

RESEARCH ARTICLE

ECONOMICS OF PRODUCTION AND MARKETING OF CABBAGE IN KAVREPALANCHOWK DISTRICT, NEPAL

Anuja Khatri^a, Sanjiv Subedi^b, Ayusha Adhikari^c^a Himalayan College of Agricultural Sciences and Technology (HICAST), Kathmandu, Nepal.^b Scientist at Nepal Agriculture Research Council (NARC)^c Institute of Agriculture and Animal Science (IAAS), Tribhuvan University, Nepal*Corresponding Author Email: anujakhatri26@gmail.com

This is an open access article distributed under the Creative Commons Attribution License CC BY 4.0, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

ARTICLE DETAILS

Article History:

Received 10 July 2025
Revised 14 August 2025
Accepted 22 September 2025
Available online 02 October 2025

ABSTRACT

This study examined cabbage farming in Kavrepalanchowk, Nepal, motivated by major challenges such as the low adoption of modern farming methods, pest infestations, inadequate irrigation, labor shortages, and market access issues. A survey of 80 farmers from Panchkhal and Bethanchowk municipalities revealed that the average farmer was 47 years old, with men handling most of the farming work. While many farmers could read and write, most had only a basic education, which limited their ability to adopt improved farming techniques. Farmers typically owned between 0.5 to 2 ropani of land, predominantly growing the Green Coronet cabbage variety. The financial analysis indicated that cabbage farming was profitable, with an average production cost of Rs. 154,602.32 per hectare and a benefit-cost ratio of 1.84. It was found that input costs, such as chemical fertilizers and machinery, significantly influenced production. Higher fertilizer costs increased yields, while rising labor costs negatively impacted output. These factors underscored the delicate balance between input costs and profitability. Despite the overall profitability, farmers faced several challenges, including pest infestations, diseases, limited irrigation, labor shortages, and restricted access to reliable market information, all of which reduced productivity and profit margins. The study concluded that, while cabbage farming offered financial benefits, these issues needed to be addressed. Improved farmer education, better irrigation infrastructure, and enhanced access to markets were suggested to help mitigate these challenges and promote sustainable cabbage farming practices in the long term.

KEYWORDS

Cabbage, Cobb-Douglas, Financial analysis, Marketing

1. INTRODUCTION

Nepal is an agricultural country with a total land area of about 1,417,181 square kilometers. Around 21% of this land is used for agriculture (MoALD 2021/2022). Horticulture is a vital component of agriculture that benefits people by providing food security, generating income, and enhancing nutrition. Within horticulture, vegetables are vital for driving economic growth. The variety of landscapes and climates in Nepal allows for the successful cultivation of many types of vegetables. In 2021/2022, the total vegetable production in Nepal was about 4,153,157 metric tons from an area of 289,839 hectares (MoALD 2021/2022). Cabbage is grown throughout the world, with approximately 70,862,165 metric tons of total production in 2020 (FAOSTAT, 2022). The major vegetables grown in Nepal include cauliflower, cabbage, radish, onion, and cucumber. Although cauliflower occupies the largest area and production, cabbage has a higher yield. In the Bagmati province, Kavrepalanchowk district has the highest cabbage production, covering an area of 1,400 hectares with a production of around 24,500 metric tons and a yield of 15.50 metric tons per hectare (MoALD 2078/79).

Vegetables are high-value crops that allow farmers to earn good profits. They give higher returns than cereals or other field crops. Increasing vegetable production leads to higher income for farmers. Nepal has great potential to increase vegetable productivity and farmer income, but appropriate technologies are lacking to boost the production of all

vegetables in the country. According to a FAO report, the recommended daily intake of fresh vegetables for a balanced diet is 350 grams per person per day. Cabbage is one of the main cruciferous vegetables in the Brassicaceae family. It is an herbaceous annual for vegetable production and a biennial for seed production. The edible part of cabbage is the head, which is a vegetative bud that forms from the stem and leaves. These buds grow into a compact structure, making that part of the plant edible.

Cabbage is a great source of carbohydrates, protein, fats, minerals like calcium, magnesium, phosphorus, and potassium, and vitamins such as vitamin C, vitamin K, and B6. It is low in calories, fat, and carbohydrates but high in dietary fiber, water, and vitamin C, making it nutritionally dense. It also contains small amounts of other vitamins like thiamine, riboflavin, niacin, and pantothenic acid. Eating cabbage significantly lowers the risk of coronary heart disease, cancer, stroke, hypertension, and gastrointestinal diseases.

Cabbage is one of the most important cool-season vegetables grown across the country. Cabbage is currently grown in open fields all year round, but we might have to alter how we produce cabbage because of the rising extreme weather changes in the local area (Červenski et al., 2022). The varied climate and geography of Nepal offer great potential for cabbage production throughout the year, in different seasons. In Nepal, cabbage is grown as both a seasonal and an off-season crop. It is typically cultivated as a seasonal crop during the winter and early spring, and as an off-season

Quick Response Code



Access this article online

Website:
www.fair.com.my

DOI:
10.26480/faer.02.2025.45.49

crop during the rainy season in the Terai and mid-hills. The peak production season is during Kartik, Mangsir, Poush, Magh, and Falgun. When setting production targets, it's important to consider how the cabbage will be used, whether it's for eating fresh, pickling, storing, or another specific way of being prepared or processed. During the normal production season, there is a large amount of cabbage available, which leads to lower market prices. At these low prices, farmers cannot earn good profits and sometimes even face losses. Therefore, information on the estimated cost of production and marketing of cabbage is very important for cabbage growers to find solutions for maximizing profits.

2. MATERIALS AND METHODS

2.1 Description of the Study Area

Kavrepalanchok District, located in central Nepal, covers an area of approximately 1,396 square kilometers. Geographically, it lies between 27.5204° N to 27.8894° N latitude and 85.3957° E to 86.3668° E longitude. The district ranges in elevation from its lowest point at around 500 meters above sea level to its highest peak reaching 2740 meters. Kavrepalanchok District is composed of one Metropolitan City, seven urban municipalities, and six Rural Municipalities.

2.2 Selection of the Study Area

The Kavre district was specifically chosen for this study since it has been observed that Kavre has the highest cabbage production area and yield in Bagmati province (MoALD, 2021/2022). The study sites were selected in consultation with the agricultural office in Kavre (Bagbani). The study area is confined to Panchkhal and Bethanchowk municipalities.

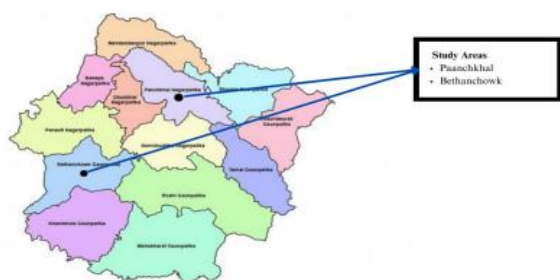


Figure 1: Map of study area

2.3 Sampling Methods, Sampling Size, and Sampling Frame

The sampling frame for the 80 farmers in the study area was created, and sample respondents were chosen using simple random sampling from two different municipalities in Kavre district, which are Panchkhal and Bethanchowk. These municipalities were selected following discussions with agricultural officials from both the local and provincial governments.

2.4 Data and data types

The study was conducted and completed mainly by collecting primary data and supported by secondary data to some extent. The methods and various tools for collecting data from each source have been described below:

2.4.1 Sources of Primary Data

Primary data was collected using a semi-structured, pre-tested questionnaire focused on cabbage marketing, production costs, net profit, and related problems. Additional data was obtained through a field survey, involving interviews with farmers at their fields, collection centers, and homes.

2.4.2 Sources of Secondary Data

Secondary data were collected from different sources, like publications of government agencies, such as MOLAD, NGO, INGOs, TEPC, NARC JOURNAL, etc. Information was also collected from research papers, reports, past theses, relevant literature found in the HICAST library, and other websites.

2.5 Data Processing and Analysis

After the collection of the data, simple descriptive statistics such as

average, frequency, and percentage were used to analyze the socio-demographic perspective of the survey. The collected information was coded, tabulated, and entered into computer software Microsoft Excel and SPSS (v.26), and analysis was done in SPSS and Microsoft Excel. The following analysis was performed.

2.6 Cost of Cabbage Production

After determining the total cost and gross return from cabbage production, the benefit-cost analysis was performed. The cost of production was computed by adding the variable cost components such as seed, fertilizer, human labor, tractor and bullock cost, and others such as herbicide and pesticide costs, and irrigation costs incurred throughout the production process.

2.6.1 Gross Return and Margin

Gross return includes the total production of cabbage multiplied by the average price received by farmers when selling cabbage heads.

Gross return = Total production * Farm gate price

The sum of money accompanied by producers is generally considered as gross margin. It is calculated by deducting the total variable cost from the gross return.

Gross margin = Gross return - Total variable cost

2.6.2 Benefit-Cost Ratio

Benefit-cost analysis was done after calculating the total cost and gross return from the cabbage cultivation. Therefore, the benefit-cost analysis was calculated by using the formula.

Benefit cost ratio (BCR) = Gross Return/ Total cost

2.6.3 Cobb-Douglas Production Function

It has been revealed that the Cobb-Douglas production function is useful in the computation of marginal value product (MVP), which is an important component to determine optimum, over, and underuse of resources.

The Cobb-Douglas production function of the following form was fitted to examine the resource productivity, efficiency, and return to scale.

$$Y = aX_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} e^u$$

Transformed to linear form for ease of computation by

Taking the logarithm on both sides, we have,

$$\ln Y = \ln a + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + u$$

Where,

Y = Gross return from cabbage production (NRs./ ha)

X₁ = Seed cost (NRs./ ha)

X₂ = Chemical fertilizer cost (NRs./ ha)

X₃ = Human labor cost (NRs./ ha)

X₄ = Machinery cost (NRs./ ha)

u = Random disturbance term or error term

a = Intercept or constant term

e = Base of natural logarithm

ln = Natural logarithm

b₁, b₂, b₃ and b₄ = Coefficients of respective variables.

The return to scale of cabbage production was calculated by summing the coefficients of all the explanatory variables estimated from the linearized Cobb-Douglas production function. A group researcher had also calculated the return to scale similarly (Dhakal et al., 2015).

2.6.4 Ranking of Problems

Farmer's perception of the different production problems was ranked by using a five-point scaling approach; the views of different issues by farmers were compared to the most serious, serious, moderate, and least serious issues. The formula given below was used to find the index for the intensity of problems faced by the farmers (Maharatha et al., 2019).

$$I_{\text{prob}} = \sum (S_i * f_i / N)$$

Where,

I_{prob} = Index value for intensity of problem

Σ = Summation

S_i = Scale value of i th intensity

f_i = Frequency of i th response

N = Total number of respondents

2.6.5 Price Spread

Price spread (total of the marketing margin) is the gap between the farm gate price and the retail price.

Price spread = Price paid by the consumer - Price received by the producer

3. RESULT AND DISCUSSION

3.1 Socio-Demographic

A total of 80 people from Panchkhal (57.5%) and Bethanchowk (42.5%) were surveyed. Their ages varied between 25 and 77 years, with an average age of 47. Most of them were between 40 and 50 years old, making up 46.25% of the group. Most of the respondents were men, accounting for 86.2%, while women made up 13.8% and were mainly involved in tasks like planting, weeding, and harvesting. When it came to education, 13.8% were illiterate, while 86.2% were literate. Of the literate group, 38.8% had only primary education, 11.3% had lower secondary, 15% had secondary, and 21.3% had higher secondary education. This shows that overall, education levels are not very high, and people mostly rely on traditional farming methods.

3.2 Cultivation Information

3.2.1 Number of family members involved in agriculture

The study shows that 61.3% of farm households, with fewer than 3 people, were involved in agriculture, while 37.5% of households had family members in the range of 3-5 involved in agriculture. And, only 1.3% had more than 5 people involved in agriculture. This also signifies a low involvement of the household members in agriculture.

3.2.2 Loan taken by respondent in the study area

The survey indicated that out of 80 respondents, 35% had taken a loan for crop production, including cabbage, and 65% did not take a loan for agricultural purposes. Local cooperatives and the Agricultural Development Bank were the agencies providing loans.

3.2.3 Area under cabbage production

The distribution of the respondents based on the size of land holding was categorized into 4 groups. The majority of the respondents (56.25%) owned 0.5-2 ropani of land. Similarly, 26.25% of them owned 2-3.5 ropani, 15% owned 3.5-5 ropani, while only 2.5% of the respondents owned more than 5 ropani of land for cabbage production.

3.2.4 Variety of cabbage cultivated

There are 5 varieties of cabbage cultivated in Kavrepalanchowk, i.e., among 80 respondents, 68.8% of them grow Green Coronet, and 22.5% of them cultivate Nepal Green, while 5% of them use Super Green.

3.2.5 Source of seeds

The majority of the respondents purchased seeds from agro vets, and only a few of them used locally grown seedlings. It showed that farmers prefer buying the seeds/seedlings from agro vets rather than self-production.

3.2.6 Irrigation

After transplanting, light irrigation was provided to maintain a proper soil moisture level. In the survey site, the majority of the respondents used water lifted by the pump from rivers as a source of irrigation. Most of the farmers applied irrigation weekly or in 10-15-day intervals. However, studies suggest that daily evening irrigation is required to achieve optimum cabbage yield and to use water resources efficiently (Beshir, 2017).

3.2.7 Weeding

All the farmers in the study area carried out manual weeding. None of them were found using herbicides. First-hand weeding was done after transplantation when weeds arose, and second weeding was done 25-30 days after the first weeding, followed by hoeing and earthing up.

3.2.8 Fertilizers

The study revealed that the farmers used Urea, DAP, MOP, and compost in the field.

Table 1: Manures and Fertilizers Applied in Cabbage by the Respondents		
Manures/Fertilizers	Dose (Kg/ropani)	Method of Application
Urea	25-50	Three times (First during land preparation, second and third as top dressing)
DAP	25-35	Once, at the time of land preparation
MOP	5-10	Once, at the time of land preparation
Compost/FYM	100-200	Once at the time of land preparation and another during weeding/earthing-up

3.3 Economics of Cabbage Production

3.3.1 Cost incurred in cabbage production

The average cost of cabbage production in the study area was estimated at Rs. 154,602.32 per hectare. The major components of total variable cost were compost (24.14%), hired labor (23.76%), inorganic fertilizers including Urea, DAP, and MoP (17.66%), and bullock/tractor use for field preparation (17.12%), while irrigation accounted for 7.94%. Estimating these costs is essential for evaluating farm profitability and determining the economic feasibility of continued production.

Table 2: Average Cost of Cabbage Production per Hectare		
Particulars	Cost per hectare	Percentage (%)
Seed	5778.728	3.73
Labor	36746.638	23.77
Bullock/Tractor	26471.421	17.10
Irrigation	12279.317	7.93
Urea	7000.893	4.53
DAP	16377.389	10.58
Potash	3926.498	2.54
Compost/ FYM	37326.477	24.14
Micronutrients	5462.443	3.53
Pesticides/ IPM Cost	3232.512	2.09
Total Variable Cost	154602.319	100

3.3.2 Economic Indicators of the Cabbage Production

Table 3: Economic Indicators of the Cabbage Production	
Cost items	Amount (Rs.)
Total variable cost (Rs. /hectare)	154602.3198
Total Return (Rs. /hectare)	285033.9597
Gross Margin (Rs. /hectare)	130431.6399
B: C Ratio	1.84

The total variable cost of cabbage production was Rs. 154,602.32/ha, generating a gross return of Rs. 285,033.96/ha and a gross margin of Rs. 130,431.64/ha. The calculated gross return and gross margin are found to be higher than the gross return and margin calculated in the Dhankuta district (Gahatraj et al., 2019).

In this case, the B: C ratio is 1.84, indicating profitability. This means that for every rupee invested, a return of 1.84 rupees is achieved. The result aligns with the findings of cauliflower farming, while it differs slightly from the findings of cabbage (Gahatraj et al., 2019; Dahal et al., 2019). This demonstrates that overall cabbage cultivation is a profitable option for farmers.

3.3.3 Production function analysis

Table 4: Estimated Value of the Coefficient of the Cobb-Douglas Production Function

Variables (Variable Cost)	Coefficient	SE	T-Stat	P-Value
Seed	0.113	0.133	1.131	0.262
Chemical Fertilizer	0.451	0.153	4.087	0.001
Human Labor	-0.292	0.127	-2.94	0.004
Machinery	0.278	0.125	2.42	0.018
Constant	3.161	1.704	1.855	0.068
R square	0.488			
Adjusted squared	0.46			
F value	17.852			

The Cobb-Douglas production model was used in the study to understand how different factors influence the gross return from cabbage production in the area. The model included variables like the cost of seed, chemical fertilizers, labor, and machinery. The regression results for cabbage production are shown in the table above. The analysis found that the cost of chemical fertilizers, human labor, and machinery all have a significant impact on the total income from cabbage production.

The F value of 17.852 ($p < .001$) indicates that the model is strong and reliable, explaining about 48.8% of the variation in production. The value of R-squared is 0.488, indicating that 48.8% of the variation in the dependent variable is due to the independent variables. The analysis shows that chemical fertilizers, human labor, and machinery costs significantly affect the total income from cabbage production. The Cobb-Douglas model revealed that chemical fertilizer cost ($p < .001$), human labor cost ($p < .001$), and machinery cost significantly affect the total income from cabbage production. Specifically, the model showed that an increase in chemical fertilizer cost by 1% leads to a 45% rise in total income, while a 1% increase in machinery cost results in a 27.8% increase. On the other hand, a 1% rise in labor cost actually causes a 29.2% decrease in total income. When the coefficients from the regression analysis were added together, the total came to 0.55.

This indicates that the production of cabbage in the study area experiences decreasing returns to scale. This finding is similar to a previous study by which also found decreasing returns to scale in cauliflower production, with a coefficient value of 0.59 (Ghimire et al., 2014).

3.3.4 Major constraints in cabbage production

The details of the intensity of production problems and their index value are presented in the table.

Table 5: Problems Associated with Cabbage Production and Marketing

Production and marketing problems	Index	Rank
Diseases, Pest infestation	0.835	I
Inadequate Market information and marketing channel	0.7025	II
Labor unavailability on time	0.655	III
Inadequate Irrigation facilities	0.485	IV
Inadequate availability of quality Seed and fertilizers	0.4575	V

It has been reported that diseases and pest infestation significantly hinder cabbage production and productivity. Additionally, inadequate market

information and marketing channels further complicate the marketing process, affecting overall profitability. Moreover, timely labor availability, proper irrigation, and access to quality seeds and fertilizers play crucial roles in improving cabbage yield and ensuring sustainable production. A group researcher also reported disease, pest infestation as a major problem (Gahatraj et al., 2019).

3.4 Marketing of cabbage

3.4.1 Marketing Channels of Cabbage

In the study area, different types of marketing channels were observed through which the produced cabbage reached to consumer level from the producer/farmer which as shown below. Channel II was the most used marketing channel of the study area.

Table 6: Marketing Channels of Cabbage

Marketing channels	Volume (in kg)	Volume in percentage
Producer-Wholesaler/Retailer-Consumer	216000	20
Producer-collector-wholesalers-retailer-consumer	54700	80
Producer-Consumer	0	0
Total	270700	100

3.4.2 Price of cabbage

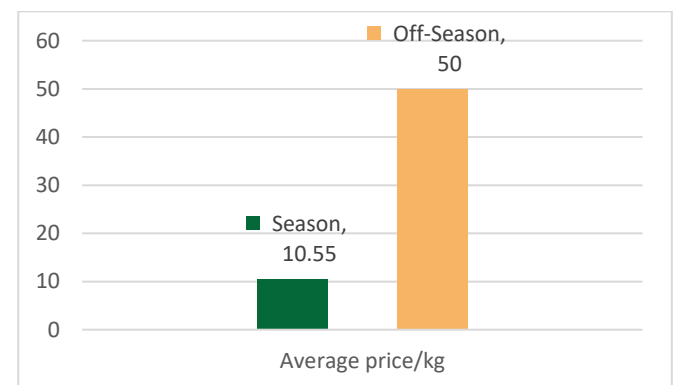


Figure 2: Chart representing the price of cabbage in different seasons

After the field visit, it was known that the price of cabbage was high during off off-season and low during on on-season. The average price of cabbage was Rs 10.55/kg during the normal season, and the price of cabbage was normally high in off off-season, which averaged Rs 50/kg. Additionally, the price of cabbage was found to be decreasing, as per the respondents. This has discouraged farmers from cultivating cabbage. The average price of cabbage was Rs. 16.9 per kg last year.

3.4.3 Price spread

Table 7: Price Spread of Cabbage

Marketing channels	Volume (in kg)	Volume in percentage
Producer-Wholesaler/Retailer-Consumer	216000	20
Producer-collector-wholesalers-retailer-consumer	54700	80
Producer-Consumer	0	0
Total	270700	100

In the study, we found that, farm gate price in the last year was on average Rs. 10, and the retail price was Rs. 20. Thus, the marketing margin was 10. A group researcher differ from this as the price spread in channel 1 was 35 and in channel 2 was 32, while the result resembles the findings of (Pandeya et al., 2021; Regmi et al., 2021).

4. CONCLUSION

The study concludes that cabbage production is highly profitable in the study areas. It is experienced that involvement with cabbage production created ample scope to increase income, employment, and nutritional status of farmers. The study revealed that the majority of the farmers used the green coronet variety and sowed the seeds mainly in September-October in an open field. Cabbage cultivation, being a good source of income, the farmers had not been able to gain maximum profit due to the high cost of production, low market price, poor technical knowledge on its cultivation, and plant protection measures.

High infestation of diseases and pests and low market price, being the major problems of cabbage in the survey site, have even forced a few farmers to shift their cultivation to other crops. Most of them had no idea about plant protection measures and fertilizer dose, on top of technical knowledge on scientific cultivation. Many farmers were still unaware of the IPM practices and other necessary micronutrients for the growth of crops. Generally, the farmers had been selling the cabbage produce to the middleman. Financial analysis revealed profitability with an economically viable benefit-cost ratio, though farmers faced significant challenges, including disease (specifically Clubroot) and pest infestations, inadequate irrigation, labor shortages, and inadequate market information. Overall, cabbage farming remains viable but requires addressing these challenges to enhance productivity and sustainability.

ACKNOWLEDGEMENT

I sincerely acknowledge all the farmers for their cooperation and valuable information during the survey. I am also thankful to AKC, Kavre, for providing the necessary data and support. My appreciation further goes to my college, HICAST, for offering this opportunity to explore and understand the real farming circumstances of our country.

REFERENCES

Beshir, S., 2017. Review on estimation of crop water requirement, irrigation frequency, and water use efficiency of cabbage production. *Journal of Geoscience and Environment Protection*, 14;5(07), Pp. 59.

Červenski, J., Vlajić, S., Ignjatov, M., Tamindžić, G., Zec, S., 2022. Agroclimatic conditions for cabbage production. *Ratarstvo*

povrtarstvo, 59 (2), Pp. 43-50.

Dahal, B.R., Shrestha, B., Dhakal, S.C., Bolakhe, K. and Shrestha, J., 2019. Technical efficiency of cauliflower production in the suburbs of Kathmandu valley, Nepal: Stochastic Frontier Approach.

Dhakal, S.C., Regmi, P.P., Thapa, R.B., Sah, S.K., and Khatri-Chhetri, D.B., 2015. Resource use efficiency of mustard production in Chitwan district of Nepal. *International Journal of Applied Sciences and Technology*, 3 (4), Pp. 604-608.

FAO (Food and Agriculture Organization of the United Nations) (n.d.). Dietary guidelines and vegetable consumption. Rome: FAO.

FAO. 2022. World Food and Agriculture – Statistical Yearbook 2022. Rome. Available at: <https://doi.org/10.4060/cc2211en> [Accessed 30 July 2024].

Gahatraj, S., Rai, H.H., and Uprety, R., 2019. Assessment of the contribution of cabbage to rural livelihood and constraints of production in Dhankuta, Nepal. *International Journal of Agriculture, Environment and Food Sciences*, 3 (3), Pp.150-154.

Ghimire, B., and Dhakal, S.C., 2014. Production economics of sustainable soil management based on cauliflower (*Brassica oleracea* L. var. botrytis) in the Dhading district of Nepal. *American Journal of Agriculture and Forestry*, 2 (4), Pp.199-205.

Maharatha, S., Dahal, B.R., Acharya, N., and Devkota, S., 2019. Price behavior, marketing and consumption pattern of tomato in selected region of western Nepal. *Archives of Agriculture and Environmental Science*, 4 (4), Pp. 472-477.

MoALD (Ministry of Agriculture and Livestock Development). 2021/2022. Statistical Information on Nepalese Agriculture. Kathmandu: Government of Nepal.

Pandeya, A., Jhaa, N., Gaireb, K.R., Thapaa, G., and Karkib, R., 2021. Economics Of Early-Season Cauliflower Production And Marketing In Dhading District Of Nepal.

Regmi, S., Pokhrel, S., Paudel, M., Mahatara, B., and Budhathoki, S., 2021. Appraising the productivity and profitability of major vegetables in Nawalpur district, Nepal.

