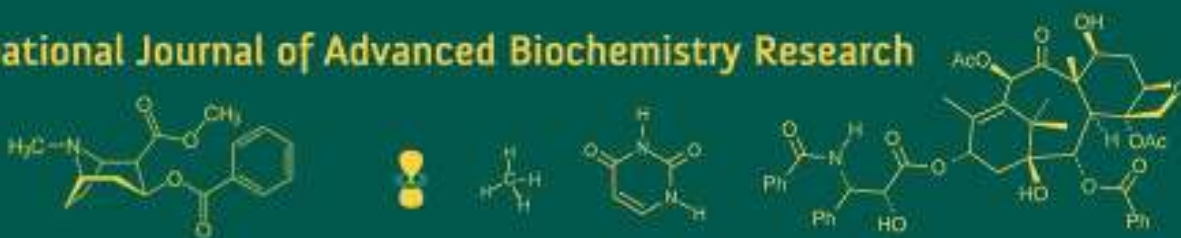


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Exploring knowledge and adoption patterns of potato production technologies in Nalanda district of Bihar

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Abstract

The present study was carried out during the year 2023-24 in Nalanda, Bihar. This study explores the knowledge and adoption patterns of potato production technologies among farmers in Nalanda district, Bihar. Bihar, being one of India's leading potato-producing states, has experienced growth in acreage and output; however, productivity remains below neighbouring states. The study investigates the socioeconomic characteristics, media exposure, and technological adoption behaviours of 200 respondents, selected using probability proportionate to size sampling. Farmers exhibited medium levels of education (60%), with most (61%) being middle-aged (37-60 years). Agriculture served as the primary livelihood for 75.5% of respondents, reflecting a significant dependence on farming. Notably, mobile phones ranked as the most preferred source of agricultural information, followed by television and newspapers. Adoption of improved potato varieties, timely sowing, and irrigation practices were high (over 70%), while advanced practices like soil testing and the use of true potato seeds saw minimal adoption. Medium-level annual income (₹50,000-₹2,00,000) and small landholdings (63.5% owning less than one hectare) shaped adoption dynamics, indicating resource constraints. The findings highlight the impact of education, media exposure, and landholding size on technology uptake. Gaps in adopting advanced practices underscore the need for targeted extension strategies to enhance productivity. This study emphasizes the role of socioeconomic factors and media in driving agricultural innovation, contributing to policy frameworks for sustainable potato farming in Bihar.

Keywords: Agricultural technology, socioeconomic factors, education, media exposure, scientific aspiration, marginal farmers, irrigation practices, true potato seeds, soil testing

Introduction

India is widely recognized as an agricultural nation, with nearly three-fourths of its populace relying on agriculture (Kalamkar, 2009) [6]. According to (FAO, 2008) [4], potato has been declared as a Future Food crop and the United Nation during the international potato year (2008), call the crop a "hidden treasure" (Hussain, 2016) [5]. the carbohydrate content is 20.7%, with 0.4% fat and 0.8% ash. It also contains a good number of important amino acids including isoleucine, tryptophan, and leucine (Nutrition in Potato and Its Food Products, 2023). India has significantly increased vegetable production due to rising productivity and expanded cultivation areas. The country ranks second globally in vegetable production, following China. This growth has resulted in an availability of 357 grams of vegetables per person per day in India. India produced 45.34 million tons of potatoes in 2013 from 1.99 million hectares of land, yielding a productivity of 22.76 t/ha. Over the course of six decades, there has been a remarkable rise in potato area (8.5 times), production (29.4 times), and productivity (3.5 times). Bihar currently ranks third among Indian states in potato acreage and output, after only Uttar Pradesh and West Bengal. Potatoes are produced on 0.32 million hectares in Bihar, with an annual production of 5.74 million tonnes and a productivity of 17.78 tonnes per hectare. Potatoes are grown in all 38 districts of Bihar with Nalanda, Patna, and Begusarai. However, Bihar (17.78 t/ha), which is sandwiched between extremely productive states West Bengal (24.70 t/ha) and Uttar Pradesh (21.97 t/ha), has always been the source of concern for policy planners due to its poor production, despite the fact is blessed with high fertile land and good quality water resources. The current study deals with the socioeconomic characteristics of members and Adoption Patterns of potato production technology in Nalanda district of Bihar.

Materials and Methods

This study was conducted in Nalanda district during the year 2023-24. Nalanda district comprise of 20 blocks in which two blocks namely Noorsarai and Biharsharif were purposively selected. A total of 200 number of respondents were selected for the purpose of the investigation.

The study involved 200 potato producers, selected using the Probability Proportionate to Size sampling method. From this framework, a proportionate stratified random sampling technique was employed to choose participants, representing 10% of the total potato growers. The statistical tools used in the study were frequency, percentage, arithmetic mean, standard deviation and rank order.

Results and Discussion

Three distinct age groups were established for analysis. The distribution of respondents according to these groups is shown in Figure 1. As illustrated in the table, the majority of farmers (61%) belonged to the middle age group, followed by the younger age group (31%) and the older age group (8%). The data suggests that most farmers are in their prime years, positioned within the middle age range. These findings are largely in line with the research by Arneja *et al.* (2009) ^[1]. This age group is likely to be more experienced, active, dynamic, and open to adopting various technologies to enhance potato production and Singh *et al.* (2021) ^[11].

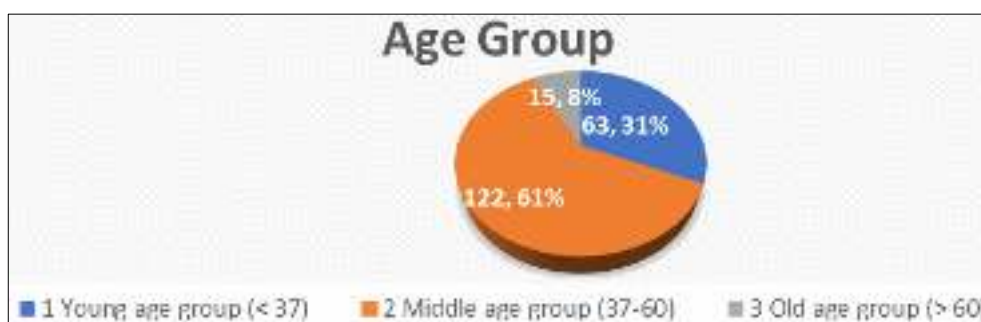


Fig 1: Distribution of Respondents according to their Age group.

The education of a person determines the level of his knowledge and his mental status. Education helps in understand and increase the decision-making ability of the person. The data presented in the table shows that 22.5% of the respondents were illiterate, while 12% had completed primary education, 21% had attended middle school, 27% had reached high school, and 17.5% had received a college education. They have better understanding and decision-

making abilities. They are able to think for the betterment of their present and future. The similar result finding Singh *et al.* (2021) ^[11] These findings emphasize the importance of promoting educational opportunities and vocational training programs for farming communities, particularly for family heads, because they can have far-reaching consequences for agricultural productivity, resource efficiency, and rural development

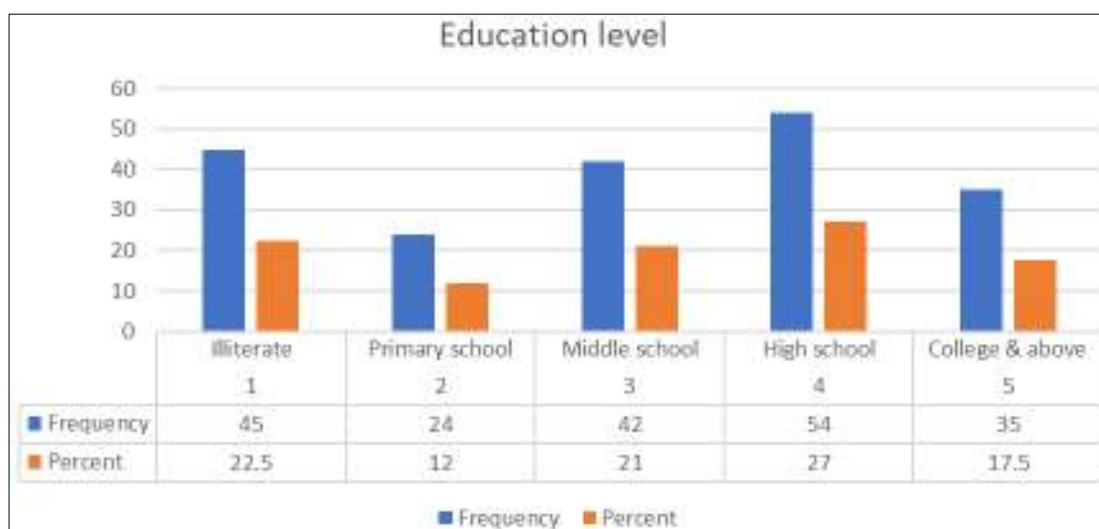


Fig 2: Distribution of the respondents according to the level of education

the above table, the majority of respondents (57.5%) fall into the medium group, followed by low membership (24.5%) and high participation (18%) in social organizations. Their primary activity, farming, may be the cause. The majority of farmers are sporadic and do not belong to any other groups. Ordinary members of the Panchayat have a mean score of 1.46 and rank I, meaning they are office executives with no involvement in other organizations. Desai (2022) The study aims at exploring the

extent of agricultural information literacy of farmers in the northern region of Bangladesh

Category	Frequency	Percent
Low	49	24.5
Medium	115	57.5
High	36	18

The table reveals that the majority (58%) of respondents had medium social contact, followed by 20.5% in both the low and high categories. This indicates positive progress in expanding the respondents' social horizons. of the respondent similar result found that Mohapatra (2016) [7], and Busthanul (2022) [2].

The above table shows that the highest percentage of farmers (77%) belonged to the medium level of Cosmo politeness, which is a significant indication of their strong outside contact and dynamism, which helps them expand their horizon. The next lowest percentages are 16% and the highest percentage is 7%, both of which require additional outside exposure similar result found that Mohapatra (2016) [7].

The farm broadcast via mobile received the highest mean score (2.39) and ranked first in the table. Television, newspapers, and the Farmer Consulting Group followed, with mean scores of 2.36, 2.06, and 1.86, ranking second, third, and fourth, respectively. Respondents preferred using mobile devices for agricultural information due to their widespread availability, ease of use, and extensive coverage. Similar study like Yadav (2021) [10] Socio - Economic Status of Potato Growers Regarding Potato Production Technology in Western Uttar Pradesh, India Thus, it can be inferred that Mobile Phone, TV, Newspaper and radio were main sources

for getting information and recreation purposes Mishra et. el. (2021) [11].

The table indicates that the majority (62%) of farmers lived in pucca houses, while 35% resided in semi-pucca houses, and only 3% had huts. Notably, none of the respondents reported living in thatched houses, which reflects a positive sign of the community's improved social status. Similar study found that Yadav (2021) [10]. Type of house is one of the indicators of level of living standard.

the above table, the majority of respondents (63.5%) were marginal farmers, holding land up to one hectare. Small farmers (29 percent) and medium farmers (7.5 percent) held property between one and two hectares, while very few were huge land holders (above). This implies that a farmer who has more land will be more likely to adopt improved potato varieties the implication of this finding is that farmers with larger landholdings should not be overlooked when promoting the adoption of improved crop varieties, as they are more likely to embrace such innovations. Several studies have supported this observation. For example, Adesina and Zinnah suggested that farmers with larger farms are more inclined to adopt agricultural technologies, as they can manage the risks associated with experimenting with new practices due to the ability to diversify their crops. Similarly, Doss *et al.* (2003) [3].



Fig 3: Distribution of respondents according to land holding size

As shown in the above table, 75.5% of the respondents had agriculture as their sole source of income and main occupation; while only 24.5 had other secondary occupations, such as service and business, to meet the family needs in addition to agriculture. The large proportion of household heads engaged in agriculture, particularly in animal husbandry, underscores the sector's role as a key

source of income for rural communities. However, the growing diversification of occupations, with many household heads also working in the service sector and other non-farm activities, highlights the need for policies that support sustainable agricultural practices while also creating alternative income sources. Mohapatra (2016) [7].

Sl. No.	Category	Frequency	Percent	Valid percent	Cumulative percent
1	Primary (Agriculture)	151	75.5	75.0	75.5
2	Secondary (others)	49	24.5	25.0	100.0
Total		200	100.0	100.0	

The data from the table shows that 60% of farmers possess a medium level of farm power, while 25% and 15% are in the higher and lower categories, respectively, signalling a slow but steady adoption of mechanized farming methods. A positive and

significant coefficient of farm size indicates that farm mechanization is more prevalent among large farmers, confirms the findings of Moniruzzaman (2021) [8].

Category	Frequency	Percent
Low	30	15
Medium	120	60
High	50	25

The above table reveals that the majority of farmers, accounting for 75%, fall into the medium-level annual income category. This is followed by 25% of farmers who belong to the high-income class. The distribution of income levels can be attributed to the fact that agriculture serves as the primary occupation for all respondents. The level of income is closely tied to the knowledge and adoption of modern farming practices. Farmers with higher income levels often demonstrate a greater awareness of new agricultural techniques and technologies, which they incorporate into their farming methods. This correlation

highlights that a higher income is not only a result of effective farming practices but also a sign of how well farmers have adapted to innovations and advancements in agriculture. Agricultural income is inherently variable, influenced by factors such as fluctuations in production, market prices, and input costs. These variations in yield and net returns significantly affect the overall income distribution among the farming community, resulting in the observed disparity between medium- and high-income groups. Similar study found that Mohapatra (2016) ^[7], and Yadav (2021) ^[10].

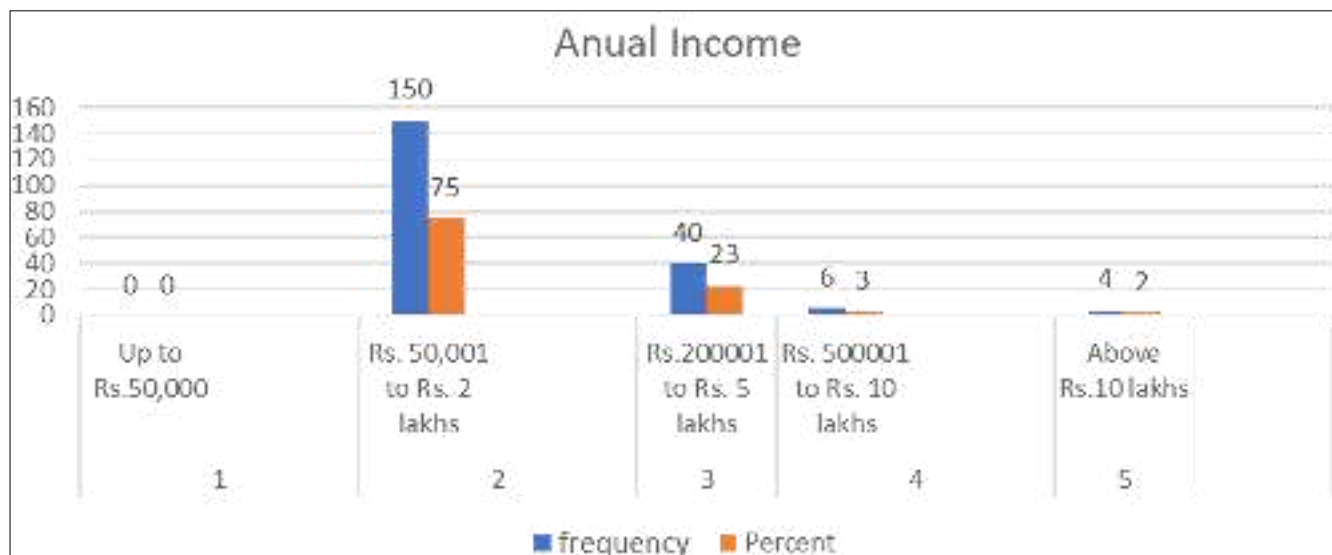


Fig 4: Distribution of respondents according to their average annual Income

The results obtained from the above table show that 70.5% of the respondents exhibited a medium level of scientific aspiration. Additionally, 10.5% of the respondents demonstrated a high level of scientific aspiration, while 19% fell into the low category. This indicates that the majority of the respondents possess a fairly good level of scientific aspiration. Such a level of aspiration is significant because it suggests that most farmers are likely open to exploring and adopting new technologies in farming, which can contribute to enhancing agricultural productivity and efficiency. Similar finding of result show that Mohapatra (2016) ^[7].

The distribution of respondent on the basis of their experience in potato cultivation is presented in table 4.15. the data revealed that the majority (39.5%) of the respondent possess 0-10 years of experience followed by 10-20 years (34%), 31% are 20-30 years and above 40 years (1%)

To evaluate the extent of adoption of recommended potato production technologies among farmers in the district.

Results of the study on the adoption of potato cultivation technology by farmers reflected that the adoption rate in the cultivation of improved varieties is 70% full adoption 26% partially adopted having possessed rank I mean score 2.73 followed by Timely sowing 77.5% full adoption and 17.5%

partially adopted having mean score 2.725, whereas Irrigation practices 80% full adoption and 12% partially adopted having Rank III mean (2.72), earthing up 75% adoption and 20% partially adopted having mean (2.715), spacing 75% full adoption and 15% partially having mean (2.68), Use of weedicides 72.5% full adoption and 20% partially having mean (2.65), storage under proper conditions 65% adopted and 29% partially adopted having mean (2.585), Use of agrochemicals 66% adopted and 22% partially adopted having mean (2.54), Dehaulming 55.5% adopted and 39% partially adopted having mean (2.50), Breaking seed dormancy 21.5% full adoption and 66.5% partially adoption having mean (2.095), soil testing 10.5% adopted 37.5% partially adopted having mean (1.585), Composting of plant debris 20% adopted and 62.5% partially adopted having mean (1.58), Mulching in potato crop 10.5% adopted and 17% partially adopted having mean (1.38), Seed plot technique 6.5% adopted and 20% partially adopted having mean (1.19) and True potato seed are not adopted in this region. it can be concluded that majority (68%) of the potato growers were having medium extent of adoption of improved cultivation practices of potato crop. The above findings are in line with the outcome reported by Kanwal, Desai (2022) ^[16].

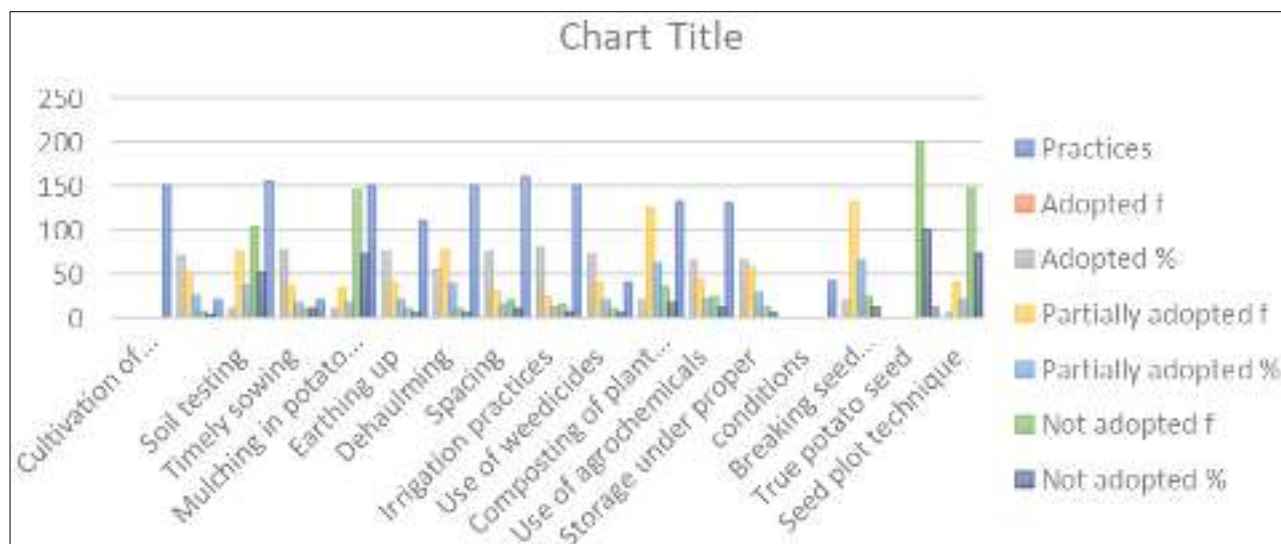


Fig 5: Distribution of Respondent adoption of improved Production technology of farmers in the district.

it was observed that a good number of socio-economic variables such as: age, sex, family type, Cosmopolitaness, Media exposure, Land Holding size, Farm power, Scientific Aspiration had very significant impact upon the adoption level of the respondents and regarding various production related technologies. Among all selected variables, Media exposures was found most important variables, in exercising influence on adoption of potato cultivation practices. Verma (2019) ^[14] Extent of Knowledge and Adoption of Potato Growers in Kannauj District of Uttar Pradesh

Conclusion

The majority of farmers (61%) belonged to the middle-aged group (37-60 years), which is considered an active and dynamic phase for implementing agricultural innovations, Education levels varied, with 60% achieving a medium education level (high school or equivalent), Most respondents resided in joint family systems (79%), indicating strong traditional ties and resource sharing, operated on marginal landholdings (63.5%), which influenced their adoption of mechanized farming and advanced agricultural practices, Agriculture was the primary occupation for 75.5% of respondents agriculture and livestock, Annual income levels of the majority ranged from ₹50,000 to ₹2,00,000, reflecting moderate financial stability, Housing patterns also indicated relatively secure socio-economic conditions, with 62% of respondents living in pucca houses, Media and Social Exposure Media exposure through mobile phones (mean score: 2.39) was ranked highest among information sources, followed by television and newspapers, Cosmopolitaness and social contact showed positive trends, with most farmers having medium levels of exposure and engagement, High Knowledge Areas Farmers exhibited the most knowledge in variety selection (85.87%) and nutrient management (81.63%), underlining the emphasis on high-yield and disease-resistant varieties like K. Pukhraj and K. Mohan. Moderate to Low Knowledge Areas Knowledge was moderate in areas like harvesting and post-harvest care (72.5%) but significantly lower for intercultural operations such as weeding and irrigation (46.87%), Highly Adopted Practices Cultivation of improved varieties, timely sowing, and irrigation practices had adoption rates of over 70%. This underscores farmers' prioritization of high-yield practices. Partially

Adopted or Neglected Practices: Practices like soil testing (10.5%) and advanced techniques such as the use of true potato seeds (not adopted) were poorly adopted, reflecting gaps in knowledge and resource availability.

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