in-the-field technical services. In addition, they have acquired good cultivation practice, tunnel farming and thus have built confidence to access material

and services from the service providers. This has enhanced communication and negotiation skills with buyers, and ability to approach for business services from service providers.

With regard to social assets, farmers have obtained membership in variety of social networks: farmers group, agriculture cooperatives, women agri-cooperatives and they were benefitted from such engagement. In Rong, Jirmale Women Agriculture Cooperative provided skills training, account keeping, leadership and gender training to women farmers to strengthen their human assets. Likewise, agri-product based cooperative 'SUMADUA'³ helped farmers in getting inputs and marketing services. In Thaha, farmer's cooperatives called 'Sana Kishan' provided technical, financial and marketing support to the farmers. Women have formed separate groups where they conduct savings and credits programs. Such engagement has enabled them to manage inputs, labour, finance and transportation.

Farmers were helping one another by sharing labour, '*parma*' however, they were not strict on roles specific to men and women. In cardamom and vegetables, men and women were almost equally involved in terms of number of labour days though they differ in specific roles. In cardamom, men's primary roles include seedlings production, transportation, processing and trading, and women's engagement are primarily with planting, weeding, cleaning and fertilizing, and separation of cardamom pods.

Likewise, in vegetable farming, men's primarily roles involved establishment of tunnel house, irrigation, spraying pesticides and trading, while women were primarily involved in planting, weeding, hoeing, harvesting and grading. Though proportion of women involved was below that of men, women farmers were managing labour,

3 The name was developed using initials that stood for the following SU = suntala (orange), MA = maha (honey), DU = dudh (milk) and A = Alainchi (cardamom).

inputs and trading their produce. However, men's engagement demanded for tasks involving physical strength, frequent mobility, trading and roles that require skills while women dominated roles that required patience, sensitivity and care.

Despite high rate of out-migration of men from the mid-hills, cardamom and vegetable farming has rather attracted and retained youths. The following view of one returnee migrant from Saudi Arabia reflects the youth attraction in HVA in Rong.

"I came to Nepal one and half years ago leaving a job in Saudi Arabia. I could not become happy there doing hard physical labour, low income and staying away from my family. I returned to Nepal and expanded cardamom farm in 30 ropanis (1.5 ha) from which I will be earning about NPR 600,000 per annum in coming 2-3 years".

- Interviewee, Rong, November 2018

In the positive note, farmers have added physical assets which have contributed to better lives. At the household level, farmers have added separate kitchen, flush toilets, and furniture. Farmers have mobile phones, radio, television and some large farmers have valuable assets such as motorcycle and or four-wheeled vehicle and land in cities. Many farmers have switched to use of cooking energy from firewood to liquid petroleum gas (LPG). Farmers have added farming assets, for example, tunnels, sprayers, irrigation pumps/pipes and more. Despite all these contribution in the livelihoods of farmers, they have however perceived some risks associated with HVA farming.

Risks in Farming System

Farmers have experienced various risks in HVA farming. From the perspective of the farmers, HVA is associated with more risks than cereals or pulses because the latter have adapted well to the local climate and soil for centuries. They used family labour or exchange labour in production of these crops and they consumed the products locally. But

in case of HVA, climate, soil and market all were challenging.

Farmers experienced economic risks generally emanate from limited access to market infrastructure, fluctuation in price, unpredictable supply situation and access to production inputs. Among these, fluctuation in price has more implication on farmers' income. Vegetable farmers suffer from the daily or weekly price fluctuation phenomena whereas price of cardamom fluctuates on periodic basis. For instance, in 2018, average farmgate price of cardamom was NPR 700 per kg. If they were to get the same average price of cardamom, they used to get in 2015, i.e., NPR 2000 per kg, their earnings would be three times higher. Likewise, farmers who could actually predict the fluctuation in vegetable prices and were able to manage the peak time of supply and off-season, made higher income than other farmers. But farmers have grievances that intermediaries take major share in price margin. Though few farmers attempted to sell vegetable directly to the market, they could not break the chain of intermediaries. One farmer expressed his dissatisfaction on intermediaries' network as:

"They take vegetables at the rate of 20 per kg from us and the consumers pay more than NPR 50 per kg. In the mobile applications we can see about 25 per cent rate difference in the farmgate price and customers' price. But in reality, the difference goes above 150 per cent".

- Interviewee, Thaha, May 21

On top of this, farmers have perceived unpredictable supply of vegetables from India which greatly influences vegetable price in Kathmandu and other major cities. Buyers fix vegetable price in accordance with the number of trucks with vegetables entering from India. Farmers expressed their grievances that Nepal government has neither checked import from India nor supported farmers to increase their competitive capacity.

Unlike vegetables, 99 per cent of cardamom market is limited to India. Farmers and traders see potential risks on sole dependence on the Indian market. They believe market diversification can reduce this risk as well as provide higher price than what they have been getting so far. Farmers were worried from unexpected fluctuation in the price of cardamom in past 10 years. Average price of cardamom was NPR 600 per kg in 2009/10 which unexpectedly increased and reached to NPR 2500 per kg in 2013/14, and again dropped and to NPR 650 per kg in 2019/20 (FLCEN 2020).

Reduced income from decline in the price added risks to the livelihoods of many small farmers, eventually affecting their food security, clothing, children education, costs to cover their medication and other expenses needed to organising cultural events. Many small farmers opted for loans, sold land and some were forced to migrate for job. Some intermediaries and traders sold their properties to pay bank loans. One intermediary shared his hardship while trading cardamom as:

Four years ago (in 2015), I sold cardamom at NPR 91,000 per mund⁴. Being excited from this, I collected cardamom paying in advance in 2016. But it dropped to NPR 65,000 per mund that year. I hold cardamom in stock hoping that the price would bounce back. But it continued to drop and transacted between NPR 40,000 – 60,000 per mund in 2017. I could not hold cardamom anymore and sold at NPR 35,000 per mund in 2018.

- Interviewee, Ilam, March 2019

Fall in the price has implications in the expansion of cardamom farm. Nursery growers reported that demand for cardamom seedlings dropped to below 25 per cent in 2017 as compared to that in 2016. Among nursery growers who had made high income from the sale of seedling, small nursery growers switched to vegetable farming and larger nursery growers reduced their production volume by more than half in 2018.

Though not severe, farmers have experienced social risks in the form of out-migration, role division and workload distribution among men and women. Despite these, as mentioned in the findings above, youths, especially male, have taken HVA as their main occupation for livelihoods, and thus reversing the outmigration rates to some extent. There exists out-migration from small farming households as they have not been benefiting much due to low remunerative cardamom price. This out-migration has created labour shortage in the peak season of cardamom harvesting and local processing. Moreover, this has increased workload of those left behind, especially women. Both Thaha and Rong had similar situations where men had been abandoning farming in search of non-farm jobs elsewhere. Consequently, as men left farming, women had to carry with farming or give others in rent or leave fallow.

Studies on climate change risks in agriculture show that farmers have experienced changes in precipitation pattern, increased temperature, reduced water supply for irrigation, diseases and wildlife attack which reduces their agricultural production and productivity (Pandey 2012; Khanal et al. 2018). Changes in precipitation pattern and reduced water flow has negatively affected cardamom production. Cardamom farmers who have access to water, irrigate their farm from November through end of May. Cardamom and vegetables, both demand water, which excluding the rainy season is only possible through irrigation. Small farmers depend on rainfall and a good rainfall can double the production of cardamom. In 2018 and 2020 a good amount of rainfall was recorded, however there was a prolonged drought in 2019. Interestingly, farmers considered hailstorm as good for cardamom production as it keeps the soil moist for a longer period, but contrastingly, it is detrimental to vegetables.

4 1 Mund equals- 37.324 Kg

Likewise, cardamom farms in one cluster in Rong were attacked from *chhikey phurkey* diseases and have shown symptoms of dry leaves, fruits not ripening, and eventually dying of entire bush. Cardamom farms adjoining to forests were severely affected by the depredation of monkeys. Monkeys destroy cardamom sprouts in growing season and consume the inner part. Other pests, rats eat flowers of cardamom and mammalian pest locally called *Kala* (Himalayan Palm Civet) eat ripen fruits and soft mucilage of cardamom during night. In farmers view, overall losses from disease and pest damage to cardamom come to be as high as 10 per cent.

Vegetable farmers in Thaha have also faced the impact of unpredictable weather events. They expected timing for farming has altered, drought days have increased, and number of rainy days have decreased, though rainfall have become more intense. They have experienced unprecedented numbers of mosquitoes in their region. Rainfall has become so erratic that there have been prolonged dry days while in other cases, excessive rainfall has resulted in detrimental effect to the crops. Moreover, this year (2021), farmers experienced an unexpected damage to their vegetable farms as well as other crops from untimely and huge hailstorms due to which farmers had to incur a huge loss. One of the farmers in Thaha expressed his grievances as follows:

"We used to experience hailstone used for a short period of time, however, this year it lasted for 2 hours and all the crops were destroyed. I used to harvest 20 sacks of potato from my land, sadly this year it was only 5 sacks".

- Interviewee, Thaha, May 2021

Observations of the vegetable farmers in Thaha suggest that changing climatic conditions and excessive use of chemical fertilizers have resulted in increased pest attack. Consequently, the pest

is becoming more resistant to the effects of pesticides. Farmers have experienced that pest attack varies with the level of drought. In dry climatic condition, pests were more visible than in other conditions. Heavy use of pesticide and chemical fertilizers in vegetables added risks as the residue remains back in the soil and could also contaminate the nearby water bodies. In 2017-18, when there was prolonged drought spell, pestilence was in rife, however, nowadays there have been more rainy days which has reduced the incidences of pest attack in vegetables. With the growing forest areas, farms near forests have reported to have increase in the deer and monkey population and as a result of that, intrusion to crop land and crop depredation is on rise.

The global COVID-19 pandemic too had toll on the farmers due to problem in accessing chemical fertilizers and seeds for vegetable farming. The imposition of lockdown this year and last year (2020) severely affected the livelihoods of many vegetable farmers in Thaha. Due to lockdown, many farmers did not harvest vegetables, rather they ploughed and buried as the demand for it was too low and intermediaries' network were offering low prices. Also, farmers could not predict the market demand and produced less than they normally used to. This eventually had a negative impact on the overall income of farmers. Whereas in case of cardamom, the impact of COVID-19 was relatively minimum, as cardamom farmers use household made compost fertilizer, and thus the production was not affected. Likewise, cardamom supply chain was disturbed only for three months from March to May 2020 due to lockdown in Nepal and India.

Farmers Capacity to Adaptation

Majority of farmers showed ability to adapt with the social risks, however, they were not prepared to adapt with the economic and environmental risks. As a strategy to adapt with such risks, farmers have intensively utilised the land and thus trying their best

not to leave any land fallow in both municipalities. Those households who do farm themselves have rented land to others and have also invested in irrigation. Vegetable farmers have managed irrigation through ground water extraction and drawing water from the river. Cardamom farmers have brought water in polythene pipes from small spring waters, streams and rivulets from distance stretching to as long as 5-10 km. Likewise, large scale farmers have also invested as high as NPR 500,000 in irrigation in Rong. In Thaha, irrigation canals had been destroyed in 1993 by flood. Since then, farmers are dependent on ground water supplies and river water for irrigation. Similarly, farmers used forest products from own farm or from community forest in giving stake, making tunnels, forest litter in making compost and firewood in processing cardamom. Moreover, farmers were using Zinc phosphate to trap rats, cleaning regularly and practiced day watching to chase the monkeys.

Likewise, farmers have adopted crop diversification as one of the adaptation strategies. In Rong, farmers were also cultivating *Rudrakshya* (*Eleocarpus species*), kiwi, banana, avocado, tea and coffee which generate economic return in the long-run. One farmer said he established betel nut nursery to replace cardamom to avert risk of price decline of the latter. But many small farmers switched to vegetable farming because it provided cash flow for small farmers within short period. Availability of improved variety of seeds, tunnel farming, access to technical services, high productivity and high market demand attracted farmers to vegetable farming.

Farmers shared that they have more secure access to food these days compared to the past. Farmers were taking diverse food products like rice, vegetables, pulses, milk and milk products, and meat more frequently. It was less possible for small farmers three decades ago. At that time, farmers considered 'Chayote' (*Isbwarra* or *Iskus* in Nepali),

a staple vegetable, as major food product and used to consumed three times a day. Households who produced more Chayote were considered rich in the village. Chayote now comes as least favored food.

Cardamom farmer's increased financial assets has built confidence to cope with potential risk. Many small farmers were saving their income in local cooperatives whereas large farmers were depositing in commercial banks. At the time of low price of cardamom, small farmers made up their living using saved money, taking loan, sale of valuables including land. Some small farmers switched schools for their children in order to avoid paying high fees, and those aspiring for technical education like engineering, agriculture, livestock at higher level were admitted to general subjects including social science, economics, education, and management among others.

To adapt to price fluctuation, vegetable farmers followed production calendar so as to tap high prices at the time of peak demand in the market. Because of the altitudinal difference between Thaha and the Terai, seasonal production of vegetables in Thaha get off-seasonal high price in Terai mainly during rainy season. In response to shortage of chemical fertilizer in 2020 following COVID-19 restrictions and subsequent lockdown, local farmers' cooperative got authorisation to procure and sell chemical fertilizer to the farmers. At that time, they could not buy seeds imported from Korea, Thailand and Japan, and managed by using local seeds. From this, they learnt an important lesson to become self-reliant on seeds. One farmer expressed his view as:

"We generally plant foreign seeds; they make us seed dependent. This year also it happened so, that the land was ready for planting and the seeds were not in the market, of those available in limited numbers the price was too expensive"

- Interviewee, Thaha, June 2021

Farmers have developed local strategies to manage shortage of labour during peak season. Cardamom farmers switched from daily wage labour to piece-based contract for certain activities, for example: separating the cardamom pods. Farmers paid NPR 20 for separation of one *tina*⁵, i.e., around 20 kg of fresh cardamom. This arrangement provided opportunity to elderly, students, family members and neighbours to utilize time without any restriction and earn as high as NPR 500 per day. Likewise, women were taking roles that were assigned to men, for example: cardamom harvesting. So, there was less distinction in division of roles between men and women. Few large farmers started labour contract for the whole year. One such labour contract was worth NPR 500,000 for the FY 2018/19 to perform all activities related to cardamom. The same farmer produced 50 mund cardamom in 2018.

In vegetable farming, more women were employed as labours and women were doing all sorts of jobs which was used to be gender stereotype. Some farmers prefer women than men as the latter demand more wages for the same piece of work. With the introduction of tunnel farming and imposed lockdown, number of vegetable farmers were increasing in Thaha and took it as their primary livelihood strategy.

Role of the local government was important for cardamom and vegetable production and trading. Thaha municipality supported farmers in construction of tunnels, purchase of water motors and vegetables collection centres. Thaha municipality was constructing cold storage in certain locations to preserve vegetables for some time so that farmers could sell it at the time of high price and reduce the influence of intermediaries. This municipality also provided soil test and quality control services free of cost to farmers. Likewise, Rong municipality provided support on soil test and treatment and distribution of seedlings of HVA crops to farmers.

Municipal governments have also initiated incentive-based mechanism targeting the farmers, for example: grants, subsidies in agricultural equipment purchase and material support have provided certain relief to farmers though some farmers expressed their dissatisfaction over the procedural difficulty and transaction cost. One of such cases from Thaha was farmers constructed iron tunnels hoping to get 50 per cent incentives from the municipality but they were not getting that incentive on the mentioned date. Municipal authorities were urging that documentation was not complete to provide payment. Farmers in Rong expressed their grievances on the insurance policy which they said were more procedural and time consuming. In the view of Ward chairperson, farmers' level of awareness is low and could not make documentation as demanded by the insurance service providers. Some of the banks have given the facilities of crop insurance, however, farmers have never received the insurance amount in case of loss and damage of vegetable crops.

DISCUSSION

This section discusses and interprets the key findings of the research linked to livelihood resilience, risks in farming and adaptation measures taken by farmers in the study sites. HVA crops such as cardamom and vegetables, have contributed significantly in financial asset building of the farmers through generation of income and employment opportunities contrary to the cultivation of subsistence crops. This can be assumed that if these crops were economically less profitable and environmentally challenging, farmers would not have been planting continuously since the past 30 years. This exhibits the fact that farmers adopt the farming of particular crops as long as they meet their livelihood needs (Karki *et al.* 2020; Kafle *et al.* 2021), which is supported by high productivity, high market demand and

5 It is local unit of measurement where 1 tina cardamom almost equal 20 kg.

satisfactory price (Pande *et al.* 2017). Both cardamom and vegetables have high productivity of 0.550 Mt and 13.48 Mt respectively (MoALD 2020) and both fetch good market price.

Cardamom and vegetables are profitable that benefit cost ratio (BCR) for cardamom shows 3.06 (Shrestha 2018), and vegetables shows 2.5 (Arain *et al.* 2018; Paudel and Adhikari 2018). Farmers in both municipalities have been attracted to crops of high economic significance and these crops provide foundation for their economic growth. The municipal record also showed average annual export of HVA products worth more than NPR 0.5 billion from Rong and over NPR 1.0 billion from Thaha (RRM 2019; TM 2019).

Records show that between 2008 and 2018, growth in production area, production volume and productivity of HVA crops increased at much faster rate. Statistics from MoALD (2020) support this claim wherein there has been 27.5 per cent increase in production area, 44 per cent increase in production volume, and 17.5 per cent increase in productivity across the country. These evidences show that HVA is profitable, adaptive and supportive to the livelihood of farmers.

Livelihood security through farming has had positive outcomes in the form of higher literacy rate, lower out-migration and increased access to production assets. There was decline in the out-migration vis-à-vis lower reliance of farmer on remittance money, that is around 10 per cent in both study sites. This finding is similar to Karki *et al.* (2020) and UN (2020) which confirm that youths quit agriculture when they see risks in livelihood from the sector. Fei-Ranis model of rural-urban migration claims youth retention in agriculture is subject to agricultural output which is equal or more than institutional wages in non-farm sector (Fei and Ranis 1964). Thus, this study notes that cardamom, vegetables and HVA crops provide the basis for resilient livelihoods.

Having said that it does not mean HVA farming is free from socio-economic and environmental risks. Cardamom farmers see India, a sole market till date, as major economic risks and has a major influence in the overall price. Dependence over India and challenges in export market diversification add economic risks (Acharya *et al.* 2020). Vegetable farmers see risks from the import of vegetables from India, and hold of intermediaries in the value chain. In addition, cardamom and vegetables farmers face risks that arise from change in precipitation pattern, increasing temperature and reducing water supply. Such environmental risks demand high investment in farm management, irrigation and labour (Sharma *et al.* 2017).

As an adaptation strategy to increase competitive capacity, vegetable farmers use chemical additional fertilizer, insecticides and pesticides or other inputs compared to the normal context. Likewise, cardamom farmers use firewood in processing and have not left water source from tapping for irrigation. Farmers using land intensively for cardamom and vegetables production without fallow period. Extensive use of such resources put pressure on the environment and add environmental risks (Deshar 2013). From this, commercial farmers demonstrate their ability to cope with and absorb the climate variability than subsistence farmers (Shrestha and Nepal 2016).

Farmers capacity to adaptation with risks is reflected on crop diversification, cultivating resilient varieties, soil quality improvement, managing irrigation, adjusting production calendar, cultivating high yielding varieties and inputs like fertilizer. Farmers' adaptation strategy can be specific to local context (Lin 2011) and farmers had demonstrated in the past too. In Rong farmers had switched to cardamom as ginger was heavily attacked from disease in 1990s (KC 2019), and in Thaha, farmers switched from subsistence farming of staple food crops to vegetables after the flood hazard in 1993 (TM 2019). These crops showed

to have relatively less effect even in the extreme condition of COVID-19.

Our observation shows that small farmers are usually interested in vegetables than other HVA crops because this provides quick income on regular basis from on season and off-season farming. In addition, they can be grown even in small piece of land and can begin from small investment. This behavior of farmers can be linked to farmers' ability to take decisions looking over the particular economic and environmental context (Andreatta 1998; Amin *et al.* 2020).

Both cardamom and vegetables demand intensive labour which has implications to gender-based division of roles. Specifically, labour requirement created space for women to takeover roles that were traditionally assigned to men in one hand, and on the other hand, men and women had overlap in their roles and shared workload. Likewise, income and employment from HVA can reverse the situation of agriculture sector dependence on women as men are equally involved in farming (Dahal *et al.* 2009) which contradicts with the findings of Tamang *et al.* (2014) which claims the feminisation of Nepal's agriculture.

Municipal governments have given high priority on commercial farming of HVA crops in the respective municipalities. Their sense of priority can be observed in their annual plan and budget, insurance, subsidies and grants. But small farmers are less benefitted from such policies because they lack awareness of policies, limited access to service providers and procedures they have to fulfill in order to reap benefits (Dhakal 2019).

CONCLUSION

The commercial farming of crops of higher economic importance such as cardamom and vegetables contribute to financial asset building of farmers through income and employment

opportunities. Financial asset is key to build other livelihood assets and re-enforce each other that ultimately contributes to the overall livelihood improvement of the farmers. Cardamom and vegetables demonstrated to be resilient crops in terms of surviving in the context of economic risks, particularly market infrastructure, and environmental risks specifically related to climate change. To adapt with such risks, vegetable farmers demonstrated their resilient capacity through season and off-season production, use of quality seeds, intensive use of water, pesticides and fertilizers. Likewise, cardamom farmers adapted strategies like crop diversification, mobilization of saved resources at the time of financial crisis, management of irrigation and farmers supporting each other. Since cardamom can be retained for years without degradation in quality, it is more resilient than perishable crops like vegetables, in the context of short-term break in value chain, for instance during COVID-19.

This study concludes that promotion of HVA in the hills of Nepal contributes in building resilient livelihood of farmers through intensive use of assets of production like land, water, forest and human resource. Intensive use of land and generation of employment from HVA can be suitable and sustainable means to the three pertinent problems of hills of Nepal viz. leaving fertile land fallow, youth out-migration, and added workload to women. HVA crops though have to pass through fragile economic and environmental context, they can withstand and retain farmers in agriculture. For the retention of small farmers who are more vulnerable from economic and environmental risks, role of local government is important particularly in adoption of environment friendly farming practices, awareness, easy access to insurance, grant and credits together with market promotion and market infrastructure development.

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