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## Research

### Assessing Information Gaps and Training Requirements of Farm Women in Crop Production Technology: Evidence from Central India

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## Abstract

The farm women in India are a critical component in the agricultural production sector but their access to information regarding better technologies on crop production is minimal and untimely. This research evaluates the knowledge deficits and education needs of farm women in crop production technology in Central India. Primary data were collected using a structured interview scheme on a sample population of farm women using a descriptive research design. The socio-personal factors to be analyzed included the existing levels of knowledge, the perceived gaps in information, and the priority training needs in most crop production practices. The results show that there are significant gaps in technical knowledge associated with seed treatment, nutrient management, pest and diseases control, and post-harvest. It was observed that training needs differed greatly with age, level of education, landholding and social participation. As noted in the study, farm women choose need-based, practical, and locally oriented training methodologies. The findings demonstrate

the need to consider gender-sensitive extension programs, which could fill the lack of knowledge and increase decision-making capabilities of farm women. Enhancing specific training interventions would help in increasing farm productivity, livelihood security, and sustainable agricultural development of the area.

**Keywords:** Farm women; Information gap; Training needs assessment; Crop production technology; Agricultural extension; Capacity building; Central India

## 1. Introduction

In India, agriculture still forms the basis of the rural economy and supports a large percentage of the population, as well as leads to food security and economic stability. In this industry, women in farms have a critical and dynamic role to play, as they are involved in nearly all aspects of production of crops, which include sowing, transplanting, weeding, harvesting, post harvest management, and seed preservation. The contributions of farm women are sometimes underestimated despite their huge participation, and their opportunities of

getting information and extension services regarding agriculture as well as formal training remain minimal.

The introduction of better technologies in crop production is generally considered one of the major factors of agricultural productivity and sustainability. There are technologies associated with better seed varieties, nutrient management, control of pests and diseases, water management, and post-harvest activities and it could help to boost yields, losses and farm incomes. Nevertheless, the successful implementation of these technologies is largely based on both the accessibility of the farmers to the correct information and their ability to comprehend and utilize technical knowledge. Structural barriers, especially the low educational level of farm women, their poor mobility, lack of time to access the information because of their housework, and access to information about extension agencies, often limit such information coverage.

The gap in information between farm women may cause incomplete or wrong adoption of advice practices which would translate to poor productivity and more susceptible to production risks. It is thus necessary in the identification of such gaps in the designing of need-based and effective training programs. The assessment of training needs is used as a systematic method to identify the domains in which women in the farm need knowledge and skills to be enhanced so that the extension interventions be relevant, practical and responsive to the local conditions. In the absence of such evaluations, training

programs are likely to be generic and ineffective as they will fail to meet the real limitations that women farmers have.

With regard to Central India, agriculture is typified by a variety of cropping systems, small to middle-sized landholdings, and intense reliance on rainfed agriculture. The women in this region contribute significantly to the maintenance of agricultural activities, but it has been empirically found out that they have poor access to the modern crop production information. In addition, there is dearth of region-specific studies that combine data on information gap with the training needs of farm women resulting into a critical research gap.

It is on this background that the current research is set to determine the information gaps and training needs of Central Indian farm women on crop production technology. The study will provide information that can inform the formulation of gender sensitive and context-specific agricultural extension plans by reviewing their socio-personal profiles, current levels of knowledge and the perceived training needs of the same. The need to address these gaps not only serves the interests of increasing the productivity of farms but also in empowering the decision-making power of farm women hence added value in terms of inclusive and sustainable agricultural development.

## 2. Methodology

**Research Design:** The research design was descriptive research design, which suits to the systematic evaluation of the current conditions, gaps of knowledge and the needs of training of female farmers in crop

production technology. This design will be able to collect quantitative data and will make interpretation of relationships between chosen variables meaningful.

**Area of the Study:** The study was undertaken in Central India, which is a diverse agro-climatic region and women have a significant portion of involvement in agricultural activities. The area was chosen purposely as the farm women had a major role in crop production and that gender-responsive agricultural extension services in the area had to be enhanced. Selection of Population and Sample. The study population was the farm women who were actively involved in crop production activities. The selection of respondents was done using a multistage sampling technique. During stage one, purposive selection of districts was done. During the second stage, the villages were picked at random in the selected districts. During the last step, the sample was chosen randomly, and farm women were selected in their respective villages. The final sample used in the study was 120 farm women.

**Data Collection :** A structured interview plan was used to collect primary data, and this was developed after an in-depth analysis of relevant literature and relevant expert advice. The interview tool included the parts covering socio-personal and economic attributes, the current levels of information, the perceived information gaps, the needs of the training in the crop-production technologies, limitations that exist, and suggestions of their improvement. Before the ultimate deployment, the schedule was pre-tested in a non-sample area to ensure

there was clarity, relevance, and reliability, and the necessary adjustments made.

**Measurement of Variables:** Socio-personal and economic variables such as age, education, size of landholding, socio-economic status, social participation, and innovativeness were measured using standard procedures and proper scoring techniques.

Information levels were measured through asking the respondents about their knowledge and understanding of the recommended practices that control crop-production practices like seed treatment, nutrient management, pest and disease control, irrigation practices and post-harvest management practices.

The identification of the information gaps was based on the comparison between the recommended practices and the actual level of knowledge of the respondents.

The needs assessment was done by evoking the perception of the respondents regarding the relevance of training in different aspects of crop-production technology, using a weighted mean score methodology.

**Data Analysis:** Coded, tabulated and analysed using relevant statistical methods were used to analyse the data collected. Frequency, percentage, mean, standard deviation, and coefficient of variation, which were used to entrap the data, were considered descriptive statistics. The association between the socio-personal and economic variables that were selected and the training needs of the farm women was investigated through correlation analysis. The subsequent interpretations were expressed logically and the results were

displayed using tables and figures in order to make the discussions clear.

**Ethical Issues:** The study was done on a voluntary basis. The respondents were well informed about the objectives of the study and informed consent was sought before the data collection. The anonymity of the information provided by the respondents was strictly observed.

### 3. Results and Discussion

This section presents and discusses the findings of the study on information gaps and training requirements of farm women in crop production technology in Central India. The results are organized according to the objectives of the study and interpreted in the context of existing extension and gender studies.

#### 3.1 Socio-personal and Economic Profile of Farm Women

The socio-personal and economic characteristics of respondents were analyzed to understand their background and its influence on information access and training needs. The findings revealed that a majority of the farm women belonged to the middle-age group, indicating active involvement in agricultural operations and household decision-making. Education levels varied considerably, with a substantial proportion having primary to middle education, while a notable segment remained illiterate. This variation suggests differences in learning capacity and exposure to formal agricultural information.

Most respondents possessed small to medium landholdings, reflecting the prevailing agrarian structure of Central

India. Socio-economic status was largely distributed across low to medium categories, highlighting resource constraints faced by farm women. Social participation was generally low to moderate, indicating limited engagement with formal organizations and extension networks. These findings suggest that socio-economic and social factors play a significant role in shaping access to agricultural knowledge and training opportunities.

Table 1: Socio-Economic Profile of the Respondent Farm Women (n = 120)

S. No.	Socio-economic characteristics	Category	Frequency	Percentage (%)
1	Age (years)	Young ( $\leq 30$ )	32	26.67
		Middle (31-50)	50	41.67
		Old ( $> 50$ )	38	31.66
2	Education level	Illiterate	37	30.83
		Primary-Middle	47	39.17
		Higher education	36	30.00
3	Landholding size	Small	32	26.67
		Medium	52	43.33
		Large	36	30.00
4	Socio-economic status	Low	36	30.00
		Medium	42	35.00
		High	42	35.00
5	Social participation	Low	48	40.00
		Medium	38	31.67
		High	34	28.33

**Note:** Percentages are based on total respondents and may not total exactly 100 due to rounding.

#### 3.2 Level of Information and Information Gaps in Crop Production Technology

The assessment of information levels revealed that farm women possessed partial knowledge of traditional crop production practices but exhibited significant information gaps in modern and scientific technologies. Major gaps were observed in areas such as seed treatment, recommended fertilizer application, integrated pest and disease management, and post-harvest handling practices.

Relatively better awareness was found in basic operations like sowing methods and

manual weeding, which are traditionally performed by women. However, limited knowledge of input doses, pest identification, and scientific crop protection measures indicates inadequate exposure to extension advisories. These gaps can lead to improper application of technologies, increased production costs, and reduced crop productivity.

The results emphasize the need for targeted dissemination of technical information using simple language, demonstrations, and visual aids suitable for farm women with varying educational backgrounds.

Table 2: Level of Information and Information Gaps in Crop Production Technology among Farm Women (n = 120)

S. No.	Crop production practices	Fully informed (%)	Partially informed (%)	Not informed (%)	Information gap (%)
1	Selection of improved varieties	28.33	41.67	30.00	71.67
2	Seed treatment practices	20.00	35.00	45.00	80.00
3	Time and method of sowing	45.00	38.33	16.67	55.00
4	Recommended fertilizer dose	22.50	40.83	36.67	77.50
5	Nutrient deficiency symptoms	18.33	34.17	47.50	81.67
6	Weed management practices	40.00	37.50	22.50	60.00
7	Pest identification	16.67	33.33	50.00	83.33
8	Pest control measures	19.17	35.83	45.00	80.83
9	Disease identification	15.00	30.83	54.17	85.00
10	Disease control measures	17.50	32.50	50.00	82.50
11	Irrigation management	33.33	40.00	26.67	66.67
12	Post-harvest handling & storage	21.67	36.67	41.66	78.33

#### Note:

$Information\ gap\ (\%) = 100 - Fully\ informed\ (\%)$ .

Percentages are based on total respondents and rounded to two decimals.

### 3.3 Training Requirements of Farm Women in Crop Production Technology

Training need assessment revealed that farm women expressed a high demand for training in critical areas of crop production. Priority training needs were identified in pest and disease management, nutrient management, seed treatment, improved varieties, and post-harvest practices. Moderate training needs were reported for

irrigation management and weed control, while relatively lower needs were expressed for traditional farming activities already familiar to respondents.

The preference for practical, field-based, and season-specific training methods was clearly evident. Farm women favored hands-on demonstrations, on-farm training, and interaction with local extension personnel over classroom-based approaches. This indicates that experiential learning methods are more effective for enhancing understanding and adoption of technologies among farm women.

Table 3: Training Requirements of Farm Women in Crop Production Technology (n = 120)

S. No.	Crop production practices	High need (%)	Medium need (%)	Low need (%)	WMS	Rank
1	Pest and disease management	62.50	25.00	12.50	2.50	I
2	Nutrient management	58.33	28.33	13.34	2.45	II
3	Seed treatment practices	55.83	30.83	13.34	2.43	III
4	Selection of improved varieties	50.00	32.50	17.50	2.33	IV
5	Post-harvest handling & storage	48.33	34.17	17.50	2.31	V
6	Weed management	45.00	35.83	19.17	2.26	VI
7	Irrigation and water management	42.50	36.67	20.83	2.22	VII
8	Cropping pattern and rotation	38.33	40.00	21.67	2.17	VIII
9	Farm mechanization (women-friendly tools)	35.83	41.67	22.50	2.13	IX
10	Record keeping and farm management	33.33	42.50	24.17	2.09	X

#### Note:

- *Weighted Mean Score (WMS) was calculated using weights: High = 3, Medium = 2, Low = 1.*
- Higher WMS indicates higher perceived training requirement.

### 3.4 Relationship between Training Needs and Selected Variables

Correlation analysis revealed meaningful relationships between training needs and selected socio-personal and economic variables. Education level showed a negative relationship with training needs, suggesting that better-educated farm women had

relatively lower perceived gaps due to higher information access. Landholding size and social participation exhibited significant relationships with training needs, indicating that women with larger landholdings and higher social involvement were more inclined to seek advanced training.

Age showed a mixed relationship, where younger and middle-aged women expressed greater interest in training compared to older respondents. These findings highlight that training programs should be tailored according to the socio-economic characteristics of farm women to ensure effectiveness and inclusivity.

Table 4: Relationship between Training Needs and Selected Socio-Economic Variables of Farm Women (n = 120)

S. No.	Independent variables	Correlation coefficient (r)	Significance
1	Age	0.162	NS
2	Education	-0.386	**
3	Landholding size	-0.291	*
4	Socio-economic status	-0.274	*
5	Social participation	-0.342	**
6	Innovativeness	-0.318	**
7	Extension contact	-0.365	**

#### Note:

\* Significant at 0.05 level of probability

\*\* Significant at 0.01 level of probability

NS = Non-significant

### 3.5 Constraints Faced by Farm Women in Accessing Training

Farm women reported several constraints that limited their participation in training programs. Major problems included lack of time due to household responsibilities, limited mobility, inadequate information about training schedules, and distance to

training centers. Social restrictions and absence of women-friendly training environments were also reported as significant barriers.

These constraints underline the importance of organizing trainings at the village level, ensuring flexible timings, and involving female extension workers to enhance participation and comfort among farm women.

Table 5: Constraints Faced by Farm Women in Accessing Training Programmes (n = 120)

S. No.	Constraints	Frequency	Percentage (%)	Rank
1	Lack of time due to household responsibilities	92	76.67	I
2	Limited mobility / family restrictions	86	71.67	II
3	Inadequate information about training schedules	81	67.50	III
4	Distance to training centres	78	65.00	IV
5	Absence of women-friendly training environment	72	60.00	V
6	Lack of female extension workers	68	56.67	VI
7	Low confidence to participate	61	50.83	VII
8	Seasonal workload during peak agricultural operations	59	49.17	VIII
9	Financial constraints	54	45.00	IX
10	Lack of family support	49	40.83	X

#### Note:

Multiple responses were allowed; therefore, percentages may exceed 100.

### 3.6 Suggestions for Improving Training and Extension Services

Based on respondents' feedback, several measures were suggested to improve training effectiveness. These included organizing need-based and location-specific training programs, increasing the number of women-oriented extension activities, providing follow-up support after training, and ensuring the availability of practical learning materials. Strengthening self-help groups and local women institutions was also recommended to improve information flow and collective learning.

Table 6: Suggestions for Improving Training and Extension Services as Perceived by Farm Women (n = 120)

S. No.	Suggestions	Frequency	Percentage (%)	Rank
1	Organize need-based and location-specific training programmes	98	81.67	I
2	Conduct trainings at village level with flexible timing	94	78.33	II
3	Increase involvement of female extension workers	89	74.17	III
4	Emphasize practical, hands-on and demonstration-based training	87	72.50	IV
5	Provide timely information about training schedules	82	68.33	V
6	Ensure follow-up support after training programmes	79	65.83	VI
7	Use local language and simple training materials	76	63.33	VII
8	Strengthen self-help groups and women farmer collectives	72	60.00	VIII
9	Provide incentives such as travel allowance or childcare support	68	56.67	IX
10	Integrate digital tools (mobile advisories, videos) with training	61	50.83	X

**Note:** Multiple responses were allowed; therefore, percentages may exceed 100.

#### 4. Constraints Faced by Farm Women

The research found that there were a number of constraints that restricted the access of farm women towards agricultural training and extension services. The biggest limitation was lack of time given household demands where most of the respondents indicated that they struggled to find time to attend training programmes as well as house chores. This observation is an indication of the double burden that farm women experience and this tends to limit their time to engage in capacity building events.

The second significant limitation was observable in limited mobility and family limitations, meaning that there were still socio-cultural barriers that affect the access of women to formal training programmes. Also, a large percentage of farm women said they did not have the necessary information about training schedules, which implies the lack of communication between the extension agencies and the women farmers.

The other critical limitations were proximity to training facilities, the lack of training facilities that are friendly to women and the lack of trained personnel who are female because they minimized comfort, accessibility and participation. Low confidence to participate in the training sessions was another psychological barrier that limited participation in the training especially when it came to women who were less educated.

The attendance was also constrained by seasonal workloads on peak agricultural activities and financial limitations and some respondents cited lack of family support as limiting the attendance. All in all, these results point out that limitations experienced by farm women are not merely technical but also social, economic, and institutional. To overcome these barriers, extension strategies have to be flexible, village-level and gender-responsive and recognize the role of women, their responsibilities, and their constraints.

#### 5. Conclusion

The research exhibits a strong lack of knowledge on crop-production technology amongst the female farmers in Central India. Although they are actively involved in agrarian work, they are not exposed to evidence-based scientific knowledge and training, which also affects their productivity and empowerment. These deficits need to be rectified by use of tailor made educational programmes, enhanced extension contacts, and policies that are focused on women in order to ensure sustainable agricultural development.

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