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A study on knowledge and adoption of improved potato cultivation practices in Thoubal district of Manipur

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Abstract

The main purpose of the study was to ascertain the knowledge and adoption behavior towards improved potato cultivation practices in Thoubal district of Manipur. The study was conducted in Thoubal block of Thoubal district in the year 2023-2024. Descriptive research designed was applied for this study. The primary data was collected from 120 respondents by personal interview method using pre-structure. Knowledge of farmers was measured my asking 24 questions in respect of potato cultivation and adoption of the farmers was measured by asking 14 questions in respect of potato cultivation. Finding showed that majority (54.17%) of the respondents have medium knowledge level category, 29.16 per cent respondents were observed in the high knowledge level category and remaining 16.67 per cent respondents formed low knowledge level category towards potato cultivation practices and majority (50%) of the respondents have medium level adoption level, 34 per cent of the respondents have high adoption level and 15 per cent of the respondents have low adoption level towards improved potato cultivation respectively. It was revealed that out of ten independent variables, i.e., age, education, annual income, occupation, land holding, farming experience, risk bearing capacity, mass media exposure, scientific orientation and progressiveness are positively and significantly correlate with knowledge and adoption of farmers towards improved potato cultivation practices.

Keywords: Potato, knowledge, adoption, behavior, improved potato cultivation practices

Introduction

The potato (commonly known as *Solanum tuberosum*) belongs to the nightshade family called Solanaceae and is a part of the genus Solanum. This genus includes a variety of plants, some of which are edible like the potato, while others may be ornamental or toxic. The Solanaceae family also includes other important crops like tomatoes, eggplants, and peppers.

In Manipur area, production and productivity of potato recorded 1.7 ha, 15.2 tonnes and 89.4 q/ha respectively (Anonymous, 2010). The productivity of potato in Manipur region is very low compared to national productivity of potato. This may be due to high cost of cultivation, high input of seeds and chemical fertilizers and use of less yielding variety etc. For reducing the costs of cultivation of many potato growers are using high yielding varieties. But no systemic work has been done to determine the suitable variety for a particular region which has a great impact on the yield of the crop. The most popular potato variety among the farmers in Manipur is Kufri Jyoti. The variety, which has a 25–30 t/ha production potential, was introduced in 1968. The variety is suited to plateaus, plains, and hills. It takes 110–130 days for this medium-maturing cultivar to mature. The late blight disease of potato is the most important factor for the low yield of potato in Manipur. To replace Kufri Jyoti with a better potato variety suited to Manipur and spread awareness among the farmers, Front Line demonstration of potato varieties Kufri Pukhraj and Kufri-Chipsona-1 in five different locations of Manipur viz. Haorong Sabal, Kwasiphai, Mayang Langjing, Mapao and Phumlou organized by ICAR-Central Potato Research Institute, Regional Station, Shillong, and ICAR RC for NEH Region, Manipur Centre, Lamphel-pat during rabi season of 2022 along with ICAR KVK-Imphal West. In Manipur, during the preparation of some common everyday dishes, especially "*Eromba*" and "*Kangsoi*", potato is used as a base. In the cooking of many different cultures, potatoes are crucial and have multiple uses. It forms the base for many diverse foods depending on the consumer's preference and offers a wide range of flavours and textures on the finished plate. While potato is a well-known source of carbohydrates, it is a good source of essential protein, vitamins, minerals, and biologically active compounds such as polyphenols, flavonoids, and fibre. Potatoes provide a moderate amount of iron while being rich in vitamin C, which helps the body absorb iron. It is a good source of minerals like potassium, phosphorus, magnesium, and vitamins B1, B3, and B6 (Ningombam *et al.*, 2023) [2].

Justification of the study

The findings of the present study will help the knowledge and adoption behaviour of the farmers that is existing among the Potato growers in Thoubal district, Manipur. It will enable to investigate its appropriate approach to trace

out the constraints in utilization of improved cultivation practices and knowledge for better crop management and enhance productivity regarding improved potato cultivation.

Objectives

- To assess the socio-economic profile of the respondents.
- To ascertain the knowledge and analyse adoption level of the respondents toward improved potato cultivation practices.
- To establish the relationship between selected independent variables with dependent variables.

Research Methodology

The study was conducted in Thoubal district of Manipur. Descriptive research design was followed for the present study as it describes the characteristics or phenomenon that is being studied. Multi stages sampling was followed for the present study for the selection of samples required. Manipur has 16 districts and out of which Thoubal district was selected. There are three blocks in Thoubal district, out of which Thoubal block was selected purposively based on maximum area cover under potato cultivation. Khangabok village was selected from Thoubal block and a total number of 120 respondents were randomly selected proportionately on the basis of maximum area covered under potato cultivation.

Methods used for data collection

A pre-tested structured interview schedule focused towards the objectives of the study was developed for data collection. Survey method of data collection with the help of a pre-structured interview schedule was used. The collected data were classified, tabulated and analyzed in light of the objectives.

Data statistical analysis

The data collected from the respondents was converted to 3 point score (Likert Scale) and tabulated. The evaluation of the data and the relationship between the independent and dependent variables was done using Mean, Frequency, Percentage and Correlation.

Results and Discussion

Socio-economic Characteristics of the Respondents:

Table 1: Characteristics of the respondents (N=120)

Sl. No	Attributes	Characteristics	Frequency	Percentage
1	Age	Young (Below 39 years)	41	34.17
		Middle (40 to 52 years)	59	49.16
		Old (Above 52 years)	20	16.67
2	Education	Illiterate	8	6.67
		Can read and write	3	2.50
		Primary school	7	5.83
		High school	42	35.00
		Intermediate	34	28.33
		Graduate and above	26	21.67
3	Annual income	Upto Rs 1,00,000	37	30.83
		Rs. 1,00,000 to Rs. 2,50,000	59	49.17
		Above Rs. 2,50,000	24	20.00
4	Occupation	Agriculture only	25	20.84
		Agriculture + labour	10	8.33
		Agriculture + business	69	57.50
		Agriculture + service	16	13.33
5	Land holding	Upto 1 acre	32	26.67
		1-2 acre	80	66.67
		Above 2 acre	8	6.66
6	Farming experience	Upto 10 years	37	30.83
		11-20 years	65	54.17
		Above 20 years	18	15.00
7	Risk bearing capacity	Low	40	33.33
		Medium	62	51.67
		High	18	15.00
8	Mass media exposure	Low	36	30.00
		Medium	62	51.67
		High	22	18.33
9	Scientific orientation	Low	37	30.83
		Medium	61	50.83
		High	22	18.34
10	Progressiveness	Low	39	32.50
		Medium	61	50.83
		High	20	16.67

The data presented in Table 1 revealed that 49.16 per cent of the respondents are middle age (40-52 years) followed by 34.17 per cent young age (below 39) and 16.67 per cent of the respondents are of old age (above 52 years). It also indicated that 35 per cent of the respondents were educated upto high school level of education followed by 28.33 per cent of the respondents had intermediate education, 21.67 per cent of the respondents had graduate and above level of education, 6.67 per cent respondents were illiterate, 5.83 per cent of respondents had primary school level education and 2.5 per cent of the respondents can read and write. It was found that 49.17 per cent of the respondents had an income between Rs 1,00,000 and Rs 2,50,000 followed by 30.83 per cent of the respondents had an income upto Rs 1,00,000 and 20 per cent of the respondents had an income above Rs 2,50,000. It was revealed that 57.5 per cent of the respondents were engaged in business along with agriculture, 20.84 per cent of the respondents were engaged in agriculture only, 13.33 per cent of the respondents were engaged in service along with agriculture and 8.33 per cent of the respondents were engaged in agriculture and labour. It was found that (66.67%) of the respondents had a land holding of 1-2 acres, 26.67 per cent of the respondents had a land holding upto 1 acre and 6.66 per cent of the respondents had a land holding above 2 acres. It was revealed that (54.17%) of the respondents had farming experience between 11-20 years, 30.83 per cent of the respondents had farming experience upto 10 years and 15 per cent of the respondents had farming experience above 20 years. It was found that majority (51.67%) of the respondents had medium level of risk bearing capacity followed by 33.33 per cent of the respondents had low level and 15 per cent of the respondents had high level of risk bearing capacity. It was revealed that (51.67%) of the respondents had medium level of mass media exposure, 30 per cent of the respondents had low level and 18.33 per cent of the respondents had high level of mass media exposure. It was found that majority (50.83%) of the respondents had medium level of scientific orientation followed by 30.83 per cent of the respondents had low level and 18.34 per cent of the respondents had high level of scientific orientation. It was revealed that (50.83%) of the respondents had medium level of progressiveness followed by 32.5 per cent of the respondents had low level and 16.67 per cent of the respondents had high level of progressiveness.

Knowledge of respondents towards improved potato cultivation practices

Table 2: Distribution of respondents based on the knowledge level of the respondents on improved cultivation practices: (N=120)

Sl. No	Statement	Evaluations					
		Full known		Partially known		Not known	
		f	%	f	%	f	%
1	Method for land preparation of potato	110	91.67	10	8.33	0	0
2	Knowledge about Kufri Jyoti potato variety	120	100	0	0	0	0
3	Knowledge about Kufri Pukhraj potato variety	9	7.5	88	73.33	23	19.17
4	Knowledge about Kufri Chipsona 1 potato variety	90	75	22	18.33	8	6.67
5	Knowledge about Aber Chaibi (*local name*) potato variety	119	99.17	1	0.83	0	0
6	Method of planting of potato	108	90	12	10	0	0
7	Suitable crop rotation	33	27.5	59	49.17	28	23.33
8	Time for planting of early crop	115	95.83	5	4.17	0	0
9	Time for planting of main crop	120	100	0	0	0	0
10	Proper spacing during planting	115	95.83	5	4.17	0	0
11	Knowledge about FYM application	64	53.33	56	46.67	0	0
12	Knowledge about time of irrigation	117	97.5	3	2.5	0	0
13	Knowledge about time for harvesting	108	90	12	10	0	0
14	Knowledge about modern irrigation techniques	3	2.5	98	81.67	19	15.83
15	Knowledge about Epilachna beetle on potato crop	3	2.5	38	31.67	79	65.83
16	Knowledge about cutworm on potato crop	70	58.33	38	31.67	12	10
17	Knowledge about aphids on potato crop	14	11.67	45	37.5	61	50.83
18	Knowledge about potato leaf hoppers	17	14.17	39	32.5	64	53.33
19	Knowledge about white grubs on potato crop	108	90	12	10	0	0
20	Knowledge about potato tuber moth	23	19.17	52	43.33	45	37.5
21	Knowledge about optimum seed rate	117	97.5	3	2.5	0	0
22	Knowledge about early blight disease of potato	14	11.67	81	67.5	25	20.83
23	Knowledge about late blight disease of potato	116	96.67	4	3.33	0	0
24	Knowledge about wilt disease of potato	35	29.17	72	60	13	10.83

The above table 4.2.1 stated that majority (91.67%) of the respondents fully knows the appropriate method for land preparation for potato cultivation and 8.33 per cent of the respondents partially know about the land preparation. It reveals that majority (100%) fully knows about the Kufri Jyoti variety of potato. It reveals that majority (73.33%) of the respondents partially know about Kufri Pukhraj variety of potato, 19.17 per cent of the respondents are not known with the variety and 7.5 per cent of the respondents fully known about the variety. It reveals that majority (75%) of the respondents are fully known with the Kufri Chipsona-1 variety of potato, 18.33 per cent of respondents are partially knows and 6.67 per cent of the respondents are not known with the variety. It reveals that majority (99.17%) of the respondents are fully known with the Aber chaibi variety of potato and 0.83 per cent of the respondents are partially known about the variety. It states that majority (90%) of the respondents are fully known with the method of planting

potato crop and 10 per cent of the respondents are partially. It reveals that majority 49.17 per cent of the respondents are partially known with crop rotation practice suitable with potato, 27.5 per cent of the respondents are fully known and 23.33 per cent of the respondents are not known with the crop rotation practice suitable with potato. It states that majority (95.83%) of the respondents are fully known with the appropriate time for planting of early crop of potato and 4.17 per cent of the respondents are partially known. It reveals that majority (100%) of the respondents are fully known with the appropriate time for planting of main crop. It reveals that majority (95.83%) of the respondents are fully known with the appropriate spacing between plants during planting of potato crop and 4.17 per cent of the respondents are partially known. It states that majority (53.33%) of the respondents are fully known with the proper amount of FYM application for the potato crops and 46.67 per cent of the respondents are partially known about the FYM application. It states that majority (97.5%) of the respondents are fully known with the appropriate timing for the irrigation of potato crop and 2.5 per cent are partially known. It shows that majority (90%) of the respondents are fully known with the correct harvesting time of the potato crop and 10 per cent of the respondents are partially known. It reveals that majority (81.67%) of the respondents are partially known with the modern techniques of irrigation, 15.83 per cent are not known with the modern techniques and 2.5 per cent of the respondents are fully known with the modern techniques of irrigation. It was observed that majority (65.83%) of the respondents are not aware of the Epilachna beetle, 31.67 per cent respondents are partially aware of the Epilachna beetle and 2.5 per cent of respondents are fully aware of the Epilachna beetle. It was observed that majority (58.33%) of the respondents are fully known of cutworm on potato, 31.67 per cent respondents are partially known of the cutworm and 10 per cent of the respondents are not aware of cutworm on potato. It shows that majority (50.83%) of the respondents are not aware of the aphids on potato crop, 37.5 per cent of the respondents are partially aware of the aphids and 11.67 per cent of the respondents are fully aware of the aphids on potato crop. It shows that majority (53.33%) of the respondents are not aware of the potato leaf hopper, 32.5 per cent of the respondents are partially aware of the potato leaf hopper and 14.17 per cent of the respondents are fully aware of the potato leaf hopper. It shows that majority (90%) of the respondents are fully aware of the white grubs on potato crops and 10 per cent of the respondents are partially aware of white grubs on potato crop. It shows that majority 43.33 per cent of the respondents are partially aware of the potato tuber moth, 37.5 per cent of the respondents are not aware of the potato tuber moth and 19.17 per cent of the respondents are fully aware of the potato tuber moth. It was revealed that majority (97.5%) of the respondents are fully known with the optimum seed rate required for cultivation of potato and 2.5 per cent of the respondents are partially known with the optimum seed rate required for potato cultivation. It was observed that majority (67.5%) of the respondents are partially known of early blight disease of potato, 20.83 per cent of the respondents are not known with the disease and 11.67 per cent of the respondents are fully aware of the early blight disease of potato. It was observed that majority (96.67%) of the respondents are fully known of late blight disease of potato and 3.33 per cent of the respondents are partially known of late blight disease of potato. It was observed that majority (60%) of the respondents are partially known of wilt disease of potato, 29.17 per cent of the respondents are fully known of wilt disease and 10.83 per cent of the respondents are not known of wilt disease in potato crop.

Table 3: Overall distribution of respondents based on the knowledge level of the respondents towards improved potato cultivation practices:

Sl. No	Knowledge	Frequency	Percentage
1	Low (47-55)	20	16.67
2	Medium (56-64)	65	54.17
3	High (65-72)	35	29.16
Total		120	100

Table 3. reveals that majority (54.17%) of the respondents have medium knowledge level category, 29.16 per cent respondents were observed in the high knowledge level category and remaining 16.67 per cent respondents formed low knowledge level category. The similar results were also observed by Pottappa *et al.*, (2014) [3].

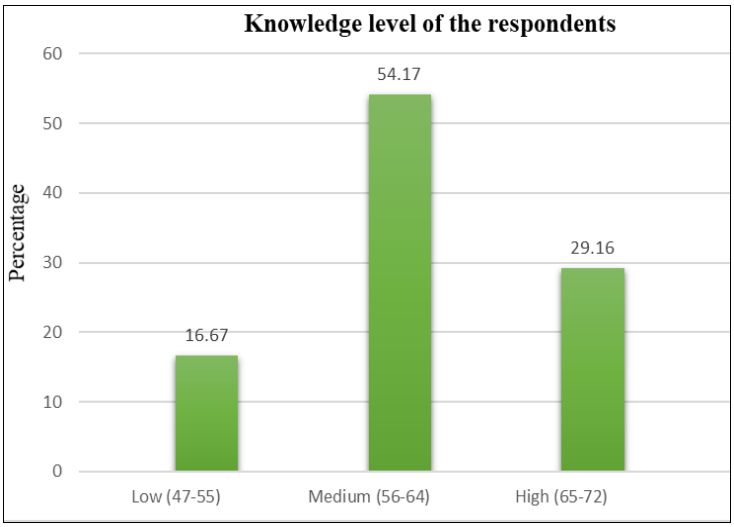

Fig 1: Overall distribution of the respondents based on the knowledge level towards improved potato cultivation practices

Adoption of improved potato cultivation practices

Table 4: Distribution of respondents based on the adoption level of the respondents towards improved potato cultivation practices (N=120)

Sl. No	Statement	Adoption					
		Fully Adopted		Partially adopted		Not adopted	
		f	%	f	%	f	%
1	Adopted the improved method of land preparation of potato cultivation	13	10.83	107	89.17	0	0
2	Use of improved cultivar for plantation	116	96.67	4	3.33	0	0
3	Use of improved planting method	25	20.83	95	79.17	0	0
4	Suitable crop rotation	57	47.5	63	52.5	0	0
5	Proper spacing during planting	86	71.67	34	28.33	0	0
6	Application of recommended dose of FYM	35	29.17	85	70.83	0	0
7	Crop rotation can benefit the lower incidence of weeds, insects and plant diseases	51	42.5	69	57.5	0	0
8	Sensitize the field equipment as plant protection measure	44	36.67	76	63.33	0	0
9	Considering optimum seed rate	90	75	30	25	0	0
10	Harvest and post-harvest management	0	0	44	36.67	76	63.33
11	Recommended fertilizer dose	24	20	96	80	0	0
12	Modern equipment to apply fungicides to control disease	7	5.83	103	85.84	10	8.33
13	Control measures to prevent from pest	106	88.33	14	11.67	0	0
14	Mixed cropping can increase the productivity	37	30.83	83	69.17	0	0

The above table 4. shows that majority (89.17%) of the respondents have partially adopted the improved method of land preparation for potato cultivation and 10.83 per cent of the respondents have fully adopted. It was observed that majority (96.67%) of the respondents have fully adopted the use of improved cultivar for plantation and 3.33 per cent have partially adopted. It shows that majority (79.17%) of the respondents have partially adopted the use of improved planting method and 20.83 per cent of the respondents have fully adopted. It reveals that majority (52.5%) of the respondents have partially adopted suitable crop rotation and 47.5 per cent of the respondents have fully adopted. It shows that majority (71.67%) of the respondents have fully adopted the proper spacing during planting of potato and 28.33 per cent of the respondents have partially adopted. It states that majority (70.83%) of the respondents have partially adopted the recommended dose of FYM and 29.17 per cent of the respondents have fully adopted. It states that majority (57.5%) of the respondents have partially adopted crop rotation that can benefit in lowering the incidence of weeds, insects and plant diseases and 42.5 per cent of the respondents have fully adopted. It shows that majority (63.33%) of the respondents have partially adopted the technique of sensitizing field equipment as plant control measures and 36.67 per cent of the respondents have fully adopted. It was revealed that majority (75%) of the respondents have fully adopted the optimum seed rate and 25 per cent of the respondents have partially adopted. It shows that majority (63.33%) of the respondents have not adopted the harvest and post-harvest management and 36.67 per cent of the respondents have partially adopted. It was revealed that majority (80%) of the respondents have partially adopted the use of recommended fertilizer dose and 20 per cent of the respondents have fully adopted. It shows that majority (85.84%) of the respondents have partially adopted the use of modern equipment to apply fungicides to control disease, 8.33 per cent of the respondents have partially adopted and 5.83 per cent of the respondents have fully adopted. It was revealed that majority (88.33%) of the respondents have fully adopted the control measures to prevent potatoes from pest and 11.67 per cent of the respondents have partially adopted. It states that majority (69.17%) of the respondents have partially adopted the use of mixed cropping to increased productivity and 30.83 per cent of the respondents have fully adopted.

Table 5: Overall distribution of respondents based on the adoption level of the respondents towards improved potato cultivation practices:

Sl. No	Adoption	Frequency	Percentage
1	Low (28-30)	18	15
2	Medium (31-33)	60	50
3	High (34-41)	42	35
Total		120	100

The table 5. reveals that majority (50%) of the respondents have medium level adoption level, 34 per cent of the respondents have high adoption level and 15 per cent of the respondents have low adoption level. Similar findings was also reported by Desai *et al.,* (2022) [1].

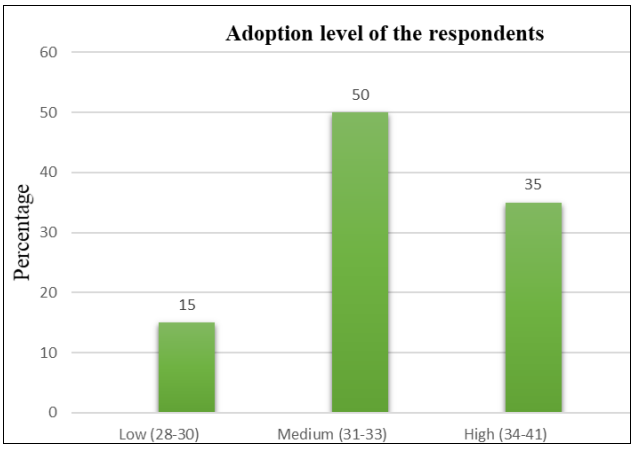

Fig 2: Overall distribution of respondents based on the adoption level of improved potato cultivation practices.

Association between Selected Independent Variables with the Adoption of the Respondents towards Improved Mustard Cultivation Practices

Table 6: Association between selected independent variables and knowledge

Sl. No	Variables	Pearson's correlation coefficient
1	Age	0.6204**
2	Education	0.7445**
3	Annual income	0.7585*
4	Occupation	0.7679**
5	Land holding	0.7857**
6	Farming experience	0.7337**
7	Risk bearing capacity	0.6546*
8	Mass media exposure	0.7740**
9	Scientific orientation	0.7487**
10	Progressiveness	0.6859**

* = Significant at p = 0.5%, ** = Significant at p = 0.01%, NS = Non Significant

The above table 6. revealed that out of ten independent variables, i.e. age, education, annual income, occupation, land holding, farming experience, risk bearing capacity, mass media exposure, scientific orientation and progressiveness are positively and significantly correlated with knowledge of farmers towards improved potato cultivation practices.

Table 7: Association between selected independent variables and adoption

Sl. No	Variables	Correlation Coefficient ('r' Value)
1	Age	0.3865*
2	Education	0.5374**
3	Annual income	0.5552*
4	Occupation	0.5673**
5	Land holding	0.5903**
6	Farming experience	0.5238**
7	Risk bearing capacity	0.4271*
8	Mass media exposure	0.5751**
9	Scientific orientation	0.5427**
10	Progressiveness	0.4649**

* = Significant at p = 0.5%, ** = Significant at p = 0.01%, NS = Non Significant

The above table 7. revealed that out of ten independent variables, i.e. age, education, annual income, occupation, land holding, farming experience, risk bearing capacity, mass media exposure, scientific orientation and progressiveness are positively and significantly correlated with adoption of farmers towards improved potato cultivation practices.

Conclusion

It is concluded from the present study that most of the respondents were middle age (40-52 years). Most of the respondents were educated upto high school level of education. Most of the respondents had an annual income between Rs 1,00,000 to Rs 2,50,000. Most of the respondents were engaged in business along with agriculture. Most of the respondents had land holdings between 1-2 acres. Most of the respondent had farming experience between 11-20 years. Majority of the respondents had medium level of risk bearing capacity. Most of the respondents had medium level of mass media exposure. Majority of the respondent had medium level of scientific orientation. Most of the respondents had medium level of progressiveness. Majority of the respondents had medium level of knowledge. Majority of the respondents had medium level of adoption respectively. Subsequently, all of the selected independent variables, i.e., age, education, annual income, occupation, land holding, farming experience, risk bearing capacity, mass media exposure, scientific orientation and progressiveness are positively and significantly correlate with knowledge and adoption of farmers towards improved potato cultivation practices.

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