

## PRODUCTION AND MARKETING POTENTIALITY OF CAULIFLOWER (*Brassica oleracea* var. *botrytis*) FROM THE PERSPECTIVE OF COMMERCIALIZATION IN TAPLEJUNG DISTRICT OF NEPAL

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### ABSTRACT

*Cauliflower (Brassica oleracea* var. *botrytis*) cultivation is popular in Nepal and is profitable to farmers. Although the Terai region produces and sells more cauliflower, hilly region produces has better value. A study on production and marketing potentiality of cauliflower from the perspective of commercialization was conducted in Taplejung district in 2010, where membership of Commercial Agriculture Alliance (CAA) was distributed. Two hundred twenty seven farmers from four VDCs were selected purposively. The regression analysis showed that income from cauliflower has significant ( $p < 0.01$ ) contribution to total household income. Around 80 percent farmers were buying seeds from agro-vets. Most of the farmers were using hybrid varieties such as White Sticks, Snow Crown and Snow Mestique. Average area used per household for cauliflower production and its productivity was found 0.52 Ropani (0.026 ha) and 947 Kg/Ropani (18.94 tons/ha) respectively. The cost of production per Kg cauliflower was NRs. 5.7. Means of transportation to district headquarters was by human labor and its cost ranged from NRs. 2-5 per Kg whereas transportation cost from district headquarters to Birtamod market was ranged from NRs. 4-6 depending up on season. Gross margin of cauliflower per Ropani was NRs. 32,406 (648,120/ha) and the benefit cost ratio was 6.9. The highest average price of cauliflower (NRs. 35-37.5 per Kg) at Birtamod wholesale market was found in July to October, whereas the highest average price of cauliflower (NRs. 50 per Kg) at Taplejung market was found in March to July. About 11.90 and 47.10 percent household has been practicing collective farming and collective marketing, respectively. However, hundred percent respondents were thinking about collective marketing in future. Findings revealed that access to collection centre, high transportation cost, and insufficient knowledge on improve technologies and post harvest handling were the major problems, whereas suitability of climate, availability of improved technology, improving access to road and communication, uniting and thinking about collective marketing were the major strengths for cauliflower production in the district. Findings indicated that there was high potentiality of commercial cauliflower production in Taplejung district; however, it will be necessary to suitably adjust by creating time and place utility in future

### INTRODUCTION

Horticulture sector contributes about 14 percent to the Total AGDP (Thapa, 1998). The share of horticulture to the AGDP has been increasing in the recent years. By realizing the importance and role of horticulture, the APP has targeted the growth rate of horticulture GDP to 5.5 percent per annum by 2014/2015 and growth rate of vegetable GDP, in particular, to 5.42 percent per annum. Among the horticultural crops, vegetable is the major sector to contribute on total horticultural GDP. Vegetable crops are cultivated in 232,295 ha of land in Nepal in 2008. Nepal produces vegetables worth NRs 45 billion annually. And, NRs. 9 billion is invested in vegetable farming every year. Around 70 percent of Nepal's total household is involved in vegetable farming. Terai is the major vegetable growing area with an annual production of 1,437,921 tons, followed by hilly region with 1,261,041 tons. Total annual production of vegetables in Nepal is 2.82 million tons (Prasain, 2011). Of the total output, 39 percent (1.10 million tons) is used for household consumption and 61 percent (1.71 million tons) for sale. However, of the total vegetable farmers, only 18 percent are engaged in commercial farming (Prasain, 2011).

Cole crops such as cauliflower and cabbage are the major vegetable crops of Nepal. These are popular amongst the farmers and are profitable to vegetables growers (NARC, 2006). In terms of cultivation area, production and value, cauliflower is the number one vegetable crop. A total of 404,580 tons of cauliflower is produced in 33,172 ha of land in the country. Cauliflower worth NRs 6.5 billion is produced annually in Nepal (Prasain, 2011). Due to the higher return per unit of land, the area, production and productivity of

vegetable is increasing day by day. In commercializing the agriculture sector, off-season vegetable farming has played a vital role contributing to the upliftment of the economic status of the farmers residing all agro-ecological zones of the country. It has been providing regular employment and income to the marginal farmers and their family members throughout the year there by bringing economic gains (Panta, 2001). Although the Terai region produces and sells more vegetables, vegetables grown in hilly region have better value. "The reason behind the difference in value is vegetables in hills are produced during rainy season when prices are relatively higher (Prasain, 2011). According to Nepal Agricultural Research Council (NARC), Cauliflower is commonly an important winter vegetable grown during November-February, farmers do not fetch good price by selling cauliflower during these months. In order to fetch a good price, farmers need to produce cauliflower during off-season i.e. from March to November. Taplejung is a hilly district of Nepal located at Eastern Development Region. Cauliflower is a major vegetable crop producing in the district (DADO, 2009). About 546 mt of cauliflower has produced from 65 ha of land in Taplejung in FY 2008/09 (VDD, 2009). In this connection, this study was designed to find out the production and marketing potentiality of cauliflower from the perspective of commercialization in Taplejung district as a broad objective, whereas specific objectives were to; find out gross margin, benefit cost ratio of cauliflower cultivation, contribution of cauliflower to total household income, commercial production and marketing status, price analysis for different markets along with SWOT (strengths, weaknesses, opportunities and threats) analysis of cauliflower cultivation in Taplejung district.

## METHODOLOGY

### Selection of Study Area and Sample

Taplejung district was selected purposively, as it is only one hilly district (as per national classification) of Commercial Agriculture Development Project (CADP) areas. Similarly, Fungling, Dokhu, Nangkholang and Handewa Village Development Committees (VDCs) were selected based on distribution of CAA's membership. Two hundred twenty seven farmers from 4 VDCs were selected purposively for the study.

### Tools and Techniques of Data Analysis

The primary and secondary information were collected from the field survey. The collected information were coded, tabulated and analyzed by using Statistical Package of Social Science (SPSS) and Microsoft Excel for calculating gross margin, benefit cost ratio, regression analysis. Moreover, SWOT analysis was also carried out.

### Gross Margin Analysis

Gross margin = Gross return – Total variable cost

$$\text{Benefit – cost analysis} = \frac{\text{Gross return}}{\text{Total cost (including only variable costs)}}$$

### Analysis of contribution of cauliflower production to HVCs income

The effect of different explanatory variables to dependent variable was assessed by running linear regression model. The mathematical specification of the model was

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5$$

Where, Y= Total household income

a, b<sub>1</sub>, b<sub>2</sub>...b<sub>5</sub>= Coefficients to be estimated

X<sub>1</sub>= Annual income from cauliflower (NRs.), X<sub>2</sub>= Annual income from remittance (NRs.)

X<sub>3</sub>= Annual income from fruits (NRs.), X<sub>4</sub>= Annual income from firewood/fodder/grasses (NRs.)

X<sub>5</sub>= Annual income from cash crops (NRs.), X<sub>6</sub>= Annual income from cereals (NRs.)

### SWOT Analysis

Strength, Weakness, Opportunities and Threat (SWOT) is a tool used in developing strategies for intervention. It was used for identify SWOT of cauliflower crop.

S - What are the sub-sector's internal strengths?

W - What are the sub-sector's internal weaknesses?

O - What external opportunities might move the commodity forward?

T - What external threats might hold the commodity back?

## RESULTS AND DISCUSSION

### Land holding

The average total land holding in the study area was found 41 ropani, (2.05 ha) where majority of their land was *pakhobari* followed by low land and up land. The respondents having minimum and maximum land holding was found 4.99 ropani (0.25 ha) and 408 ropani (20.25 ha) respectively. In the Taplejung district, about 20 percent households having 1 to 5 ha of land (DADO, 2009). The farmers having more land holding might be due to selection of commercial farmers in the district during study. The details are given in Table 1

**Table 1.** Land holding (Ropani<sup>4</sup>) in study area

Description	Low land <sup>1</sup>	Up land <sup>2</sup>	<i>Pakhobari</i> <sup>3</sup>	Total land
Average	14	7	20	41
Minimum	1.7	1.4	1.98	4.99
Maximum	98	98	212	408

<sup>1</sup> It is irrigated and banded land in Nepal is known as *Khetland*, <sup>2</sup> It is unirrigated and unbanded land in Nepal as *Bariland*,

<sup>3</sup> It is a marginal land, normally not used for crop cultivation, <sup>4</sup> *Ropani*= 500 m<sup>2</sup>

### Cauliflower production and selling

Out of total area, average of 0.52 Ropani (0.026 ha) of land was used for cauliflower cultivation. On an average 492 Kg of cauliflower was produced per household, out of which only 82 Kg was used for their own consumption. The results indicated that farmers sold cauliflower up to 2000 Kg per household. The details are given in Table 2.

**Table 2.** Area, production and selling pattern of cauliflower per household in the study area

Description	Area (Ropani)	Production (Kg)	Own use quantity (Kg)	Selling quantity (kg)
Average	0.52	492	82	410
Minimum	0.13	60	20	40
Maximum	1.30	2500	500	2000

\*Total income calculated based on the average price of district headquarter @ NRs. 40/Kg

\*\* Buying rate of 1 US\$= 72. 56 NRs (Nepalese Rupees) as of 2010

### Contribution of Cauliflower to Total Annual Income

For the estimates of the effects of different explanatory variables including cauliflower income to the total annual income, linear regression model was run. The variation covered by the model was satisfactory as R<sup>2</sup> and adjusted R<sup>2</sup> obtained was 0.588 and 0.577 respectively. All the explanatory variables were found significant ( $p < 0.01$ ) except annual income from firewood/fodder/grasses. The contribution of cauliflower (0.181) to total annual income was higher than contribution from fruits (0.129) and cereals (0.147). However, the contribution from cash crops (0.538) and remittance (0.491) was found higher than cauliflower. The main reason for higher contribution of cash crop to total household income was due to large cardamom, turmeric and ginger were the major cash crops in the district (DADO, Taplejung, 2009). The results revealed that one rupee increment in cauliflower income can contribute to total annual income by 0.181 rupee. The details are given in Table 6.

**Table 6.** Contribution of Cauliflower to Total Annual Household Income

Model	Standardized	t	Significance
	Coefficients		
	Beta		
Constant	60473.694	11.0	0.000
Annual income from cauliflower (NRs.)	0.181	3.8	<b>0.000*</b>
Annual income from remittance (NRs.)	0.491	11.1	0.000
Annual income from fruits (NRs.)	0.129	2.7	0.006
Annual income from firewood/fooder/grasses (NRs.)	0.009	.20	0.837
Annual income from cash crops (NRs.)	0.538	11.5	0.000
Annual income from cereals (NRs.)	0.147	3.2	0.001

Dependent Variable: Total Annual Income (NRs.), R square 0.58, adjusted R square 0.57, \* significance at 1% level

**Price analysis at different markets**

The price of Taplejung market and Birtamod wholesale market was analyzed from June/July, 2009 to May/June 2010. From the results it was revealed that price increased from December/January and it rises to NRs. 50 per Kg during March to July except May/June at Taplejung market. However, at Birtamod market price rose from June/July to September and gradually decreased until January/February. The price of cauliflower in Indian markets was higher in the months of June, July, August and September. Due to the lower volume produced during that period, the price hike can be observed. Hence, Nepal can trap the opportunity in exporting the Cauliflower during those periods if the price, quantity and the quality of Nepalese product can be made competitive (Oli, 2009). At the present context, there was no problem of marketing for cauliflower in Taplejung district. However, when cauliflower production massively scaled up to commercial production in Taplejung, then, there should create time and place utility as cost of production was relatively higher in Taplejung than India and Terai districts of Nepal. The details are given in Figure 1.



**Figure 1.** Price of Cauliflower at Taplejung and Birtamod markets

**Collective farming and marketing status**

In totality, about 11.9 percent respondents were practicing collective farming of cauliflower in the study areas. The percentage of respondents performing collective farming was nil in all VDCs except in Fungling. The reason for adopting collective farming only in Fungling VDC might be due to implementation of commercial cauliflower production project supported by CAA in Yanglijung Women Farmers Group at Fungling. The details are given in Table 7.

**Table 7.** Status of collective farming of cauliflower by VDCs

Description	VDC Name				Total
	Fungling	Dokhu	Hangdewa	Nangkholang	
Yes	27 (21.2)	0 (0)	0 (0)	0 (0)	27 (11.9)
No	100 (78.8)	25 (100)	25 (100)	50 (100)	200 (88.1)
Total	127 (100)	25 (100)	25 (100)	50 (100)	227 (100)

Figure in parenthesis indicate percentage

Majority of the respondents (60.6 %) following collective marketing in Fungling VDC followed by Dokhu (48.0%), Hangdewa (32.0%) and Nangkholang (20.0%). In totality about 47.10 percentages of respondents were practicing collective marketing. The highest percentage for practicing collective marketing in Fungling VDC might be due to implementation of more number of non-infrastructure related projects supported by CAA. However, hundred percent respondents were thinking about collective marketing in near future. The details are given in Table 8 and Table 9.

**Table 8.** Status of collective marketing by VDCs

Description	VDC Name				Total
	Fungling	Dokhu	Hangdewa	Nangkholang	
Yes	77 (60.6)	12 (48.0)	8 (32.0)	10 (20.0)	107 (47.10)
No	50 (39.4)	13 (52.0)	17 (68.0)	40 (80.0)	120 (52.1)
Total	127 (100)	25 (100)	25 (100)	50 (100)	227 (100)

Figure in parenthesis indicate percentage

**Table 9.** Respondents' thinking towards collective marketing by VDCs

Description	VDCs Name				Total
	Fungling	Dokhu	Hangdewa	Nangkholang	
Yes	127 (100)	25 (100)	25 (100)	50 (100)	100
No	0 (0)	0 (0)	0 (0)	0 (0.0)	(0.0)
Total	127 (100)	25 (100)	25 (100)	50 (100)	227 (100)

Figure in parenthesis indicate percentage

#### SWOT of Cauliflower Cultivation in Taplejung District

Strengths	Weaknesses
<ul style="list-style-type: none"> <li>▪ Farmers are thinking for collective marketing</li> <li>▪ Because of good earning from cauliflower cultivation farmers are interested to continue its production in increased area</li> <li>▪ Road access and transportation facility are improving.</li> <li>▪ New high yielding varieties are available based on geographical areas</li> <li>▪ Improved technology are readily available for wider adoption</li> <li>▪ Traditional marketing linkage is still functioning</li> <li>▪ Farmers are being united in groups and cooperatives to enhance better marketing</li> </ul>	<ul style="list-style-type: none"> <li>▪ Insufficient irrigation facility.</li> <li>▪ Quality inputs are not available in time and are very expensive.</li> <li>▪ Farmers lack improved knowledge and training in production techniques and post harvest handling.</li> <li>▪ High transport cost</li> <li>▪ No link roads connecting production pockets to road heads.</li> <li>▪ Problem of access to credits in large scale</li> <li>▪ Insufficient collection centers</li> <li>▪ All weather road not available.</li> <li>▪ Very weak value chain.</li> <li>▪ Production centers are scattered and are far from market centers.</li> <li>▪ Farmers have inadequate information on marketing of produce.</li> <li>▪ Insufficient marketing knowledge and awareness.</li> </ul>
Opportunities	Threats
<ul style="list-style-type: none"> <li>▪ There will be improvements in the livelihoods of cauliflower growers.</li> <li>▪ Various organizations such as CBOs, NGOs, and Co-operatives are supporting farmers for cauliflower cultivation.</li> <li>▪ Seasonal export to neighbouring countries like India.</li> <li>▪ Government has categorised fresh vegetables including cauliflower as a high value crop in Nepal and policy supports are available to provide facilities to the farmers and traders.</li> <li>▪ Government is also emphasizing cauliflower for commercial cultivation.</li> <li>▪ DADOs are providing inputs and technical services to the farmers.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Lack of appropriate varieties has to confine in two or three varieties only.</li> <li>▪ Not allowable commodity for export to India</li> <li>▪ Limited demand in Taplejung district</li> <li>▪ Inconsistency in internal as well as external demand and lack of coordination between production and marketing.</li> <li>▪ Lack of group cohesiveness due to different culture orientation.</li> <li>▪ Big consumption markets are situated far.</li> <li>▪ Farmers, particularly small farmers do not want to take risks against food security and stick to grow traditional food crops.</li> <li>▪ Occurrence diseases such as damping off in nursery and alternaria in standing crop.</li> <li>▪ Hybrid seeds, labour and other inputs are not available in time and of desired quality</li> </ul>

## CONCLUSION

The productivity of Cauliflower was higher in the study area than district as well as national levels. The reason of higher productivity might be due to use of improve varieties in the study areas. The cost of production per Kg of Cauliflower at farm level was found NRs. 5.7 and the gross income per Ropani of cauliflower was recorded NRs. 32406.0. The contribution of Cauliflower ( $p < 0.01$ ) to total annual income was found significant. Results indicated that about 47.1 percentages of respondents were practicing collective marketing. However, hundred percent respondents were thinking about collective marketing in future. It was revealed that, at Taplejung market, price increased from December/January and it rises to NRs. 50.0 per Kg at the months of March to July except May/June. However, at Birtamod market price rises from June/July to September and gradually decreases until January/February. The price of cauliflower in Indian markets was higher in the months of June, July, August and September. Due to the lower volume produced during that period, the price hike can be observed. Hence, Nepal can tap the opportunity in exporting the cauliflower during those periods if the price, quantity and the quality of Nepalese product can be made competitive. At the present context, there was no problem of marketing for cauliflower in Taplejung district. However, when cauliflower production massively scaled up to commercial production in Taplejung, then, there should create time and place utility and reduce cost of production as cost of production was relatively higher in Taplejung than India and terai districts of Nepal.

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