

Marketing analysis of apple crop in High Hills of Himachal Pradesh

Bharti¹, Kaustav Aditya^{1,*} and Sarita Devi²

¹ICAR-Indian Agricultural Statistics Research Institute, New Delhi 110 012, India

²College of Horticulture and Forestry, Dr Yashwant Singh Parmar University of Horticulture and Forestry, Thunag, Mandi 175 048, India

Apple crop is the predominant temperate fruit in the high hills of Himachal Pradesh (HP), India, primarily due to the ideal temperate climate of the region characterized by high altitude and significant snowfall. This study aims to examine the marketing aspects of apple crops in the high hills of HP, taking into account the complex nature of its marketing patterns. It emphasizes the importance of maintaining a cautious approach within the marketing channel, as any oversight can reduce prices and profits. Additionally, the study examines the arrival trends of apples in the Agricultural Produce Marketing Committee of HP. The findings reveal that the retail channel demonstrated the highest marketing efficiency, followed by the commission agent's channel, suggesting that reducing the intermediaries in the channel contributes to enhanced marketing efficiency.

Keywords: Apple, arrival trend, high hills, marketing efficiency, price spread.

INDIA possesses a diverse range of climatic and physio-geographical conditions, providing an ideal environment for cultivating various fruits and vegetables. Among these, temperate fruits such as apples, pears, plums and peaches are primarily cultivated in the hilly regions of Kashmir, Himachal Pradesh (HP) and Uttarakhand in the country. Apples, in particular, constitute nearly half of the world's deciduous fruit trees. China holds the first position with regard to apple production, accounting for approximately 49% of the global production, followed by Turkey, the United States, Poland and India (Figure 1)¹. The major apple-growing states in India are Jammu & Kashmir (77.85%), Himachal Pradesh (19.22%), Uttarakhand (2.53%), Arunachal Pradesh (0.32%) and Nagaland (0.09%) (Figure 2)². The total apple production in India amounts to 2057 thousand metric tonnes, cultivated across 312 thousand hectares. The per capita monthly apple consumption is 0.06 kg in rural areas and 0.19 kg in urban areas³.

HP is known for cultivating temperate horticulture crops and has gained recognition as the leading apple-producing region in India, supplying superior-quality fruits. The apple crop spans an area of 112.63 thousand hectares in HP, producing 446.57 thousand tonnes². Apples hold significant potential for generating income and employment, particu-

larly in the high-mountain districts of HP. The Department of Horticulture, Government of HP actively encourages farmers in the state to cultivate high-density and high-yielding apple varieties⁴. Given the perishable nature of apples, ensuring their distribution to end-consumers in optimal condition is paramount. The first step involves transporting the apples to wholesale markets near the production areas, distributing them to retailers and finally reaching the consumers. Hence, the marketing system for apples holds great significance for commercial growers and intermediaries such as wholesalers, village traders, contractors and retailers.

The marketing of apples in HP is primarily handled by the private sector, involving various entities like pre-harvest contractors, commission agents, wholesalers and retailers. This process is intricate and involves numerous nodes and channels. Preparing apples for marketing requires several steps, including picking, grading, packing and transportation. The efficiency of these operations plays a crucial role in determining the price apples can fetch in the market. Farmers consider an efficient marketing system to maximise their net returns. Thus, it is essential to closely examine the marketing practices related to apple cultivation. Therefore, this study was conducted to analyse the marketing aspects of apple crops in Shimla district, HP. Numerous studies have been carried out to explore the production, marketing and economics of apple⁵⁻⁷ as well as other crops^{8,9} across the country.

Material and methods

Study area and sampling scheme

Shimla district was selected for this study as it has the highest apple production among all districts in HP (Figure 2). The district is located within 77.00°–78.19°E long. and 30.45°–31.44°N lat. In 2020–21, the apple cultivation area in the district covered 42,085 ha, producing 47,179 metric tonnes¹⁰. To ensure representative sampling, a stratified multistage random sampling technique was employed. Districts were considered strata/stratum, villages were selected as primary stage units, and households as the final stage units.

Data description

A total of 400 eligible households were selected to acquire information on the production and marketing of apples.

*For correspondence. (e-mail: Kaustav.Aditya@icar.gov.in)

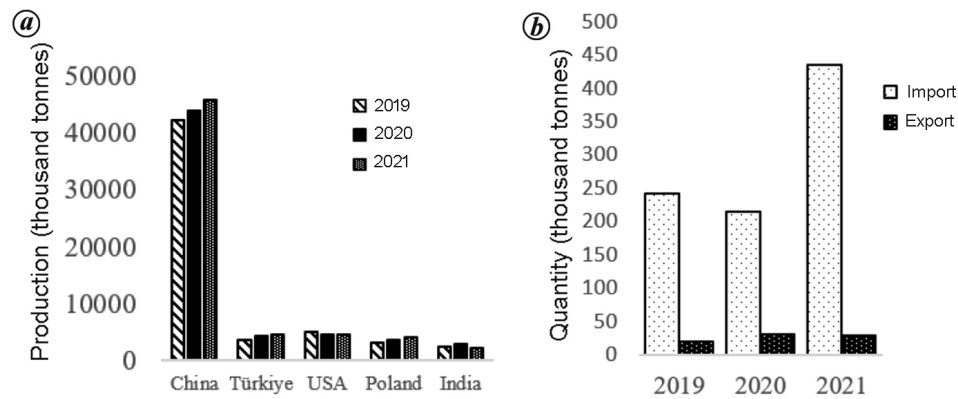


Figure 1. a, Top five producers of apples in world. b, Import and export of apples in India (FAOSTAT, 2021).

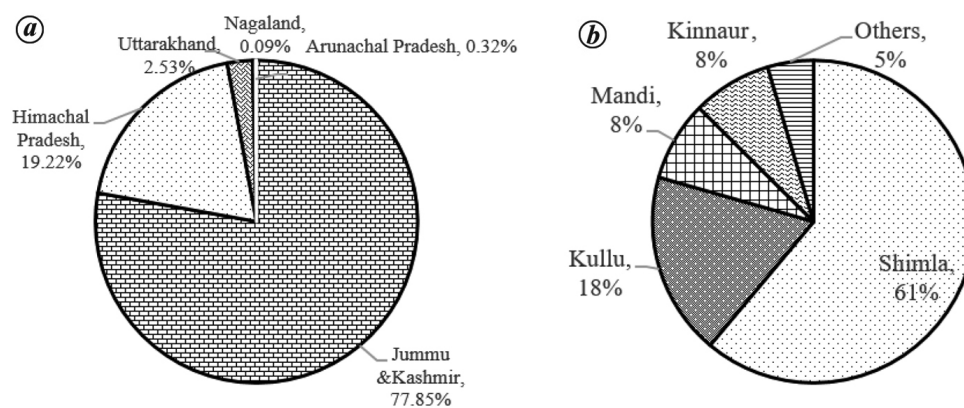


Figure 2. a, State-wise percentage production of apples in India². b, District-wise percentage production of apples in Himachal Pradesh (Statistical abstract of Himachal Pradesh, 2020; https://himachalservices.nic.in/economics/pdf/StatisticalAbstract_2019_20.pdf).

From the selected farm households, primary data were collected on various factors related to the production and marketing of apples using a meticulously planned schedule through a face-to-face interview survey method during 2015–17. The average family size of farm households was 5.06 persons, with 3.01 people engaged in apple orchard activities. With respect to educational qualification, 44.75% of family members were below intermediate level, 42.25% were intermediate level, and 13% were graduates/postgraduates. Agriculture was the primary occupation of 71.5% of the selected farm households. In the study area, the average landholding size was 1.28 ha. Of this, an average area of 1.06 ha was allocated to apple cultivation, while an average area of 0.05 ha was allocated for growing other fruit crops. The average production of apples per farm household was 8.77 q. A mere 0.46% of the apple production from farm households was kept for home consumption, while 0.34% was distributed as kind/gift payments. The majority of the apples, accounting for 99.2%, were directed towards the market for sale through appropriate marketing channels. The selection of marketing channels depended on the net returns to farmers and intermediaries involved.

Analytic tools

Several parameters, including price spread, marketing cost and margin, were calculated for each channel to assess and compare the marketing efficiency of various channels. These parameters were computed following the methodology described by Acharya and Agrawal¹¹.

Marketing cost: This encompasses the overall expenses accrued by farmers and intermediaries involved in the marketing channel. It is estimated by considering various factors and using the following methodology

$$C_{00} = C_{Fa} + C_{mid}$$

where C_{00} is the total marketing cost, C_{Fa} the expense borne by the producer and C_{mid} is the cost/expense incurred by the intermediaries.

Marketing margin: The marketing margin of an intermediary is determined by subtracting the selling price of the intermediaries from the total payments they receive, which includes the marketing cost and purchase price.

$$A_{md} = P_{Ri} - (P_{pi} + C_{mi}),$$

where A_{md} is the absolute margin of the middlemen, P_{Ri} the total value of receipts per unit, P_{pi} the purchase value of goods per unit and C_{mi} is the cost incurred on marketing per unit.

Producer's/farmer's price: To determine the net price received by farmers, the marketing costs incurred by them are subtracted from the initial price paid to them by the wholesaler/commission agent. This can be expressed as follows

$$P_{pr} = P_{Sl} - P_{co},$$

where P_{pr} is the net price received by the farmer/producer, P_{Sl} the producer's/farmer's selling price and P_{co} is the expense borne by the producer/farmer.

Price spread: It is the discrepancy between the price paid by the ultimate consumer and the amount received by the farmer.

Efficiency: The efficiency of a marketing channel is assessed using marketing cost, margin and price spread. There are three common methods to calculate efficiency, which are as follows

$$\text{Conventional method: } E_c = \frac{\text{Total price}}{\text{Total marketing cost}},$$

$$\text{Shepherd's method: } E_s = \frac{\text{Consumer price}}{\text{Total marketing cost}},$$

Acharya's method:

$$E_A = \frac{\text{Producer price}}{\text{Total marketing cost} + \text{total marketing margin}}.$$

The marketing channel with the lowest value for the above-mentioned ratios is more efficient compared to other marketing channels.

Results and discussion

A total of 400 eligible households were considered for acquiring information on the marketing of apples. The process of preparing apples for marketing involves various tasks such as picking, grading, packing, transportation, loading/unloading and storage. Fruits are typically harvested by hand, and sorting is done to eliminate diseased, rotten fruits. Subsequently, grading is done based on the colour and size of the fruits. Apples are classified into six grades based on their size: pitto, extra-small, small, medium, extra-large and super-large. These grades are additionally subdivided into

three categories based on their quality: grade A (extra-fancy), grade B (fancy) and grade C (standard). After grading, the apples are packed in either wooden or corrugated fibreboard cartons, along with pulp trays, depending on their quality. These packed apples are then distributed to end-consumers through various marketing channels, involving different entities like farmers, pre-harvest contractors, local/distant wholesalers and retailers. This network of intermediaries and participants is referred to as the marketing channel. The channels identified as significant for apple marketing in the sampled farm households in HP are listed below.

Channel A: This channel involves the following sequence: producers/farmers, pre-harvest contractors, commission-agents, retailers and ultimately the consumers.

Channel B: Producers/farmers, village traders, local wholesalers, commission agents, distant wholesalers, retailers and consumers.

Channel C: Producers/farmers, commission agents, retailers and consumers.

Channel D: Producers/farmers, retailers and consumers.

Channel E: Producers/farmers, Himachal Pradesh Horticultural Produce Marketing and Processing Corporation Ltd, processing units.

Price spread in marketing channels

The efficiency of a marketing system is commonly assessed by examining the price spread. A lower price spread indicates a more efficient marketing system. The price spread is calculated based on the disparity between the price received by the farmers/producers and the price paid by the purchasers/consumers. Tables 1–4 present the price spread in the marketing channels A, B, C and D respectively. The marketing channel E is mainly for culled apples which are directly sent to the factories for making juice, squash, jelly, etc.

In marketing channel A, the net price received by the farmer was 41.67% of consumer rupees. The cost incurred by pre-harvest contractors was 7.14% of consumer rupees, which includes watch and ward (0.32%); picking and grading (1.43%); container cost (1.07%); transportation (0.62%); loading/unloading (0.19%), etc. The pre-harvest contractors sold produce to the wholesalers at a profit margin of 4.05%. The commission agents/wholesalers incurred a cost equivalent to 9.64% of consumer rupees, which includes the market fee (1.06%), transportation cost (1.16%), packing boxes and repair (1.45%), spoilage/wastage (1.38%), etc. The margin of commission agents/wholesalers was 10.62% of consumer rupees. The cost incurred by retailers was 11.05% of consumer rupees, which includes market fees (1.46%), transportation costs (1.37%), spoilage/wastage (1.15%), etc. Thereafter, the apple produce was sold to the retailer, generating a profit margin of 10.62% of the purchaser rupees. In channel B, the net price received by the producers was 31.25% of consumer rupees. The cost

Table 1. Price spread in marketing channel A

Particulars	Rs/q	Percentage share in consumer rupees
Net price received by producer's/contractor's purchase price	4,500.00	41.67
Cost incurred by pre-harvest contractors	770.60	7.14
Margin of pre-harvest contractors	437.40	4.05
Pre-harvest contractor's sale price/wholesaler purchase price	5,708.00	52.85
Cost incurred by commission agents/wholesalers	1,041.34	9.64
Commission agent's/wholesaler's margin	1,146.66	10.62
Wholesaler's sale price/retailer's purchase price	7,896.00	73.11
Cost incurred by retailers	1,193.28	11.05
Retailer's margin	1,710.72	15.84
Retailer's sale price/consumer's purchase price	10,800.00	100.00

Table 2. Price spread in marketing channel B

Particulars	Rs/q	Percentage share in consumer rupees
Net price received by producer's/contractor's purchase price	4,500.00	31.25
Cost incurred by village traders	440.89	3.06
Margin of village traders	184.11	1.28
Village trader's sale price/wholesaler's purchase price	5,125.00	35.59
Cost incurred by wholesalers	1,102.50	7.66
Wholesaler's margin	937.50	6.51
Wholesaler's sale price/commission agent's purchase price	7,165.00	49.76
Cost incurred by commission agents	822.70	5.71
Commission agent's margin	787.30	5.47
Commission agent's sale price/wholesaler's purchase price	8,775.00	60.94
Cost incurred by wholesalers	1,647.10	11.44
Wholesaler's margin	702.90	4.88
Wholesaler's sale price/retailer's purchase price	11,125.00	77.26
Cost incurred by retailers	2,034.10	14.13
Retailer's margin	1,240.90	8.62
Retailer's sale price/consumer's purchase price	14,400.00	100.00

Table 3. Price spread in marketing channel C

Particulars	Rs/q	Percentage share in consumer rupees
Net price received by producer's/commission agent's purchase price	4,500.00	45.07
Cost incurred by commission agents	847.39	8.49
Commission agent's margin	2,327.61	23.31
Commission agent's sale price/retailer's purchase price	7,675.00	76.87
Cost incurred by retailers	1,243.58	12.45
Retailer's margin	1,066.42	10.68
Retailer's sale price/consumer's purchase price	9,985.00	100.00

Table 4. Price spread in marketing channel D

Particulars	Rs/q	Percentage share in consumer rupees
Net price received by producer's/contractor's purchase price	4,550.00	56.45
Cost incurred by retailers	994.83	12.34
Margin of retailers	2,515.17	31.21
Retailer's sale/consumer's purchase price	8,060.00	100.00

incurred by village traders, wholesalers, commission agents and retailers was 3.06%, 7.6%, 5.71% and 14.13% of consumer rupees respectively. The margin of village

traders, wholesalers, commission agents and retailers was 1.28%, 6.51%, 5.47% and 8.62% of consumer rupees respectively. In marketing channel C, costs incurred by the

Table 5. Estimates of total marketing cost, margin and marketing efficiency for Himachal Pradesh apple

Particulars	Channel A (Rs)	Channel B (Rs)	Channel C (Rs)	Channel D (Rs)
Total marketing cost	3,555.22	6,960.29	3,003.97	1,907.83
Total market margin of intermediaries	3,294.78	3,852.71	3,394.03	2,515.17
Total cost margin	6,850.00	10,813.00	6,398.00	4,423.00
Net price received by growers	3,950.00	3,587.00	3,587.00	3,637.00
Consumer price	10,800.00	14,400.00	9,985.00	8,060.00
Index of marketing efficiency (ratio)				
Conventional method (E_c)	1.93	1.55	2.13	2.32
Shepherd's method (E_s)	3.04	2.07	3.32	4.22
Acharya's method (E_A)	0.58	0.33	0.56	0.82

Table 6. Arrival of apples (quintals) in the Agriculture Produce Marketing Committees (APMCs) at Shimla

APMC	2015–16	2016–17	2017–18	2018–19	2019–2020
Shimla	1,205,184	1,051,791	1,103,998	973,015	1,640,867
Bhatta-kuffer	696,958	582,368	460,821	430,254	692,311
Parala	223,123	165,240	337,788	274,209	437,870
Nerwa	1,978	2,316	2,575	2,276	6,740
Kharapather	3,306	19,320	23,041	23,946	33,938
Rohru	279,819	282,547	279,773	242,330	470,008

Source: Himachal Pradesh State Agricultural Marketing Board (<https://hpsamb.org>).

commission agents included transportation costs (1.60%), packing material costs (0.85%), market fees (0.90%), etc. The commission agents received 23.3% of the purchaser rupees and sold the apple produce to the retailers. The retailers, in turn, obtained a margin of 10.68% of consumer rupees. The price spread was Rs 5485/q. In channel D, the producer's price from the retailers constituted 56.45% of the consumer rupees. On average, the retailers incurred a cost of 12.34% and obtained a margin of 31.21% of the purchaser rupees.

Marketing efficiency

It is a measure of market performance. An increase in efficiency is indicated when costs associated with a specific function are reduced without compromising consumer satisfaction. However, if an alteration reduces costs and diminishes consumer satisfaction, it does not necessarily imply increased marketing efficiency. Table 5 estimates the overall marketing margin, cost and efficiency levels for channels A–D.

Three methods, namely Shepherd's method, conventional method and Acharya's method were used to assess market efficiency. The analysis revealed that the village trader channel (channel B) had the highest total marketing cost, market margin of intermediaries and cost margin. This was followed by the pre-harvest channel (channel A), commission agents' channel (channel C) and retailers' channel (channel D). From Table 5, it is evident that, according to all the above methods, channel D shows the highest level of efficiency. This is followed by channel C, channel A and

channel B in the study area. Thus we can conclude that marketing efficiency increases when fewer intermediaries are involved in the channel.

Trend of arrival of apples in agricultural produce marketing cooperation

As apple is mainly produced in the hilly regions of HP, several constraints related to production and marketing are faced by the orchardists and intermediaries involved in the transportation of apples to the ultimate consumers. The orchards were, on average, 2.42 km from the road in the study area. Apples were carried to the main road through labour (79%), animals (19%) and small vehicles (2%). In the orchards connected by link roads, light vehicles were utilized for transportation. However, the absence of road infrastructure directly to the orchards results in additional transportation costs. From the roadhead to the terminal markets, trucks transport the fruit. Apples are sold by the farmers mainly in the Agriculture Produce Marketing Committees (APMCs) at Shimla. The trend in the arrival of different agricultural commodities in various APMCs has been studied by various researchers across the country^{12–14}.

The arrival and price of agricultural commodities are closely connected, making it essential to gain information about the arrival of agricultural produce in order to assess price fluctuations over time. By understanding the arrival trends of agricultural produce, farmers can make informed decisions on when to market their products to maximize their chances of obtaining a higher price. The trend of arrival of apples at APMC in Shimla was studied (Table 6). The

area under apples in the Shimla district was substantial; however, fluctuations in the arrival of apples were observed in the APMC. The peak time of apple arrival was from August to November. Maximum arrival was observed in September and November¹⁵. Maximum arrival was observed at Bhattakufer, followed by Rohru and Parala¹⁶. However, farmers also sold their produce at various APMCs across the country depending upon the cost of transportation and returns from their produce. In the marketing process, several intermediaries are involved, which decreases the farmers' share in consumer rupees. Marketing efficiency can be achieved by reducing the number of intermediaries involved in the process and minimizing the constraints related to transportation costs.

Conclusion

In this study, we have analysed the marketing channels and trends of the arrival of apple crops in Shimla, HP. Farmers prefer marketing channels based on a variety of factors, including higher returns and lower risk. They prefer the pre-harvest channel to avoid risks and labour issues associated with apple marketing. However, commission agents and retail channels are preferred because they offer better rates, and their prices are market-regulated. We found that channel D was the most efficient for apple crop marketing in the study area. The present marketing systems involve several intermediaries and involvement of many intermediaries in market channel lower the farmers share in consumer rupees. Also, farmers in the study area are facing constraints like a lack of proper roads to apple orchards, labour shortages and cold-storage issues.

Conflict of interest: The authors declare that there is no conflict of interest.

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