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FARMERS KNOWLEDGE AND ADOPTION OF IMPROVED CUCUMBER (*Cucumis sativus* L.) CULTIVATION PRACTICES IN NAGALAND, INDIA

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ABSTRACT

Cucumber (*Cucumis sativus* L.), a member of the Cucurbitaceae family, is among the oldest cultivated vegetables globally. In India, particularly in Nagaland, cucumber plays a vital role in household food security and income generation. This study conducted during the year 2022 to 2023 to assess the knowledge and adoption status of improved cultivation practices among cucumber farmers in Mokokchung district, Nagaland. A total of 120 respondents from six purposively selected villages across Ongpangkong North and South blocks were surveyed using a structured interview schedule. Results revealed that while knowledge levels were relatively high for basic practices such as sowing time (99.2%), irrigation (93.3%), and harvesting (91.7%), the adoption of advanced agronomic practices remained low. Practices like seed treatment, pest and disease management, and use of recommended varieties had zero adoption. Overall, 67.5% of respondents were classified as having medium knowledge levels, and 46.6% were medium adopters. The study concluded that while traditional knowledge is strong, constraints such as organic farming norms, lack of input availability, and limited extension support hinder the adoption of modern practices. Targeted interventions focusing on organic-compatible inputs and farmer training are essential.

(Key words: Cucumber cultivation, knowledge level, adoption, improved practices, organic farming, Nagaland)

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is one of the most ancient and globally cultivated vegetables, widely grown in tropical and subtropical regions (Adetula and Denton, 2003). As a monoecious, annual climber, it has been part of human diets and traditional agriculture for over 3,000 years. In India, its cultivation dates back to 400 BC, during the invasion of Northwestern India by Alexander the Great (Gopalakrishnan, 2007). The crop is adaptable to a variety of soils, from sandy to clayey loam, with an optimal pH range of 6.0 to 7.5 and a preferred temperature range of 20–28°C.

Cucumber is valued for its high water content, refreshing taste, and medicinal properties. In recent decades, there has been growing demand for improved varieties and modern cultivation practices to enhance productivity, quality, and resistance to biotic stresses. Nevertheless, the level of awareness and adoption of such innovations remains variable across regions.

In Nagaland, cucumber is traditionally grown as a component crop in jhum (slash-and-burn) cultivation systems, indicating its cultural and agronomic significance (Biswas, 2017). It is primarily cultivated for household consumption and local markets. Despite being cultivated under organic and low-input conditions, yield gaps persist due to limited knowledge and adoption of improved cultivation practices.

Mokokchung district, located in the central part of Nagaland, leads in cucumber production with the highest area (220 ha) and output (5,600 Mt) (Anonymous, 2021). However, the extent to which farmers adopt improved practices remains underexplored. Therefore, this study aimed to assess the knowledge and adoption levels of cucumber growers regarding recommended cultivation practices in this high-potential region and to identify gaps that could inform targeted extension interventions.

MATERIALS AND METHODS

The study was conducted in Mokokchung district of Nagaland, which offers favorable agro-climatic conditions, including well-distributed rainfall, varied soil types, and mild temperatures suitable for cucumber cultivation. The study was undertaken in the year 2022.

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Two blocks, Ongpangkong North and Ongpangkong South, were purposively selected due to their high cucumber cultivation intensity and organic farming reputation. From each block, three villages were selected: Aliba, Chungtai, Kinunger (North), and Chubayimkum, Longsa, Kupza (South). Twenty respondents were randomly selected from each village, totaling 120. The study employed an ex-post facto research design. Data were collected using a structured interview schedule based on 12 recommended cucumber cultivation practices identified from literature and extension advisories. Responses were quantified into knowledge and adoption scores and categorized into low, medium, and high levels.

Sl. No.	Category	Range
1.	Low	<μ-S.D
2.	Medium	Between μ±S.D
3.	High	> μ+ S.D

For the study, a list of 13 questions was prepared in-order to examine the knowledge level of the respondents on cucumber cultivation practises and were calculated using knowledge index. Based on the responses given, it was measured by the score (0) for never (1) for partial and (3) for fully. The formula of knowledge index was adopted in-order to find out about the knowledge level of cucumber growers.

$$\text{Knowledge Index (KI)} = \frac{\text{Total scored obtained x 100}}{\text{Maximum possible score}}$$

For calculating adoption quotient each practice was framed in a question form to obtain the response from the respondents. The responses were classified as full adoption (2), partial adoption (1) and never adopted (0).

$$\text{Adoption quotient} = \frac{\text{Total scored obtained x 100}}{\text{Maximum possible score}}$$

RESULTS AND DISCUSSION

Knowledge level on improved practices

The data presented in Table 1 shows that a majority (99.17%) of the respondents had sound knowledge regarding the recommended sowing time, i.e., from late December to the first week of January. This aligns with seasonal best practices for hill agriculture in the region, as confirmed by Das and Bhowmik (2019) and echoed in the context of fruit crops by Manvar *et al.* (2003), who observed that mango growers in Maharashtra had high knowledge regarding crop seasonality.

About 93.33% of respondents knew the irrigation requirement for cucumber, reflecting a strong awareness of water management. Choudhury (2018) observed similar awareness among cucumber growers in Assam, indicating the influence of extension services in disseminating basic crop care practices.

A good proportion (91.67%) had knowledge of correct harvesting stages, such as harvesting cucumbers at 45–55 days after sowing at tender maturity. This practical knowledge was consistent with the findings of Rani and Singh (2020), who emphasized the importance of timely harvesting for market acceptability and yield.

Spacing was correctly understood by 85% of farmers, with knowledge of maintaining 1.5–2 m between rows and 1.5 m between plants. KVK Mokokchung's extension outreach stresses this spacing. Manvar *et al.* (2003) also found high spacing knowledge in perennial horticultural crops.

Regarding land preparation, 82.50% of respondents showed awareness of deep ploughing, raised beds of 1m width, and mixing FYM and fertilizers with topsoil. These practices are encouraged by the Department of Agriculture, Nagaland (Anonymous, 2021), and are aligned with recommended methods in hilly terrains.

About 80.83% of respondents were knowledgeable about post-harvest storage conditions, specifically the optimal temperature (10–13°C) and relative humidity (90–95%). These parameters follow ICAR-IIVR (Anonymous, 2020) post-harvest standards for perishable vegetables.

Knowledge about the recommended seed rate of 2–2.5 kg ha^{-1} was present among 78.33% of the respondents. This aligns with Adetula and Denton (2003) findings in the humid tropics of Nigeria, indicating the transferability of best practices across agro-ecological regions.

Knowledge of disease and pest management was fairly high, with 77.50% and 76.67% respectively. Farmers mentioned fungicides like carbendazim and pesticides such as neem oil. However, as noted by Tiwari and Tiwari (2018), organic preferences often limit chemical use among tribal farmers.

Only 41.67% were aware of seed treatment with *Trichoderma viride* or *Pseudomonas fluorescens*, though such bioagents are widely promoted by KVKs and extension manuals. Limited adoption might be due to poor input access or lack of hands-on demonstrations.

Just 8.33% of respondents knew about improved cucumber varieties like Poinsette, Pusa Uday, and Pusa Sanyog. The prevalence of traditional landraces such as Pangrong and Matsu, as noted by Biswas (2017), might be inhibiting varietal diversification.

Finally, only 7.50% had knowledge of the recommended FYM and NPK fertilizer dosages (20–25 t ha^{-1} of FYM, and 35:25:35 kg ha^{-1} of NPK). This could be attributed to the dominance of organic farming culture and a lack of soil health card utilization in rural Nagaland.

These findings indicate that while farmers are knowledgeable in basic and traditional practices like sowing time, irrigation, and harvesting, there are significant gaps in scientific interventions such as seed treatment, use of improved varieties, and nutrient management. Similar results were reported by Das and Nath (2016), who found that while vegetable growers in Tripura possessed good traditional knowledge, their understanding of improved cultivation practices was limited.

Adoption level of improved practices

Table 3 revealed that a majority (50.83%) of the respondents had adopted the recommended sowing time, i.e., late December to the first week of January. Adoption of land preparation practices, such as preparing beds of 1 m width and 5–10 cm height with pits filled with FYM and fertilized topsoil, was observed among 43.33% of respondents. Spacing practices (rows 1.5 to 2 m apart and 1.5 m between plants) were adopted by 37.50%, while 35.00% practiced harvesting at the tender stage, 45–55 days after sowing. Adoption rates for irrigation (frequent watering during growth and fruiting) and storage under ideal conditions (10–13ºC and 90–95% relative humidity) were comparatively low at 14.17% and 12.50%, respectively.

None of the respondents reported adoption of recommended improved varieties, seed treatment, seed rate, manure and fertilizer application, or chemical pest and disease management. This was largely because farmers relied on local varieties such as Pangrong, Narep, and Aomatsu and preferred natural and organic farming methods over chemical inputs. Similar trends have been reported by Rani *et al.* (2021), Das and Bhowmik (2020) stated that organic practices predominated and adoption of chemical recommendations remained minimal.

The study revealed that while farmers in Mokokchung district possess strong traditional knowledge of cucumber cultivation, adoption of improved practices remains low, particularly in areas like seed treatment, pest and disease management, and use of improved varieties. This gap stems from organic preferences, limited extension contact, and lack of training.

To improve adoption, targeted capacity-building programs on organic-compatible practices are recommended. Strengthening local access to bio-inputs, recommended seeds, and participatory extension services can help bridge the gap between traditional knowledge and scientific practices.

Table 1. Distribution of respondents based on recommended knowledge level (N=120)

Sl. No.	Category	Recommended practices	F	P (%)	RANK
1.	Sowing time	Late December to first week of January	119	99.17	I
2.	Irrigation	The plants should be watered at 3-5days interval	112	93.33	II
3.	Harvesting	Harvesting should be done 45-55 days after sowing at tender stage	110	91.67	III
4.	Spacing	Row to row were kept 1.5-2 m and 1.5 m between the plants	102	85.00	IV
5.	Land preparation	Bed size of 1m width, 5-10 cm height were prepared. Pits should be filled with FYM, and fertilizers are mixed with topsoil	99	82.50	V
6.	Storage	10-13ºc temperature and 90-95% relative humidity	97	80.83	VI
7.	Seed rate	2-2.5 kg of seeds/ha	94	78.33	VII
8.	Disease management	Dinocap (0.06%), carbendazim (0.05%) or difenoconazole (0.03%) at 10-14 days interval	92	77.50	VIII
9.	Pest management	Neem oil and monosil @ 2-3 ml/litre of water	93	76.67	IX
10.	Seed treatment	*Trichoderma viride*/ *Pseudomonas fluorescents*	50	41.67	X
	Recommended		9	8.33	XI
11.	Varieties of cucumber	Poinsette, Pusauday and Pusasanyog			
12.	Manures and fertilizers	FYM @ 20-25 t ha^{-1} as basal dose of nitrogen (35 kg) and full dose of phosphorous (25 kg) and potassium (35 Kgh^{-1})	10	7.50	XII

F- Frequency, %- Percentage (P)

Table 2. Distribution of respondents according to overall knowledge status N=120

Sl. No.	Category	Frequency	Percentage (%)	Mean	S. D.
1.	Low	19	15.83		
2.	Medium	81	67.50	21.01	3.43
3.	High	20	16.67		

Table 3. Adoption level of improved cucumber cultivation practices among respondents

(N=120)

Sl. No.	Category	F	P (%)	Rank
1.	Sowing time	61	50.83	I
2.	Land preparation	52	43.33	II
3.	Spacing	33	37.50	III
4.	Harvesting	42	35.00	IV
5.	Irrigation	17	14.17	V
6.	Storage	15	12.50	VI
7.	Seed treatment	0	00.00	VII
8.	Disease management	0	0.00	VII
9.	Pest management	0	0.00	VII

Table 4. Overall adoption level of recommended cucumber practices

(N=120)

Sl. No.	Category	Frequency	Percentage (%)
1.	Low adopters (0.1-33.33)	46	38.33
2.	Medium adopters (33.33-66.66)	56	46.57
3.	High adopters (66.67-100.00)	18	15.00

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