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Assessment of contribution of cabbage in rural livelihood and constraints of production in Dhankuta, Nepal

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Abstract

Cabbage production is an important farm enterprise for descent socioeconomic status and nutritional security of rural farmers in eastern hill of Nepal. The study was conducted to determine contribution of cabbage in livelihood of rural farmers and constraints in commercial cabbage production in Chhathar-Jorpati Rural Municipality, Dhankuta district of Nepal. A total of 60 cabbage producing households were randomly selected. Primary data were collected through 60 questionnaire survey. The data obtained were analyzed using MS-Excel and SPSS. Average land holding of farmers was 1.45 hectare. Cabbage occupied 67.99% of total land area under vegetables production with 60.06% contribution on annual income from vegetables and 23.69% contribution on total annual household income. Gross return and total variable cost per hectare were NRs. 195424.66 and NRs. 117566.70 respectively. The average gross margin per hectare from cabbage production was calculated Rs.77857.96; benefit cost ratio was estimated 1.66. Among total variable cost, labor cost (47.52%) was highest followed by nutrient (46.97%), seed (5.31%) and pesticides (0.21%) cost. Productivity of cabbage was 26.66 Mt per hectare. There is a huge potential for improvement of yield and benefit of crop, but the government should support farmers with subsidy in fertilizers and disease management programs.

Keywords: Cabbage, Economics, Farm Gate Price, Extension, Price Regulation

Introduction

Cabbage (*Brassica oleracea* var *capitata*) is one of the most important vegetable crops grown all over the world. It belongs to family- Brassicaceae. It is mainly consumed as raw as well as cooked vegetable, being rich source of vitamins (A, C and K), fibre, proteins and also anti-cancer property due to the presence of "Inole-3-carbinol" (Singh, Sharma, & Singh, 2009). Cabbage accounts the third position in terms of area planted out of 55 vegetables cultivated in Nepal Cabbage is being emerging profitable farm enterprise of farmers of Nepal, especially of eastern hill. Its many varieties are now grown in different parts of the country. In Nepal, Cabbage occupies 28071.4 hectares area, with total production of 484036.8 Metric ton and productivity is 17.2 Mt ha⁻¹ (ABPSD, 2016). Dhankuta is most potential district for cabbage pro-

duction and export, having highest productivity (26.2 Mt ha⁻¹) among other districts of Eastern region of Nepal with 1460 ha cropped area and 38234 Mt annual productions (ABPSD, 2016). Cabbage occupies largest area among vegetables area in Dhankuta (ABPSD, 2016). In 2015, vegetables worth of NRs. 370 millions were sold from from Sidhuwa Agriculture Store, Chhathar-Jorpati Rural Municipality, Dhankuta. Out of the vegetables sold, cabbage had largest amount of 2500 tonnes. According to United States Department of Agriculture (USDA) cabbage is the second most economical cooked vegetable in terms of price per edible cup. This relatively low cost of cabbage in comparison with most other vegetable and its unique antioxidant properties makes this crucifer vegetable a nutrition bargain.

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Materials and Methods

Study Area and Sampling Design

The research was conducted in Chhathar-Jorpati Rural Municipality of Dhankuta district of Province 1 of Nepal. The site locates at 27° 06' N latitude and 87°40' E longitude with an elevation of 2150 masl. A total of 60 cabbage producing households were randomly selected among 250 recorded households in Prime Minister Agriculture Modernization Project at time of study.

Data Collection and Analysis

Primary data were collected through face to face interview by use of pre-tested semi-structured interview schedule in July of 2018. Key Informants Interview (KII) was carried out to cross check and supplement collected information. Collected data were analyzed using SPSS and MS Excel software.

Cost and Return Analysis

The total variable costs of cabbage production was calculated by considering all variable inputs such as seed cost, organic manures cost, chemical fertilizers cost, pesticides cost and labor cost at their current market prices. All the cost were taken in NRs./ hectare.

$$\text{Total Variable Cost} = C_{\text{seed}} + C_{\text{organic manure}} + C_{\text{fertilizer}} + C_{\text{pesticide}} + C_{\text{labor}}$$

Where, C_{seed} = total cost on seed (NRs./ha), $C_{\text{organic manure}}$ = cost on organic manures (NRs./ha), $C_{\text{fertilizer}}$ = cost on fertilizer (NRs./ha), $C_{\text{pesticide}}$ = cost on pesticides (NRs./ha) and C_{labor} = cost on human labor (NRs./ha).

Gross Margin Analysis

Gross Margin = Gross Returns – Total Variable Cost

Where, Gross Returns = average price of cabbage × total cabbage production

Benefit Cost Analysis

It was calculated by using following formula:

$$\text{B/C Ratio} = \frac{\text{Gross Return}}{\text{Total Variable cost}}$$

Problems ranking

Preferential ranking for production problems and diseases was done by indexing. Knowledge scoring was done to assess the knowledge level of farmers according to the results of the questionnaire survey.

- Indexing was computed using following formula.

$$I_{\text{imp}} = \sum (si \times fi / N)$$
 Where, I_{imp} = Index of importance
 \sum = Summation
 si = Scale value
 fi = Frequency of importance given by respondent
 N = Total number of respondents

Knowledge scoring to assess knowledge level was done as follow

- Each respondent were asked 17 questions regarding clubroot identification, spread and management.
- Each response was recorded as 'Yes' or 'No'
- One score was given if the response was 'Yes'
- Score below and equal to mean was categorized as low knowledge and score above mean categorised as high knowledge

Results and Discussion

Status of cabbage production

Vegetable is a major contribution on economy and nutritional health of Nepalese farmers. Temperate vegetables such as cabbage, cauliflower, garden pea, broad leaf mustard were major vegetable grown at study area. (Figure 1). According to villagers and agriculture stakeholders, income from cabbage was a major and dependable source of income of farmers in Dhankuta district of Nepal. This survey study revealed that income from cabbage production contributes a major part of total income from vegetable in Dhankuta district, Nepal. Income from cabbage had highest contribution (60%) on total income from vegetables (Figure 1).

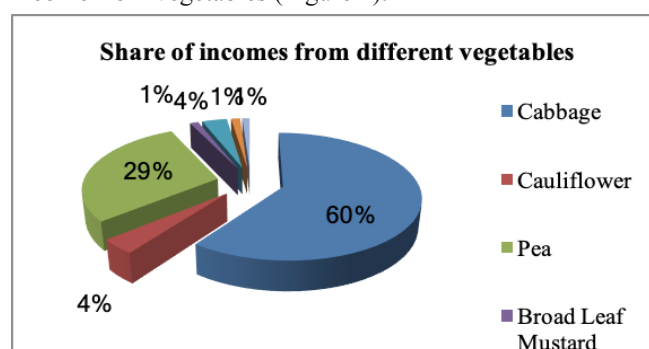


Figure 1. Share of cabbage on total income from vegetable

Chhathar-Jorpati Rural Municipality has been considered as vegetable hub of eastern region of Nepal. About 91.19% of cultivated land was under vegetable cultivation. Cabbage had highest cropped area among the vegetables grown over there. Cabbage production has attracted the youth of that locality preventing their unwanted migration to terai or foreign countries for earning. Cabbage is the major agriculture product exported to India through Kakarbhitta customs, Jhapa, a major customs of Eastern region of Nepal. Similarly, off season cabbage is the major fresh vegetable exported to India through Pashupatinagar customs, Ilam (Ojha, 2016). Dhankuta is most potential district for cabbage production and export, having highest productivity (26.2 Mg ha⁻¹) among other districts of Eastern region of Nepal with 1460 ha cropped area and 38234 Mg production (MoAD, 2016). Cabbage occupies largest area among vegetables area in Dhankuta (MoAD, 2016).





Figure 2. (a) Harvesting of cabbage and packaging; (b) Transportation upto main road on back by farmers (Photo credit: Sachin Gahatraj, Agriculture and Forestry University, Rampur, Chitwan, Nepal)

Major problems in production

Disease was the major problem in cabbage production in the study area with highest index value of 5.45. Marketing was the second important problem with index value 4.9 followed by Insect with index value 4.42, Irrigation with index value 2.5 and Input unavailability with index value 1.76.

Clubroot is a major soil-borne disease of Brassica crops having high economic impact worldwide (Dixon, 2009) the pathogen probably spread worldwide as a result of transfer on and in fodder taken by colonists as livestock feed. It is a moot point, however, whether there was much earlier spread by *P. brassicae* into China and subsequently Japan as *Brassica rapa* (Chinese cabbage and many variants. Severe and widespread epidemic of clubroot have been recorded in Kathmandu valley and Makawanpur of Nepal (Timila *et al.*, 2008). Few year ago, it was recorded in cabbage growing fields of Dhankuta and spreading rapidly in the vicinity. Most of the commercial cabbage growing areas of Chhathar-Jorpati rural municipality have been already infested by clubroot pathogen. The yield of major Brassica crops at this locality such as; cabbage, cauliflower, broad leaf mustard is less than national average. Furthermore, clubroot has exacerbated the situation. Productivity has been drastically reduced since few years after field got infested with pathogen. In addition to productivity, cropping area under Brassica crops is also shrinking as farmers have started to seek alternative crops like maize, potato although these crops are not economically beneficial as brassica crops (cabbage, cauliflower and broad leaf mustard) at this locality.

Clubroot has a cosmopolitan distribution and is responsible for up to 50-100% yield loss of cabbage (Karling, 1968). It is considered most destructive disease of Brassica crops not only because of extent of yield loss it cause but also because of difficulties in elimination from the area once get infested (Gahatraj *et al.*, 2019).

Cost of production

The largest proportion of the cost of cabbage production was found to be occupied by labor cost (47.52%) and plant nutrient cost (46.97%). Pesticide cost (243.82 NRs/ha) was very low applied on cabbage production was very low (Table 1). This implies that used of pesticide has been reduced in recent few years. It may be due to the reason that cabbage exported to India and Bangladesh from this district had to be assured as free from pesticide residue by rapid bioassay for pesticide residue (RBPR) before passed through quarantine at custom office. Nutrient cost was also a major cost on cabbage production, which was almost equal to labor cost. (Table 1). Cabbage is heavy feeder that is why it needs to be applied with ample amount of balanced macro and micronutrients.

Return from cabbage production

Productivity of cabbage was 26.66 Mt/ha at study area, which is quite equal to cabbage productivity (26.2 Mt/ha) of Dhankuta district and higher than national average productivity of 17.2 Mt/ha (AICC, 2017). The overall benefit cost ratio of cabbage production -considering total variable cost- was estimated to be 1.66. This means with one unit investment, 1.66 unit returns we get. Farm gate price was found to be far lower than wholesale price (NRs. 25-27 per Kg) at same time, at Kalimati Fruits and Vegetable Market, Kathmandu, Nepal (KFVWMD, 2018).

Conclusion

In study area, cabbage is grown under largest area among vegetables. Vegetable had significant contribution on total income of farmers while cabbage was a major contributor. Although cabbage production was found to be quite profitable farm enterprise, price spread was found to be a major impeding factor of higher benefit of cabbage. There is high potential of increasing benefit of crop, but intervention of government is needed. In addition, government should also intervene on market regulation and on price policy to increase farm gate price. Diseases were found to be major hindering factor of production of cabbage. Among diseases, clubroot was major problem.

Table 1. Ranking of problem in cabbage production in Dhankuta, 2018

Problems	Level						Weight	Index	Rank
	6	5	4	3	2	1			
Disease	43	5	8	4	0	0	327	5.45	I
Insect	0	29	27	4	0	0	265	4.42	III
Inputs	0	0	0	15	16	29	106	1.76	V
Irrigation	0	3	9	16	18	14	149	2.5	IV
Marketing	17	24	16	3	0	0	295	4.9	II

Source: Field Survey, 2018

Table 2. Ranking of diseases hindering cabbage production in Dhankuta, 2018

Diseases	Level						Weight	Index	Rank
	6	5	4	3	2	1			
Clubroot	47	0	0	0	0	8	290	4.8	I
Sclerotinia rot	6	16	10	10	7	1	201	3.35	IV
Black rot	0	0	0	0	13	47	73	1.2	V
Damping off	2	18	26	14	0	0	248	4.13	III
Blight	9	23	15	13	0	0	268	4.46	II

Source: Field Survey, 2018

Table 3. Total variable cost of cabbage production (NRs/ha)

Inputs	Means	Percentage
Seed Cost	6240.75	5.31
Nutrient Cost	55219.3	46.97
Pesticide Cost	243.82	0.21
Labour Cost	55862.83	47.52
Total Variable Cost	117566.7	100

Source: Field Survey, 2018

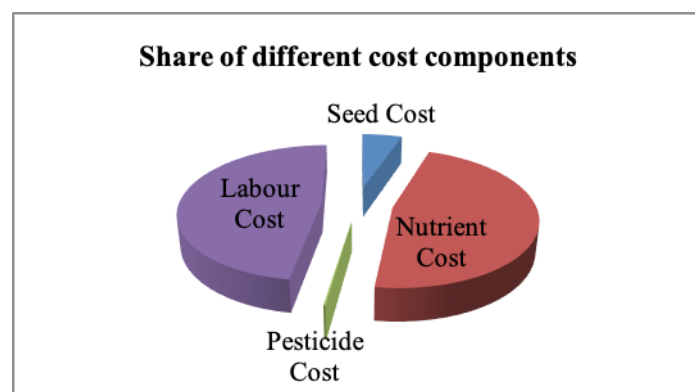


Figure 3. Share of different cost components of cabbage production

Table 4. Economic statement of cabbage production in Dhankuta, 2018

Measuring Criteria	Average Value
Area	0.58
Productivity	26.66
Average Revenue	7.61
Gross Return	195424.66
Total Variable Cost	117566.7
Gross Margin	77857.96
Benefit Cost Ratio	1.66

Source: Field Survey, 2018

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