

RESEARCH PAPER

Market Dynamics of Walnut in Jammu and Kashmir

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ABSTRACT

Walnut (*Juglans regia*), commonly regarded as the “Brain Food,” is a significant nut crop of temperate regions. It serves as a crucial contributor to the agricultural economy, generating substantial foreign exchange for the nation. Jammu and Kashmir, accounting for 80.58 per cent of the nation’s total walnut cultivation area and 91.16% of its production, stands out as the leading producer of walnuts. Hence, this study aimed to analyze the seasonality in walnut’s arrivals and prices, along with investigating its marketing pattern (marketing cost, marketing margins and marketing efficiency) within the markets of the Union Territory of Jammu and Kashmir. To achieve the research objectives, data were collected from both primary and secondary sources. The study revealed that walnut arrivals exhibited seasonal variations, with peak arrivals typically observed during October and November. Consequently, prices also fluctuated across different months. The marketing process comprised two main channels: Channel I, involving direct sales to local retailers and Channel II, entailing sales through Farmer’s Cooperative (F/C) agent retailers. Besides, producer’s share in consumer rupee varied depending on the chosen marketing channel, ranging from 52.70 per cent to 67.41 per cent for Channel I and 60 per cent to 62 per cent for Channel II, respectively.

HIGHLIGHTS

- Walnut trade holds significant importance in Jammu and Kashmir.
- Marketing resources were used effectively in channel II thereby representing greater efficiency.
- October month saw a simultaneous surge in both arrivals and prices suggesting a period of high demand and supply.

Keywords: Arrival, Price, Walnut (*Juglans regia*), Marketing cost, Marketing margins, Marketing efficiency

Walnut, a venerable nut fruit cherished for its rich flavour and myriad health benefits, has woven itself into the tapestry of human history, tracing back to ancient civilizations. From its origins in Persia (modern-day Iran), where it was esteemed for its economic significance, to its global dissemination aboard English trading ships, the walnut has traversed continents and cultures, leaving an indelible mark on gastronomy, commerce, and even folklore. Today, the crop is cultivated globally, with China standing out as the foremost producer, contributing approximately 48% of the world’s total

production (FAO, 2021), while other significant walnut-producing nations include Iran, Turkey, Ukraine, Mexico, France, India, Romania and Chile. In India, walnut is grown in the North-Western Himalayan belt extending up to Darjeeling and Sikkim. This dominance is attributed to the ideal climatic conditions of the Himalayas, making it a natural habitat for walnut trees (*Juglans*

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regia L.) Jammu and Kashmir (J&K) occupies a unique position in the Indian horticulture sector, particularly when it comes to walnuts (Mohammad and Vajahat, 2019). According to statistics from the Agricultural and Processed Food Products Export Development Authority (APEDA, 2020–21), Jammu and Kashmir occupies the largest share in total area and production of walnut, emphasizing the pivotal role of this region in the national walnut industry. The total area under cultivation for walnut 109 thousand hectare and production 282 thousand MT (PIB, 2021-22 first advance estimate). Walnuts are not merely a horticultural product in J&K; they represent a significant economic pillar for the region. A study by Shah *et al.* (2017) highlights the cost-benefit ratio of walnut production, indicating a promising 1:5.35 return per hectare. This translates to substantial income generation for farmers and contributes significantly to the region's Gross Domestic Product (GDP). Furthermore, the walnut industry fosters employment opportunities across various stages of the value chain, from cultivation and harvesting to processing, packaging, and marketing. Additionally, the designation of J&K as an "Agri-Export Zone" for walnuts presents a promising avenue for increased exports and foreign exchange earnings.

Even though Jammu and Kashmir dominates the Indian walnut market, its industry grapples with a multitude of interconnected market forces. The market dynamics of walnut in Jammu and Kashmir encapsulates a complex interplay of seasonal fluctuations, economic imperatives and socio-cultural traditions, shaping the trajectory of walnut cultivation and trade in this region. Therefore, this research delves into the intricate dynamics governing this crucial sector, with a specific focus on walnut arrivals, pricing patterns, marketing costs, margins, and overall efficiency. By analyzing these aspects, the study aims to provide valuable insights for stakeholders and formulate strategies for a more sustainable and profitable walnut market in J&K.

MATERIALS AND METHODS

Data Source: To achieve the study's objectives, both primary and secondary data were gathered. Primary data was acquired through surveys conducted by interviewing farmers, utilizing a meticulously crafted and pre-tested questionnaire. Secondary

data essential for the research was obtained from a range of published sources and agencies including economic surveys (across different editions), statistical digests, annual reports and pertinent government publications.

Selection of Markets: Kupwara market in the Kashmir region and Narwal market in the Jammu region were chosen as focal points to investigate the arrival, pricing and marketing dynamics of walnuts given that these markets predominantly facilitate walnut trade.

Research Formulas

1. Seasonal Index for Arrivals and Prices

Seasonal variations in the prices and arrivals of walnut were assessed through the application of the moving average technique. The formula for determining the simple moving average at any given point in time was derived by computing the average of a specified number of periods leading up to that point.

Mathematically, it is represented as,

$$\text{Simple Moving Average} = (A_1 + A_2 + \dots + A_n) / n$$

Where, A_n is the data point in the n th period.

Seasonal Index

$$S.I = \frac{PI}{MA(12)} \times 100$$

$$\text{Where, } MA(12) = \frac{1}{12} \sum PI$$

$MA(12)$ = Twelve month moving average

PI = Market arrivals/ Price indices

$S.I$ = Seasonal Indices for market arrivals/ prices

2. Marketing Margins, Costs and Efficiency

The study accounted for post-harvest losses occurring at different marketing stages, whether they affected the farmers' net margins or the margins of market intermediaries. The research explicitly estimated the marketing losses at various stages, utilizing modified formulas to isolate post-harvest losses during marketing and to calculate the

producers' share, marketing margins and marketing losses.

(a) Net Farmers Price

The net price received by the grower was calculated by deducting the combined expenses of marketing and losses in value occurring during harvesting, grading, transit, and marketing from the total amount received. Hence, the mathematical representation of the grower's net price is expressed as follows:

$$NP_F = GP_F - \{C_F + (L_F \times GP_F)\}$$

Or

$$NP_F = \{GP_F\} - \{C_F\} - \{L_F \times GP_F\} \quad \dots(1)$$

Where, NP_F = Net price received by the farmers (₹/kg),

GP_F = Gross price received by the farmers or wholesale price to farmers (/kg),

C_F = Cost incurred by the farmers during marketing (₹/kg),

L_F = Physical loss in produce from harvest till it reaches assembly market (per kg).

(b) Marketing Margins

The margins of market intermediaries encompassed profits and returns derived from storage, capital interest, and operational establishment expenses, adjusted for any marketing losses incurred during handling. The expression used for estimating the margin for intermediaries is as follows:

- ♦ Intermediaries margin = Gross price (sale price) – Purchase price (cost price) – Cost of marketing – Loss in value during wholesaling
- ♦ Net marketing margin of the wholesaler is given mathematically by

$$MM_w = GP_w - GP_F - C_w - (L_w \times GP_w)$$

Or

$$MM_w = \{GP_w - GP_F\} - \{C_w\} - \{L_w \times GP_w\} \quad \dots(2)$$

Where, MM_w = Net margin of the wholesaler (₹/kg),

GP_w = Wholesaler's gross price to retailers or purchase price of retailer (₹/kg)

C_w = Cost incurred by the wholesalers during marketing (₹/kg),

L_w = Physical loss in the produce at the wholesale level (per kg)

Within the marketing chain, if multiple wholesalers are engaged, such as primary wholesalers, secondary wholesalers and so forth, the cumulative margin of wholesalers equals the total sum of each individual wholesaler's margin.

Mathematically,

$$MM_w = MM_{w1} + \dots + MM_{wi} + \dots + MM_{wn}$$

Where, MM_{wi} = Marketing margin of the i^{th} wholesaler.

Net marketing margin of retailer is given by:

$$MM_R = GP_R - GP_w - C_R - (L_R \times GP_R)$$

or

$$MM_R = \{GP_R - GP_w\} - \{C_R\} - \{L_R \times GP_R\} \quad \dots(3)$$

Where, MM_R = Net margin of the retailer (₹/kg),

GP_R = Price at the retail market or purchase price of the consumers (₹/kg)

L_R = Physical loss in the produce at the retail level (per kg),

C_R = Cost incurred by the retailers during marketing (₹/kg).

The initial bracketed component in equations (1), (2) and (3) signifies the gross return, whereas the subsequent bracketed terms represent the respective costs and losses incurred at various stages of marketing.

Thus, the total marketing margin of the market intermediaries (MM) is calculated as;

$$MM = MM_w + MM_R \quad \dots(4)$$

Likewise, the overall marketing expenses (MC) borne by both the producer/seller and various intermediaries are computed as follows,

$$MC = C_F + C_w + C_R \quad \dots(5)$$

The aggregate marketing loss (*ML*) in the value of the produce due to harm or deterioration occurring during the handling process from harvest to reaching consumers was determined as follows,

$$ML = \{L_F \times GP_F\} + \{L_W \times GP_W\} + \{L_R \times GP_R\} \dots (6)$$

(Source: Murthy, *et al.* 2007).

(c) Marketing Efficiency

Commonly employed metrics like the traditional input-to-output marketing ratio, Shepherd's value-to-cost ratio (Shepherd, 1965), and Acharya's marketing efficiency formula (Acharya and Agarwal, 2001) do not explicitly address the loss incurred in the produce during marketing as a distinct element. Consequently, the 'marketing loss' component was integrated into Acharya and Agarwal's widely accepted formula (2001), resulting in the modified marketing efficiency (*ME*) formula provided below;

$$Me = \frac{NP_F}{(MM + MC + ML)}$$

Where,

NP_F = Net price received by the farmers (/kg)

MM = Marketing margin

MC = Marketing cost

and ML = Marketing loss

(Source: Murthy, *et al.* 2007).

RESULTS AND DISCUSSION

Arrival and Prices of Walnut

To examine walnut arrival and pricing trends in the Jammu region, data on these variables was collected from Narwal Mandi, the sole regulated market in Jammu, spanning the period from 2012 to 2022.

Table 1 presents walnut arrival and selling prices throughout the season for the entire study period. The data reveals that walnut primarily arrives in the months of April, September, October, November, and December. The peak arrival for April occurred in 2018-2019 with 2175 quintals, while September recorded its highest arrival of 6480 quintals in 2016-2017. This peak might be due to good harvest season, favourable weather conditions and efficient

cultivation practices. Selling prices reached their highest point in November and December of 2020-2021, commanding ₹ 2,66,604 and ₹ 1,97,500 per quintal respectively. This could be the result of increased demand, limited supply and surge in global demand for walnuts. However, the overall maximum annual arrival of 1,38,340 quintals was registered in 2013-2014, occurring simultaneously with the highest walnut price of ₹ 15,41,333 per quintal in 2020-2021. Furthermore, the arrival quantities were found to be consistently exceeding in the months of October and November across multiple years. This could be attributed to the harvest season, with October typically marking the period when walnuts are harvested, processed, and prepared for market distribution. November is also a notable month for walnut arrivals, likely because the harvest season extends to November. The increased arrivals in November can possibly be because of the conclusion of the harvesting process and the greater availability of walnuts for trade in that month.

Therefore, the data suggests that the sellers have experienced heightened profitability in the recent years compared to the earlier periods, corresponding with the elevated selling prices observed during the final four years of the study.

Seasonal Index of walnut

Utilizing the collected arrival and prices data, a seasonal index for walnuts was computed which has been summarised in Table 2 and graphically represented in Fig. 1.

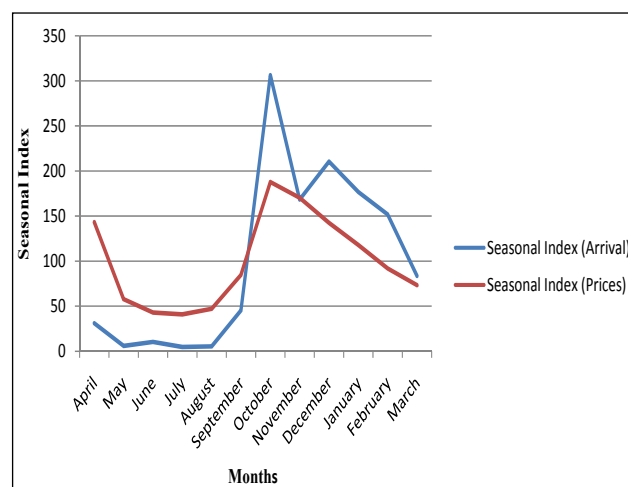


Fig. 1: Seasonal Index of Walnut for Arrival and Prices

Table 1: Arrival and selling price of walnut in Narwal mandi from 2012 to 2022

₹/ Quinta	2012-2013		2013-2014		2014-2015		2015-2016		2016-2017		2017-2018		2018-2019		2019-2020		2020-2021		2021-2022	
	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices	Arrival	Prices
Apr	2290	1573 44	0	0	0	0	250	1520 50	455	8383 4	0	0	2175	1040	2095	9250	2000	2500	1370	1680
May	0	0	0	0	0	0	0	0	0	0	0	0	0	1090	414	7500	250	2500	1370	1680
June	0	0	0	0	0	0	0	0	0	0	0	0	2125	1040	0	0	0	0	1410	1760
July	0	0	0	0	0	0	0	0	0	0	0	0	0	9050	0	0	0	0	1610	1760
August	0	0	0	0	0	0	0	0	0	0	0	0	270	1125	0	0	0	0	1570	1940
September	0	0	4410	0	1275	1250	0	0	6480	9210	1334	2850	2280	1125	0	0	0	2566	990	1940
October	1295 5	1818 31	4205	1068	2121	9225	1839	1068	1527	9147	6715	9710	7977	7300	0	0	0	2666	1520	2095
November	7935	1900	2756	8936	1759	8068	1790	8936	1211	9047	3265	1045	3568	0	0	0	0	2666	1410	1995
December	4805	1755	2249	9743	3646	7952	7465	9743	791	9259	1201	9750	1149	6750	1550	2450	2000	1975	1800	0
January	2320	1455	2302	9286	2373	8000	8570	9286	0	0	3150	9750	690	6750	1370	2500	2050	1680	900	0
February	0	0	1881	8605	1655	7500	5700	8605	0	0	4221	8800	1250	7100	1130	2500	2050	1680	320	0
March	0	0	0	8870	55	3400	1095	8870	0	0	3709	0	510	7350	1020	2500	2050	1680	1800	0
Total	3030	8503	1383	7133	4781	5664	4326	7133	3510	4504	3440	5131	2199	9850	7579	2670	8375	1541	1607	1485
	5	15	40	14	3	52	5	14	6	74	9.16	00	4	00		00	0	333	0	000

Table 2: Determination of Seasonal Index of walnut

Months	Seasonal Index (Arrivals)	Seasonal Index (Prices)
April	31.06	143.28
May	5.94	57.79
June	10.32	42.92
July	4.70	40.85
August	5.37	46.98
September	45.26	84.62
October	306.36	187.84
November	168.36	170.25
December	210.50	142.48
January	176.78	117.91
February	151.690	91.83
March	83.63	73.25

Seasonal indices quantify the expected seasonal variation relative to the average level. For arrivals, the values fluctuate significantly, with the highest index in October (306.36) indicating maximum arrivals, and the lowest in July (4.70) showing minimal arrivals. For prices, the maximum is in October (187.84), while the lowest is in June (42.92). The range for arrivals spans from 4.70 in July to 306.36 in October. For prices, the range extends from 40.85 in July to 187.84 in October. Significantly, October sees a simultaneous surge in both arrivals and prices, suggesting a period of high demand and supply. Conversely, the summer months of May to August generally exhibit lower indices for both arrivals and prices, reflecting reduced market activity. Therefore, it can be inferred that a strong seasonality in both arrivals and prices exists, with the autumn months, especially October, being the busiest and priciest, whereas the summer months show reduced activity as seen in Fig. 1. The highest values may result from the seasonal nature of walnut production, with the harvest peak occurring in the month of October. However, seasonal indices can also be affected by external factors such as weather conditions, shifting consumer preferences, and global market trends.

Marketing Pattern of Walnut

Marketing patterns are the recurring behaviours, trends, and strategies observed within the realm of marketing. These patterns are shaped by various factors, including consumer behaviour, technological advancements and economic conditions. In this

study, the marketing pattern of walnut in both Jammu and Kashmir region were observed through two major channels to calculate marketing cost, margins of the intermediaries involved and producer's share in consumer rupee.

Table 3: Marketing pattern of walnut in the Jammu region

Sl. No.	Particulars	Channels	
		(I) Producer-Local Retailer-Consumer	(II) Producer-F/C Agent Retailer-Consumer
1	Producer sale price	12000	15000
2	Producer expenses	—	—
3	Cost of gunny bags	100	100
4	Picking/filling	1200	1200
5	Loading/unloading	—	50
6	Transport	—	250
7	Commission@7%	0	1050
8	Total costs	1300	2650
9	Net price received by the farmer	10700	12350
10	Retailer's level (local)	—	—
11	Purchase price	15000	—
12	Transport	120	—
13	Loading/unloading	80	—
14	Commission@5% to F/C agent	—	—
15	Total cost	20	—
16	Marketing margin	11000	—
17	Purchase price of consumer/sale price of retailer	17250	—
18	Purchase price of retailer	—	15000
19	Transport	—	100
20	Loading/unloading	—	50
21	Commission@5% to F/C agent	—	750
22	Total cost	—	900
23	Marketing margin	—	9100
24	Purchase price of consumer/sale price of retailer	—	25000
25	Producer's share in consumer's rupee	52.50	60.00

In Channel I, the journey of walnuts began with the producer selling them to the local retailer, who then sold them to the consumer. The producer set

an initial price of ₹ 12,000 for the walnuts (varying according to the quality, variety and demand), factoring in expenses of ₹ 1,300 for packaging, labour and transportation. After covering these costs, the producer received a net price of ₹ 10,700. The local retailer purchased the walnuts from the producer at ₹ 15,000, incurring additional expenses for transportation. After deducting total costs, the retailer's margin stood at ₹ 11,000.

In Channel II, the walnuts followed a different path, going from the producer to the F/C agent retailer and then to the consumer. The producer set a higher selling price of ₹ 15,000 for the walnuts, with expenses totalling ₹ 2,650 for packaging, labour, transportation and commission. This higher price can be attributed to the commission that farmers must pay to agents, leading to an increased producer price. After accounting for these expenses, the producer received a net price of ₹ 12,350. The F/C agent retailer purchased the walnuts from the producer at ₹ 15,000, incurring expenses for transportation, loading/unloading, and commission to the F/C agent. After deducting total costs, the F/C agent retailer's margin was ₹ 9,100. The marketing margin was lower in this channel as compared to channel I because of the commission costs, thereby reducing the retailer's net margin. Therefore, in both the channels, the consumer purchase price varied, with Channel I observed at ₹ 35,000 and Channel II at ₹ 25,000. The producer's share ranged from ₹ 52.50 to ₹ 60 per consumer rupee, as per the choice of the marketing channel. This difference is likely due to lower purchase costs at various intervals within Channel II.

Table 4: Marketing pattern of walnut in the Kashmir region

Sl. No.	Particulars	Channels	
		(I) Producer-Local Retailer-Consumer	(II) Producer-F/C Agent Retailer-Consumer
1	Producer sale price	15000	18000
2	Producer expenses	—	—
3	Cost of gunny bags	100	100
4	Picking/filling	1200	1200
5	Loading/unloading	—	50
6	Transport	—	250
7	Commission@7%	—	1050

8	Total costs	1300	2650
9	Net price received by the farmer	13700	15350
10	Retailer's level (local)	—	—
11	Purchase price	15000	—
12	Transport	100	—
13	Loading/unloading	50	—
14	Commission@5% to F/C agent	0	—
15	Total cost	150	—
16	Marketing margin	8000	—
17	Purchase price of consumer/sale price of retailer	22250	—
18	Purchase price of retailer	—	18000
19	Transport	—	100
20	Loading/unloading	—	50
21	Commission@5% to F/C agent	—	750
22	Total cost	—	900
23	Marketing margin	—	9100
24	Purchase price of consumer/sale price of retailer	—	35000
25	Producer's share in consumer's rupee	67.41	62.00

In the Kashmir region, when the same marketing channels were assessed in order to calculate the desired parameters, it was observed that in Channel I, the producer sold the walnuts at a price of ₹ 15,000, higher than the price in Jammu because of the superior quality of walnuts produced in Kashmir, incurring total expenses of ₹ 1,300 for packaging (gunny bags), labour for picking/filling and loading/unloading expenses. After the sale to the local retailer at the same price, he received a net price of ₹ 13,700. From the retailer's perspective, additional costs related to transportation, loading/unloading, and commission to the Farmer's Cooperative (F/C) agent amounted to ₹ 150 only. Thus, the total margin for the retailer in Channel I was found to be 8,000 rupees after deducting all costs.

On the other hand, in Channel II, the walnuts followed a different route, where the F/C agent was also included. Here, a higher selling price of ₹ 18,000 was set by the producer, with expenses amounting to 2,650 rupees for packaging, labour, loading/unloading, transport, and commission. Since the farmers have to pay commissions to the agents,

the producer prices are increased to compensate for these costs. After deducting these expenses, a net price of ₹ 15,350 was received by him. The retailer purchased the walnuts from the producer at the same price of ₹ 18,000, with expenses totalling ₹ 900 for transportation, loading/unloading, and commission to the F/C agent. The F/C Agent retailer's margin was ₹ 9,100 after subtracting all costs from the purchase price. The consumer purchase price was observed to be ₹ 35,000. In both the channels, the producer's share ranged between ₹ 67.41 and ₹ 62.00 per consumer rupee. This difference can be attributed to lower purchase costs at various intervals in Channel I, as it does not include the commissions observed in Channel II.

Marketing efficiency

Marketing efficiency refers to the effectiveness with which marketing strategies and tactics are implemented to achieve desired outcomes. It involves optimizing the allocation of marketing resources to maximize return on investment (ROI), ensuring that marketing activities are not only cost-effective but also yield measurable results. High marketing efficiency implies that a business is able to reach its target audience more effectively while using the least amount of resources necessary. In this study, the marketing efficiency across different channels in the regions of both Jammu and Kashmir was worked out separately and the same has been presented in Table 5.

Table 5: Marketing Efficiency of walnut in Jammu and Kashmir region

Region	Channel	Marketing efficiency
Jammu Region	Channel I	0.87
	Channel II	0.97
Kashmir Region	Channel I	1.47
	Channel II	5.79

In the Jammu region, Channel II demonstrates a higher marketing efficiency (0.97) compared to Channel I (0.87). In the Kashmir region, Channel II significantly outperforms Channel I, with an efficiency of 5.79 compared to 1.47. The highest marketing efficiency is found in the Kashmir region through Channel II (5.79), while the lowest is in the Jammu region through Channel I (0.87). This suggests that Channel II is a more

effective marketing channel overall, particularly in the Kashmir region. These values indicate how effectively marketing resources are used in channel II, thereby representing greater efficiency. In addition to these findings, the analysis revealed that marketing losses were negligible.

CONCLUSION

Walnut trade holds significant importance in Jammu and Kashmir, as the region is renowned for its high-quality walnut production. The cultivation and trade of walnuts contribute substantially to the local economy, providing livelihoods for a large number of farmers and associated workers. The region's unique climatic conditions also favour the growth of premium walnut varieties, making it a critical area for walnut cultivation in India. The trade also supports ancillary industries, including processing, packaging, and transportation, further bolstering economic activity in the region.

However, to sustain and enhance this trade, it is imperative to address several key areas. The development of quality planting materials through collaborative efforts between state and private agencies is essential to ensure farmers have access to superior plant varieties. Establishing a robust marketing intelligence system is crucial for providing up-to-date price information and insights into market trends. Additionally, government support in the form of suitable price policies can protect farmers from market volatility and ensure profitability. Promoting value addition through local processing plants can lead to higher and more stable walnut prices. Strengthening extension services and providing farmer training on pest management and disease control can further enhance productivity and sustainability in the walnut industry.

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