Review Article

A Review on Production and Marketing of Betel Vine

Abstract

Betel Vine is grown widely across the country, playing an essential role in social, religious, and cultural activities and significantly contributing to the economy through employment and foreign exchange. This review article on Betel Vine, a significant economic and heritage crop in India, employs a systematic literature review to analyze and synthesize existing research on its production and marketing. Betel Vine, with its heart-shaped leaves known as "Paan," provides substantial employment and foreign exchange. The review identifies that the marketing of Betel leaves faces unique challenges due to their perishable nature and specific regional preferences. The systematic literature review provides a comprehensive understanding of the trends, challenges, and opportunities in Betel Vine production and marketing. Key findings indicate significant economic contributions from states like Karnataka, Tamil Nadu, and West Bengal. The review also identifies research gaps, such as the need for improved marketing strategies and better management of production challenges. Future research should focus on developing value-added products, enhancing marketing efficiency, and addressing health concerns associated with Betel chewing. The conceptual framework guides the review process, synthesizing diverse literature to facilitate a structured and comprehensive analysis. The outcomes suggest that effective strategies for enhancing the Betel Vine industry should address these identified gaps and leverage opportunities to boost economic growth and support rural communities.

***Keywords**: Betel Vine; Production; Marketing; Comprehensive review.*

UNDER PEER REVIEW

1. Introduction

Betel Vine, scientifically known as *Piper betel Linn*, is a significant economic and heritage crop in India (Kar *et al.,* 2021). Part of the Piperaceae family, its deep green, heart-shaped leaves are commonly referred to as "Paan" (Tutu *et al.,* 2022).Betel vine is a dioecious, evergreen, perennial creeper with glossy heart-shaped leaves (Bar *et al.,* 2020).Betel Vine, an evergreen and perennial plant, has a long history in India, dating back to

the time of the Mahabharata. Offering betel leaves, or 'Bida,' symbolizes mutual love and friendship and is integral to Hindu ceremonies and social gatherings (Kumar *et al.*, 2023).

Betel Vine farming provides year-round employment to agricultural laborers, supporting around 20 million people involved in its production, processing, handling, shipping, and marketing. The plant is a climber with heart-shaped leaves that come in pungent and non-pungent varieties. The leaves are shiny and smooth, and range from light to dark green. Male spikes are flat, while female spikes are cylindrical, blooming primarily in East India's humid climate (Tutu *et al.*, 2022).

Betel leaves are highly nutritious, containing significant vitamins and minerals, and are known for their medicinal properties. Rich in vitamins B, C, and carotene, the leaves aid digestion, freshen breath, and are beneficial to the respiratory system (Gupta *et al.*, 2023) They are used in Ayurvedic medicine for various treatments, including as an antibacterial and for respiratory issues. Despite concerns about its link to mouth cancer when chewed with tobacco, moderate use of betel leaves is considered harmless by many educated Indians.

Globally, Betel Vine is believed to have originated in Central and Eastern Malaysia and is mainly cultivated in Southeast Asian countries, including India, Bangladesh, Sri Lanka, Malaysia, Thailand, and the Philippines (Singh *et al.*, 2020). In India, there are 125 to 150 cultivars of Betel Vine, a significant cash crop grown on around 55,000 acres with an annual production value of approximately Rs. 9000 million. Major producing states include Karnataka, Tamil Nadu, West Bengal, and Assam.

Table 1. Contribution percentage of Betel Vine in India

S. No	State	Contribution (Percent)
1	Karnataka	18
2	Tamil Nadu	11
3	Odisha	10
4	Bihar	7
5	Assam & Bengal	6

Source: (Suryasnata *et al.*, 2016)

UNDER PEER REVIEW

In Tamil Nadu, Betel Vine is a crucial commercial crop for small and marginal farmers. Leading districts in production include Namakkal, Thanjavur, Salem, Cuddalore, Trichy, and Theni, with Namakkal being the top producer. Over the past seven years, the average productivity has been 28 tonnes per hectare, with fluctuations in cultivation area. The primary varieties of Betel Vine grown in India include Desawari, Bangla, Kapoori, Meetha, and Sanchi, with regional preferences for different cultivars.

The marketing of betel leaves presents unique challenges due to their perishable nature and the specific consumer preferences in different regions. This review will analyze the complex supply chain involved in betel leaf trade, from local markets to international exports. Additionally, it will discuss the economic impact of betel vine cultivation on rural communities and examine the potential for value-added products derived from betel leaves. The article will also address the health concerns associated with betel chewing and how these issues affect market demand and regulatory policies in various countries. Further detailed reviews of the value chain of Betel Vine will be discussed in the upcoming article sections.

2. Methodology

The primary method used is a systematic literature review, involving an extensive search and examination of peer-reviewed academic journals, government reports, and industry studies related to Betel Vine production and marketing. This approach ensures the inclusion of diverse perspectives and comprehensive data.

By employing a systematic literature review and incorporating various research techniques, this review aims to provide a detailed understanding of Betel Vine production and marketing. The methodology enables the identification of significant trends, challenges, and opportunities, contributing to the development of effective strategies for enhancing the Betel Vine industry.

The review process is guided by a conceptual framework that outlines the key components of Betel Vine production and marketing (Table 2). This framework serves as an organizational tool for synthesizing the diverse literature, facilitating a structured and comprehensive review.

Table 2. Conceptual framework

Review of Concepts	Review of Past Studies

UNDER PEER REVIEW

Production & Functions Cost and Return Market Marketing Marketing Cost Marketing Margin Marketing Efficiency Marketing Channel Price Spread	Economics of betel vine cultivation Research on marketing channels and marketing efficiency Constraints in Betel Vine Cultivation

3. Review of Concepts

3.1. Production & Functions

Koutsoyiannis (2003) and Hewings (2020) defined production as a combination of inputs required to produce one unit of output. Sharma (2014) elaborated that production involves techniques and processes for converting tangible and intangible inputs into goods and services. Thulasriram and Sivaraj (2020) described production as converting inputs into outputs over time. This study defines production as using inputs like seeds, fertilizer, and insecticides to create or modify outputs.

3.2. Cost and Return

Marglin (2017) and Rutledge andMérel, (2023)discussed the costs incurred for hiring fixed factors of production that don't change with output levels.Thamban*et al.* (2006) defined total returns or gross returns as the combined value of the main product and its by-products.

3.3. Market

Acharya and Agarwal (2004) described the market as a social entity facilitating the exchange of goods between traders and purchasers. Barkley (2016) explained the market as a venue or method enabling buyers and sellers to exchange products and services.

3.4. Marketing

Kotler (1998) defined marketing as a management and social process where individuals obtain what they desire by producing and exchanging items with others. Armstrong and Murlis (2007) viewed marketing as managing relationships with successful

UNDER PEER REVIEW

consumers. The American Marketing Association (2013) described marketing as an activity, group of entities, and process creating, connecting, distributing, and exchanging offerings to value partners, consumers, suppliers, and society. This study defines marketing as the plan, promotion, pricing, and distribution of betel leaf by farmers and middlemen.

3.5. Marketing Cost

Nawadkar*et al.* (1995) defined marketing costs as expenses like market rent, loading and unloading fees, transportation, and packing. Naphade and Tingre (2008) and Dutta *et al.*, (2022) included sorting, grading, packing, and transportation in marketing costs. This study refers to marketing costs as expenses incurred in selling betel vine to consumers.

3.6. Marketing Margin

Kerur et al. (1998) defined marketing margins as the difference between the net price received by farmers and the price paid by consumers. Venkatesa Palanichamy et al . (2024) described it as the revenue generated in the marketing of betel vine. Shankar et al. (2008) and *Rahayuet al.*, (2021) defined marketing margin as the difference between a product's unit sale price and its overall manufacturing and distribution costs. In this study, the marketing margin is the revenue generated by middlemen in distributing betel vine leaves from producers to consumers.

3.7. Marketing Efficiency

Radha and Prasad (2001) used the Shepherd index analysis to estimate the marketing efficiency of vegetables. Barakade*et al*. (2011) and Puspaningrum (2020)described marketing efficiency as a measure of the effectiveness of the marketing strategy used. This study defines marketing efficiency as the ability to move a product from the producer to the end user at a low-cost relative to the producer's share price.

3.8. Marketing Channel

Verma (2004) described a marketing channel as a chain of intermediaries facilitating the transportation of produce from producers to final customers. Coughlan (2007) described it as a collection of interdependent businesses making goods or services available for use or consumption. Palanichamy*et al.* (2024) defined marketing channels as exchange relationships adding value to customers during the purchase, use, and disposal of goods and services. In

UNDER PEER REVIEW

this study, the marketing channel refers to the transportation of betel vine from producers to final consumers.

3.9. Price Spread

Acharya and Agarwal (2004) defined the price spread as the difference between the price consumers pay and the price farmers receive, known as the marketing gross margin. Baba et al. (2010) found an inverse relationship between the producers' share and the number of intermediaries by analyzing the price spread of vegetables in different marketing channels. Subhashree *et al.* (2022) and Kopp and Sexton (2021)defined the price spread as the percentage-based difference between the producer's price and the final consumer's price. In this study, the price spread is the gap between the price the end user pays and the price the growers receive.

4. Review of Previous Studies

4.1. Economics of Betel Vine Cultivation

Srivastava and Prasad (1996) studied betel vine cultivation in Bihar, noting high production and marketing risks despite significant annual net income per hectare. Patil (1996) found high initial investment and marketing costs in Sangli, Maharashtra, limiting land use for betel vine. Chandra and Sagar (2004) observed improved livelihood security from betel vine cultivation in Sundarbans. Medda *et al.* (2011) identified superior betel vine cultivars in West Bengal based on growth and yield traits. Halder (2013) found high labor intensity in West Bengal's Ramnagar, with significant annual net income from betel vine cultivation. Suryanarayana *et al.* (2014) noted consistent productivity and changing cultivation areas for betel vine in Karnataka. Tholkappian (2014) compared higher returns from organic betel leaf farming to conventional methods in Tamil Nadu. Mandal and Mandal (2016) found betel vine cultivation financially viable in the research area with favorable financial metrics. Venyo and Sharma (2018) studied potato cultivation economics in Nagaland, highlighting a favorable benefit-cost ratio. Anupam *et al.* (2022) evaluated betel vine farming knowledge in Karnataka, finding moderate expertise among farmers.Dev *et al.*, (2023) found that the initial first year the cost incurred by respondents is more because of additional cost incurred on

UNDER PEER REVIEW

barojconstruction. Net return was calculated by subtracting total costs from total returns; in the following years it gets amplified with the increase in economic life of the crop.

4.2. Research on Marketing Channels and Marketing Efficiency

Lahiri (1990) highlighted the unorganized sector's dominance in betel leaf marketing in Midnapur. Das *et al.* (1995) reported significant betel leaf production in West Bengal, with substantial exports. Srivastava and Prasad (1996) attributed price differences between consumers and farmers to market intermediaries. Pradhan and Rao (1999) described Piper betel cultivation practices and yield patterns. Varadarajan and Bose (2005) identified effective marketing channels for betel leaf in Tamil Nadu, favoring producer-wholesaler-retailer-consumer chains. Sajjad *et al.* (2008) found lower producer margins in certain rice marketing channels in Malakand. Thakare *et al.* (2011) noted high marketing efficiency in cowpea direct sales channels. Hasan and Khalequzzaman (2017) analyzed garlic marketing channels in Bangladesh, highlighting the importance of retailer margins. Bagde*et al.* (2017) calculated marketing effectiveness for betel leaves in Amravati. Yesdhanulla and Aparna (2018) found high producer shares in certain marketing channels. Pavithra *et al.* (2018) compared marketing costs and prices in different talukas of Tumkur district.Dev *et al*., (2023) identified that the most efficient marketing channel of the study area (odisha) was Producer- Wholesaler- Retailer – Consumer.

4.3. Constraints in Betel Vine Cultivation

Chandra and Sagar (2004) and *Mahfuza et al., (2023)* identified price fluctuation and lack of market regulation as major constraints for betel vine growers in the Sundarbans and RajshahiDistricts of Bangladesh respectively. Lashari and Khushk (2004) noted high initial costs and poor management in coastal betel leaf farming. Shashikant et al. (2011) highlighted labor and pest issues in red gram production in Karnataka. Guruswamy and Gurunathan (2012) found manpower shortage to be a significant barrier to organic farming in Tamil Nadu. Kaleeshwari and Sridhar (2013) identified price fluctuations and marketing issues in Tamil Nadu's betel vine cultivation. Mandal and Mandal (2016) pointed to disease and water availability as major challenges. Hirala and Debabrata (2017) listed insect infestations and inadequate pricing as key issues for betel vine growers in West Bengal. Mehazabeen*et al.* (2021) emphasized electricity and price volatility as primary constraints for banana farmers in Andhra Pradesh. Kumar *et al.* (2021) identified pest incidence and price fluctuations as major

UNDER PEER REVIEW

constraints for betel vine cultivation in Bihar.Mukherjee and Kumar (2024) found that four major production constraints are unavailability of timely credit, yield loss due to climatic variability, high fixed Cost (mainly for the establishment of orchard), lack of proper training and extension activities and major marketing constraints are higher degree of price fluctuation, middlemen involvement, lack of export services, lack of definite price policy.Dev *et al.*, (2023) identified that disease severity and price fluctuation are the major constraints faced by growers during production and marketing respectively.

5. Conclusion

This review highlights the significant economic and cultural role of Betel Vine (Piper betel Linn) in India. As an essential crop deeply rooted in the country's heritage, Betel Vine contributes substantially to employment and foreign exchange. Its cultivation provides year-round employment to millions, directly benefiting the livelihood of around 20 million people involved in its production, processing, handling, shipping, and marketing. The review also underscores the nutritional and medicinal benefits of Betel Vine, emphasizing its rich vitamin content and applications in Ayurvedic medicine. Despite concerns about its link to mouth cancer when chewed with tobacco, moderate consumption of betel leaves is generally considered harmless by educated Indians.

The review identifies several key factors influencing Betel Vine production, including the types of cultivars grown, the regions of cultivation, and the specific agricultural practices employed. Furthermore, it addresses the marketing challenges associated with Betel Vine due to its perishable nature and regional consumer preferences. The supply chain analysis reveals the complex processes involved in the local and international trade of betel leaves, highlighting the economic impact on rural communities and the potential for developing value-added products.

Despite the extensive literature on Betel Vine, there are notable research gaps that warrant further investigation. Future studies should focus on exploring innovative marketing strategies to enhance the distribution and sale of betel leaves, particularly in international markets. Additionally, research should examine the potential for developing value-added products from Betel Vine to increase its market appeal and economic value. There is also a need for more in-depth studies on the health implications of Betel Vine consumption, particularly in relation to its association with mouth cancer. Such research could inform

UNDER PEER REVIEW

regulatory policies and consumer education programs to promote safer consumption practices.

In conclusion, while the existing body of research provides a comprehensive understanding of Betel Vine production and marketing, addressing the identified research gaps could significantly enhance the economic viability and sustainability of Betel Vine cultivation. By focusing on innovative marketing strategies, value-added product development, and health impact studies, future research can contribute to the growth and prosperity of the Betel Vine industry, benefiting millions of farmers and consumers alike.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

Option 2:

Author(s) hereby declare that generative AI technologies such as Large Language Models, etc have been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology

Details of the AI usage are given below:

1.

2.

3.

UNDER PEER REVIEW

References

Acharya, S, and N Agarwal. 2004. "Agriculture marketing in India". In Rawat Publishing New Delhi.

Armstrong, M, and H Murlis. 2007. Reward Management. In A handbook of remuneration strategy and practice:Kogan Page Publishers.

Baba, S, M Wani, S Wani, and S Yousuf. 2010. "Marketed surplus and price spread of vegetables in Kashmir Valley." Agricultural Economics Research Review 23 (347-2016-17025):115-128.

Bagde, N, NV Shende, AV Kale, and PV Shende. 2017. "Supply Chain Management of Betel leaf." Contemporary Res., in India 7 (1):2231-2137.

Bar, A., Pariari, A., Biswas, P., Karmakar, M., & Saha, G. (2020). Comparative studies on leaf yield, quality and economy of three cultivars of Betel vine (Piper betle L.) as Influenced by Integrated nitrogen management. Int. J. Curr. Microbiol. App. Sci, 9(11), 3137-3147.

Barakade, A, T Lokhande, and G Todkari. 2011. "Economics of onion cultivation and its marketing pattern in Satara district of Maharashtra." International journal of agricultural sciences 3 (3):110.

Barkley, A. 2016. "Principles of Agricultural economics." Routledge.

Chandra, G, and R Sagar. 2004. "Harvesting green gold: Cultivation of betelvine in Sundarban." Indian Farmers Digest 37 (3):5-13.

Coughlan, A. 2007. "Marketing channels." Pearson Education India.

Das, KK, B B.N., and MH Ali. 1995. "Economic Efficiency of Betel Leaf Marketing System in West Bengal." Indian Journal of Agricultural Marketing:49.

Dey, A., Sharma, A., Gautam, Y., Swain, K. G., & Singh, H. P. (2022). Production and Marketing of Betel Leaf in Odisha: An Economic Analysis. Asian Journal of Agricultural Extension, Economics & Sociology, 40(12), 1-8.

Dutta, S. K., Dutta, P., Majumdar, S., Saikia, G., Zhimomi, L. K., &TechiYajoTara. (2022). Enhancing Bio-Diversity Conservation through Integrated Horticultural Development Strategies: A Case Study of Kiwi Fruits in Arunachal Pradesh of North-East India. In North-East Research Conclave (pp. 249-269). Singapore: Springer Nature Singapore.

Gupta, R. K., Guha, P., & Srivastav, P. P. (2023). Phytochemical and biological studies of betel leaf (Piper betle L.): Review on paradigm and its potential benefits in human health. Acta Ecologica Sinica, 43(5), 721-732.

Guruswamy, K, and KB Gurunathan. 2012. "A study on factor affecting growth of organic farming." European Journal of social Sciences 30 (2):247-253.

Halder, S. "A Study of Betel Vine Cultivation and Its Market Crisis in Two Selected Blocks of Ramnagar-1 and Ramnagar-2, Purba Medinipur, West Bengal."

UNDER PEER REVIEW

Hasan, MK, and K Khalequzzaman. 2017. "Marketing efficiency and value chain analysis: the case of garlic crop in Bangladesh." American Journal of Trade and policy 4 (1):7-18.

Hewings, G. J. (2020). Regional input-output analysis.

Hirala, J, and B Debabrata. 2017. "Problems faced by farmers in betelvine cultivation in Moyna block of West Bengal." Journal of Interacademicia 21 (1):68-83.

Kaleeshwari, V, and T Sridhar. 2013. "A study on betel vine cultivation and market crisis in Karur district." Indian Journal of Applied Research 3(10):1-3

Kar, R. K., Saha, P., Upadhyaya, K., & Mohanty, S. K. (2021). Betel vine (Piper betel L.): The neglected green gold claims livelihood and health security in rural India. In National Seminar On Management Of Natural Resources For Sustainable Development: Challenges And Opportunities (Vol. 167, p. 176).

Kerur, K, HB Banakar, S Murthy, and M Dodmani. 1998. "Efficiency of Sunflower Marketing in North Karnataka." The Bihar Journal of Agricultural Marketing 38 (2):36-41.

Kopp, T., & Sexton, R. J. (2021). Farmers, traders, and processors: buyer market power and double marginalization in Indonesia. American Journal of Agricultural Economics, 103(2), 543-568.

Koter, P. 1998. "Marketing Management,Analysis,Planning,Implementation and Control.New Delhi:Prentice Hall of India Private Ltd.".

Koutsoyiannis, A. 2003. "Modern Microeconomics." Hong Kong:Macmillan Press:1985 & 2003

Kumar, A., Yadav, S. K., Jangid, R., Gupta, A. K., Kumar, A., Kumar, D., & Shankar, K. (2023). Challenges and Economic Feasibility of Betelvine Cultivation in Uttar Pradesh. International Journal of Economic Plants, 10(May, 2), 160-169.

Kumar, B, S Rahaman, M Wadhwani, and N Kumari. 2021. "Constraints and Scope of Betel Leaf Production in Bihar." Economic Affairs 66 (4):619-621.

Lahiri, D. 1990. "Seasonal Variation in Arrival and Prices of Betel Leaf in Midnapur District of West Bengal." Indian Journal of Agricultural Marketing 4(2):184-188.

Lashari, MI, and AM Khushk. 2004. "Study on betel leaf cultivation in coastral area of Sindh:An economic analysis." Sarhad Journal of Agric., 20 (2):313-318.

Mahfuza, E. J., Ahamed, M. S., & Hassan, M. F. (2023). Impact of Betel Leaf Farming on Livelihood and Income Generation in Some Selected Areas of the Rajshahi District of Bangladesh. South Asian Journal of Social Studies and Economics, 20(3), 250-259.

UNDER PEER REVIEW

Mandal, A, and S Mandal. 2016. "Financial feasibility and constraints of Betel vine cultivation in coastal areas of Sundarbans, West Bengal."

Marglin, S. A. (2017). Wages, prices, and employment in a Keynesian long run. Review of Keynesian Economics, 5(3), 360-425.

Medda, P, S Chakraborty, and P Bhattacharya. 2011. "Studies on growth and yield of different betelvine cultivars under Terai zone of West Bengal." Journal of Crop and Weed 7 (2):148-151.

Mehazabeen, A, G Srinivasan, and S Radhakrishnan. 2021. "A constraint analysis on production and marketing of banana in Andhra Pradesh, India." Plant Arch 21 (Suppliment-1):2215-2216.

Mukherjee, S., & Kumar, S. (2024). Evaluation of the Constraints Perceived by Farmers in Production and Marketing of Betel Vines in Bankura District of West Bengal, India. Journal of Scientific Research and Reports, 30(7), 571-583.

Naphade, S, and A Tingre. 2008. "Economics of Production and Marketing of Guava in Buldhana District of Maharashtra." Indian Journal of Agricultural Marketing 22 (2):32-41.

Nawadkar, D, S Shete, S Nawale, and S Khemnar. 1995. "An Economic Analysis of Tomato Marketing in Unorganised Sector." The Bihar Journal of Agricultural Marketing 3 (3):280-283.

Palanichamy N, V., Kumar K, D., Kalpana, M., & Kumar M, S. (2024). A Study on Price Spread Analysis and Marketing Efficiency of Ragi in Krishnagiri and Dharmapuri Districts of Tamil Nadu, India. Asian Research Journal of Agriculture, 17(2), 249-258.

Patil, BV. 1996. "Management of betelvine cultivation in Sangli district Maharashtra."

Pavithra, H, T Gajanana, and M Satishkumar. 2018. "Marketing of betel leaves in Tumkur District, Karnataka-Economic analysis." Indian Journal of Agricultural Marketing 32 (2):1-8.

Pradhan, N, and KS Rao. 1999. "Marketing of Betel Leaves;A Case Study of Golanthra Area in Orissa." Indian Journal of Agricultural Marketing:116.

Puspaningrum, A. (2020). Market orientation, competitive advantage and marketing performance of small medium enterprises (SMEs). Journal of Economics, Business, and Accountancy Ventura, 23(1), 19-27.

UNDER PEER REVIEW

Radha, Y, and Y Prasad. 2001. "Economics of Production and Marketing of Vegetables in KarimnagarDistrict.Andhra Pradesh." Indian Journal of Agricultural Marketing 15 (1):55-61.

Rahayu, H. S. P., Dewi, M., & Abid, M. (2021). Analysis of marketing margins and farmers' shares on corn in Sigi Regency, Central Sulawesi, Indonesia.

Rutledge, Z., &Mérel, P. (2023). Farm labor supply and fruit and vegetable production. American Journal of Agricultural Economics, 105(2), 644-673.

Sajjad, M, M Khan, D Sardar-ul-Mulk, and M Nazir. 2008. "An Investigation into Marketing Channels and Margins of Rice in District Malakand." Sarhad J, Agric 24.

Shankar, B, M Devajar, and R Rangaswamy. 2008. "Marketing of grapes in Karnataka:A case of bangalore and bijapur district." Indian Journal of Marketing 38 (2).

Sharma, M. 2014. "Economics analysis of commercial flower cultivation in Sirmaur district of Himachal Pradesh." Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya Palampur.

Shashikant, V, I Prabhakar, and B Manjunatha. 2011. "Constraints in Production and Marketing of Redgram in Gulbarga District of Karnataka." Journal of Community Mobilization and Sustainable Development 6 (2):202-204.

Singh, A., Dikshit, R., & Chaturvedi, P. (2020). Betel nut use: the South Asian story. Substance use & misuse, 55(9), 1545-1551.

Srivastava, GC, and B Prasad. 1996. "An Economic Analysis of Marketing of Betel Vine in Bihar." The Bihar Journal Agricultural Marketing 6 (2):157-165.

Subhashree, M., Palanichamy, N. V., Prahadeeswaran, M., &Paramaeswari, E. (2022). Price Spread Analysis of Castor in Salem and Namakkal District. Asian Journal of Agricultural Extension, Economics & Sociology, 40(10), 742-748.

Suryanarayana, M, K Vasantha, B Hima, and A Lokesha. 2014. "Status of Betelvine cultivation in Karnataka." Conference paper. Section of Medicinal Crops, Indian Institute of Horticultural Research, Bangalore.

Suryasnata, D, R parida, Is Sandeep, and S Nayak. 2016. "Biotechnological Intervention in Betel vine :A review and recent advances and future prospects "Asian pacific journal of tropical medicine:1-9.

Thakare, SS, SA Naphade, and AK Vitonde. 2011. "Economic analysis of production and marketing of cowpea." Indian Journal Agricultural Marketing 25 (2):67-76.

UNDER PEER REVIEW

Thamban, C, C Sairam, J vasanthakumar, and S Arulraj. 2006. "Economic Analysis of Coconut Cultivation under Micro-Irrigation." Agricultural Situation In India 63 (7):425.

Tholkappian, C. 2014. "Production Function and Returns Organic and Conventional Betel Leaf Cultivation:A Case Study of Thanjavur District in Thanjavur District in Tamil Nadu." International Journal Recent Research and Applied Studies 5(3):2349-4891.

Thulasriram, R, and P Sivaraj. 2020. "An economic analysis of production and marketing of jasmine in madurai district of tamilnadu." International Journal Of Farm Sciences 10 (2):60-67.

Tutu, A. K. S., Guddun, S. S. K., Kumari, P., & Dey, S. K. D. (2022). An overview of Betel vine (Piper betle L.): Nutritional, pharmacological and economical promising natural reservoir. Advances in Horticultural Science, 36(1), 63-80.

Varadarajan, R, and A Bose. 2005. "Marketing Channels,MarketingCost,Price Spread and Marketing Efficiency of Betel Leaf." Indian Journal Agricultural Marketing 19 (3):28-38.

Venkatesa Palanichamy, N., Kalpana, M., Sathya, K. N., & Aruna Prabha, S. (2024). Betel Vine Marketing in Tamil Nadu, India: Price Spread Analysis. Asian Journal of Current Research, 9(2), 163-172.

Venyo, V, and A Sharma. 2018. "Economics and Constraint of Potato crop in Kohima District of Nagaland." AJ Multidisciplinary Adv. Res 7 (1):75-80.

Verma, A. 2004. "Economic analysis of production,resource -use efficiency ,marketing andconstraints of garlic in Indore District of Madhya Pradesh." Agricultural Marketing 47 (2):37-48.

Yesdhanulla, S, and B Aparna. 2018. "Marketing channels and price spread of tomato in Chittoor district of Andhra Pradesh." Journal of Pharmacognosy and Phytochemistry 7 (2):873-876.

UNDER PEER REVIEW