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Economics of apple production in Chandannath municipality, Jumla, Nepal

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Abstract

This paper analyzes the economics of apple production and its role in the rural livelihood of Chandannath municipality in Jumla district. We hypothesized that farmers engaged in apple production and related activities have higher income and positive effects on their livelihoods. A field survey was carried out to collect the data from randomly selected 60 apple growers in Chandannath Municipality of Jumla district during October 2017. Focus group discussion and key informant interview were also conducted to collect information from traders, government officials and related stakeholders. The Data is Data were entered, coded and analyzed using statistical software SPSS and MS-Excel. We analyzed gross margin, benefit-cost ratio as well as household income from apple production. The gross margin from apple production per hectare of land was NPR 109, 615.48 USD 1000, which shows that apple cultivation is a profitable business in Jumla district. The average farm gate price of apple was NPR 40.17 per kg USD 0.40 and benefit-cost ratio was found to be 2.03. The study results revealed that 20% i.e. USD 550 of the total annual household income i.e. USD 2700 comes from apple farming. Benefit Cost Ratio B/C ratio and Gross margin, which show that apple production is a profitable enterprise in Jumla. Thus farmers of Chandannath municipality can withstand on this business as one by fifth of total income is obtained from apple. In our research area, contribution of Apple in economy is One fifth part of total income. So, contribution of apple production to household income of the rural people is also satisfactory.

Keywords: Apple production, gross margin, benefit-cost ratio, livelihood, Jumla

1. Introduction

Agriculture is the major occupation of Nepal which contributes 28.25% of total Gross Domestic Product GDP to the national economy MoAD, 2017^[17]. It also provides livelihood and employment to 65.6 percent % of total labor force of country CBS, 2011^[6].

Fruits plays significant part of the agriculture sector contributing 14% of the total GDP in Nepal. Major fruit crops in Nepal are Mango *Mangifera indica*, Banana *Musa acuminata*, Mandarin orange, Apple *Malus pumila*, Litchi *chinensis* Sonn. Pear, Sweet orange *Citrus sinensis*, Guava *Psidium guajava* L., Jackfruit *Artocarpus heterophyllus* and Papaya *Carica papaya*. These crops covers 88% of the total fruit production in 2015 / 16 ABPSD, 2017^[1].

Apple is one of the main temperate fruit of Nepal, which is cultivated on 12,015 hectares with production of 19,850 Mt / ha and productivity 5.36 Mt/ha ABPSD, 2017^[1]. Largest productive area under apple in Nepal is found in Jumla 850 ha, followed by Mustang 360 ha, Dolpa 315 ha and Mugu 314 ha respectively. But Mustang has highest production i. e 4,500 MT with productivity 12.50 as compare to Jumla i. e production of 3500 MT and productivity 4.12 only MoAD, 2016 / 2017^[16-17]. There is high demand of organic product in international market. Chandannath municipality of Jumla produces a substantial amount of apple where 677 households and total 31700 trees are grown MoAD, 2014.

Apple is one of the important high value cash crops in Nepal. Farmers gain higher benefit from apple than from cereals crops. The productivity of apple is low as compared to India and China because the farmers here are facing the problems of selling their produce showing weak marketing structure. Realizing the importance of apple marketing to increase farm income, this study was purposed to, benefit cost ratio, gross margin and it's functioning of Jumla apple. Economic analysis of apple can be useful tool to identify efficiency of production and the activities enabling a competitive market environment. It helps in providing information related to competitive advantage in term of cost, product segment, and critical success factors for better production and markets.

Analyzing existing production status, it is very important to suggest new production technology with low cost and market oriented solution which will be helpful to the apple producers. Problems and suggesting production and marketing oriented solutions which will be helpful to all the actors related to economics of apple. So, this study helpful for the formulation and implementation of plans and programs by the concerned stakeholders within Jumla district.

The general objective of this study is to assess the economics of apple production in Chandannath municipality and their contribution in the livelihood of rural community in Jumla district. The specific objectives of this study are:

- To study area and status of Apple production trends
- To calculate gross margin and BC ratio
- To assess the contribution of apple production in the rural household economy

2. Literature review

2.1 Apple production in Nepal and Jumla

Fruit production in Nepal in 2009 / 2010 was 686, 213 Mt from 68, 785 ha with productivity 9.976 Mt / ha. Deciduous fruit were cultivated in 12, 572 ha, production of 107, 582.3 Mt with productivity of 8.55 Mt / ha (MoAC, 2010) [11]. Apple is a deciduous fruit and is grown successfully in mid and high mountainous areas from the east to the far west of the country. Sub humid and dry temperate areas in mountain with elevation ranging from 1800 - 2800 m. a. s. l. Meter above the sea level are considered most suitable for high quality apple production. The low rainfall areas are located in the western and mid-western mountainous region some low chilling apple cultivars are being grown at low altitudes up to 1200 m. a. s. l. Apple can grow 54 however, there are only 12 major apple producing district mainly from high mountain region. Jumla and Dolpa are major districts of Karnali zone for apple production. Jumla is one of the remote and economically poorest mountain districts in western Nepal. Its climatic conditions are very rich for growing fruits like apple walnut, peach, plum, pear etc. Nepal government introduced apple in 1970s. They were brought from the Himachal Pradesh of India. There are now about 10 varieties being cultivated in the district they are mostly from delicious group; red, royal, golden delicious which makes around 70 percentage of total plantation. The other varieties grown are Jonathan and Macintosh types. The climate of Jumla district consider highly favorable for apple Production. It is the most importance crop in terms of area, production, and house hold economy in the district. Jumla and Mustang have an organized export to major town in Nepal. (MOAC, 2011) [12]. Apple *Malus pumila* is one of the key fruit with potential to generate income and employment in high mountain districts of western Nepal and also a prioritized high value cash crops ADS, 2014 [4]; Amgai *et al.*, 2015 [5]. It contributes about 4.75 percent of the total fruit production and occupies 5.6 percent of the total fruit area in Nepal MoAD, 2013 [14].

The average apple production area in Nepal is 5,420.5 over the five years ranging from in 2011 / 12 5, 674 ha to 2015 / 16 5,625ha. In Nepal maximum area cultivated for apple in 2011 / 12 5,674 ha and minimum area cultivated for apple in 2012 / 135,063 ha then 2013 to 2015 cultivated area is increasing in increase rate then 2015 / 16 slightly increase rate.

The average Production of apple in Nepal is 4,243.8mt / ha over the five years ranging from in 2011 / 1248, 946 Mt to 2015 / 16 41,011Mt. In Nepal maximum production of apple in 2011 / 1248, 946 Mt and minimum apple production in 2013 / 1435920.7 Mt then 2014 to 2016 apple production is

fluctuation. The average Production area of apple in Jumla is 515ha over the five years ranging from in 2011 / 2012 400 ha to 2015 / 2016 700ha. In Jumla production area of apple increase with increasing rate from 2011 to 2016.

In term of total production amount and the world's harvested area in 2008, is the fourth most extensively produced deciduous fruit crop worldwide after citrus, grapes and banana (FAO, 2010) [9].

The efficiency of marketing is crucial in determining the profit from the products. It is; therefore necessary to identify different marketing constraints along with production constraints to boost up the production of horticultural crops. The major constraint in the agriculture marketing in Nepal poor institutional, legal and marketing infrastructure Thapa, *et al.*, 2007 [18].

Adhikari, 2011 [3] found that the major production problems were Incest pests, lack of irrigation, disease, lack of technical knowledge, loan facility, crop insurance and lack of quality planting materials. The major marketing problems were lack of transportation, lack of storage facilities, lack of credit, lack of packaging materials, perishability of product, unorganized market and lack of price information. There are difficulties in apple storage, a lack of organized wholesalers and problems with non-graded and unclean fruit in Nepal IFAD, 2009 [10].

3. Research methodology

3.1 Study Area

Jumla lies in the Karnali province of Nepal, extended from 25058' to 29030' North latitude and 81051' to 820 35' east longitude, and surrounded by Mugu, Dolpa, Kalikot and Jajarkot districts. The area of district is 2531sq. Km, among them 39486 ha land is suitable for agriculture. Apple production is an important economic activity of karnali province of Nepal. Jumla is one of the leading apple producing districts DADO, 2016 [8]. Hence, Jumla district was purposely selected for the study. Among the different municipalities and rural municipalities, Chandannath municipality was purposely selected as majority of the household in the municipality are engaged in apple production. A field survey was carried out in October 2017 to collect information from apple growers and traders. A total of 60 Apple growing households were selected using simple random sampling technique. Stratified sampling was done to select 5 wards among total 10 wards. Among the selected 5 wards sample size proportional to size was selected using simple random sampling. Samples were taken randomly from 5 wards; ward number 10, ward number 1, ward number 2, ward number 3 and ward number 4. Primary data were collected through semi-structured interview, focus group discussion and key informant interview about socioeconomics and demographic information, variable costs incurred in production as well as income from apple production. The secondary data were collected by reviewing various Books, Government reports, Published journal articles. Respondents were selected randomly from the list of apple growers of the study area. Collected data were coded, entered and analyzed using Microsoft Excel and Statistical Package for social Sciences SPSS.

4. Discussion and Finding

4.1 Income from Apple

Table 1: Income under Sample Survey 2017

Total annual Income	NRs 276528.3
Income From Apple	NRs 56195 20.32%

Above table shows that income from apple is 56195 20.32% of total income 276528.3 of people. This indicates there is high contribution of apple production and marketing in the rural household economy.

4.2 Cultivation Area

Table 2: Cultivation Area Apple under Ropani under Sample Survey 2017

Landholding	Average	Max	Min	SE
Total land Ropani	12.73	84	1.2	2.01
Total Apple cultivated land Ropani	6.32	77	1	1.42

Above table shows that, total land under apple cultivation is 49.64% 6.32 ropani of total cultivated land 12.73 ropani i. e 0.64 ha. The maximum land that a household use for apple cultivation is 77 ropani 3.87 ha and the minimum land that a household for cultivation is 1 ropani 0.05ha. The average area for cultivation for apple is 6.32 ropanii. e 0.31 ha. This result support that the apple production in that area is one of the important source of income for their livelihood improvement of that area.

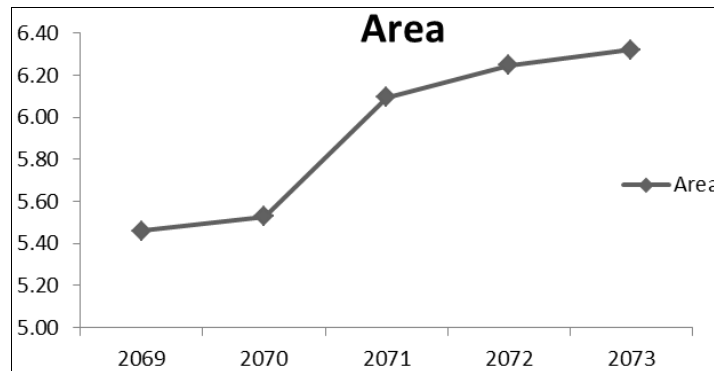


Fig 1: Trends Of Apple Production Area Ha In Chandannath under Sample Survey 2017

Survey shows the average Production area of apple in Chandannath is 5.93 ropani over the five years ranging from in 2069 5.46 ropani to 2073 6.32 ropani. In Chandannath production area of apple increase with increasing rate from 2069 to 2073.

4.3 Production status

Table 3: Production Status of Apple under Sample Survey 2017

Parameter	Average	Max	Min
Total apple production kg	1487.333	17000	40

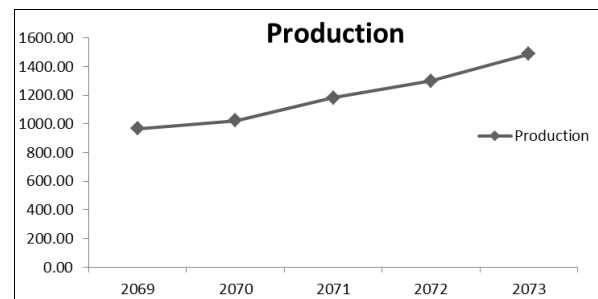


Fig 2: Trends of Apple Production Kg in Chandannath under Sample Survey, 2017

Above table shows average production of apple in 2073 was 1487.33 kg ranging from minimum 40 kg to maximum 17000 kg.

The average Production of apple in our survey area is 1191.73 kg over the five years ranging from 965.67 kgmin in 2069 to 1487.33 kg in 2073.

Table 4: Average Apple Trees and Average Production under Sample Survey 2017

Average No Of Plant Per Ropani			Average Production Per Plant Kg	Average Production Per Ropani Kg
Fruiting	Non fruiting	Total plant		
10.40	6.42	16.82	22.60	235.17

Above table shows that, there were 16.82 total apple trees per ropani among 10.40 fruiting trees and 6.42 none fruiting

trees. We found average production per plant was 22.60 kg and average production per ropani was 235.17 kg

4.4 Economic Analysis of Production

4.4.1 Cost of Production

Table 5: Cost of Cultivation under Sample Survey 2017

Cost Items	Average Cost NRs	Average Cost Per Kg NRs
Land rent	2500 per ropani	10.63
Sampling cost	50 per plant	0.45
Manure cost	60 per doka	2.08
Training and pruning cost	20 per plant	0.88
Irrigation cost	200 per ropani	0.84
Plant protection cost	100 per ropani	0.42
Labor cost	500 per ropani	2.13

Harvesting	1 per kg	1
Transportation cost	3 per kg	3
Storage cost	2 per kg	1.5
Total		22.90

Above table shows in average, NRS 22.90 is the total cost needed to produce 1 kg of apple.

Return of production

From our survey average return from one kg of apple was NRs 46.5 whereas maximum return was NRs 50 and minimum was NRs 43.

Table 6: Return of Production under Sample Survey 2017

Return of production	Price NRs
Maximum	50
Minimum	43
Average	46.5

The result of above table shows our average benefit from 1 kg of apple in our survey area was NRS 23.6 Average return of production - average cost.

4.4.2 Gross Margin

The gross margin provides simple and quick method of analyzing a farm business.

It was calculated by the following formula:

Average gross return = Rs 10,894.52 per ropani

Average total cost = Rs 5,366.76 per ropani

Gross margin = Gross return – Total cost

= Rs 10894.52 - Rs 5366.76

= RS 5527.76 ropani i.e. Rs 1, 09, 615. 48 per ha

Gross Margin was obtained in study area as Rs 1, 09,615.48 per ha. Similar result was found in study conducted on Jumla District as NPR 1, 38,285/ha of land (Adhikari, 2011)^[3]. This shows that apple cultivation is profitable enterprise in Jumla district.

4.4.3 Benefit Cost Ratio

Table 7: Benefit cost ratio of apple of Field survey, 2017

Characteristics	Results
Average cost benefit ratio	2.03
Lowest cost benefit ratio	0.18
Highest cost benefit ratio	8.82

From above table, average benefit Cost Ratio of apple found in study area was 2.03. This result supports to that average cost of production and gross profit of fruit farming in Nepal. B/C ratio of the fruits crop varied from 1.86 to 3.66 showing their higher level of profitability in terms of investment MoAD, 2015^[15].

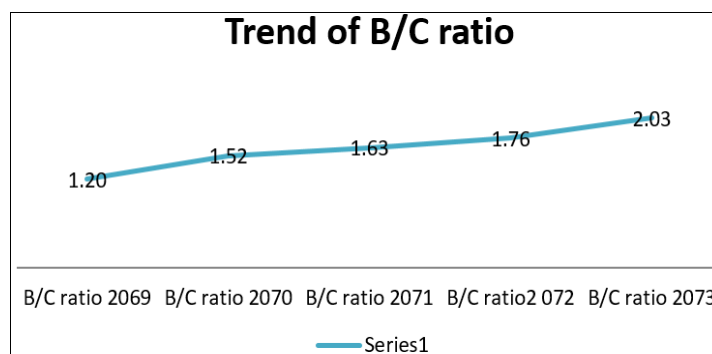


Fig 3: Trends of B/c ratio in Chandannath under sample survey 2017

Our sample Survey shows that the trend of b/c ratio of apple in chandannath is increasing which denotes apple farming is being more profitable day by day.

Conclusion

Although Nepalese farming system is dominated by the cereal cropping system, apple has been taken as one of the high priority commodities in high hill of Nepal especially in western and mid-western development region. The Area under apple in chandannath municipality in Jumla is increasing year by year, but the production and productivity is poor as compared to China, India and world.

Furthermore following should be done to improve current apple production scenario:

- Provision of more number of government operated farms, well suited production technologies, collecting and processing centers and grass-root level monitoring and encouraging system.
- Technical knowledge and market information should be

- provided at local level.
- Strengthen existing cooperatives in group marketing.
- Make sure government should provide subsidies that ease in credit.
- Research on productivity and postharvest quality of apple should be increased.

Apple cultivation in Karnali region has been a major source of income enhancing the livelihoods of poor farmer's. Gross margin analysis and Benefit Cost Ratio in study area shows apple production is a profitable enterprise. Also, One by Fifth of total income is obtained from apple thus, contribution of apple production to household income of the rural people is good. Thus, farmers of chandannath municipality can withstand on this business.

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