ISSN Print: 2664-844X
ISSN Online: 2664-8458
NAAS Rating (2025): 4.97
IJAFS 2025; 7(8): 507-513
www.agriculturaljournals.com
Received: 03-06-2025
Accepted: 05-07-2025

Aravind M
PG Scholar, Department of Agricultural Extension, Institute of Agriculture Research and Technology, NMV University, Muthuramalingapuram, Virudhunagar district, Tamil Nadu, India

Dr. Israel Thomas M
Professor, Department of Agricultural Extension, Krishi Vigyan Kendra, Palakkad, Pattambi, Kerala, India

Dr. Archana AS
Assistant Professor, Department of Agricultural Extension, Institute of Agriculture Research and Technology, NMV University, Muthuramalingapuram, Virudhunagar district, Tamil Nadu, India

Dr. Ram sundar. T
Assistant Professor, Department of Agricultural Extension Education, Institute Agriculture Research and Technology, NMV University, Muthuaramalingapuram, Virudhunagar district, Tamil Nadu, India

Dr.Vaidheki .M
Assistant Professor, Department of Agricultural Statistics, Institute Agriculture Research and Technology, NMV University, Muthuaramalingapuram, Virudhunagar district, Tamil Nadu, India

Corresponding Author:
Aravind M
PG Scholar, Department of Agricultural Extension, Institute of Agriculture Research and Technology, NMV University, Muthuramalingapuram, Virudhunagar district, Tamil Nadu, India

Comparative study on the pre and post training evaluation of Palmyra farmers FPO's in Ramanathapuram district

Aravind M, Israel Thomas M, Archana AS, Ram Sundar T and Vaidheki M

DOI: https://www.doi.org/10.33545/2664844X.2025.v7.i8g.650

Abstract
This study assesses the impact of a structured training program on value addition, marketing strategies, and technology adoption among Palmyra growers associated with Farmer Producer Organizations (FPOs) in Kadaladi block, Ramanathapuram district, Tamil Nadu. Although the region is rich in Palmyra resources (*Borassus flabellifer*), the full economic potential remains underutilized due to conventional practices, limited market access, and low entrepreneurial capacity. To bridge these gaps, a training program was introduced to enhance farmers' skills in value-added processing, marketing, and export readiness of Palmyra products such as palm syrup and jaggery. A quasi-experimental research design was employed, involving 30 FPO-affiliated farmers selected through multistage sampling. Pre- and post-training evaluations were conducted using structured interview schedules to assess changes in knowledge, production behavior, and marketing practices. Data analysis was performed using SPSS, applying paired t-tests, Pearson's correlation, and descriptive statistics. Results revealed a significant increase in knowledge and practice levels, with the mean score rising from 34.2 to 57.3 ($t = -18.299$, $p < 0.0000000001162$). Correlation analysis showed that experience and age were positively associated with post-training performance, while gender showed a moderate negative correlation, suggesting the importance of gender-sensitive approaches. Among participants, 97% gained knowledge on value addition, 90% showed interest in starting Palmyra-based enterprises, and 87% felt confident about meeting export standards. The study concludes that structured, FPO-based training programs can significantly enhance farmers' technical and entrepreneurial capabilities. It recommends the wider adoption of localized, visually supported training models to empower rural communities and promote sustainable development in other Palmyra-growing regions.

Keywords: Palmyra farmers, farmer producer organizations (FPOs), pre and post training evaluation, value addition, technology adoption, export and marketing of Palmyra products

IntroductionM

Palmyra (*Borassus flabellifer*) is an important tree crop in South India, particularly in Tamil Nadu, where it provides a vital source of livelihood for rural communities. Among the many products derived from Palmyra, palm syrup has recently gained global recognition due to its nutritional value, organic purity, and natural sweetening properties. Its quality is determined by factors such as sugar content (Brix level), absence of artificial additives, and modern processing methods. As global demand increases for plant-based, low-glycaemic sweeteners-particularly in health-conscious and vegan markets-palm syrup has emerged as a high-value commodity with significant export potential. Compared to palm jaggery, which is traditionally consumed in domestic markets, palm syrup commands higher profit margins internationally and integrates more easily into processed food industries such as beverages, bakery items, and pharmaceuticals. It also has a longer shelf life and benefits from advanced techniques like filtration and vacuum evaporation, which enhance product safety and reduce spoilage. Additionally, palm syrup production involves fewer energy-intensive steps, making it a more sustainable and eco-friendly option. These advantages position palm syrup as a more commercially viable product than jaggery, offering Palmyra farmers greater economic opportunities through value-added processing and international trade.

This study, therefore, focuses on assessing the potential of palm syrup as a means to boost rural entrepreneurship, particularly by evaluating the impact of structured training programs on farmers' knowledge, practices, and market readiness.

Materials and Methods

The study adopts a quasi-experimental research design that facilitates the comparison of data collected before and after the training interventions provided to participants. This design is particularly appropriate for extension and rural development studies where controlled experimental conditions are difficult to implement in real-world settings. By allowing a structured evaluation of change over time, the quasi-experimental approach effectively captures the extent to which targeted training influences critical variables such as knowledge levels, adoption of production techniques, and marketing efficiency among Palmyra-based farmers. In this context, the pre- and post-training assessments help to quantify the gains in understanding and behaviour change related to value addition, technology adoption, and enterprise development. This methodology provides empirical evidence on the impact of training, supporting a deeper understanding of how extension efforts can enhance the capabilities of rural producers. The selected population for this research comprised Palm Jaggery farmers who were part of organized Farmer Producer Organizations (FPOs), as these institutions offered a structured platform for training dissemination, group mobilization, and collective marketing. FPOs also facilitated smooth coordination in terms of mobilizing participants, recording their responses, and ensuring consistency in data collection during both phases of the study. The study was carried out in the Ramanathapuram district of Tamil Nadu, focusing specifically on the Kadaladi block. This locale was purposefully selected due to its prominence as a major Palmyra-growing region and its substantial involvement in traditional Palmyra-based farming systems. Ramanathapuram, located in the southeastern coastal belt of Tamil Nadu, is ecologically defined by its arid and semi-arid climatic conditions. The district is known for low rainfall, saline soil types, and limited irrigation potential. Despite these challenges, Palmyra trees thrive in this environment owing to their drought tolerance, minimal input requirements, and adaptability to marginal lands. Over generations, rural communities in this region have relied on Palmyra for a wide variety of products, with palm jaggery being one of the most significant in terms of local consumption and income generation. However, traditional jaggery-making methods remain labour-intensive, with limited attention to hygiene, quality standards, and modern processing techniques. These constraints have prevented farmers from realizing the full economic potential of Palmyra products, especially in high-value or export markets. In recent years, development interventions and government programs have sought to transform this sector by organizing growers into FPOs and providing support in areas such as training, credit linkage, and market access. Kadaladi block, in particular, emerged as an ideal site for this study due to its high concentration of Palmyra growers and the presence of several functional FPOs focused on palm-based enterprises.

The block encompasses a cluster of villages where a significant proportion of the rural population engages in Palmyra tapping, processing, and product sales. These farmers typically operate at small or marginal scales, using inherited traditional knowledge but lacking exposure to value-added processing and branding techniques. The FPOs in the area play an increasingly important role in facilitating training programs, aggregating produce, and establishing market linkages beyond local markets. This made Kadaladi not only a relevant geographic focus but also a practically advantageous site for organizing training sessions and conducting field-based data collection. The socio-economic characteristics of the farmers including variations in age, gender, experience, and farm size provided a diverse sample for studying the impact of training across multiple demographic segments. Furthermore, the coexistence of traditional practices with emerging institutional support systems offered an excellent context for examining how structured interventions can catalyse behaviour change and enterprise development. Given these factors, the selection of Kadaladi block within Ramanathapuram district was both purposeful and strategic, ensuring that the research findings would be rooted in a setting that combines traditional agricultural livelihoods with the potential for modernization and entrepreneurship. The district's unique mix of ecological suitability for Palmyra cultivation, community dependence on palm products, and evolving institutional infrastructure for farmer development created an ideal environment for assessing the outcomes of capacity-building initiatives in the value-added Palmyra sector.

Member of Respondent: 30
Statistical tools: Correlation, Pared ‘t’ test, Frequency, Percentage Analysis.

Variables

Independent

1. Gender
2. Age
3. Farm size
4. Palmyra production in Experience

Dependent

1. Knowledge and Production techniques
2. Palmyra value addition marketing and export
3. Impact of Training.

Results and Discussion

In this chapter, the analysed data are presented and discussed in detail. The analysis was carried out in line with the objectives of the study, and the key findings are systematically arranged under relevant subheadings.

Correlation

To understand the relationships among selected independent variables (Gender, Age, Farm Size, Experience in Palmyra Production) and the dependent variables (Before Training Average Score and After Training Average Score), Pearson’s correlation coefficient was calculated. The correlation matrix is interpreted below.

Table 1: Correlation Analysis data

Independent variable	Before Training. Avg (r)	Sig.(2-tailed)	After Training. Avg (r)	Sig.(2-tailed)
Gender	0.327	0.083	-0.209	0.276
Age	-0.317	0.094	0.151	0.435
Farm size	0.069	0.722	0.187	0.330
Experience in Palmyra production	-0.463*	0.011	0.072	0.712

Note: *Correlation is significant at the 0.05 level (2-tailed).

Table 2: Correlation Analysis data

r value	Strength of Correlation
0.00-0.19	Very weak
0.20-0.39	Weak to moderate
0.40-0.59	Moderate
0.60-0.79	Strong
0.80-1.0	Very strong

Table 3: Correlation Analysis data

Sig. (2-tailed) or p-value	Interpretation
≤ 0.05	The correlation is statistically significant there is evidence of a real relationship between the two variables.
> 0.05	The correlation is not statistically significant any relationship could be due to chance.

Key Findings from Correlation Analysis

1. **Gender and Experience in Palmyra Production:** A strong negative correlation was found between gender and experience in palmyra production (r = -0.801), indicating that as gender shifts (possibly from male to female depending on coding), experience in palmyra production decreases significantly. This could suggest that male respondents have more experience in palmyra cultivation than female respondents.
2. **Gender and After Training Average Score:** A moderate negative correlation was observed between gender and the after-training average score (r = -0.339), suggesting that gender influences post-training performance. If coded as 1 = male and 2 = female, this would mean males had relatively better performance post-training.
3. **Age and Experience in Palmyra Production:** A moderate positive correlation (r = 0.506) was found, indicating that as age increases, experience in palmyra production also increases, which is logically consistent.
4. **Experience in Palmyra Production and After Training Average Score:** A positive and statistically significant correlation (r = 0.712, p < 0.01) was observed, indicating that those with more experience benefited more from the training and performed better afterward.
5. **Farm Size and Other Variables:** Farm size showed weak or negligible correlation with most variables. This indicates that farm size did not play a significant role in influencing either pre- or post-training scores or experience in palmyra cultivation.
6. **Before and After Training Scores:** The positive correlation (r = 0.471**) between before and after training scores reveals that individuals who had relatively higher knowledge before training also tended to perform better after training. The double asterisk (**) denotes that this relationship is significant at the 1% level, suggesting that training enhanced existing knowledge among already informed individuals.

Paired t- test Analysis

The t-statistic of -18.299 is a large negative value, which suggests a significant difference between the before and after means. The calculated p-value of $1.162\times 10^{-}10$ or (0.0000000001162) is very small, indicating strong evidence against the Alternative hypothesis (which assumed no difference between before and after).

Table 4: Paired t- test table

t-Test: Paired Two Sample for Means		
	Before	After
Mean	34.21428571	57.28571429
Variance	25.41208791	0.527472527
Observations	14	14
Pearson Correlation	0.234117088	
Hypothesized Mean Difference	1	
df	13	
t Stat	-18.29917572	
P(T<=t) one-tail	5.81101E-11	
t Critical one-tail	1.770933396	
P(T<=t) two-tail	1.1622E-10	
t Critical two-tail	2.160368656	

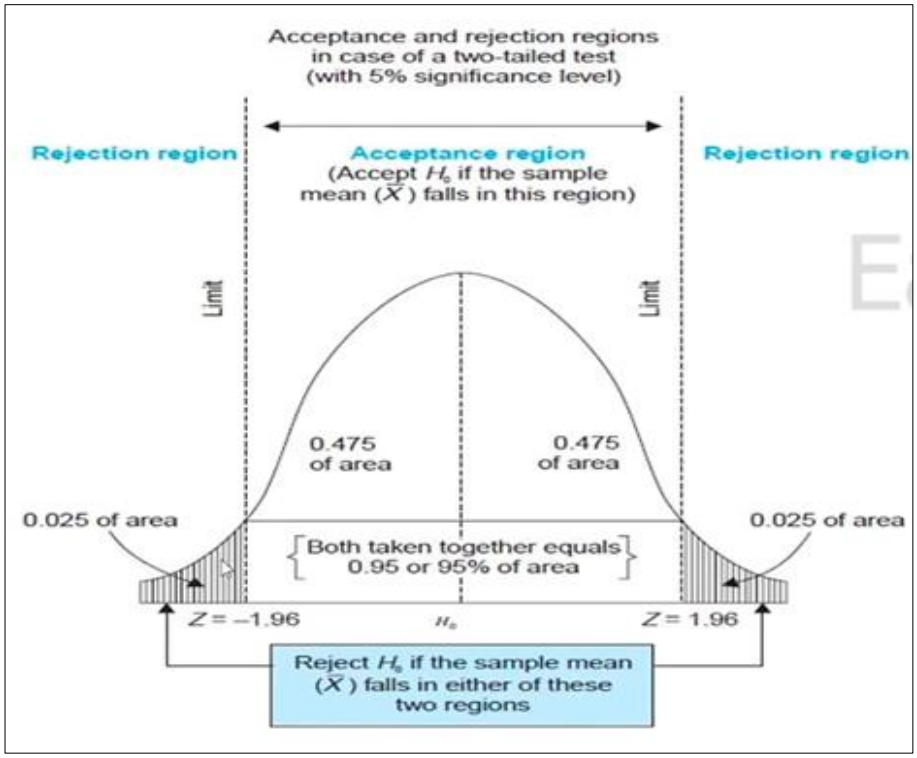

Fig 2: Bell curved diagram

The paired t-test results show a significant improvement in the farmers' knowledge and strategies regarding technology and marketing post-training. Here's a breakdown of the statistical results**.**

1. Statement of Hypothesis

- **Null Hypothesis (H_0):** There is a significant difference in the farmers knowledge and strategies related to technology adoption and marketing practices before and after the training. This means the training had a positive impact**.**
- **Alternative Hypothesis (H_1):** There is no significant difference in the farmers' knowledge and strategies related to technology adoption and marketing practices before and after the training. This means that the training has no effect on the outcomes.

Final Hypothesis Conclusion

Interpretation of the P-Value

The two-tailed p-value is $1.162\times 10^{-}10$, which is extremely small (much lower than the typical significance level of 0.05 or 0.01).

This means there is strong statistical evidence to reject the alternative Hypothesis (H_1).

Since the p-value is almost zero, we can confidently conclude that the difference in means before and after training is highly significant and not due to random chance. leading to a meaningful improvement in performance.

Percentage Analysis

1. Gender

Gender was found to be a significant factor influencing the outcomes of the pre- and post-training evaluation of farmers associated with Palmyra-based Farmer Producer Organizations (FPOs). The respondents were categorized into two groups: male and female. The distribution of respondents based on gender is presented in Table 5.

Table 5: Distributed of respondents according to their Gender

S. No	Category	Respondents (n=30)	
		f	Percentage (%)
1.	Male	14	47.00
2.	Female	16	53.00
	Total	30	100.00

2. Age

Although age was not found to be a statistically significant factor, it still had an influence on the pre- and post-training evaluation of farmers associated with Palmyra-based Farmer Producer Organizations (FPOs). The respondents were categorized into three age groups: young, middle-aged, and old. The distribution of respondents based on age is presented in Table below,

Table 6: Distributed of respondents according to their age

S. No	Category	Respondents (n=30)	
		f	Percentage (%)
1.	Young (18-35yrs)	02	06.67
2.	Middle(above35-45yrs)	10	33.33
3.	Old (above45yrs)	18	60.00
	Total	30	100.00

Farm size

Although farm size was not found to be a statistically significant factor, it still had an influence on the pre- and post-training evaluation of farmers associated with Palmyra-based Farmer Producer Organizations (FPOs). The respondents were categorized into three groups: Marginal farmer (Less than 1ha), Small farmer (above1ha-upto2ha) and big farmer (more than 2ha). The distribution of respondents based on age is presented in Table below.

Table 7: Distributed of respondents according to their Farm size

S. No	Category	Respondents (n=30)	
		f	Percentage (%)
1.	Marginal farmer (Less than 1ha)	25	83.33
2.	Small farmer (above1ha-upto2ha)	03	10.00
3.	Big farmer (more than 2ha)	02	06.67
	Total	30	100.00

Summary and conclusion

1. Summary of Survey Responses

Understanding the Value of Palmyra Products:

- 97 percent of respondents gained knowledge on making Palmyra products more valuable.
- 3 percent did not gain this knowledge.
- Farmers trained by their showed higher engagement and knowledge adoption was increased and also local-direct training was more.

Confidence in Producing Palmyra Products:

- 90 percent of respondents became more confident in production.
- 10 Percent did not feel an impact on their confidence.

Plans to Start a Palmyra Industry:

- 90 Percent of respondents are interested in starting small-scale or medium-scale industries.
- 10 Percent are not planning to start such industries.

Confidence in Following Export Standards:

- 87 percent of respondents feel confident in selling internationally.
- 13 percent do not feel confident in this area.

2. Significant Improvement

- There is a statistically significant difference in the farmers adoption of technology and marketing strategies before and after the training program.
- video Based training increased knowledge retention and adoptation.

3. Statistical Evidence

The t-test results, with a p-value far below 0.05, support the hypothesis that the training had a positive effect.

Conclusion

The present study aimed to evaluate the impact of a structured training program focused on value addition, technology adoption, and marketing strategies among Palmyra farmers associated with Farmer Producer Organizations (FPOs) in Ramanathapuram District. Through a comparative analysis of pre- and post-training performance using statistical tools such as Pearson's correlation and paired t-tests, the results clearly demonstrate the training's effectiveness and transformative potential.

1. Significant Improvement in Knowledge and Practices: The paired t-test yielded a highly significant result ($t = -18.299$, $p < 0.0000000001162$), confirming a substantial increase in knowledge and capability among participants post-training. The before and after average scores indicated that the training had a direct, positive impact on farmers' understanding of value addition and modern agricultural practices. The extremely low p-value provides robust statistical evidence that this improvement is not due to chance but is a direct result of the intervention.

2. Correlation Insights

- A strong negative correlation between gender and experience ($r = -0.801$) and between gender and post-training score ($r = -0.339$) suggests that gender dynamics influence training outcomes, potentially highlighting the need for gender-sensitive training approaches.
- A positive correlation between age and experience ($r = 0.506$), as well as between experience and post-training score ($r = 0.471$), implies that experience and maturity play key roles in training effectiveness.
- The correlation between pre- and post-training scores ($r = 0.471^{**}$) suggests that those with higher baseline knowledge were better able to absorb and apply new information, pointing to the importance of building foundational knowledge prior to advanced training.

3. Impact on Perceptions and Aspirations

- Survey responses revealed a high level of satisfaction and confidence among trained farmers:
- 97 percent reported enhanced knowledge in value-added product development.
- 90 percent expressed interest in starting small- or medium-scale Palmyra-based industries.
- 87 percent felt confident about meeting export standards and venturing into international markets.

These responses reflect not only improved knowledge but also behavioral and attitudinal shifts, with farmers showing entrepreneurial intent and readiness for market expansion.

4. Training Modality and Effectiveness

Insights from secondary sources (e.g., Kumar *et al*., 2023; Krishnan *et al*., 2023) support the effectiveness of video-based and localized hands-on training, which led to greater knowledge retention and practical adoption. This underscores the importance of context-specific, visually engaging educational methods in rural capacity-building efforts.

5. Policy and Programmatic Implications: Given the statistically significant improvements and positive farmer responses, this study reinforces the need for:

- Wider implementation of value-addition training programs in similar agro-climatic regions.
- Integration of gender-sensitive approaches to ensure equitable participation.
- Continued support for FPOs to act as channels for training, aggregation, and marketing.
- Investment in scalable training models that incorporate video, demonstration, and localized content.

Final conclusion

The study successfully demonstrates that structured training programs significantly enhance the technical knowledge, market readiness, and confidence of Palmyra farmers in Ramanathapuram. The findings validate the critical role of value addition and capacity building in transforming traditional livelihoods into economically viable, scalable rural enterprises. These insights offer a strong foundation for policy interventions, future research, and development initiatives aimed at empowering farmers and strengthening the rural economy through FPO-led innovation and

collaboration. The paired t-test analysis clearly shows that the training program had a significant impact on the farmers' adoption of technology and marketing strategies. The difference of small p-value in post-training data suggest that the training was successful in achieving its objectives.

References

1. Dev SM. Small farmers in India: Challenges and opportunities. Indira Gandhi Institute of Development Research; 2012.
2. Govil R, Neti A, Rao MR. Farmer producer companies: Past, present and future. Azim Premji University, Bangalore; 2020.
3. Kumar R, Kumar S, Pundir R, Surjit V, Rao C. FPOs in India: Creating enabling ecosystem for their sustainability. ICAR-National Academy of Agricultural Research Management, Hyderabad, India; 2022.
4. NABARD. Farmer producer organisations - Frequently asked questions (FAQs). Farm Sector Policy Department & Farm Sector Development Department, NABARD Head Office, Mumbai; 2015.
5. Adhikari A, Pradhan K, Chauhan JK, Reddy SK. Analyzing the perceived impact of farmers' producer organization (FPOs) on sustainable economic development. Indian Research Journal of Extension Education. 2021;21(2&3):80-2.
6. Badatya KC. Financing horticulture for sustainable livelihood in times of COVID-19: Emerging delivery models. Message from Chairman Introduction. p. 3-4.
7. Balasubramanian P, Manoharan M. Development and evaluation of Palmyra palm (*Borassus flabellifer*) fruit-based RTS beverage. International Journal of Food Science and Nutrition. 2017;2(6):257-62.
8. Balamurugan S, Manoharan M. Economic value and supply chain analysis of Palmyra (*Borassus flabellifer*) and its products in Tamil Nadu. Asian Journal of Agricultural Extension, Economics & Sociology. 2018;25(4):1-9.
9. Chandrasekaran M, Venkatesan P. Value-added products from Palmyra palm (*Borassus flabellifer*) and their storage stability. Journal of Food Science and Technology. 2016;53(3):1405-14.
10. Datta SK, Ramaswamy B. Collective action for small-scale producers: A case study of Indian cooperatives in fruits and vegetables markets. Natural Resources Forum. 2010;34(1):55-64.
11. Fischer E, Qaim M. Linking smallholders to markets: Determinants and impacts of farmer collective action in Kenya. World Development. 2012;40(6):1255-68.
12. Ganesan M, Rajendran R. Exploring the nutritional, health, and economic potential of Palmyra palm (*Borassus flabellifer*) products. Journal of Ethnobiology and Ethnomedicine. 2019;15(1):1-10.
13. Gorai GK, Wason M, Padaria RN, Rao DUM, Paul S, Paul RK. Factors contributing to the stability of the farmer producer organisations: A study in West Bengal. Indian Journal of Extension Education. 2022;58(2):91-6.
14. Kapileshan P, Senthil Kumar R, Muralidharan C, Selvi RP. Economic value and supply chain analysis of Palmyra (*Borassus flabellifer*) and its products. Asian Journal of Agricultural Extension, Economics & Sociology. 2021;39(11):459-67.
15. Kumari N, Malik JS, Arun DP, Nain MS. Farmer producer organizations (FPOs) for linking farmer to market. Journal of Extension Systems. 2022;37(1):1-6.
16. Manikandan R, Somasundaram S. Development of value-added products from Palmyra palm (*Borassus flabellifer*) fruit pulp. International Journal of Food and Nutritional Sciences. 2015;4(3):123-8.
17. Natarajan R, Rajasekaran R. Economic analysis of value-added products from Palmyra palm (*Borassus flabellifer*) in Tamil Nadu. International Journal of Agricultural Science and Research. 2016;6(5):231-8.
18. Nikam V, Singh P, Ashok A, Kumar S. Farmer producer organisations: Innovative institutions for upliftment of small farmers. Indian Journal of Agricultural Sciences. 2019;89(9):15-24.
19. Parameswaran M, Sivakumar T. Development and quality evaluation of Palmyra palm (*Borassus flabellifer*) fruit spread. International Journal of Food Science and Nutrition. 2017;2(6):251-6.
20. Parthiban Sakthi R, Nain MS, Singh R, Kumar S, Chahal VP. Farmers' producer organisation in reducing transactional costs: A study of Tamil Nadu mango growers' federation. Indian Journal of Agricultural Science. 2015;85(10):1303-7.
21. Rathour V, Tiwari PK, Pandey PK, Singh KP, Singh DP. Socio-economic upliftment of tribal women through FPO in Bastar district of Chhattisgarh. Indian Journal of Extension Education. 2022;58(4):144-8.
22. Ramesh T, Kumar P. Impact of Farmer Producer Organizations on income and livelihood of small and marginal farmers in India. International Journal of Agricultural Research. 2019;14(1):1-10.
23. Sakthivel K, Muthusamy S. Development and evaluation of Palmyra palm (*Borassus flabellifer*) fruit-based RTS beverage. International Journal of Food Science and Nutrition. 2018;3(1):123-8.
24. Selvaraj P, Kumar S. Value addition in Palmyra palm (*Borassus flabellifer*) for sustainable income generation. International Journal of Agricultural Science and Research. 2017;7(4):253-60.
25. Singh G, Vatta K. Assessing the economic impacts of farmer producer organizations: A case study in Gujarat, India. Agricultural Economics Research Review. 2019;32:139-48.
26. Singh M, Tiwari D, Monga S, Rana RK. Behavioural determinants of functionality of farmer producer organisations in Punjab. Indian Journal of Extension Education. 2022;58(1):130-5.
27. Sivakumar R, Manoharan M. Development of Palmyra palm (*Borassus flabellifer*) fruit-based jelly and its quality evaluation. International Journal of Food Science and Nutrition. 2016;1(6):39-44.
28. Subramanian S, Venkatesh R. Value-added products from Palmyra palm (*Borassus flabellifer*) and their market potential. International Journal of Agricultural Science and Research. 2015;5(4):203-10.
29. Trebbin A. Linking small farmers to modern retail through producer organizations: Experiences with producer companies. Food Policy. 2014;45:35-44.
30. Venkatesan P, Senthilkumar R. Value addition in Palmyra palm (*Borassus flabellifer* L.): A potential strategy for livelihood security and poverty alleviation. Journal of Applied and Natural Science. 2016;8(1):175-81.

31. Vijayakumar P, Rajendran G. Development and evaluation of Palmyra palm (*Borassus flabellifer*) fruit-based squash. International Journal of Food Science and Nutrition. 2018;3(1):129-34.
32. Yogeshwaran S, Kumar S. Value addition in Palmyra palm (*Borassus flabellifer*) for enhancing farmers' income. International Journal of Agricultural Science and Research. 2017;7(5):345-52.
33. Zachariah J, Mathew P. Development of Palmyra palm (*Borassus flabellifer*) fruit-based nectar and its quality evaluation. International Journal of Food Science and Nutrition. 2016;1(6):45-50.
34. Kumar S. Impact of training programs on the adoption of sustainable agricultural practices among farmers in Haryana, India [Master's thesis]. Chaudhary Charan Singh Haryana Agricultural University; 2018.
35. Patel R. Effectiveness of extension training programs on knowledge and adoption behavior of dairy farmers in Gujarat [Doctoral dissertation]. Anand Agricultural University; 2019.
36. Sharma P. Evaluation of capacity-building programs for enhancing agricultural productivity in Rajasthan [Master's thesis]. Maharana Pratap University of Agriculture and Technology; 2020.
37. Singh A. Assessing the impact of farmer field schools on integrated pest management adoption in Uttar Pradesh [Doctoral dissertation]. Banaras Hindu University; 2021.
38. Verma M. Pre- and post-training evaluation of women self-help groups in agricultural entrepreneurship development in Madhya Pradesh [Master's thesis]. Jawaharlal Nehru Krishi Vishwa Vidyalaya; 2017.
39. Ministry of Corporate Affairs. Master details of companies registered. [cited 2025 Aug 13]. Available from: https://www.mca.gov.in/content/mca/global/en/data-and-reports/company-llp-info/incorporated-closed-month.html