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Study of technical knowledge and adoption level of chilli growers in Varanasi district of Uttar Pradesh

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Abstract

The study was conducted in Arajiline, Sevapuri, Badagaon and Harahua blocks of Varanasi district Uttar Pradesh selected purposely. A total number of 400 respondents were selected through random sampling. The structured schedule was developed keeping in view the objectives and variables under study. The respondents were contacted personally for data collection. The percentage, mean, standard deviation and correlation were used for calculation and drawing the inferences. Results reveals that majority of respondents were found in highest knowledge level of chilli farmers respect to Temperature for good Germination (23.5%), High Yielding Verities (24.5), Field Preparation (40%), Seed requirement (34%), Seed treatment (18.25%), Fertilizer and Manure Management (13%), Sowing Time (39%), Method of Sowing (37.75%), Irrigation (17.5%), Weed control (21.25%), Insect and disease (20%) and Harvesting (22.5%) and adaption level regard to High Yielding Verities (12.25%), Field Preparation (21.75%), Seed requirement (48%), Seed treatment (17%), Fertilizer and Manure Management (17.5%), Sowing Time (17%), Method of Sowing (16.75%), Irrigation (13.0%), Weed control (21.5%), Insect and disease (18.0%) and Harvesting (6.5%).

Keywords: Technological knowledge, adaption rate, cultivation methods

Introduction

Chilli (*Capsicum* spp.) is an essential spice crop cultivated worldwide for its pungent flavor, vibrant color, and rich nutritional profile. It belongs to the Solanaceae family and is extensively grown in tropical and subtropical regions. The primary bioactive compound in chilli, capsaicin, contributes to its characteristic heat and possesses numerous medicinal properties, including pain relief and metabolism enhancement. Additionally, chilli is a rich source of vitamins A, C, and E, along with antioxidants, making it a valuable ingredient in both traditional and modern medicine (Bosland & Votava, 2012) [7]. Chilli is cultivated primarily in countries like India, China, Thailand, Mexico, and Indonesia, with India being one of the largest producers and exporters. The crop thrives in warm climates with well-drained, sandy loam soil and requires adequate sunlight and water management. Despite the increasing demand for chilli in global markets, challenges such as pest infestations, climate change, and improper farming practices affect productivity and quality. Therefore, farmers' knowledge and adoption of improved cultivation techniques play a crucial role in sustaining chilli production (Ali *et al*., 2020) [1]. Chilli is a high-value crop that contributes significantly to the income of small-scale farmers, especially in developing countries. The global chilli market continues to expand due to increasing demand from the food processing industry (Rani *et al*., 2018) [14]. Health Benefits: Rich in capsaicinoids, flavonoids, and carotenoids, chilli exhibits antimicrobial, anti-inflammatory, and antioxidant properties (Gibson *et al*., 2015) [9]. Chilli is utilized in pharmaceuticals, cosmetics, and natural dye industries. Chilli is a widely cultivated spice crop in India, and its production is crucial for the country's agricultural economy. Varanasi district, located in the state of Uttar Pradesh, is known for its significant chilli production. However, the level of technical knowledge and adoption of recommended chilli production practices among the growers in this region is not well-understood. India is the world's second largest vegetable producer next to China. The country had a diversified range of agro-climatic zones and seasons which allows for the cultivation of wide varieties of vegetables (Hanks, G. (2015) [11]. Vegetables are the rich sources of vitamins and minerals that contribute to the fight against malnutrition. They are the most affordable source of natural protective tools and also referred as functional foods Vegetable cultivation would be approximately 4-5 times more profitable than cereals and other field crops and also provides more job opportunities. (Gopalakrishnan, T. R. 2007) [10].

Asia produces 65.8 per cent of world green chillies and pepper and stands at the top (Anonymous, 2004) [2]. India is the largest producer and contributes 25 per cent to total world production (Anonymous, 2012 b) [6]. It is also largest consumer and exporter of chilli. India is the major exporter in the world market and the total export of chillies from India is on an average around 10-15 per cent of total production (Anonymous, 2012 a) [5]. India has produced about 13.2 million tons of chilli during 2009-10 (Anonymous, 2012 a) [5]. It is observed from the yield of

chilli, that the average national yield is 1199.28 kg hectare-1 (Anonymous, 2009) [3]. Chhattisgarh state has 31.576 thousand hectare area, 195.473 thousand metric tonn production of chilli (Anonymous, 2011) [4]. Similarly Raipur district is the capital of the state having regular and heavy demand of vegetables. Similarly Varanasi district having regular and heavy demand of vegetables. Rajatalab block had the highest chilli cultivation in Varanasi district and hence, the block was considered for the study with the objective to assess the extent of knowledge and adoption of recommended chilli production technology in Arajiline, Sevapuri, Badagaon and Chiraigaon block of Raipur district. The knowledge level of farmers regarding chilli farming varies significantly based on factors such as education, access to extension services, and technological advancements. Studies have shown that proper training and exposure to scientific methods significantly improve farmers' productivity and profitability (Kumar & Sharma, 2021) [12]. A majority of small-scale farmers still rely on traditional farming techniques, such as using local seed varieties, organic manure, and manual irrigation methods. While these methods have been passed down through generations, they often lead to lower yields and vulnerability to pests and diseases (Sharma *et al*., 2020). [15] On the other hand, farmers who adopt modern technologies—such as hybrid seed varieties, drip irrigation, and integrated pest management (IPM)—tend to achieve higher yields and better-quality produce (Ali *et al*., 2020) [1].

Agricultural extension services play a vital role in disseminating knowledge about improved farming practices. Farmers who engage in training programs and workshops tend to have better awareness and implementation of advanced techniques, leading to higher productivity and income (Kumar & Sharma, 2021) [12]. Governments and agricultural organizations should invest in training programs, field demonstrations, and farmer-to-farmer knowledge sharing to improve adoption rates of modern practices (FAO, 2020) [8].

Methods and Materials

A random survey was conducted in four major chilli growing block *viz*., Arajiline, Sevapuri, Badagaon and Harahua block of Varanasi Uttar Pradesh in which selected five village each block and 20 chilli growers from each village were randomly selected to constitute the total sample size of 400 respondents for survey of technical knowledge and adoption level of chilli grower. A total of 20 villages covering 5 block in Varanasi districts were surveyed. The data were collected through a well-structured and pre tested interview schedule. The researcher personally met with the respondents and explained to them about the purpose of the study to build the rapport. Data were recorded through interview schedule and analyzed to use appropriate statistical methods *viz*., mean, average, frequency, per cent and standard deviation etc. For the study of knowledge, ten recommended practices of chilli production technology *viz*., Temperature for good Germination, High Yielding Verities, Field Preparation, Seed requirement, Seed treatment, Fertilizer and Manure Management, Sowing Time, Method of Sowing, Irrigation, Weed control, Insect and disease and Harvesting. The level of low knowledge, medium knowledge and high knowledge were assigned for each practice. The total score obtained by the respondents from all ten practices was the knowledge score of the individual respondent.

The adoption behaviour of chilli production technology refers to the extent of adoption of recommended improved farm prentices. The questions were asked regarding extent of adoption of High Yielding Verities, Field Preparation, Temperature for good Germination, Seed requirement, Seed treatment, Fertilizer and Manure Management, Sowing Time, Method of Sowing, Irrigation, Weed control, Insect and disease and Harvesting.

Results and Discussion

Knowledge level and adaptation level of chilli growers recommended cultivation practices

1. High Yielding Verities

The above table shows that the majority of the respondent (67.0%) were observed having fair knowledge level about high yielding verities of chill followed by poor (9.5%) and good (23.5%) level respectively. The every score the knowledge level found out to be 61. 21 percent with range of minimum (28.57) and maximum (92.85) score hence it can be inferred that the majority of the chilli growers (268) were belonging to medium category of knowledge about chilli high yielding verities.

2. Field Preparation

The above table shows that the majority of the respondent (55.0%) were observed having fair knowledge level about high yielding verities of chill followed by poor (20%) and good (24.5%) level respectively. The every score the knowledge level found out to be 61. 23 per cent with range of minimum (27.57) and maximum (91.15) score hence it can be inferred that the majority of the chilli growers (220) were belonging to medium category of knowledge about chilli high yielding verities.

3. Temperature for good Germination

The above table 1 shows that the majority of the respondent (42.5%) were observed having fair knowledge level about high yielding verities of chill followed by poor (17.5%) and good (40%) level respectively. The every score the knowledge level found out to be 76.23 per cent with range of minimum (30.00) and maximum (98.00) score hence it can be inferred that the majority of the chilli growers (170) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2. shows that the majority of the respondent (52%) were observed having fair adaption level about high yielding verities of chill followed by good (48%) and low (0%) level respectively. The every score the adaption level found out to be 49.23 per cent with range of minimum (32.00) and maximum (68.00) score hence it can be inferred that the majority of the chilli growers (208) were belonging to medium category of knowledge about chilli high yielding verities.

4. Seed requirement

The above table 1 shows that the majority of the respondent (49.5%) were observed having fair knowledge level about high yielding verities of chill followed by poor (16.5%) and good (34%) level respectively. The every score the knowledge level found out to be 63.38 per cent with range of minimum (24) and maximum (100.00) score hence it can be inferred that the majority of the chilli growers (198) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2 shows that the majority of the respondent (72%) were observed having fair adaption level about high yielding verities of chill followed by good (17%) and low (11%) level respectively. The every score the adaption level found out to be 56.23 per cent with range of minimum (25.00) and maximum (100.00) score hence it can be inferred that the majority of the chilli growers (288) were belonging to medium category of knowledge about chilli high yielding verities.

5. Seed treatment

The above table 1 shows that the majority of the respondent (60.25%) were observed having fair knowledge level about high yielding verities of chill followed by good (18.25%) and low (21.5%) level respectively. The every score the knowledge level found out to be 67.18 per cent with range of minimum (42.51) and maximum (90.00) score hence it can be inferred that the majority of the chilli growers (241) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2 shows that the majority of the respondent (69.5%) were observed having fair adaption level about high yielding verities of chill followed by good (17.5%) and low (13%) level respectively. The every score the adaption level found out to be 52.23 per cent with range of minimum (37.00) and maximum (81.00) score hence it can be inferred that the majority of the chilli growers (278) were belonging to medium category of knowledge about chilli high yielding verities.

6. Fertilizer and Manure Management

The above table 1 shows that the majority of the respondent (70.5%) were observed having fair knowledge level about high yielding verities of chill followed by low (16.5%) and good (13%) level respectively. The every score the knowledge level found out to be 66.23 per cent with range of minimum (42.00) and maximum (88.76) score hence it can be inferred that the majority of the chilli growers (282) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2. shows that the majority of the respondent (69.00%) were observed having fair adaption level about high yielding verities of chill followed by good (17.00%) and low (14.00%) level respectively. The every score the adaption level found out to be 55.23 per cent with range of minimum (40.00) and maximum (84.65) score hence it can be inferred that the majority of the chilli growers (276) were belonging to medium category of knowledge about chilli high yielding verities.

7. Sowing Time

The above table 1 shows that the majority of the respondent (40.5%) were observed having fair knowledge level about high yielding verities of chill followed by low (20.5%) and good (39%) level respectively. The every score the knowledge level found out to be 65.23 per cent with range of minimum (24.00) and maximum (100) score hence it can be inferred that the majority of the chilli growers (162) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2. shows that the majority of the respondent (70.25%) were observed having fair adaption level about high yielding verities of chill followed by low (17.5%) and high (12.25%) level respectively. The every score the adaption level found out to be 52.23 per cent with range of minimum (25.00) and maximum (100) score hence it can be inferred that the majority of the chilli growers (281) were belonging to medium category of knowledge about chilli high yielding verities.

8. Method of Sowing

The above table shows that the majority of the respondent (41.5%) were observed having fair knowledge level about high yielding verities of chill followed by high (37.75%) and low (20.75%) level respectively. The every score the knowledge level found out to be 66.23 per cent with range of minimum (40.00) and maximum (88.00) score hence it can be inferred that the majority of the chilli growers (166) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2. shows that the majority of the respondent (79.25%) were observed having fair adaption level about high yielding verities of chill followed by high (16.75%) and low (4.00%) level respectively. The every score the adaption level found out to be 55.33 per cent with range of minimum (43.00) and maximum (80.00) score hence it can be inferred that the majority of the chilli growers (317) were belonging to medium category of adaption about chilli high yielding verities.

9. Irrigation

The above table shows that the majority of the respondent (57.5%) were observed having fair knowledge level about high yielding verities of chill followed by low (25%) and low (17.5%) level respectively. The every score the knowledge level found out to be 69.23 per cent with range of minimum (46.00) and maximum (90.00) score hence it can be inferred that the majority of the chilli growers (230) were belonging to medium category of knowledge about chilli high yielding verities.

The above table 2. shows that the majority of the respondent (68.25%) were observed having fair adaption level about high yielding verities of chill followed by low (18.75%) and high (13.00%) level respectively. The every score the adaption level found out to be 56.23 per cent with range of minimum (50.00) and maximum (80.00) score hence it can be inferred that the majority of the chilli growers (273) were belonging to medium category of adaption about chilli high yielding verities.

10. Weed control

The above table 1 shows that the majority of the respondent (51.25%) were observed having fair knowledge level about high yielding verities of chill followed by low (27.5%) and low (21.25%) level respectively. The every score the knowledge level found out to be 59.23 per cent with range of minimum (32.00) and maximum (75.00) score hence it can be inferred that the majority of the chilli growers (205) were belonging to medium category of knowledge about chilli high yielding verities.

The above table shows that the majority of the respondent (51%) were observed having fair adaption level about high yielding verities of chill followed by low (27.5%) and high (21.5%) level respectively. The every score the adaption level found out to be 48.63 per cent with range of minimum (30.00) and maximum (62.00) score hence it can be inferred that the majority of the chilli growers (204) were belonging to medium category of adaption about chilli high yielding verities.

11. Insect and disease

The above table 1 shows that the majority of the respondent (50.00%) were observed having fair knowledge level about high yielding verities of chill followed by low (30.00%) and low (20.00%) level respectively. The every score the knowledge level found out to be 76.23 per cent with range of minimum (43.00) and maximum (78.00) score hence it can be inferred that the majority of the chilli growers (200) were belonging to medium category of knowledge about chilli high yielding verities.

The above table shows that the majority of the respondent (69.5%) were observed having fair adaption level about high yielding verities of chill followed by high (18.00%) and low (12.5%) level respectively. The every score the adaption level found out to be 53.23 per cent with range of minimum (35.00) and maximum (75.24) score hence it can be inferred that the majority of the chilli growers (278) were belonging to medium category of adaption about chilli high yielding verities.

12. Harvesting

The above table 1 shows that the majority of the respondent (48%) were observed having fair knowledge level about high yielding verities of chill followed by low (29.5%) and low (22.5%) level respectively. The every score the knowledge level found out to be 74.23 per cent with range of minimum (44.00) and maximum (100.00) score hence it can be inferred that the majority of the chilli growers (192) were belonging to medium category of knowledge about chilli high yielding verities.

The above table shows that the majority of the respondent (78.5%) were observed having fair adaption level about high yielding verities of chill followed by low (15.00%) and low (6.5%) level respectively. The every score the adaption level found out to be 47.23 per cent with range of minimum (26.00) and maximum (78.00) score hence it can be inferred that the majority of the chilli growers (314) were belonging to medium category of adaption about chilli high yielding verities.

Table 1: Distribution of respondent according to level of knowledge about high yielding verities.

Variable	Respondents	
	F	%
1. High Yielding Verities		
UP to 46 (Poor)	38	9.5
47-77 (medium)	268	67
78 & above (good)	94	23.5
2. Field Preparation		
UP to 46 (Poor)	80	20
47-91(medium/fair)	220	55
92 & above (good)	98	24.5
3. Temperature for good Germination		
UP to 45 (Poor)	70	17.5
46-75 (medium/fair)	170	42.5
76 & above (good)	160	40
4. Seed requirement		
UP to 34 (low)	66	16.5
35-89 (medium)	198	49.5
90 & above (good)	136	34
5. Seed treatment		
UP to 52 (low)	86	21.5
53-80 (medium)	241	60.25
81 & above (good)	73	18.25
6. Fertilizer and Manure Management		
UP to 55 (low)	66	16.5
56-78 (medium)	282	70.5
79 & above (good)	52	13
7. Sowing Time		
UP to 34 (Low)	82	20.5
35-93 (Medium)	162	40.5
94 & above (High)	156	39
8. Method of Sowing		
UP to 34 (Low)	83	20.75
35-93 (Medium)	166	41.5
94 & above (High)	151	37.75
9. Irrigation		
UP to 61 (Low)	100	25
62-76 (Medium)	230	57.5
77 & above (High)	70	17.5
10. Weed control		
UP to 50 (Low)	110	27.5
51-67 (Medium)	205	51.25
68 & above (High)	85	21.25
11. Insect and disease		
UP to 54 (Low)	120	30
55-72 (Medium)	200	50
73 & above (High)	80	20
12. Harvesting		
UP to 55 (Low)	118	29.5
56-90 (Medium)	192	48
91 & above (High)	90	22.5

Table 2: Distribution of respondent according to adoption extent about high yielding verities (HYVs).

Variable	Respondents	
	F	%
1. High Yielding Verities		
UP to 35 (low)	50	12.5
36-65 (medium)	301	75.25
66 & above (good)	49	12.25
2. Field Preparation		
UP to 26 (low)	0	0
27-54 (medium)	313	78.25
55 & above (good)	87	21.75
3. Temperature for good Germination		
UP to 32 (low)	0	0
33-67 (Medium)	208	52
68 & above (good)	192	48
4. Seed requirement		
UP to 35 (low)	44	11
36-77 (medium)	288	72
78 & above (good)	68	17
5. Seed treatment		
UP to 40 (low)	52	13
41-65 (medium)	278	69.5
66 & above (good)	70	17.5
6. Fertilizer and Manure Management		
UP to 47 (low)	56	14
48-63 (medium)	276	69
64 & above (good)	68	17
7. Sowing Time		
UP to 44 (Low)	70	17.5
45-66 (Medium)	281	70.25
67 & above (High)	49	12.25
8. Method of Sowing		
UP to 44 (Low)	16	4
45-66 (Medium)	317	79.25
67 & above (High)	67	16.75
9. Irrigation		
UP to 53 (Low)	75	18.75
54-65 (Medium)	273	68.25
66 & above (High)	52	13
10. Weed control		
UP to 40 (Low)	110	27.5
41-56 (Medium)	204	51
57 & above (High)	86	21.5
11. Insect and disease		
UP to 47 (Low)	50	12.5
48-60 (Medium)	278	69.5
61 & above (High)	72	18
12. Harvesting		
UP to 36 (Low)	60	15
37-58 (Medium)	314	78.5
59 & above (High)	26	6.5

Conclusion

Chilli cultivation plays a crucial role in global agriculture and the economy. However, the knowledge level of farmers remains a determining factor in achieving optimal productivity and sustainability. Improved the former knowledge of chilli cultivation by training of practices like High Yielding Verities, Field Preparation, Seed requirement, Seed treatment, Fertilizer and Manure Management, Sowing Time, Method of Sowing, Irrigation, Weed control, Insect and disease and Harvesting Addressing knowledge gaps through extension services, digital technologies, and farmer cooperatives can significantly enhance the efficiency and profitability of chilli farming. Sustainable approaches and continuous learning opportunities are key to ensuring long-term success in chilli production.

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