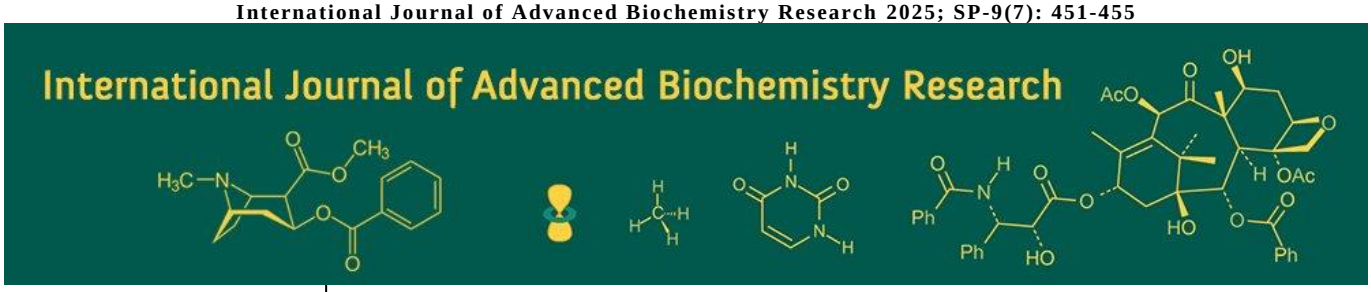

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Study of socio-economic profile of cauliflower-growing farmers of Bihar

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Abstract
The current research titled "Knowledge and Adoption of Recommended Cultivation Practices of Cauliflower Growers in Khagaria District of Bihar" was undertaken during 2017-18 with 120 respondents drawn from 10 randomly selected villages. Data were gathered with the help of a structured survey and by employing appropriate statistical techniques. Results showed 51.60% of farmers belonged to middle age, whereas 26.60% of farmers attained education at high school level. Approximately 56.60% possessed medium farming experience and 46.70% owned farms with medium size (10.01-25.00 acres). Almost 35% possessed an annual income of Rs. 75,000 to Rs. 1,00,000. 55.00% of the farmers possessed a medium degree of risk-taking capacity, while 45.00% were moderately innovative. In terms of knowledge and adoption, 61.66% possessed moderate knowledge about recommended practices, while 53.50% adopted them at a medium level. The research identifies the imperative for better farmer support, particularly in grasping market conditions and price fluctuations. Enhancing awareness campaigns through mass media and providing timely advice on pest and disease management is necessary to improve productivity and facilitate sustainable cauliflower production.

Keywords: Cauliflower cultivation, risk-bearing capacity**,** newspapers, radio**,** TV

Introduction

Vegetable Production and Cauliflower Cultivation in India: A Growing Potential

India's favorable climate and agro-ecological diversity favor cultivation of a large number of vegetables throughout the year. Vegetables are an important source of essential carbohydrates, proteins, vitamins, minerals, and dietary fiber for human consumption. Though vital, vegetable intake in India is just 160 grams per capita on a daily basis, much less than the desired 280 grams. To meet the nutritional needs of the rising population, the nation must produce almost 0.3 million tonnes of vegetables per day (Kanavi *et al.*, 2000) [4]. Owing to its extensive variety of soils, topography, and climatic regions, India is particularly suitable for vegetable cultivation. Since the inception of the Green Revolution, vegetable production and the area under vegetable cultivation have increased remarkably. All this development can be accounted for by the implementation of high-yielding varieties, scientific management methods, and advanced agricultural technologies (Nagaraja *et al.*, 2002) [6]. Currently, India accounts for about 7% of total world production of vegetables, reflecting the industry's huge potential as well as its increasing importance.

As part of the wider horticulture industry comprising fruits, vegetables, spices, plantation crops, and flowers, vegetable production holds a central place. It is increasingly becoming farmers' favorite crop in view of its higher returns compared to crops like cereals and pulses. Moreover, vegetable crops possess an impressive ability to respond to environmental stresses, including different soils, irregular rainfall, and temperature changes. This ability to endure enables vegetables to grow even in degraded or marginal soils, thus becoming a good option for increasing rural livelihood in risk-prone areas.

Apart from their nutritional worth, vegetables also play a significant role in the country's economy through domestic consumption and export. India's present revenue from vegetable exports is, however, relatively modest-slightly more than ₹300 crores—indicating tremendous potential for expansion in the export market if quality norms, supply chains, and global marketing are enhanced. The numerous vegetables cultivated throughout the nation, cauliflower is one of the most prominent.

Year after year, there has been continuous global production of cauliflower. The global production of cauliflower in 1979-1981 was approximately 4.63 million tonnes. This greatly increased to 8.86 million tonnes during 1989-1991 and further increased to 15.72 million tonnes by 2001. India and China are now the most dominant producers of cabbage and cauliflower in the world, and India takes the first position in cauliflower cultivation. India was growing cauliflower on some 0.26 million hectares of area as of 2001 and producing around 6.5 million tonnes.

Other prominent cauliflower-producing nations are Italy, Spain, Poland, and Mexico. It is thought to have originated in Cyprus and the Mediterranean basin. Cauliflower is a cool-season crop and does well at lower temperatures, so it is particularly well adapted to the northern regions of India. Cauliflower is also very high in vitamin C, further adding to its nutritional quality and appeal to consumers. India's yearly cauliflower production is approximately 1 million tonnes, grown on over 200,000 hectares. West Bengal and Bihar are the top cauliflower-producing states, followed by Uttar Pradesh, Odisha, Haryana, Madhya Pradesh, Assam, and Gujarat. They play an important role in satisfying both domestic and potential overseas demand.

Research and Methodology

Background information regarding the study region:

Study Area and Study Approach

For making the findings of the research relevant, there is a need to provide extensive background information regarding the region that is under investigation. Geographical, agricultural, and socio-economic backgrounds of the region enable researchers to correlate the findings of the study with existing local conditions efficiently.

Study Location

The research was undertaken in Bihar's Khagaria district, which comes under the administrative control of the Munger division. The district is renowned for the cultivation of vegetables, especially cauliflower, and hence became a suitable location for the research.

District Selection

Khagaria district was purposefully chosen because of its dense population of cauliflower farmers. The area has witnessed significant participation in vegetable cultivation practices and thus was included in the current study.

Selection of Block

There are seven administrative blocks in Khagaria district. Among them, Chautham block was purposively selected for the study. The reason behind selecting Chautham block was its image of having a greater proportion of progressive farmers who adopt better agricultural practices early, particularly for cauliflower cultivation.

Selection of Villages

A master list of villages was drawn up from the block office with focus on those with active farmers' participation and improved decision-making powers. Twelve villages were then randomly selected from this list to provide an equitable and representative sample of the block.

Selection of Respondents

From each selected village, the list of farmers who were renowned for their decision-making ability and active involvement in cauliflower cultivation was collected from the Block Development Officer (BDO) office. A simple random sampling method was used to select the needed number of respondents to ensure objectivity of the study.

Selection of Variables

Independent Variables: The research contained various socio-personal and economic factors like age, educational level, landholding size, years of experience in farming, yearly income, cosmopoliteness, motivation for money, risk-taking orientation, innovativeness, and degree of participation in extension programs.

Dependent Variables: The dependent variables addressed in the research were the knowledge and adoption levels in terms of suggested cultivation practices for cauliflower.

Data Collection Tools

Primary data were gathered through a well-prepared interview schedule, framed in accordance with the study objectives. To establish its reliability and validity, it was pre-tested among a sample of ten farmers from an unsampled village. The feedback led to required adjustments prior to final deployment.

Operationalization and Measurement of Dependent Variables

Knowledge: Knowledge for the purposes of this study referred to the level of accurate information which the respondents had regarding better cauliflower cultivation practices. Anitha *et al.*'s (2004) [1] suggested methodology for evaluating knowledge among pomegranate producers was modified and appropriately adapted for cauliflower cultivation. 24 questions pertaining to recommended practices were incorporated. For every correct answer, one point was assigned; for an incorrect or no answer, zero points. Respondents were classified into three levels-low, medium, and high-based on the cumulative scores using the mean and standard deviation as the classification criteria.

Categories score	Score
Fully known	1
Partially known	2
Not known	3

Categories	Score
Partial awareness	(<Mean-SD)
Moderate awareness	(in between Mean ± SD)
Complete	(>Mean + SD)

Statistical Method for Analysis

The collected data were analyzed statistically to identify the important impacts of the parameters to be investigated. Descriptive statistics were used in summarizing and explaining findings efficiently.

a) Frequency

Frequency is the frequency with which a given response or event occurs. It is an indicator of the number (fi) of how frequently an event (i) was observed in the sample set. It assists in selecting frequent patterns and trends across the respondents.

b) Percentages

Percentages were employed to display the data as a comparative and understandable format. They were derived by taking the frequency of a given response and dividing it by 100 and multiplying it by the total number of respondents, thus providing a proportionate view of the responses across categories.

$$\text{Percentage} = \frac{\text{Frequency}}{\text{Total number of respondents}} \times 100$$

a) Arithmetic Mean (A.M)

The mean is the epitomized value arrived by dividing the sum of observations by the total number of observations.

$$X = \frac{\Sigma Xi}{N}$$

Where,
Xi = Observation Score
N = Total number of observations
X = Mean Score

b) Standard Deviation (S.D.)

The square root of the mean of the squared deviations of individual values from their mean is standard deviation of that set of values. The formula used for standard deviation was as below

$$\text{S.D.} = \frac{\sqrt{\sum(Xi-X)^2}}{N}$$

Where,
S.D.= Standard deviation
$\sum$= Sum
X_i =Individual score
X = Mean of sample
N = Total no. of respondents

Results and Discussion

Age

The information shown in Table 1 shows that most (51.60%) of the cauliflower producers were in the middle-aged group, followed by 38.30% in the youth age group and 10% in the old age group. Middle-aged farmers, aged between 31 and 50 years, are usually seen to be more efficient and productive because they have more experience in farming and a greater sense of responsibility in family and economic matters. This age group tends to be more self-motivated to pick up new farming methods than both younger, inexperienced producers and elderly farmers with waning physical ability. The current results are similar to those of Babanna *et al.* (2002) [2], who also found a greater percentage of respondents active in farming activities in the 31-50 years age range.

Education

A look at Table 1 shows that 26.60% of the respondents had education up to high school, 21.70% intermediate education, 20.00% up to middle school, and 13.30% were graduates. To the surprise, as low as 6.60% of the cauliflower growers were illiterate. It indicates that more than 90% of the respondents were educated to some degree. The very high literacy level among farmers can be explained as a consequence of the social atmosphere where education is given importance and its contribution towards raising livelihood prospects is acknowledged. Literate farmers are more apt to learn about better agricultural practices, and this can promote higher productivity and income, raising their standard of living. These findings concur with those presented by Karpagam (2000) [5] and Dhamodharan and Vasanth Kumar (2001) [3], which also pointed to the good impact of education on farmers' enlightenment and uptake of better farming practices.

Farming experience

Table 1 also shows that 56.60% of the cauliflower farmers had been cultivating the vegetable for 10 to 20 years and thus fell under the medium farming experience category. Moreover, 33.30% of the surveyors, being of high experience, were engaged in cauliflower farming for more than 20 years. As few as 10.00% of farmers belonged to the low experience group with fewer than 10 years' experience in cauliflower farming. This sustained activity of cauliflower farming can be explained by the crop's higher market price, regular income attainment, and increasing demand in local markets over other crops. These favorable economic aspects probably spurred farmers to pursue its cultivation year after year. Therefore, most farmers were observed to have medium-level experience in cauliflower farming. These observations are consistent with the research work of Nagaraj *et al.* (2002) [6], which also pointed out the impact of market incentives and profitability in determining the long-run adoption of crops by farmers.

Land holding

From Table 1, it is apparent that 46.70% of the cauliflower producers were in the medium landholding segment (10.01 to 25.00 acres) followed by 28.30% in the semi-medium segment (5.01 to 10.00 acres). Also, 13.30% of the participants possessed small holdings of land (2.51 to 5.00 acres), 8.30% fell under the marginal category (up to 2.5 acres), and just 3.30% possessed large holdings of land (above 25.00 acres). This pattern indicates most farmers who practiced cauliflower production owned semi-medium to medium-sized areas of land. This can be possibly explained because agriculture is still the major activity for most families in the country, so there is a high demand to own and hold more land. Another possible reason is that cauliflower is a high-value and market-commodity crop that has boosted the economic status of farmers over time and allowed them to increase their holdings. Due to this, the majority of growers have a medium landholding. These results are partly consistent with those of the research works of Karpagam *et al.* (2000) [5], Nagaraj *et al.* (2002) [6], and Raghavendra *et al.* (2004) [7], whose findings also indicated the same trend in farmers who grew high-value crops.

Annual income

The findings revealed through Table 1 indicate that a substantial majority (35.00%) of the cauliflower farmers fell under the medium annual income class, whose annual earnings ranged from ₹75,000 to ₹1,00,000. This trend can be explained based on the reason that most of the respondents had medium (10-25 acres) and semi-medium (5-10 acres) holdings. In general, large holdings have more scope for diversified cultivation of crops and intensive use of land, which can enhance the level of income. Moreover, as a result of improved education and stronger economic

orientation among such farmers, improved farm management practices and productivity may have been generated, leading to superior incomes. Hence, the earning trend identified is consistent with landholding pattern and socio-economic profiles of the respondents. These results are in line with previous research work carried out by Veda Murthy *et al.* (2002) [10], Sunil Kumar *et al.* (2004) [9], and Shashidhar *et al.* (2005) [8], wherein they too established the same kind of relationships between farm income levels, education, and size of landholding.

Cosmopoliteness

Table 1 data indicate that 40.50% farmers went to town once every fortnight and 30.33% visited once a month. For the purpose of their visit, 50.83% went to town for domestic or personal purposes and 43.84% went to collect information on new agricultural technologies or practices. Such a response might be justified due to the widening reach of private agencies, input dealers, and extension staff who tend to visit farmers personally at home or in the field and offer guidance and information on the spot. As such, most farmers may no longer be compelled to make regular visits to towns in order to access agricultural information. Nevertheless, more innovatory and inquiring people still preferred making visits to towns in order to remain current on the latest happenings in agriculture. These results are aligned with what was observed by Shashidhar *et al.* 2005 [8], who also observed similar trends in visits to towns and acquisition of information among innovative and information-seeking farmers.

Extension participation

The statistics in Table 2 show that 22.50% of the cauliflower producers participated regularly in agricultural shows. 40.83% also participated occasionally in group meetings, while 32.50% attended demonstrations. Such participation can be a result of greater interaction with extension functionaries and a higher exposure to mass media, which enable farmers to get the latest news about agriculture. But what is striking is that over half the interviewees did not participate in other extension services. One of the possible explanations for this low participation rate might be the routine appearance of private firms in rural areas. The firms frequently market their commodities and deliver new agricultural information to farmers at their doorstep or at the field. Consequently, farmers will not necessarily see the necessity to go to formal extension events. This change in methodology of information provision could be diminishing participation from farmers in conventional extension programs. These results support findings noted by Shashidhara *et al.* (2005) [8] and Raghavendra *et al.* (2004) [7], who also noted minimal involvement in extension programs owing to increasing private sector outreach.

Table 1: Socio-economic status of respondents

Variables	Category	Frequency	Percentage
Age	Young age (18-30years)	46	38.30
	Middle age (31.50-50 years)	62	51.60
	Old age (>50 years)	12	10.00
Education	Illiterate	8	6.60
	Primary school (1st to 5th)	10	8.30
	Middle school (5th to 7th)	24	20.00
	High school (8th-10th)	32	26.60
	Intermediate	26	21.70
	Graduate	16	13.30
	PG	4	3.30
Land holding	Marginal farmers (0-2.5acres)	10	8.30
	Small farmers (2.51-5acres)	17	13.30
	Semi medium farmers (5.01-10 acres)	34	28.30
	Medium farmers (10.01-25 acres)	56	46.70
Farming experience	Big farmers (>25 acres)	4	3.30
	Low (upto10) years	12	10.00
	Medium (10-20) years	68	56.60
	Above (>20 years)	40	33.30
Annual income	Low (< Rs 20,000)	12	10.00
	Semi Medium (Rs 20,000-75,000)	28	23.30
	Medium (Rs 75,000-1,00,000)	42	35.00
	>Rs 100000	38	31.60
Risk orientation	Low (up to 7.70)	42	35.00
	Medium (7.70-10.98)	66	55.00
	High (above 10.98)	12	10.00
Innovativeness	Low (up to 21.51)	35	29.16
	Medium (21.51-30.89)	54	45.00
	High (above 30.89)	31	25.83
Cosmopoliteness	**a. Number of visit to town**		
	Once in a week	25	20.84
	Once in a fortnight	45	37.50
	Once in a month	40	33.33
	Occasionally	10	8.33
	b. Purpose of visit		
	Visits related to Agriculture	43	35.84
	Personal/domestic	67	55.83
	Entertainment	10	8.37
Economic motivation	Low (up to 18.56)	27	22.50
	Medium (18.56-25.40)	63	52.53
	High (above 25.40)	30	25.00

Table 2: Extension participation

N=120

S. No	Activities	Extent of participation					
		Regular		Occasional		Never	
		F	%	F	%	F	%
1	Training programmes	13	11.66	26	21.66	80	66.67
2	Demonstration	25	20.83	39	32.50	56	46.67
3	Field visits	6	5.00	3	2.50	111	92.40
4	Group meetings	21	17.52	49	40.83	50	41.67
5	Exhibitions (related to agriculture)	27	22.50	24	20.30	69	57.50
6	Educational tour	5	4.16	2	1.67	113	94.17

Conclusion

The study concludes that the socio-economic profile of cauliflower-growing farmers is characterized by predominantly small to marginal landholdings and moderate levels of education. Farming serves as their main occupation, often supported by occasional wage labor to supplement household income. These insights underscore the urgent need for focused interventions by the Department of Horticulture, Government of Bihar. The study identifies key constraints such as limited exposure to modern agricultural techniques, inadequate access to institutional credit, and underdeveloped market infrastructure, all of which adversely affect productivity and profitability. Nevertheless, cauliflower cultivation continues to be a crucial livelihood activity for these farmers, offering scope for income generation and economic stability. To address these issues, the study recommends enhanced support in the form of farmer education and training, improved implementation of government schemes, development of efficient irrigation systems, and establishment of robust market linkages. Strengthening agricultural extension services, promoting financial inclusion, and investing in rural infrastructure are essential steps toward improving the socio-economic status of these growers. In conclusion, there is significant untapped potential to uplift the livelihood of cauliflower farmers through comprehensive and targeted development initiatives.

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