**Development of Participatory Training Module on Value-addition of Mango: Empowering Rural Women towards Sustainable Livelihoods**

**ABSTRACT**

Women in rural areas play a vital role in agricultural activities. They are involved in various aspects of agricultural production, including main crop production, livestock production, horticulture, post-harvesting operations and agro /social forestry. However, the potential for economic empowerment and sustainable livelihoods remains largely untapped.  This research paper focuses on developing a participatory training module on the value-addition of mango for rural women. The present study was conducted in Banswara district of Rajasthan, India in 2022-23 and the data were collected in May-June 2022.  Training was conducted with a sample of 30 randomly selected rural women from Talwara and Deoliya villages of Banswara Panchayat Samiti. The paper explores the development and effectiveness of the training module in terms of knowledge and skill gain among the respondents. The developed training module was evaluated by a panel of experts and scored high for all the evaluation criteria emphasising the module's robustness and efficacy in equipping the respondents with essential competencies. Result of the paired t-test show that gain in knowledge and skill scores of the respondents before and after exposure to the participatory training module, was highly significant at 1 per cent level of significance. The research contributes to the broader discourse on gender equality, agricultural development, and poverty alleviation, highlighting the transformative potential of empowering rural women through knowledge and skill development in the value-addition of mango.

**KEYWORDS**: *rural women, participatory training module, value-addition, sustainable livelihood, knowledge, skill, effectiveness of training module*

**INTRODUCTION**

Agriculture is the backbone of the Indian economy, contributing 18 per cent to the GDP and employing 50 per cent of the population (Pingle, 2023). India is a global leader in the production of various grains, fruits, and vegetables, including mangoes, bananas, papayas, and okra (Chauhan et al., 2022). However, the unpredictability of agriculture, coupled with economic shifts and changing lifestyles, makes the sector less appealing, particularly to the youth. As demand for high-quality fruits, vegetables, and livestock grows, there is a pressing need to enhance agricultural profitability through value-addition, which involves processing, packaging, labelling, and offering services like home delivery (Born & Bachman, 2006; Shashi et al., 2016). This approach not only increases returns but also opens new markets, extends the market season, and fosters community development, creating jobs and empowering rural population (Etumnu & Widmar, 2020).

India’s agro-climatic conditions are ideal for mango production, making it the leading global producer, with 46.74 per cent of the world’s mango-growing area and 40.48 per cent of its production (Government of India, 2013). However, 25-30 per cent of mangoes are lost due to immature falling from windstorms and other factors, and farmers often receive low prices during peak season due to market gluts (FAO, 2018). Effective pre- and post-harvest management is critical to minimizing these losses and unlocking hidden potential, creating self-employment opportunities. Traditional mango products like pickles, murabba, and aam-papad are commonly made at home, but commercializing these value-added products could be highly profitable for farmers, particularly in rural areas.

While women play a crucial role in agricultural production, they are integral to post-harvest activities, responsible for 90 per cent of tasks such as cleaning, drying, and storage but they face significant barriers, including limited access to formal training and exclusion from decision-making processes due to financial dependency (Acharya et al., 2010, Jahan & Sarkar, 2015; Saikia et al., 2020). Despite possessing indigenous skills in preserving fruits and vegetables, rural women often lack the advanced techniques needed to produce value-added products on a larger scale. Therefore, training women in mango value-addition is essential for developing a skilled community capable of meeting the growing market demand for value-added products. Training women in these skills would not only enhance their participation in sustainable agriculture but also create alternative income sources for farming families. This empowerment would strengthen their decision-making capabilities and contribute to more resilient and sustainable food systems. A well-designed training module, tailored to the specific needs of rural women, can significantly enhance their knowledge and skills. Such a module should be comprehensive, with clearly defined objectives, relevant content, and appropriate teaching methods, including multimedia aids. The present study aims to develop a participatory training module on mango value addition for rural women and assess its effectiveness in improving their knowledge and skills.

**METHODOLOGY**

The present study was conducted in two distinct phases i.e. the development of a participatory training module and assessment of its effectiveness by measuring the knowledge and skill gains among the participants. Initially, a three-day participatory training module on value-addition of mango was designed, incorporating the experiential learning cycle model to structure the training sessions. This module was subsequently evaluated by a panel of 10 experts from the fields of Extension Education and Communication Management, and Food Science and Nutrition. The evaluation was conducted using a five-point rating scale (1=poor, 5=excellent) based on criteria such as relevance to the topic, content coverage, continuity and sequence, language, and overall presentation.

To measure the effectiveness of the participatory training module, a one-group pre- and post-test experimental research design was employed. The study was conducted in two randomly selected villages i.e. Talwara and Deoliya, within the Banswara Panchayat Samiti in the Banswara district of Rajasthan. Banswara, known as the mango hub of Rajasthan, produces 39,000 MT of mangoes annually, covering an area of 3,000 hectares under mango orchards (Godha, 2021), thus selected purposively. A sample of thirty rural women, aged between 25 and 45 years, was randomly selected based on their willingness to participate and cooperate in the study. Data collection was carried out through personal interviews, with knowledge and skill assessments conducted both before and after the implementation of the participatory training module.

**RESULTS**

The designed participatory training module on value-addition of mango was first evaluated by a panel of experts and then effectiveness of the participatory training module was assessed in terms of gain in knowledge and skill with a sample of thirty rural women.

1. **Expert evaluation of training module on value-addition of mango**

The designed training module was evaluated by a panel of ten experts and scores allotted by the experts for all the evaluation criteria used for evaluation of training module were converted into Mean Weighted Scores (MWS). As indicated in Table 1, the MWS for all the criteria of evaluation ranged between 4.40 to 4.71. The overall MWS of all the criteria of evaluation of training module was 4.56. The overall Standard Deviation (SD) was found to be ±0.07 for all the evaluation criteria.

**Table:1 Criteria wise evaluation of training module by the subject experts**

 **n=10**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S.No.** |  | **Criteria** | **MWS** | **Standard Deviation (SD)** |
|  |  | Relevance to topic | 4.71 | ±0.15 |
|  |  |  Content Coverage | 4.40 | ±0.18 |
|  |  | Continuity & Sequence | 4.54 | ±0.10 |
|  |  | Language | 4.54 | ±0.07 |
|  |  | Overall presentation | 4.70 | ±0.06 |
|  | **Overall MWS** | **4.56** | **±0.07** |

The training module was evaluated for its each session and the data have been presented in Figure 1. It can be inferred from the table that all the sessions of the training module on value-addition of mango were assigned scores between 4.46 to 4.64 out of 5.

**Figure:1 Session wise evaluation of training module on value-addition of mango by the experts**

1. **Effectiveness of the participatory training module on value-addition of mango**

The developed participatory training module was field tested with a sample of thirty rural women in the age group of 25-45 years for their gain in knowledge and skills. Knowledge and skill tests were administered to assess the effectiveness of the training module. As depicted in Table 2 prior to exposure to the training module, all the respondents (100%) were having poor knowledge regarding value-addition of mango. However, after exposure to the training module, 63.33 per cent respondents demonstrated good knowledge while, rest of the respondents (36.67%) had average knowledge. Notably, none of the respondents had poor knowledge about value-addition of mango after exposure to the training module. It can also be inferred from the table that before exposure to the training module, all of the respondents (100%) were in poor skill category in preparation of value-added products but after exposure to the training module almost all of the respondents (96.67%) respondents shifted to good skill category.

The results of the Chi-square test presented in the table reveal that change in knowledge and skill levels of the respondents before and after exposure to the training module were highly significant.

**Table 2: Knowledge and skills of the respondents before and after exposure to the training module**

 **n=30**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No.** | **Category** | **Before exposure (%)** | **After exposure (%)** |
| **Knowledge** | **Skills** | **Knowledge** | **Skills** |
|  | Good | 00 | 00 | 63.33 | 96.67 |
|  | Average | 00 | 00 | 36.67 | 3.33 |
|  | Poor | 100 | 100 | 00 | 00 |
| **Chi Square test of gain in knowledge and skills before and after exposure to the training module**  |
| S. No. | Items | Knowledge | Skills |
|  | Chi Square statistics | 60 | 60 |
|  | Degree of freedom | 2 | 2 |
|  | p-value | <0.0001\*\* | <0.0001\*\* |

\*\* Significant at 1 per cent level of significance

Table 3 presents the component wise Mean Per cent Scores (MPS) of knowledge and skill scores of the respondents before and after exposure to the training module on value-addition of mango. The MPS presented in the table highlight that knowledge of all the respondents was poor in all the components before exposure to the training module. It was found that none of the respondents had any prior knowledge of products like ‘raw mango *murabba’*, ‘preservation of mango as pulp’, ‘raw mango squash’, ‘*aam-papad’*, ‘mango jam’ and the component ‘registration of enterprise’.

Table 3 also describes overall and value-added mango product wise gain in skill of the respondents and it can be inferred from the table that there is significant gain in the skill scores of the respondents having gained 86.07 MPS. It can also be seen from the table that before exposure to the training module none of the respondents had any kind of skill about preparation of products such as raw mango squash, preservation of mango as pulp and mango jam, while the respondents had some skill in preparation of value-added mango products like mango pickle, raw mango squash and *aam-papad* with MPS 12 for mango pickle and 10 for raw mango squash and *aam-papad.* After exposure to the training module, all the respondents were able to prepare *amchoor*, mango pickle and *aam-papad* while, 90 per cent respondents were able to prepare raw mango *murabba* and raw mango squash.

The table further reveals the significant difference in knowledge scores of before and after exposure to training module with the highest gain in ‘*Aam-papad’* ‘*Amchoor’*, and ‘Mango pickle’ having gained 89.33, 87.88 and 82.74 MPS, respectively. However, the components ‘Registration of enterprise’ and ‘Initial capital and marketing of food products’ had comparatively less gain in knowledge scores after exposure to the training module having gained 49.17 and 51.67 MPS.

A paired t-test was also performed to assess the significance of difference in knowledge and skill scores of the respondents before and after exposure to the training module and it was found that gain in knowledge both overall and component wise was found highly significant at 1 per cent level of significance. Gain in skill scores of the respondents both overall and product wise was also found highly significant at 1 per cent level of significance

**Tab­le 3: Significance of difference in Knowledge and Skills of the respondents before and after exposure to the training module**

 **n=30**

|  |  |
| --- | --- |
| **Knowledge** | **Skills** |
| **S. No.** | **Component** | **MPS** | **t-value** | **S. No.** | **Mango Products** | **MPS** | **t-value** |
| **Before exposure** | **After exposure** | **Gain** | **Before exposure** | **After exposure** | **Gain** |
| **1.**  | Value-addition- need and benefits  | 6.67 | 79.52 | 72.86 | 14.84\*\* |  | *Amchoor* | 6.67 | 100 | 93.33 | 20.15\*\* |
| **2.**  | Value-addition of Mango | 17.54 | 85.44 | 67.89 | 35.22\*\* |  | Mango pickle | 20 | 100 | 80.00 | 10.77\*\* |
| **3.** | Value-added mango products |  | Raw mango *murabba* | 00 | 90 | 90.00 | 16.16\*\* |
|  | 1. *Amchoor*
 | 7.58 | 95.45 | 87.88 | 65.99\*\* |  | Preservation of mango as pulp | 00 | 83.33 | 83.33 | 12.37\*\* |
| 1. Mango pickle
 | 5.95 | 88.69 | 82.74 | 16.53\*\* |  | Raw mango squash | 10 | 90 | 80.00 | 9.045\*\* |
| 1. Raw mango *murabba*
 | 0.00 | 71.25 | 71.25 | 9.10\*\* |  | *Aam-papad* | 10 | 100 | 90.00 | 16.16\*\* |
| 1. Preservation of mango as pulp
 | 0.00 | 60.48 | 60.48 | 7.02\*\* |  | Mango jam | 00 | 86.67 | 86.67 | 13.73\*\* |
| 1. Raw mango squash
 | 0.00 | 76.03 | 76.03 | 9.75\*\* |  | Overall Skills | 6.96 | 63.23 | 86.03 | 31.28\*\* |
| 1. *Aam-papad*
 | 0.00 | 89.33 | 89.33 | 17.87\*\* |  |
| 1. Mango jam
 | 0.00 | 76.83 | 76.83 | 12.80\*\* |
| **4.** | Registration of enterprise | 0.00 | 49.17 | 49.17 | 5.49\*\* |
| **5.** | Packaging, sealing and sterilization of food products | 3.33 | 63.33 | 60.00 | 11.63\*\* |
| **6.**  | Initial capital and marketing of food products | 2.38 | 54.05 | 51.67 | 9.43\*\* |
| **7.**  | Overall Knowledge | 3.78 | 75.80 | 72.02 | 26.45\*\* |

\*\* Significant at 1per cent level of significance

**DISCUSSION**

The participatory training module on value-addition of mango was developed and later field tested to assess the effectiveness of training module in terms of gain in knowledge and skill. It was marked excellent for all the evaluation criteria by the experts and similar scores were assigned by all the experts for all the evaluation criteria.This suggests that the training module was well-designed, with the content organized in a logical and comprehensive manner. This also means that the module covered all relevant topics and was structured in a way that was easy to understand. Dangi et al., (2021) also reported similar findings who designed a training module on nutrition for women and reported that training module was reported very good by the experts as the overall MWS ranged between 4.06 to 4.38 out of 5.

At the time of knowledge test before exposure to training module, it was found that women had no idea about the wide range of products that can be developed from mango. Most of respondents who attended this institutional training had never visited Krishi Vigyan Kendra and they participated in such kind of training for the first time. This lack of awareness highlights the significance of developing participatory training module for rural women.

After exposure to the training module, all the respondents showed improvement in their knowledge scores with highest gain in ‘*Amchoor*’, ‘*Aam-papad’* and ‘Mango pickle’. These products were highly appealing to the respondents as all three products can be used locally at their own homes. Such increase in knowledge scores of respondents confirms the effectiveness of training module. However, the components ‘Registration of enterprise’ and ‘Initial capital and marketing of food products’ had comparatively less gain in knowledge scores after exposure to the training module due to their more theoretical nature of content.

The participatory nature of the training module was also instrumental in helping the respondents achieve higher level of knowledge. These findings are consistent with Pandey et al., (2017) who reported that 63.33 per cent trainees had high knowledge level while, 36.66 per cent demonstrated medium level of knowledge just after completion of training on value-addition of food grains, fruits and vegetables among rural women and statistically significant difference were observed in pre- and post-training mean knowledge scores of the respondents. Similar findings were also reported by Soumya and Podikunju (2016). Paudel et al. (2024) emphasized effectiveness of a participatory training module for farmers on Integrated Pest Management (IPM) methods, the use of personal protective equipment (PPE), and maintaining personal hygiene when handling pesticides to ensure safe pesticide use.

Prior to the exposure to the training module, some of the respondents were able to prepare some mango products like mango pickle and *aam-papad*. The possible reason for at least having some skill among the respondents is that it is traditionally prepared in the community. The training module was successful in improving the respondent’s skill in preparation of value-added products of mango. The high percentage of respondents who shifted to good skill category indicates that the training module was well-designed and effective in enhancing the skill set of the respondents. Findings of the study align with the research by Babel and Sharma (2016) who reported overall 94.71 per cent skill development as a result of training to rural women.

Results of the effectiveness of training module in terms of gain in knowledge and skill indicate that there was a significant improvement in both the knowledge and skill levels of the respondents. This can be attributed to the design of the training module that used interactive and engaging techniques and provided opportunities for hands-on practice. The findings suggest that the training module was successful in achieving its objectives and can serve as a model for future training programmes and can also be used by Krishi Vigyan Kendra (KVKs) and other extension functionaries in training rural women on value-addition of mango.

**CONCLUSION**

The participatory training module designed to enhance the value-addition of mango for rural women has shown to be highly effective in empowering women in rural communities. It has successfully equipped participants with essential knowledge and skills in various aspects of value-addition of mango. The participatory approach adopted in the design and implementation of the training module has proven to be effective in promoting active engagement and ownership among the respondents. Overall, this study highlights the importance of designing participatory training module to promote the socio-economic empowerment of rural women and leverage local resources. Such interventions have the potential to create lasting positive change and contribute to the overall development of rural economies. Therefore, it is recommended to replicate and scale up similar initiatives in other contexts to maximize their impact and reach.

**Disclaimer (Artificial Intelligence)**

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

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