**Assessment of Knowledge level of Farmers on Integrated Farming System in Rewa Division of Madhya Pradesh, India**

**Abstract**

This study explores farmers’ knowledge regarding the Integrated Farming System (IFS) model in Rewa Division, Madhya Pradesh, focusing on two districts—Satna and Rewa—selected for their prior engagement with IFS. A random sample of 320 farmers from four blocks and 16 villages was interviewed using a rigorously designed and pre-tested schedule. Responses were scored using a three-continuum scale (2 =fully/complete, 1 =partial and 0= no knowledge), and knowledge levels were classified into low, medium, and high based on mean and standard deviation. Quantitative analysis employed frequency, percentage, arithmetic mean, standard deviation, and chi‑square tests. Results indicate that 59.07% of farmers had medium knowledge, 35% low, and only 5.93% high knowledge. Many farmers understood core IFS principles such as resource recycling and year-round income. Chi-square analysis revealed significant associations between knowledge levels and factors like age, education, farming experience, landholding size, mass‑media exposure, extension contacts, social participation, and innovativeness. These findings suggest that both experiential factors and information exposure play key roles in IFS knowledge among farmers.

Keyword: *Integrated Farming System, Knowledge, Innovativeness, Information, Sustainable Farming.*

**Introduction**

Agriculture faces numerous challenges in the 21st century, including the need to produce more food and fiber to feed a growing population with a shrinking rural labour force (Singh *et al.,* 2024; Gautam *et al.,* 2024), more feed stocks for a potentially huge bioenergy market (Borlaug and Dowswell, 2003). This contributed to overall development in the many agriculture-dependent developing countries by adopting more efficient and sustainable production methods in addition to adapting to climate change (Vyas *et al.,* 2025). Climate change possess major challenges which can be tackle with the proper source of information to the farmers (Saikanth *et al.,* 2023).

Over time, researchers and farmers have placed a greater emphasis on crop output while ignoring the Integrated Agricultural System. This poses a serious threat to the agricultural industry's long-term profitability and existence. At this moment, lowering the average land holding (2.00 ha) would result in substantial decrease in the productivity (Vyas *et al.,* 2025). If the current trend continues, according to the 2010-11 Agriculture Census, the average landholding size is projected to shrink to 0.32 hectares by 2030 (PK and Manikandan, 2024; Singh *et al.,* 2023). Addressing this challenge requires a focused and unified approach to tackle the growing issues in agriculture. Since over 85 percent of the farming population consists of small and marginal farmers (Goverdhan *et al.,* 2018), it is essential to implement effective strategies and adopt modern agricultural technologies that can boost income levels and create substantial employment opportunities (Yadav *et al.,* 2023).

An Integrated Farming System (IFS) is essential to meet the household needs for food (such as cereals, pulses, oilseeds, milk, fruits, honey, meat, etc.), as well as feed, fodder, and fiber (Khobragade *et al.,* 2021). Although many farmers have been practicing agriculture for generations, their focus has typically been on individual components rather than adopting a holistic, integrated approach (Darnhofer *et al.,* 2010). Various initiatives have been undertaken by ICAR and state agricultural universities to enhance the productivity of individual farming components—such as crops, dairy, livestock, poultry, piggery, goat rearing (Singh *et al.,* 2025), duck farming, beekeeping, sericulture, horticulture, and mushroom cultivation (Bayskar, 2024; Verma *et al.,* 2025). However, these efforts often lack integration under a unified farming system. In an ideal integrated model, the output of one component serves as the input for another, creating strong complementary relationships among enterprises. Initial research findings suggest that such integration can boost overall productivity by 30–50 percent (Gill, 2009), depending on the type and number of enterprises involved and how well they are managed.

National Mission for Sustainable Agriculture (NMSA) was launched in 2015. This mission aims to boost agricultural productivity, particularly in rainfed regions, by emphasizing integrated farming, efficient water use, soil health management, and the coordinated conservation of resources (Singh *et al.,* 2024; Gupta *et al.,* 2021). Considering the current situation, adopting an Integrated Farming System approach is recommended over relying solely on field crop cultivation (Rana and Chopra, 2013). This strategy can help compensate for potential crop losses and provide farmers with additional income through various other farm-based enterprises.

IFS is the best solution for small and marginal farmers. It improves both the nutritional and economic well-being of farm households, creates more job opportunities, and maximizes the use of farm resources, leading to higher productivity. In the Satna and Rewa districts, Integrated Farming Systems are being practiced as part of sustainable livelihood initiatives; however, no comprehensive and systematic study has been conducted to date.

**Methodology**

The study took place in Madhya Pradesh, which is divided into ten administrative divisions: Jabalpur, Indore, Gwalior, Chambal, Bhopal, Ujjain, Sagar, Rewa, Narmadapuram, and Shahdol. For this research, we focused on the Rewa Division, which consists of five districts—Rewa, Satna, Sidhi, Singrauli, and Mauganj. From these, Rewa and Satna were selected based on earlier studies that highlighted their successful implementation of the Integrated Farming System (IFS) model. Within Satna district (which comprises eight blocks), two—Maihar and Majhgawan—were chosen for the study. In Rewa district, which has ten blocks, we selected Rewa and Jawa blocks based on farmers’ adoption of the IFS model. For each block, a list of villages was created with input from block officials, focusing on those with higher IFS adoption. Using a random-number table, four villages from each block (16 villages) were randomly selected. In each chosen village, we prepared respondent lists with the help of the Gram Pradhan, targeting farmers who had been practicing the IFS model for at least the last three years. 20 farmers were selected from each village. A total of 320 farmers were selected for the investigation.

Since all events had already taken place, an ex-post-facto design was employed. This approach, recommended by Kerlinger (1973), is suitable for studies where the researcher analyzes existing outcomes and identifies their probable causes without manipulating variables.

To evaluate farmers’ knowledge of the Integrated Farming System (IFS) model, a well-designed questionnaire was developed, featuring both multiple-choice and open-ended questions. Each correct response was awarded one point, while incorrect or unanswered questions received zero, creating a clear and objective scoring system. After collecting and tabulating responses, we calculated the total knowledge score for each participant. Based on the overall mean and standard deviation of these scores, respondents were classified into three categories—low, medium, or high knowledge levels—ensuring a precise and statistically grounded assessment of their understanding of the IFS model.

Data collection was conducted using a pre-structured interview schedule developed through prior research and expert consultation. The schedule underwent several rounds of expert review for clarity and relevance, and was pilot-tested with 40 non-sampled farmers in the same area. After refining the instrument, we obtained approval from our advisor and experts and proceeded with personal interviews to gather responses from the farmers.

Finally, the collected data were tabulated and analyzed according to the study’s objectives, employing statistical tools such as frequency, percentage, arithmetic mean, standard deviation, chi-square tests, and other relevant methods to draw meaningful conclusions.

**Frequency and Percentage**

Frequency refers to the number of times a particular value or category appears in a data set. It is commonly used in frequency distributions to show how often each data point or range of data points occurs. Percentage is a way of expressing a number as a fraction of 100. It is often used to compare proportions, and is calculated by dividing the part by the whole and multiplying by 100.

P=(n/N) x 100

Where,

n= Frequency of a particular cell

N= Total no. of respondents in that particular cell

P= Percentage

**Arithmetic Mean**

The arithmetic mean, commonly known as the average, is the sum of all values in a data set divided by the number of values. The formula is:



Where,

 = Average number or mean value

∑X = The total no. of the scores obtained by respondents

N = The total no. of respondents

**Standard deviation:**

Standard deviation is a measure of the amount of variation or dispersion in a set of values. A low standard deviation indicates that the values tend to be close to the mean, while a high standard deviation indicates that the values are spread out.



Where,

σ = Statical standard deviation

d = Deviation of variables mean

n= Total no. of items

**Chi-Square**

Chi-Square was used with a .05 level ofsignificance. The χ2 test was first used by Karl Pearson in the year 1900.The χ2 test is one of the simplest and most widely non-parametric test in statistical works. The equation for Chi-Square (χ2) is stated as follows:

Here,

f0 = In the occurrence of frequency of observed or an experimental determined fact

fe = expected frequencies,

fο = the occurrence of independent hypothesis

The probable frequency’s Ei for circulation a given row.

Ei =

*Row total =* The sum of all observation frequency in a given row

*Column total* = the sum of the observed frequency in a given column

*Grand total* = the total no. of observations

**Results & Discussion**

The table 1 shows that, the farmers contacted different organizations. Veteniary officer is the most contacted, with 43.34% of farmers saying they reach out to them always. Looking at "sometimes" contacts, NGOs leads at 95.89%, while Scientist of KVK 62.88% and Veteniary officer is next at 45.33%. followed by Scientist of SAUs at 22.22%, and Agriculture officer at 20.89% sometimes contacted. For "never" contacts, Agriculture officer top the list at 79.11%, indicating that many people don't reach out to them, followed by Scientist of SAUs at 77.78%, Scientist of KVK at 37.12%, Veterinary officer at 11.33% and NGOs at 4.11%. and while Live department official and Input Dealers were never contact at 100%. Overall, Veterinary officer is the most engaged, while Agriculture officer is the least contacted. Thus, it can be inferred that Veterinary officer and NGOs were found to be main sources of extension participation for receiving information about farming practices. The conclusions are contradicted with the result of Prasad (2019), who reported majority of the respondents had contact Fertilizers/ seed storage and Gram Pradhan for obtain information.

**Table 1 Distribution of farmers on the basis of extension contact**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SI. No.** | **Organization** | **Frequency Contact** | | | | | |
| **Always** | | **Sometimes** | | **Never** | |
| **f** | **%** | **f** | **%** | **f** | **%** |
| 1. | Scientist of SAUs | 0 | 0.00 | 71 | 22.22 | 249 | 77.78 |
| 2. | Scientist of KVK | 0 | 00.00 | 201 | 62.88 | 119 | 37.12 |
| 3. | NGOs | 0 | 00.00 | 307 | 95.89 | 13 | 4.11 |
| 4. | Veteniary officer | 139 | 43.34 | 145 | 45.33 | 36 | 11.33 |
| 5. | Agriculture officer | 0 | 0.00 | 67 | 20.89 | 253 | 79.11 |
| 6. | Live department official | 0 | 0.00 | 0 | 0.00 | 320 | 100.00 |
| 8. | Input Dealers | 0 | 0.00 | 0 | 0.00 | 320 | 100.00 |

The table 2 shows that, the farmers used different types of mass media. Viewing TV is the most popular, with 85.33% of farmers watching it regularly, while 14.67% watch occasionally. Reading newspaper is next, with 45.66% tuning in regularly and 38.78% occasionally, but 15.56% never reading. Listening radio comes in third, with 0.33% listening them regularly, 52.45% occasionally, and 47.22% not listening them at all. Lastly, reading farm magazines is the least common, with only 20.00% reading them occasionally, and a high 80.00% never engaging with them. Overall, TV is the most frequently accessed medium, while farm magazines are the least popular. Thus, it can be concluded that watching TV and reading newspaper were the main ways farmers got early information about new technology or farming practices. The results were in accordance with the findings of Prasad (2019).

As per the findings, the overall contact level with most organizations was categorized as low, with only a few showing medium levels of interaction. Specifically, the Veterinary Officers, KVK scientists, and NGOs were identified as having a medium level of contact with farmers. The relatively higher engagement with Veterinary Officers may be attributed to the immediate and practical support they provide in managing livestock health—an integral part of the Integrated Farming System (IFS). Similarly, KVKs (Krishi Vigyan Kendras) play a frontline role in transferring agricultural technologies to farmers, which could explain their moderate level of interaction. NGOs, though often operating at a local level, may also engage in awareness-building and capacity development, contributing to their medium contact status.

In contrast, Scientists of SAUs, Agriculture Officers, Livestock Department Officials, and Input Dealers were found to have low contact levels. The low interaction with Scientists of SAUs and Agriculture Officers may be due to limited outreach programs or inadequate extension efforts. The complete absence of contact with Livestock Department Officials and Input Dealers points toward a serious communication and service delivery gap that needs urgent attention.

**Table 2 Distribution of farmers on the basis of mass media exposure**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **SI. No.** | **Mass Media** | **Regularly** | | **Occasionally** | | **Never** | |
| **f** | **%** | **f** | **%** | **f** | **%** |
| 1. | Listening to radio | 1 | 0.33 | 168 | 52.45 | 151 | 47.22 |
| 2. | Viewing TV | 273 | 85.33 | 47 | 14.67 | 0 | 0.00 |
| 3. | Reading newspaper | 146 | 45.66 | 124 | 38.78 | 50 | 15.56 |
| 4. | Reading farm magazines | 0 | 0.00 | 64 | 20.00 | 256 | 80.00 |

The table 3 presents ranking wise knowledge of farmers about Integrated Farming System (IFS) based on their mean scores. The highest-ranked practice is in IFS, balanced use of farm waste is possible, crop residues are wisely used to solve energy problems, The conversion of one cropping system into an IFS result in proper conservation of natural, Secondary waste generated from diary agri business, to increase soil fertility with a mean score of 2.00, indicating its strong effectiveness or preference. Following closely is IFS can provide balanced nutritious food to farmers’ family through various agri-enterprises at 1.89, ranked IV. The V rank is held by Various agro-based occupations in IFS help in increasing the annual income of the farmers with a mean score of 1.87, IFS lead to sustainable production with proper utilization of available resources without any harm to the environment and land at 1.85 with rank VI. while IFS generate financial resources around the year from one or integrated another agribusiness comes in VII at 1.84. IFS can reduce partial unemployment in rural areas and IFS increases crop production rank VIII and IX, with mean scores of 1.82 and 1.81, respectively. Various agro based occupations in the IFS guarantees income in the uncertainty of agricultural production held rank X with a mean score of 1.80, Do you know meaning of IFS possess rank XI with 1.77 mean score. While IFS save costs and increase productivity by recycling resources available in one agribusiness to another held rank XII with mean score 1.75 and IFS improve the living standards has rank XIII at 1.69. Finally, IFS combine cropping system with agro based subsidies occupations ranks XIV and IFS can keep cash in the hands of farmers throughout the year rank XV with the lowest mean score of 1.68 and 1.29 respectively, suggesting it may be less favoured or effective compared to the other practices.

**Table 3 Distribution of farmers according to their knowledge about Integrated Farming System (IFS)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **SI.No.** | **Questions** | **Knowledge** | | | | | | | |
| **Complete** | | **Partial** | | **No** | | **Mean score** | **Rank** |
| **f** | **%** | **f** | **%** | **f** | **%** |
|  | Do you know meaning of IFS? | 249 | 77.78 | 71 | 22.22 | 0 | 00.00 | 1.77 | XI |
|  | IFS combine cropping system with agro based subsidies occupations | 221 | 69.11 | 99 | 30.89 | 0 | 00.00 | 1.68 | XIV |
|  | IFS save costs and increase productivity by recycling resources available in one agribusiness to another. | 242 | 75.66 | 78 | 24.34 | 0 | 00.00 | 1.75 | XII |
|  | Various agro-based occupations in IFS help in increasing the annual income of the farmers | 279 | 87.22 | 41 | 12.78 | 0 | 00.00 | 1.87 | V |
|  | IFS generate financial resources around the year from one or integrated another agribusiness. | 274 | 85.56 | 43 | 13.44 | 3 | .9 | 1.84 | VII |
|  | Various agro based occupations in the IFS guarantees income in the uncertainty of agricultural production. | 257 | 80.33 | 63 | 19.67 | 0 | 00.00 | 1.80 | X |
|  | IFS can reduce partial unemployment in rural areas | 264 | 82.55 | 56 | 17.45 | 0 | 00.00 | 1.82 | VIII |
|  | IFS can provide balanced nutritious food to farmers’ family through various agri-enterprises | 287 | 89.67 | 33 | 10.33 | 0 | 00.00 | 1.89 | IV |
|  | IFS can keep cash in the hands of farmers throughout the year. | 168 | 52.55 | 77 | 24.11 | 75 | 23.34 | 1.29 | XV |
|  | The conversion of one cropping system into an IFS result in proper conservation of natural. | 320 | 100.0 | 0 | 00.00 | 0 | 00.00 | 2.00 | I |
|  | Secondary waste generated from diary agri business, to increase soil fertility. | 320 | 100.0 | 0 | 00.00 | 0 | 00.00 | 2.00 | I |
|  | IFS improve the living standards. | 222 | 69.34 | 98 | 30.66 | 0 | 00.00 | 1.69 | XIII |
|  | IFS increases crop production. | 261 | 81.66 | 59 | 18.34 | 0 | 00.00 | 1.81 | IX |
|  | In IFS, balanced use of farm waste is possible, crop residues are wisely used to solve energy problems. | 320 | 100 | 0 | 00.00 | 0 | 00.00 | 2.00 | I |
|  | IFS lead to sustainable production with proper utilization of available resources without any harm to the environment and land. | 275 | 85.89 | 45 | 14.11 | 0 | 00.00 | 1.85 | VI |

The table 4 show that the maximum of farmers 59.07% had medium level of knowledge about integrated farming system (IFS)followed by 35.00% low level of knowledge and 5.93% of the farmers had high knowledge regarding Integrated Farming System (IFS). These findings align with the result of Gogoi *et al.,* (2023); Patel *et al.,* (2014); Sharma *et al.,* (2008); Khokhar (2007).

**Table 4 Distribution of farmers according to their overall knowledge about Integrated Farming System (IFS)**

|  |  |  |  |
| --- | --- | --- | --- |
| **SI. No.** | **Category** | **Frequency** | **Percent** |
| **1.** | Low (up to 26) | 112 | 35.00 |
| **2.** | Medium (26 to 29) | 189 | 59.07 |
| **3.** | High (above 29) | 19 | 5.93 |
|  | Total | 320 | 100.00 |

*Mean= 27.12, SD= 1.60*

The results of the chi-square analysis in table 5 revealed that several socio-personal and communication variables had a significant association with the respondents' knowledge regarding the practice under study. Specifically, variables such as age (χ² = 10.16, *p* = 0.038), education level (χ² = 15.89, *p* = 0.003), farming experience (χ² = 11.77, *p* = 0.019), landholding size (χ² = 11.89, *p* = 0.018), mass media exposure (χ² = 12.35, *p* = 0.014), extension contact (χ² = 15.48, *p* = 0.003), social participation (χ² = 18.59, *p* = 0.001), and innovativeness (χ² = 9.51, *p* = 0.048) were found to be significantly associated with the knowledge level of the respondents regarding Integrated farming system. Similar findings also reported by Gogoi *et al.,* (2023); Ashraf *et al.,* (2020)*.* Among these, social participation demonstrated the strongest association, indicating that farmers who are more actively involved in community groups and social activities tend to possess better knowledge about integrated farming system. This may be attributed to increased opportunities for peer learning, exchange of ideas, and collective exposure to information through social networks. Education also showed a strong positive association, suggesting that higher educational attainment enhances farmers’ ability to comprehend and absorb agricultural innovations. Similarly, extension contact played a key role, highlighting the importance of regular interaction with agricultural advisors and field-level officials in improving awareness levels.

Furthermore, farmers with more farming experience and larger landholdings appeared to be more knowledgeable in Integrated farming system possibly due to their longer exposure to agricultural practices and a greater incentive to adopt Integrated farming system. The positive influence of mass media exposure and innovativeness further suggests that access to information and a willingness to try new ideas are important drivers of knowledge acquisition. On the other hand, certain factors—such as caste, family size, family type, housing pattern, primary occupation, annual income, economic motivation, and risk orientation did not show any significant association with knowledge levels (p > 0.05). This finding implies that demographic and economic attributes may not be as influential as educational, experiential, and social factors when it comes to understanding and adopting agricultural practices.

**Table 5 Association of Independent Variable with Knowledge of farmers about Integrated Farming System (IFS).**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **SI. No.** | **Independent Variables** | **Pearson Chi-Square** | | |
| **Calculated**  **Value** | **Degree of freedom** | **P-Value** |
| 1. | Age | 10.159 | 4 | 0.038\* |
| 2. | Education | 15.888 | 4 | 0.003\*\* |
| 3. | Caste | 3.137 | 4 | 0.535 |
| 4. | Farming experiences | 11.770 | 4 | 0.019\* |
| 5. | Family size | 5.606 | 4 | 0.231 |
| 6. | Type of family | 2.140 | 2 | 0.343 |
| 7. | Housing Pattern | 2.339 | 2 | 0.311 |
| 8. | Occupation | 2.649 | 4 | 0.618 |
| 9. | Size of Land holding | 11.885 | 4 | 0.018\* |
| 10. | Annual Family Income | 9.079 | 4 | 0.059 |
| 11. | Mass media exposure | 12.348 | 4 | 0.014\* |
| 12. | Extension contacts | 15.482 | 4 | 0.003\*\* |
| 13. | Social participation | 18.592 | 4 | 0.001\*\* |
| 14. | Economic Motivation | 3.130 | 4 | 0.536 |
| 15. | Risk orientation | 1.994 | 4 | 0.737 |
| 16. | Innovativeness | 9.507 | 4 | 0.048\* |

**Conclusion**

The present study highlights that while a majority of farmers in Rewa Division possess a medium level of understanding of IFS concepts, only a small fraction demonstrate high knowledge. Core principles such as the efficient use of farm residues, conservation practices, and diversified income generation are well-recognized. However, awareness gaps persist in areas like the consistent maintenance of cash reserves throughout the year.

The statistically significant relationships between knowledge and independent variables such as education, experience, land size, mass media exposure, extension contact, social participation, and innovativeness underscore the multifaceted nature of knowledge acquisition. Social networks and extension services emerge as critical channels for enhancing IFS understanding. Future interventions should focus on targeted training, strengthening extension frameworks, and leveraging local farmer groups and media platforms to boost knowledge levels particularly among less-informed farmer segments. By addressing these dimensions, policymakers and extension agencies can foster wider and more effective adoption of integrated farming system across the region.

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1.

2.

3.

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