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Socio-Economic and Personal Profile of Walnut Growers in Kupwara District, Jammu and Kashmir, India

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Abstract

Understanding the socio-economic characteristics of walnut growers is a foundational prerequisite for designing effective agricultural extension programmes. This paper presents a detailed analysis of the socio-economic and personal profile of 110 walnut growers selected by proportionate allocation sampling from nine horticultural zones across 27 villages in Kupwara district, Jammu and Kashmir, India. The study employed an ex-post facto research design using a pre-tested structured interview schedule. Results reveal that walnut cultivation in the district is dominated by older farmers (66.36%), most of whom are literate (84.54%) with educational levels ranging from primary to middle school. Landholdings are predominantly small (<1 ha: 68.19%), income levels are low (83.64% earn ≤ ₹5 lakh/year), and farming experience is largely medium (21-30 years: 42.72%). The sector is critically under-served by extension: 82.73% of respondents reported low extension contacts and 69.01% had never attended any training programme. Agriculture combined with horticulture and dairy constitutes the primary livelihood for 44.50% of respondents. These findings highlight the urgent need for targeted extension outreach strategies, especially for youth engagement, training intensification, and improved information access to revitalize the walnut enterprise in Kupwara district.

***Key words*:** Socio-economic profile, Walnut growers, Extension contacts, Kupwara, Kashmir, Land holding, Training exposure, Age, Education

Walnut (*Juglans regia* L.), a member of the family Juglandaceae, is one of the most valuable temperate nut crops cultivated worldwide owing to its high nutritional value, premium timber, and significant contribution to the livelihoods of farming communities. The kernels are rich in polyunsaturated fatty acids, proteins, vitamins, antioxidants, and essential minerals, making walnuts an important commodity in the global health food market. In addition to domestic consumption, walnuts constitute an important export commodity for several countries, contributing substantially to rural income and foreign exchange earnings. India occupies a prominent position among walnut-producing countries, ranking seventh globally with an annual production of nearly 35,000 metric tonnes, while the Union Territory of Jammu and Kashmir contributes nearly 98 per cent of the country's walnut exports [1-2]. Walnut cultivation has therefore emerged as one of the most economically important horticultural enterprises of the Himalayan region, particularly in the Kashmir Valley, where favourable agro-climatic conditions support the production of high-quality nuts.

The Union Territory of Jammu and Kashmir possesses a unique comparative advantage in walnut production because of its diverse temperate climate, fertile soils, suitable altitude, and adequate rainfall. According to the Directorate of Horticulture, Kashmir (2018-19), walnuts are cultivated over an area of approximately 85,622 ha with an annual production of 275,449 MT [3]. Among the walnut-growing districts, Kupwara occupies a strategic position as one of the leading producers in North Kashmir, where the crop is cultivated extensively under both traditional and commercial orchard systems. The district's altitudinal range, cool summers, cold winters, and evenly distributed precipitation provide ideal ecological conditions for sustained walnut production. Despite these natural advantages, walnut productivity in Jammu and Kashmir remains considerably below its attainable potential. While the average productivity is approximately 2.71 MT ha^{-1}, research and field observations indicate that yields exceeding 4.5 MT ha^{-1} are achievable under improved orchard management practices and scientific cultivation techniques. This substantial productivity gap suggests that several socio-economic, institutional, and technological constraints continue to limit the adoption of recommended production technologies.

The substantial productivity gap suggests that several socio-economic, institutional, and technological constraints continue to limit the adoption of recommended production technologies [4]. Understanding these characteristics is therefore fundamental for developing effective extension strategies and policy interventions aimed at improving

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productivity and profitability. Numerous studies have demonstrated that socio-economic attributes significantly influence farmers' knowledge levels and adoption behaviour across horticultural enterprises. Education enhances farmers' ability to access, interpret, and utilize technical information, whereas regular interaction with extension personnel and participation in training programmes improve awareness and facilitate the adoption of improved technologies [5-6]. Similarly, farm size, annual income, and farming experience have been reported to influence investment decisions and technology adoption among horticultural growers [7-9].

Several investigations conducted in different horticultural production systems have consistently reported that the majority of orchard farmers belong to older age groups, possess relatively small landholdings, and have limited access to extension services and institutional support. Kaundal [10] observed that most horticultural farmers in Himachal Pradesh were middle-aged to elderly, while Raykerl *et al.* [11] reported a predominance of older cashewnut growers in Maharashtra. Similar demographic trends have also been documented by Ashok [12], indicating the increasing ageing of the agricultural workforce in India. Studies by Moulasab [13] and Venkataramalu [14] established a positive relationship between educational level and adoption of improved cultivation and marketing practices. Likewise, Raut [15], Singh and Mankar [16] and Mahesh *et al.* [9] emphasized that fragmented landholdings and limited financial resources continue to constrain technological advancement among horticultural producers. Furthermore, Singh [17], Dhiman [18] and Wani *et al.* [6] highlighted that inadequate extension contact and poor training exposure remain major impediments to knowledge dissemination and adoption of scientific orchard management practices.

Although considerable research has examined the socio-economic characteristics of growers engaged in apple, mango, grape, orange, cashew, peach, and other horticultural crops across different regions of India, empirical information on walnut growers, particularly in Kupwara district of Jammu and Kashmir, remains extremely limited. The absence of comprehensive baseline information on the socio-economic and personal profile of walnut growers restricts evidence-based planning and weakens the formulation of location-specific extension programmes and development policies. Since the success of technological interventions largely depends on the socio-economic environment in which farmers operate, generating reliable information on these characteristics is essential for strengthening walnut production systems and improving farmers' livelihoods. Keeping these considerations in view, the present investigation was undertaken to develop a comprehensive socio-economic and personal profile of walnut growers in Kupwara district of Jammu and Kashmir using primary data collected from 110 respondents across nine major horticultural zones. The findings are expected to provide valuable insights for researchers, extension agencies, horticulture departments, and policymakers in designing targeted interventions for enhancing technology adoption, strengthening extension services, and improving the productivity and sustainability of walnut cultivation in the region.

MATERIALS AND METHODS

The present investigation was conducted during 2020-21 in Kupwara district of the Union Territory of Jammu and Kashmir, India, which was selected purposively owing to its highest area and production of walnut in North Kashmir. The district lies in the northernmost part of the Kashmir Valley and is characterized by diverse agro-climatic conditions ranging from approximately 1,200 to over 2,500 m above mean sea level, receiving an annual rainfall of about 760-900 mm with cool summers and cold winters, making it highly suitable for walnut cultivation. An ex-post facto research design was adopted for the study. Out of the fifteen horticultural zones in the district, nine zones, namely Langate, Kralgund, Kupwara, Handwara, Drugmulla, Trehgam, Vilgam, Dooniwari, and Kralpora, were selected purposively based on the maximum area under walnut cultivation. Subsequently, three villages from each selected horticultural zone were chosen purposively, resulting in a total of twenty-seven study villages. A comprehensive list of registered walnut growers was obtained from the Office of the Chief Horticulture Officer, Kupwara, which served as the sampling frame. From this list, a total sample of 110 walnut growers was selected through proportionate allocation sampling using the formula:

$$ni = (Ni / N) \times nn\_i = (N\_i/N) \setminus times\ nni = (Ni / N) \times n$$

Thereby ensuring proportional representation of respondents from each selected village. Primary data were collected through personal interviews using a well-structured and pre-tested interview schedule. The interview schedule was initially prepared in consultation with subject matter specialists, pre-tested among non-sample respondents to assess clarity, reliability, and relevance, and modified accordingly before final administration. Information was collected on respondents' socio-economic and personal characteristics, including age, education, family size, number of family members engaged in farming, primary occupation, annual income, farming experience, landholding, sources of agricultural information, extension contact, and training exposure. These variables were measured and classified into appropriate categories based on the objectives of the study. The collected data were coded, tabulated, and analyzed using standard statistical software. Descriptive statistical tools, including frequency counts and percentages, were employed to summarize the data, while simple percentage analysis and graphical presentations were used to facilitate interpretation and comparison of the findings across different variables.

RESULTS AND DISCUSSION

Age distribution

Data in (Table 1) reveal a striking age concentration among older farmers: 66.36% belonged to the old age category (>50 years), 28.18% were middle-aged (35-50 years), and merely 5.46% were young (<35 years). This demographic profile where two-thirds of practitioners are above 50 reflects a generational transition challenge in walnut cultivation. The long gestation period of walnut (8-15 years to full commercial production) renders it a relatively unattractive investment for youth seeking quick returns, particularly when competing enterprises like high-density apple offer bearing in 3-4 years. The near-absence of young farmers also means that accumulated traditional knowledge including tree selection, harvest timing, and local market linkages risks being lost without intentional transmission mechanisms. These findings are consistent with Kaundal [10], who reported average farmer age of 52 years in Himachal Pradesh horticulture, and with Raykerl *et al.* [11], who found 58% old-age dominance in cashewnut cultivation. The implications for extension programming are significant. Messages, media, and training formats must be calibrated for older, potentially less formally educated participants. Digital extension tools may have limited

reach in this population. At the same time, targeted incentive schemes subsidized grafted planting material, assured buyback arrangements are needed to draw younger farmers into walnut cultivation before the knowledge base erodes further.

Table 1 Age distribution of walnut growers in Kupwara district (N = 110)

Age category	No. of respondents	Percentage (%)
Young (< 35 years)	6	5.46
Middle (35–50 years)	31	28.18
Old (> 50 years)	73	66.36
Total	110	100.00

Education level

Overall literacy rate among respondents was 84.54%, with the modal category being middle-level education (30.00%), followed by primary level (29.10%). Only 2.72% were graduates or above, and 15.46% were illiterate. While the overall literacy rate is encouraging relative to rural Indian averages, the concentration at lower educational levels (primary + middle = 59.10% of respondents) limits the ability of growers to independently access, comprehend, and apply technical information from printed extension literature, digital platforms, or product manuals. The relatively high literacy rate compared to some other states can be attributed to J&K's historically strong emphasis on basic education and the presence of accessible educational infrastructure even in semi-urban and rural areas. Findings align with Moulasab [13], who found similar educational distributions among mango growers in Karnataka and linked higher education to better knowledge and adoption outcomes.

Table 2 Educational profile of walnut growers in Kupwara district (N = 110)

Education level	No. of respondents	Percentage (%)
Illiterate	17	15.46
Primary level	32	29.10
Middle level	33	30.00
Matric level	14	12.72
10+2 level	11	10.00
Graduate and above	3	2.72
Total	110	100.00

Table 3 Main occupation of walnut growers (N = 110)

Occupation	No. of respondents	Percentage (%)
Agriculture + Horticulture + Dairy	49	44.50
Horticulture + Agriculture	27	24.55
Horticulture + Business	17	15.45
Horticulture + Services	17	15.45
Total	110	100.00

Occupation pattern

The occupation data reflect the diversified livelihood strategies characteristic of small-farm households in the Kashmir Valley. No respondent relied exclusively on walnut cultivation for income all engaged in multiple livelihood activities. Agriculture + Horticulture + Dairy was the dominant combination (44.50%), followed by Horticulture + Agriculture (24.55%). This diversification, while reducing income risk, also means that walnut receives only partial farmer attention and management effort, contributing to sub-optimal cultivation practices. Mahesh *et al*. [9] similarly found mixed livelihood systems dominant among small farmers in Karnataka. The finding reinforces the need for extension programmes that are time-efficient and practically oriented, given farmers' limited time available for walnut management.

Annual income

An overwhelming 83.64% of respondents fell in the low annual income category (≤₹5 lakh), consistent with the predominance of small landholdings and diversified but low-productivity livelihood systems. Only 3.63% had high incomes (> ₹12 lakh). This income profile underscores the economic vulnerability of walnut farming households and the potential transformative impact of improving walnut productivity and market linkages. Given that walnut cultivation can achieve a benefit-cost ratio of 4.03 [19], the gap between actual and potential returns is substantial and is primarily explained by

poor technology adoption rather than inherent economic limitations. The findings align with Gupta *et al*. [20], who documented similar income distributions among farming households in Kashmir.

Table 4 Annual income distribution of walnut growers (N = 110)

Income category	No. of respondents	Percentage (%)
Low (up to ₹5 lakh)	92	83.64
Medium (₹5.01–12 lakh)	14	12.73
High (₹12.01–25 lakh)	4	3.63
Total	110	100.00

Table 5 Family size and farming participation of walnut growers (N = 110)

Family size	Frequency	Percent	Members in farming (Category: %)
Small (≤8 members)	61	55.45	Small (≤3): 90.00%
Medium (9–11 members)	33	30.00	Medium (4–6): 9.18%
Large (12–15 members)	16	14.55	Large (7–8): 1.82%

Family size and members associated with farming

Majority of respondents (55.45%) had small families (≤8 members), reflecting the nuclear family trend in contemporary rural J&K, consistent with government policy promoting small families and improving household economic status [21]. Critically, 90.00% of respondents reported that only up to three family members were associated with farming activities, indicating highly limited on-farm labour availability for intensive cultivation practices. This labour constraint partially explains the low adoption of labor-intensive practices such as grafting, training/pruning, and manure application.

Table 6 Farming experience distribution of walnut growers (N = 110)

Experience category	No. of respondents	Percentage (%)
Low (<20 years)	37	33.64
Medium (21–30 years)	47	42.72
High (31–40 years)	26	23.64
Total	110	100.00

Farm experience

Medium farming experience (21-30 years) was dominant (42.72%), followed by low experience (33.64%) and high experience (31-40 years: 23.64%). The average experience of roughly 25 years reflects the perennial, inter-generational nature of walnut cultivation in the region. This level of experiential knowledge is an important asset for extension programmes, which can build on farmers' existing tacit knowledge while introducing evidence-based improvements to traditional practices. The results align with Bheemappa [22] and Dhote *et al*. [23], who found medium-level experience dominant in their studies.

Table 7 Landholding distribution of walnut growers (N = 110)

Landholding category	No. of respondents	Percentage (%)
Small (< 1 ha)	75	68.19
Medium (1–2 ha)	28	25.45
Large (2–4 ha)	7	6.36
Total	110	100.00

Landholding size

The predominance of small landholdings (<1 ha: 68.19%) reflects the historic fragmentation of agricultural land in the Kashmir Valley. Average landholding in J&K is approximately 0.6 ha, among the smallest in India. This structural constraint severely limits farmers' ability to establish high-density walnut orchards, invest in mechanization, or benefit from economies of scale. Only 6.36% possessed large landholdings (2-4 ha) suitable for commercial walnut orchards. Girish *et al*. [24], documented similar small landholding dominance in Karnataka sericulture-dairy farming. The implication for policy is the need for collective action mechanisms cooperative orchards, FPO-based land pooling to overcome the landholding fragmentation constraint.

Table 8 Sources of information utilization by walnut growers (N = 110)

Information source level	No. of Respondents	Percentage (%)
Low	42	38.18
Medium	61	55.46
High	7	6.36
Total	110	100.00

Sources of information

Information source utilization was predominantly medium (55.46%), followed by low (38.18%), and only 6.36% reported high utilization of information sources. The predominance of medium-level information access, combined with the very low extension contact (Table 9), suggests that farmers are primarily relying on informal peer networks and personal observation rather than institutional extension channels. Singh and Sharma [25] similarly found information source utilization levels significantly associated with technology adoption behaviour among farmers in arid zones of Rajasthan. Venkataramalu [14] reported that 41.67% of chilli growers read newspapers regularly, while 22.5% possessed radios indicating that informal media exposure can be a significant but currently under-utilized channel for walnut technology dissemination in Kupwara.

Table 9 Extension contact and training exposure of walnut growers (N = 110)

Variable	Category	Frequency	Percentage (%)
Extension Contacts	Low	91	82.73
	Medium	12	10.91
	High	7	6.36
Training Exposure	No training attended	76	69.01
	At least one training	34	30.09

Extension contacts and training exposure

The most striking and policy-relevant finding of the entire socio-economic profile is the near-universal absence of meaningful extension contact: 82.73% of respondents had low extension contacts, and only 6.36% reported high-level contact with extension workers, KVKs, or subject matter specialists. Simultaneously, 69.01% had never attended any training programme related to walnut cultivation. These two figures must be considered in tandem: they confirm that the knowledge-transfer system between agricultural research institutions and walnut farming households is fundamentally broken in Kupwara district. Nagaraj *et al*. [5] identified the non-availability of extension workers during farmers' peak need periods as the primary cause of low extension contact in Karnataka a diagnosis likely applicable to J&K's thin extension staff-to-farmer ratios. The correlation between extension contacts and knowledge levels documented by Wani *et al*. [6] for apple growers in Kashmir Valley, and confirmed by the present study for walnut growers, provides strong justification for urgent investment in field-level extension capacity. The finding that 30.09% of respondents had attended at least one training while low provides a nucleus of trained farmers who can serve as farmer-to-farmer extension agents (FFS facilitators) if systematically engaged.

Table 10 Consolidated socio-economic and personal profile of walnut growers in Kupwara district (N = 110)

Variable	Dominant category	Frequency	Percent (%) of total
Age	Old (> 50 years)	73	66.36
Education	Middle level	33	30.00
Occupation	Agri + Horticulture + Dairy	49	44.50
Annual income	Low (≤ ₹5 lakh)	92	83.64
Family size	Small (≤ 8 members)	61	55.45
Farming members	Small (≤ 3 members)	99	90.00
Farm experience	Medium (21–30 years)	47	42.72
Landholding	Small (< 1 ha)	75	68.19
Information sources	Medium level	61	55.46
Extension contacts	Low	91	82.73
Training exposure	No training	76	69.01

Consolidated socio-economic profile

The consolidated profile (Table 10) presents a coherent picture of the walnut grower in Kupwara: an older, literate male farmer with middle-school education, small landholding (<1 ha), moderate farming experience, low annual income, dependent on mixed agriculture-horticulture-dairy livelihood, with near-absent contact with extension services and no training exposure. This profile defines the target audience for extension and development programmes, and should inform communication strategy, media choice, content design, and delivery mechanisms for all walnut improvement initiatives in the district.

CONCLUSION

The present study demonstrates that walnut cultivation in Kupwara district is predominantly practiced by an ageing farming population operating under small and fragmented landholdings, with limited family labour, weak extension linkages, and inadequate access to formal training programmes. Although the majority of growers are literate, their educational attainment is largely confined to the primary and middle school levels, emphasizing the need for simple, practical, and participatory extension approaches. The findings further reveal that education, landholding size, extension contact, and training exposure significantly influence the knowledge and adoption of recommended walnut production technologies, highlighting these factors as critical determinants of technological advancement in the sector. The low level of institutional outreach and training coverage represents a major constraint to improving orchard productivity and farm profitability. Therefore, strengthening the horticultural extension system through regular capacity-building programmes, establishment of Farmer Field Schools, development of locally relevant audio-visual extension materials, and deployment of dedicated walnut extension personnel is essential. Simultaneously, encouraging youth participation through entrepreneurship support, subsidized planting material, and financial incentives, along with promoting Farmer Producer Organizations (FPOs) to overcome the challenges of fragmented landholdings, can substantially enhance technology dissemination, collective marketing, mechanization, and value addition. These interventions will not only improve the adoption of scientific walnut cultivation practices but also contribute to the sustainable growth and competitiveness of the walnut industry in Jammu and Kashmir.

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