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# Assessing the Perceived Training Needs of Farm Women on Modern Crop Technologies in Jhansi District

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## HIGHLIGHTS

- Crop storage and cattle production emerged as the most critical training needs, indicating a strong focus on post-harvest management and income diversification.
- The majority of farm women (73.34%) were found to have medium-level training needs, suggesting they possess baseline knowledge but require targeted skill upgradation.
- Psychological traits, especially scientific and risk orientation, were the most powerful predictors of training demand, outweighing many socio-economic variables.

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## ABSTRACT

The study assesses the perceived training needs of farm women in modern crop production technologies, situated in the complex agro-economic landscape of Jhansi district. Despite their critical role in agriculture, women farmers often face barriers to accessing technical knowledge, which limits their productivity and empowerment. Using a descriptive survey design with a sample of 120 farm women from Mauranipur block, this research employed a multi-stage sampling technique and a structured interview schedule to collect data during 2022-23. The results reveal that the highest training needs were in crop storage (WS=2.23) and cattle production (WS=2.23), followed by weed control (WS=2.18) and improved crop varieties (WS=2.18). The majority of women (73.34%) fell into the medium training-need category, indicating a widespread demand for skill upgradation. Psychological variables, particularly scientific orientation (r=0.548) and risk orientation (r=0.498), emerged as the strongest predictors of training need, surpassing most socio-economic factors. Education, landholding, and income also showed significant positive correlations. These findings underscore the necessity of designing gender-responsive, needs-based extension programs that not only address technical skill gaps but also foster psychological readiness for innovation, thereby enabling more inclusive and sustainable agricultural development.

## INTRODUCTION

Agriculture remains the backbone of India's economy, engaging approximately 50% of the country's workforce, predominantly women (Government of India, 2020). Despite their critical role in crop production, women farmers often face systemic barriers including limited access to knowledge, resources, and technological innovations that hinder their productivity and socio-economic empowerment (Agarwal, 2018). Addressing these gender disparities is essential not only for equitable development but also for achieving global food security and sustainable agricultural intensification (FAO, 2021). The adoption of modern crop technologies such as improved seed varieties, integrated pest management, and precision agriculture has revolutionized

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productivity in various regions (Pingali, 2019). However, the successful dissemination and adoption of these innovations heavily depend on farmers' access to appropriate information and training. For women, who constitute a significant yet often marginalized segment of the farming community, perceived training needs directly influence their capacity to leverage such technologies effectively (Mason et al., 2020). Recognizing and understanding these perceived needs is crucial for designing extension programs that are inclusive and tailored to their specific contexts. The trainers should be trained in skills of instruction andragogy in order to fulfill high expectations and lofty objectives of the training organisations (Nain & Kumar, 2001).

Jhansi district in Uttar Pradesh exemplifies the challenges and opportunities inherent in empowering women farmers through technological enhancement. Located in the Bundelkhand region, Jhansi faces arid climate conditions, water scarcity, and fragmented landholdings factors that complicate crop management but also underscore the importance of innovative, context-specific solutions (District Agriculture Office, Jhansi, 2022).

Despite these challenges, women play a pivotal role in crop cultivation and household food security, yet their access to modern technologies and training remains limited (Sharma & Tripathi, 2021). Existing studies highlight that perceived training needs among women farmers are often shaped by socio-economic factors, cultural norms, and information barriers (Khan et al., 2019). These perceptions influence their willingness to adopt new practices and determine the success of extension interventions. However, there remains a paucity of comprehensive assessments that explicitly explore these perceived needs within the local context of Jhansi, especially in light of rapidly evolving agricultural technologies.

The study aims to fill this gap by systematically evaluating the perceived training needs of farm women in Jhansi regarding modern crop production technologies. By identifying priority areas and underlying factors influencing these perceptions, the research seeks to inform targeted extension strategies that promote inclusivity, resilience, and sustainable productivity. Ultimately, empowering women with the requisite knowledge and skills can catalyse broader socio-economic transformations, fostering a more equitable and resilient agricultural sector that aligns with global sustainability goals (World Bank, 2022).

## METHODOLGY

The present study adopted a descriptive survey design to assess perceived training needs and constraints of farm women regarding modern crop production technologies and to elicit suggestions for improving training and subsequent enterprise establishment in the Bundelkhand context. The study was conducted during 2022–23 in the Mauranipur Block of Jhansi district, Uttar Pradesh. Among the eight blocks of the district, Mauranipur was purposively selected owing to the presence of the College of Agriculture serving as a major extension source that regularly conducts trainings for both men and women farmers, ensuring a relevant and accessible respondent pool and an active technology dissemination environment. The sampling frame comprised adult farm women engaged in crop production across selected villages of Mauranipur. A sample of 120 farm women was drawn using a multi-stage approach: villages were identified in consultation with local extension personnel, followed by systematic selection of eligible respondents from village lists. Data were collected through a structured interview schedule administered face-to-face by trained investigators in local language. The instrument captured socio-economic and farm characteristics, exposure to information sources, awareness and adoption of recommended practices, perceived training needs across crop technology domains (seed and varietal management, nutrient, soil health, IPM and plant protection, farm mechanisation, post-harvest, and value addition), constraints to training and adoption, preferred delivery modes, and suggestions.

Perceived training needs were measured on a three-point Likert continuum and summarised using item-wise means and a Weighted Score (WS) computed. The association between categorical respondent characteristics and high-need categories was tested using the Chi-square. To analyse differences in training usage patterns across different socio-economic groups, the Kruskal–Wallis H test (1952) was employed. This non-parametric test is suitable for comparing more than two independent groups when the data are ordinal or not normally distributed.

## RESULTS

Assessment of farm women's training needs across major components of crop production revealed distinct patterns of priority. Training needs related to improved agricultural practices were consistently high. Respondents most frequently identified improved crop varieties (WS = 2.18), seed treatment (WS = 2.13), and optimal sowing methods (WS = 2.08) as essential or most essential. Land preparation, seed rate, spacing, and fertilizer application were also rated as important, with weighted scores ranging from 1.68 to 2.06. Training needs in plant protection showed similarly elevated demand. Weed control registered one of the highest scores (WS = 2.18), while disease and insect control were widely rated as essential (WS = 2.06 and 1.92, respectively). Integrated pest- and disease-management practices were also recognized as necessary, each with weighted scores close to 2.00. For agricultural implements, respondents expressed substantial need for training in the use of modern ploughing tools (WS = 2.16), followed by implements related to sowing, irrigation pumps, harvesting, and winnowing (WS ≈ 1.93–1.98). These results indicated a broad interest in mechanisation-related skills. The highest overall training requirement emerged in the area of crop storage (WS = 2.23), signalling persistent challenges in post-harvest handling and loss reduction. Training needs for soil conservation practices were also notable. Crop rotation displayed a relatively high score (WS = 2.16), followed by mulch formation (WS = 2.04) and strip farming (WS = 1.98), suggesting growing recognition of sustainable land-management techniques. Across the dimension of efficient use of conserved water, respondents prioritised selection of suitable crop varieties (WS = 2.15) and adoption of proper crop protection measures (WS = 2.20). Fertiliser management, weed control, and spacing also appeared as recurring training needs within this category. In allied activities, cattle production (WS = 2.23) and poultry farming (WS = 2.16) were the most prominent areas of interest, followed by horticulture and other small enterprises (WS

**Table 1.** Training needs of farm women in the main and sub-areas of crop production technology

| S.No. | Areas of training | Level of training needs Weighted Score | Overall Weighted Score |
|---|---|---|---|
| A | Improved agricultural practices | | |
| 1. | Preparation of land | 1.68 | 1.98 |
| 2. | Improved varieties of crops | 2.18 | |
| 3. | Sowing of time | 1.90 | |
| 4. | Seed treatment | 2.13 | |
| 5. | Seed rate | 2.00 | |
| 6. | Method of sowing | 2.08 | |
| 7. | Plant to plant, line to line distance and depth of seed | 1.90 | |
| 8. | Quantity of fertiliser and method of application | 1.96 | |
| 9. | Utilisation method of culture and PSB | 2.06 | |
| 10. | Method of preparation of bed | 2.00 | |
| B | Plant protection measure | | |
| 1. | Weed control | 2.18 | 2.03 |
| 2. | Disease control | 2.06 | |
| 3. | Insect control | 1.92 | |
| 4. | Integrated pest management (IPM) | 1.94 | |
| 5. | Integrated disease management (IDM) | 1.99 | |
| C | Improved agricultural implements | | |
| 1. | Modern implement for ploughing | 2.16 | 1.98 |
| 2. | Modern implement for sowing | 1.97 | |
| 3. | Diesel pump for irrigation | 1.93 | |
| 4. | Hand-drawn implement | 1.98 | |
| 5. | Modern implementation forharvesting and winnowing | 1.98 | |
| 6. | Tractor | 1.93 | |
| D | Crop storage | | |
| 1. | Storage | 2.23 | 2.23 |
| E | Agronomical practices for soil conservation | | |
| 1. | Contour farming | 1.89 | 1.98 |
| 2. | Ploughing operations | 1.93 | |
| 3. | Mulch formation | 2.04 | |
| 4. | Crop rotation | 2.16 | |
| 5. | Strip farming | 1.98 | |
| 6. | Cover crops | 1.88 | |
| F | Capable use of conserved water | | |
| 1. | Selection of the proper crop and its variety | 2.15 | 2.04 |
| 2. | Timely sowing and plant to plant proper plant-to-plant distance | 1.88 | |
| 3. | Use of recommended fertiliser | 2.08 | |
| 4. | Timely weed control | 1.93 | |
| 5. | Proper plant protection measures | 2.20 | |
| G | Allied activities | | |
| 1. | Cattle production | 2.23 | 2.08 |
| 2. | Poultry farming | 2.16 | |
| 3. | Fisheries | 1.88 | |
| 4. | Horticulture | 2.16 | |
| 5. | Bee keeping | 1.92 | |
| 6. | Other enterprise | 2.08 | |

≈ 2.08–2.16). Fisheries received comparatively lower interest (WS = 1.88).

Analysis of the overall training needs of farm women showed a clear concentration in the medium-need category, as shown in Table 2. Most respondents (73.34%) fell within the medium training-need range, indicating that the majority required a moderate level of support to enhance their crop production skills. A smaller proportion exhibited low training needs (16.66%), while only 10.00% reported high training needs (>38). These patterns suggested that although training demand was widespread, the intensity of need was generally moderate across the population.

Table 3 showed that several socio-economic and psychological characteristics were meaningfully related to the training needs of farm women in crop production. Age was positively associated with

**Table 2.** Overall training needs of farm women on crop production

| Categories | Percentage |
|---|---|
| Low <29 | 16.66 |
| Medium 29-38 | 73.34 |
| High >38 | 10.00 |
| Total | 100 |

Mean=33.775, S.D. 4.43

training need ($r = 0.300$; $\chi^2 = 82.30$; $p < 0.001$), indicating that older respondents tended to report higher training requirements. Education also had a positive relationship ($r = 0.336$; $\chi^2 = 19.77$; $p = 0.003$), suggesting that more educated women expressed greater demand for training. Although the correlation between family size and training need was very weak ($r = 0.062$), the association reached statistical significance ($\chi^2 = 148.60$; $p < 0.001$), implying a detectable – if small – link in the sample. Caste was not related to training need ($r = -0.102$; $\chi^2 = 1.85$; $p = 0.397$). Land holding showed a notable positive relationship with training need ($r = 0.385$; $\chi^2 = 137.00$; $p < 0.001$), and housing pattern was also positively associated ($r = 0.204$; $\chi^2 = 47.45$; $p < 0.001$). Annual income demonstrated a significant positive correlation ($r = 0.248$; $\chi^2 = 168.80$; $p < 0.001$), indicating that women with higher incomes reported greater training needs. Among the psychological measures, scientific orientation had the strongest association with training need ($r = 0.548$; $\chi^2 = 23.80$; $p < 0.001$), followed by risk orientation ($r = 0.498$; $\chi^2 = 61.30$; $p < 0.001$). Economic motivation also correlated positively, though to a lesser extent ($r = 0.192$; $\chi^2 = 37.60$; $p < 0.001$).

Table 4 indicated that the training needs of farm women varied significantly across some of the independent variables. Age did not exhibit any significant variation in training needs among different groups ($K = 23.200$; $p = 0.229$). Similarly, the size of the family and housing pattern showed no significant differences ($K = 19.705$; $p = 0.412$ and $K = 18.658$; $p = 0.479$, respectively). Education, however, showed a significant difference in training needs among its categories ($K = 30.708$; $p = 0.043$), indicating that women with different educational backgrounds expressed varying levels of training requirement. Caste also recorded a statistically significant variation ($K = 35.069$; $p = 0.014$), suggesting social grouping had an influence on training needs. Landholding showed a marginally significant difference ($K = 28.763$; $p = 0.070$), implying that farm size tended to shape training requirements, although the relationship was not strong. Annual income displayed a similar pattern with a near-significant association ($K = 28.347$; $p = 0.149$).

Among the psychological variables, scientific orientation showed a highly significant variation in training needs across groups ($K = 47.845$; $p < 0.001$). Risk orientation also varied strongly and significantly ($K = 48.609$; $p < 0.001$). Economic motivation exhibited a significant difference as well ($K = 40.692$; $p < 0.001$), indicating that women with higher motivation levels tended to express greater need for training in crop production.

**Table 4.** Kruskal–Wallis H test of independent variables with training needs of farm women on crop production

| Variables | K-Statistic | P-value |
|---|---|---|
| Age | 23.200 | 0.229 |
| Education | 30.708* | 0.043 |
| Size of family | 19.705 | 0.412 |
| Caste | 35.069* | 0.014 |
| Land holding | 28.763* | 0.070 |
| Housing pattern | 18.658 | 0.479 |
| Annual Income | 28.347* | 0.149 |
| Scientific orientation | 47.845** | <0.001 |
| Risk orientation | 48.609** | <0.001 |
| Economic motivation | 40.692** | <0.001 |

## DISCUSSION

The assessment of farm women's training needs across key components of crop production revealed clear patterns of priority, with a pronounced emphasis on foundational agronomic practices. Training needs under improved agricultural practices consistently registered moderate to high intensity. Women expressed the strongest requirement for knowledge related to improved crop varieties, seed treatment, and scientific methods of sowing, which recorded some of the highest weighted scores in this category. This pattern suggested that respondents sought skill enhancement in areas directly influencing crop establishment and early growth. Similar observations have been reported in earlier studies, where women farmers identified varietal selection, seed management, and sowing techniques as primary domains requiring technical support (Kher et al., 2004; Bhagat & Nain, 2005; Rani & Rao, 2014). Plant protection emerged as another major area of concern. Weed control exhibited some of the highest training scores, followed by disease and insect management. The elevated demand for training in IPM and IDM reflected an increasing awareness of sustainable plant protection among women farmers. These results aligned with prior research emphasizing women's growing involvement in crop health

**Table 3.** Relationship between independent variables with training needs of farm women on crop production

| Variables (Unit) | Training need of 'r' | Chi-square ($\chi^2$) | P-Value |
|---|---|---|---|
| Age (Years) | 0.300** | 82.300 | <0.001 |
| Education | 0.336** | 19.767 | 0.003 |
| Size of family (Numbers) | 0.062 | 148.600 | <0.001 |
| Caste | -0.102 | 1.850 | 0.397 |
| Land holding (ha) | 0.385** | 137.00 | <0.001 |
| Housing pattern (Kaccha=1; Pacca= 2) | 0.204* | 47.450 | <0.001 |
| Annual Income (Rs.) | 0.248* | 168.800 | <0.001 |
| Scientific orientation (Score) | 0.548** | 23.80 | <0.001 |
| Risk orientation (Score) | 0.498** | 61.30 | <0.001 |
| Economic motivation (Score) | 0.192* | 37.60 | <0.001 |

management and their need for practical training to reduce crop losses (Dhaka & Chayal, 2010). Training needs related to agricultural implements also indicated substantial gaps, particularly for modern ploughing tools, sowing implements, and irrigation pumps. These findings suggested that while mechanization has expanded in rural areas, women remain less exposed to its technical aspects. Earlier studies also noted similar constraints, wherein access to and familiarity with mechanized tools remained limited for farm women despite mechanization being crucial for labour efficiency (Rani & Rao, 2014). Crop storage recorded the highest overall training score, highlighting persistent challenges in post-harvest handling and loss reduction. Post-harvest losses continue to disproportionately affect smallholders, and women who are often responsible for storage have been shown to require targeted capacity-building interventions (Sharma & Singh, 2016). Soil conservation practices such as crop rotation, mulch formation, and strip farming also received considerable attention, indicating that respondents were increasingly conscious of sustainable farming approaches (Singh et al., 2009). Training needs were also pronounced in the efficient use of conserved water. Women prioritized the selection of suitable crop varieties and appropriate plant protection measures under limited water conditions. Similar findings have been reported in studies where water-saving practices and timely crop management were viewed as essential for climate-resilient production (Mukherjee & Jha, 2024). In allied activities, cattle production and poultry farming were among the top priorities, reflecting their role in income diversification and household nutrition. Other enterprises such as horticulture and beekeeping also showed substantial demand, consistent with previous reports highlighting women's interest in multi-enterprise integration for livelihood stability (Nain & Chandel, 2010; Miller-Klugesherz & Sanderson, 2023). The overall training-need categorisation demonstrated that a majority of farm women fell into the medium training-need group. This indicated that while baseline knowledge existed, significant gaps persisted in technical and managerial aspects of crop production. Similar patterns of moderate but widespread training needs have been noted in earlier extension studies involving women farmers (Kumar et al., 2007; Sharma & Singh, 2016).

Correlation analysis showed that socio-economic variables particularly education, landholding size, housing pattern, and annual income had meaningful positive relationships with training need. Women with higher education levels and larger operational holdings tended to express greater interest in acquiring technical knowledge, consistent with the diffusion and adoption literature (Singh et al., 2009). Income also showed a strong association, supporting earlier findings that financially secure households are more inclined to invest in knowledge acquisition and skill development (Kumar et al., 2020).

Psychological variables emerged as the strongest predictors of training need. Scientific orientation, risk orientation, and economic motivation all showed significant positive associations, a trend echoing previous research linking psychological traits with learning interest and innovation adoption (Sonu & Jha, 2025). The Kruskal–Wallis analysis further revealed significant group differences across education, caste, scientific orientation, risk orientation, and economic motivation, suggesting that socio-psychological differentiation strongly shaped training demand. Similar evidence has been documented in studies exploring determinants of women's participation in agricultural extension programmes (Miller-Klugesherz & Sanderson, 2023).

## CONCLUSION

This study reveals that farm women in Jhansi district are not passive recipients of aid, but strategic managers seeking specific skills to enhance their livelihoods. Their demand for training in crop storage, livestock care, and core agronomic practices demonstrates a holistic vision for integrated, sustainable farming. The most powerful finding is that a woman's internal drive her scientific curiosity and willingness to take calculated risks is a stronger predictor of her training needs than many external factors. In light of these findings, it is recommended that agricultural extension agencies design gender-sensitive programs that are tailored to the specific, expressed needs of women. These programs should prioritize drudgery-reducing and income-enhancing technologies, particularly in post-harvest management and mechanisation. To ensure equitable access, training should be delivered through inclusive formats that accommodate the time and financial constraints of women from diverse socioeconomic backgrounds. By recognising and nurturing the inherent psychological readiness of women to innovate, and by addressing the structural barriers they face, India's agricultural extension system can unlock the immense potential of its women farmers, paving the way for a more productive, sustainable, and equitable agricultural future.

## DECLARATIONS

Ethical Approval and Consent to Participate: Our study did not require ethical approval, and all the authors agree.

Availability of supporting data: Supporting data are available upon request.

Competing interests/Author contributions: No competing interests were declared.

Authors' Contribution: Conceptualisation of research (YP, AKB); Designing of the experiments (YP, AKB); Contribution of experimental materials (YP, AKB); Execution of field survey and data collection (YP, YK); Analysis of data and interpretation (KS); Preparation of manuscript (KS).

Conflict of interest: No conflicts of interest among the authors

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