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Evaluation of awareness levels on improved radish production practices in eastern Uttar Pradesh

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Abstract

This study aimed to evaluate the awareness levels of farmers regarding improved radish production practices in the Jaunpur district of Uttar Pradesh. The study focused on two blocks, Kerakat and Dobhi, selected for their higher concentration of radish farmers. A total of 10 villages were randomly chosen from these blocks, and 150 radish growers were selected using stratified random sampling. A structured schedule was used to measure the awareness level. Responses were recorded on a five-point scale, and total awareness scores were calculated for each respondent. The findings revealed varied awareness levels among farmers. A significant portion of farmers demonstrated a good understanding of practices like selecting high-yielding varieties (48.67%), proper soil preparation (48%), and sowing in cooler months (45.33%). However, critical areas such as pest and disease management, seed treatment, and post-harvest handling exhibited substantial knowledge gaps, with 41.33% of farmers not consistently monitoring pests and 34.66% neglecting seed treatment. The classification of overall awareness level revealed that 47.34% of respondents fell into the Medium category, 37.33% were in the Low category, and 15.33% were in the High category, indicating a moderate overall awareness level among farmers. A positive correlation was found between education, scientific orientation, risk orientation, and extension contact with awareness.

Keywords: Radish cultivation, awareness levels, scientific practices, agricultural extension

Introduction

Radish (*Raphanus sativus*), a short-duration root crop belonging to the *Brassicaceae* family, has gained significance as a major vegetable due to its adaptability, economic value, and nutritional benefits. Globally, radish is recognized as an important dietary source of vitamins C and B6, dietary fiber, potassium, and antioxidants, which contribute to improved digestion and reduced risk of chronic diseases (Ali *et al.*, 2020; Singh & Yadav, 2021) ^[1, 6]. In India, radish is cultivated throughout the year, serving as both a food and cash crop for millions of farmers (Kumar *et al.*, 2022) ^[3]. The fertile agricultural belt of Eastern Uttar Pradesh is highly suitable for radish cultivation owing to its favorable climatic conditions and alluvial soils. Despite these advantages, radish productivity in this region lags behind national and international benchmarks (Sharma *et al.*, 2021; Verma *et al.*, 2019) ^[2, 7]. Radish has year-round demand in local and export markets and contributes to value-added products like pickles and radish seed oil, further boosting profitability. Additionally, by-products such as radish leaves serve as livestock fodder, enhancing economic returns. The profit-to-cost ratio for radish

cultivation is higher than traditional crops, with farmers in Punjab and Haryana earning up to ₹1.5-₹2 lakh per hectare annually (Govind *et al.*, 2021) ^[2]. In India, radish production is significant, with the country producing approximately 2.84 million tonnes during the 2021-2022 period. (agriexchange.apeda.gov.in) On a global scale, the radish market has been expanding. In 2023, the global fresh radish market size was estimated at USD 1.3 billion, with projections indicating a compound annual growth rate (CAGR) of 4.00% from 2023 to 2030. (cognitivemarketresearch.com). Farmers often rely on traditional practices and show limited awareness of improved production technologies, such as the adoption of high-yielding varieties, proper nutrient management, and pest control measures (Govind *et al.*, 2021; Kumar *et al.*, 2022) ^[2, 3]. Scientific advancements in radish cultivation, including the use of hybrid seeds, integrated pest management (IPM), and balanced fertilization, have demonstrated significant potential to increase yields and reduce production costs (Patel *et al.*, 2020) ^[4]. For example, Govind *et al.*, (2021) ^[2] reported that implementing balanced nutrient management, particularly the application of

micronutrients such as boron and magnesium, can enhance radish root size, flavor, and shelf life. Similarly, the use of modern agronomic practices like precision planting and efficient irrigation methods, including drip irrigation, has been shown to improve productivity (Sharma *et al.*, 2021; Singh *et al.*, 2020)^[2, 1].

Despite the availability of advanced technologies, their adoption remains limited among radish farmers in Eastern Uttar Pradesh. Studies by Kumar *et al.*, (2022)^[3] and Sharma *et al.*, (2021)^[2] highlight that the primary barriers include insufficient knowledge about the benefits of these practices, lack of access to quality inputs, and poor extension services. Furthermore, socio-economic constraints, such as small landholdings, low literacy rates, and limited access to institutional credit, exacerbate the challenges faced by farmers (Patel *et al.*, 2020; Verma *et al.*, 2019)^[4, 7]. The National Horticulture Mission and other government initiatives have been promoting vegetable cultivation to enhance income and nutrition levels. Yet, the adoption of radish-specific practices in the region remains under-researched, making this study essential for informing policy and extension interventions. By assessing the awareness levels of farmers regarding improved radish production technologies, this study aims to bridge the knowledge gap and provide actionable insights for agricultural extension agencies, policymakers, and researchers. It will help in designing targeted training programs, improving dissemination strategies, and enhancing adoption rates, ultimately contributing to increased productivity, better income generation, and rural development.

Methodology

The methodology for this study aimed to evaluate the awareness levels of farmers regarding improved radish production practices in the Jaunpur district of Uttar Pradesh. Jaunpur was selected for the study due to its significant agricultural importance and the prominence of radish cultivation. The district is divided into 21 community blocks, out of which two blocks, Kerakat and Dobhi, were chosen for the study based on their higher concentration of radish farmers. The blocks consist of 115 and 124 villages, respectively, and five villages were randomly selected from each block. This resulted in a total of 10 villages chosen for the study, ensuring a broad representation of the region's radish farming practices. To select the respondents,

stratified random sampling was used to categorize the farmers into four distinct groups: marginal, small, medium, and large, based on the size of their landholdings. After the categorization, proportionate random sampling was applied to determine the appropriate sample size from each category. In the end, a total of 150 radish growers were selected for the study.

The measurement of awareness was done using a structured schedule, developed in consultation with experts from agricultural universities. This schedule consisted of 15 statements covering various aspects of scientific practices in radish production. The statements were designed to reflect key practices that are essential for improving radish productivity and quality. Each statement was evaluated on a five-point scale. The responses for each statement were recorded as per the scale, ranging from "Strongly Agree" to "Strongly Disagree". The scoring system provided a range of 1 to 5 for each statement, allowing for a granular assessment of the farmer's awareness level. The awareness scores were then analyzed in two ways. First, the responses for each individual statement were analyzed to identify the areas where farmers had the highest and lowest levels of awareness. This allowed for a detailed examination of which scientific practices were well-known and which were poorly understood. Second, the total scores of individual respondents were computed by summing the scores for each item on the schedule. Based on the calculated awareness index, the respondents were classified into three categories: Low (mean - standard deviation), Medium (mean $\pm$ standard deviation), and High (mean + standard deviation). This classification helped to provide a clear understanding of the overall distribution of awareness levels among the farmers.

The data collected were then subjected to various statistical analyses to draw meaningful conclusions. Descriptive statistics, such as frequency and percentage distributions, were used to summarize the data. The arithmetic mean and standard deviation were calculated to determine the spread of the awareness scores. Finally, correlation analysis was used to examine the relationships between farmers' demographic characteristics and their awareness of scientific radish production practices. This analysis helped identify factors that might influence farmers' awareness levels.

Major Findings

Table 1: Statement wise awareness level of radish growers, n = 150

S. N.	Statement	Strongly Agree		Agree		Undecided		Disagree		Strongly Disagree	
		f	%	f	%	f	%	f	%	f	%
1.	The selection of high-yielding and disease-resistant radish varieties is important for better productivity.	43	28.67	30	20.00	26	17.33	29	19.33	22	14.67
2.	Proper soil preparation, including plowing and leveling, is necessary for optimal root growth in radish cultivation.	30	20.00	42	28.00	32	21.33	22	14.67	24	16.00
3.	Before sowing, radish seeds should be treated with fungicides to prevent seed-borne diseases.	43	28.67	29	19.33	26	17.33	23	15.33	29	19.33
4.	Radish should be sown at the right time, preferably in the cooler months, to ensure good growth.	36	24.00	32	21.33	30	20.00	26	17.33	26	17.33
5.	Proper row spacing (10-15 cm) is required for adequate air circulation and root expansion in radish crops.	31	20.67	36	24.00	29	19.33	32	21.33	22	14.67
6.	The recommended seed rate for radish cultivation is approximately 8-10 kg per hectare for optimal seedling emergence.	37	24.67	34	22.67	25	16.67	21	14.00	33	22.00
7.	Radish plants require regular irrigation, especially in dry periods, but overwatering should be avoided to prevent root rot.	35	23.33	29	19.33	36	24.00	22	14.67	28	18.67

8.	Timely weeding is essential for reducing competition for nutrients, water, and sunlight, promoting better radish growth.	25	16.67	42	28.00	20	13.33	28	18.67	35	23.33
9.	Applying balanced fertilizers based on soil test results ensures healthy radish growth and higher yields.	30	20.00	32	21.33	35	23.33	25	16.67	28	18.67
10.	Radish crops should be monitored regularly for pests like aphids and diseases such as downy mildew and treated using recommended chemical or organic control methods.	35	23.33	26	17.33	27	18.00	29	19.33	33	22.00
11.	Intercropping with crops like mustard or spinach can help reduce pest damage and improve soil health in radish fields.	36	24.00	31	20.67	30	20.00	24	16.00	29	19.33
12.	Rotating radish with other crops like legumes or cereals can reduce soil-borne diseases and pests, improving soil fertility.	38	25.33	29	19.33	36	24.00	27	18.00	20	13.33
13.	Radishes should be harvested when the roots reach the desired size to ensure proper flavor and texture.	25	16.67	34	22.67	37	24.67	30	20.00	24	16.00
14.	After harvesting, radishes should be cleaned, sorted, and stored in a cool, shaded area to maintain freshness and prevent spoilage.	44	29.33	24	16.00	19	12.67	30	20.00	33	22.00
15.	Farmers should be aware of the best market practices, including proper packaging and transportation, to increase the sale price of radishes.	37	24.67	21	14.00	34	22.67	23	15.33	35	23.33

The data highlights a diverse range of perspectives and adoption levels of recommended radish cultivation practices among farmers, underscoring both areas of strength and critical gaps. A significant portion of farmers (48.67%) strongly agree or agree that selecting high-yielding and disease-resistant varieties is crucial for better productivity, indicating a fairly good understanding of the importance of quality seeds. Similarly, proper soil preparation, such as plowing and leveling, is acknowledged by 48% of respondents, reflecting awareness of its role in optimal root growth. Practices like sowing radishes in cooler months (45.33%) and intercropping with crops such as mustard or spinach (44.67%) are also relatively well-accepted. However, the data reveals significant gaps in critical areas. For instance, pest and disease management practices are inconsistently followed, with 41.33% disagreeing or strongly disagreeing with regular monitoring and treatment of crops. Likewise, seed treatment with fungicides to prevent seed-borne diseases is not widely adopted, as 34.66% of farmers are either undecided or disagree with the practice. Proper post-harvest handling, such as cleaning, sorting, and storing radishes in cool areas to maintain freshness, also shows low adoption, with 42% of farmers disagreeing or strongly disagreeing. Other vital practices, such as timely weeding, balanced fertilizer application based on soil testing, and proper irrigation management, display inconsistent levels of adoption. For instance, 44.67% of farmers understand the importance of timely weeding, but a nearly equal proportion (42%) fail to acknowledge its significance. Similarly, balanced fertilizer application is practiced by only 41.33%, while a significant number remain unaware or indifferent to its importance. Irrigation practices, while slightly better understood, still show that over one-third of farmers lack proper knowledge about avoiding overwatering.

Table 2: Overall awareness level of radish growers, n = 150

S. N.	Categories	Respondents	
		f	%
1.	Low (less than 23)	56	37.33
2.	Moderate (24 to 45)	71	47.34
3.	High (46 and above)	23	15.33

Mean: 34.47, S.D.- 11.33

A majority of the respondents (47.34%) fall into the medium category, indicating a moderate level of understanding or awareness of the relevant practices. Around 37.33% of respondents belong to the low category, reflecting a significant portion with limited knowledge or awareness of these practices. Only 15.33% of respondents are in the high category, demonstrating a comparatively advanced understanding or awareness of practices. These findings suggest the need for focused interventions to uplift the knowledge and skills of those in the low and medium categories to enhance overall productivity and effectiveness.

Table 3: Relationship between selected independent variable and awareness of the radish growers

S. N.	Independent Variable	'r' Value
1.	Age	-0.4921
2.	Education	0.7961
3.	Land Holding	0.4705
4.	Scientific Orientation	0.7461
5.	Economic Motivation	0.4849
6.	Risk Orientation	0.6931
7.	Extension Contact	0.5973

Significant at 5% p value

The data presented in Table 1.3 reveals significant relationships between selected independent variables and the awareness of radish growers. A negative correlation was observed between age and awareness (-0.4921), suggesting that older farmers tend to have lower awareness of radish cultivation practices, possibly due to limited exposure to modern farming techniques. Education exhibited a strong positive correlation (0.7961), indicating that higher education levels are strongly associated with greater awareness, as educated farmers are more likely to engage with new agricultural information. Similarly, land holding (0.4705) and scientific orientation (0.7461) show positive relationships with awareness, implying that farmers with larger land holdings and those inclined towards scientific approaches tend to be more aware of improved farming practices. Economic motivation (0.4849) and risk orientation (0.6931) also positively correlate with awareness, suggesting that farmers motivated by economic gains and those willing to take risks are more likely to adopt new and effective practices. Extension contact (0.5973) is positively correlated with awareness, highlighting the significant role of extension services in improving farmers' knowledge.

Conclusion

The data reveals a mixed understanding of key agricultural practices, with farmers demonstrating a good level of awareness in areas such as selecting high-yielding varieties, soil preparation, and practices like sowing in cooler months and intercropping. However, critical areas such as pest and disease management, seed treatment, and post-harvest handling show significant gaps in awareness and adoption, indicating the need for targeted interventions. Additionally, practices like timely weeding, balanced fertilizer application, and proper irrigation management are inconsistently followed, suggesting that many farmers require further education and support to fully embrace scientific farming techniques. Key factors such as education, scientific orientation, risk orientation, and extension contact exhibit strong positive correlations with farmers' awareness, underscoring the importance of these factors in improving agricultural knowledge. Age showed a negative correlation with awareness, indicating that older farmers may face challenges in adopting modern farming practices. The majority of farmers (47.34%) fall into the medium awareness category, with 37.33% in the low category, signalling a significant portion who require further education and training. Only 15.33% demonstrate a high level of awareness, indicating the need for intensive capacity-building efforts to raise the overall level of knowledge and skill among farmers.

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