Challenges and Trends in Nagaland's Horticulture: A Garrett Ranking Analysis

Abstract

India's horticulture sector, a significant contributor to the nation's economy has experienced substantial growth, particularly in states like Nagaland. This study examines the growth and challenges faced by the horticulture sector in Nagaland, with a particularly emphasis on fruit and vegetable cultivation. Despite horticulture sector being a significant component of the state's economy, the sector has experiences periods of negative growth particularly between 2011-12 and 2017-18. Taking a sample survey of 120 farmers, the study aims to analyse the farm sizes, productivity and the challenges faced by the farmers associated with the decline. Specifically for pineapple farmers, key challenges include pest and disease management, inadequate credit faculties, pest management, and effective pricing systems. Cabbage farmers face significant problems with irrigation facilities, pest management, and effective pricing systems. The findings suggest that targeted interventions, such as upgrading infrastructure, improving farm practices, and expanding market access, are crucial for revitalising the sector. The research provides valuable insights for policymakers and stakeholders to formulate strategies that can address these challenges, support sustainable growth, and ultimately strengthen the horticulture sector in Nagaland.

Keywords: Cabbage, Constraints, Dimapur, Garrett Ranking, Nagaland, Pineapple, Production.

Introduction

India's horticulture sector has experienced remarkable growth over the past decades, becoming significant source of revenue for the government and a vital contributor to the nation's economy. This sector plays a crucial role in enhancing the country's economic landscape by improving farmers' incomes and generating employment opportunities through increased productivity. The robust growth in horticulture has not only provided a steady income for farmers but also stimulated rural development and reduced poverty in agrarian communities. Vegetables and fruits dominate India's horticulture production landscape, making it the second largest producer in the world according to Ministry of Agriculture and

Farmers Welfare 2023 This dominance indicates the sector's importance in meeting the nutritional needs of the population, contributing to food security, and supporting the livelihoods of millions of farmers.

In Nagaland, the potential fruit and vegetable crops for commercial purposes include passion fruit, oranges, pineapples, bananas, cabbage, peas, onions, and potatoes (Karmakar & Banerjee, 2013). Nagaland stands out as the second highest producer of cabbage in the Northeast region (Sri *et al*., 2021) reflecting its significant contribution to regional vegetable production. Additionally, the state is a major producer of pineapples in Northeast (Mog *et al*., 2017), underscoring its vital role in the commercial fruit market. This thriving horticulture sector not only enhances the state's agricultural profile but also supports the livelihoods of numerous farmers, contributing to the local economy and food security. The study conducted in Dimapur district of Nagaland aims to analyse the growth and challenges within the horticulture sector in Nagaland, with a particular focus in fruit and vegetable cultivation. The study aims to identify key factors contributing to the observed negative growth trends, and explore the systematic issues that hinder the sector's development. Ultimately, the study seeks to provide insights and recommendations for targeted interventions that can help improve productivity, enhance infrastructure, and support sustainable growth in Nagaland's horticulture sector.

Literature Review

(Ravekar *et al.*, 2015) the study showed that frequent power cut of electricity were a major constraint for production of cauliflower and cabbage in Maharashtra. The study also revealed that producer share in consumer's rupee was more as compared to involving middlemen.**(Agarwal *et al.*, 2016)** horticulture crops significantly enhance rural incomes and generate substantial employment opportunities in India due to their labour-intensive nature. They are rich in essential nutrients, making them crucial for human nutrition and contributing to the nation's prosperity and the population's health and well-being. The area, production and productivity of horticulture crops show positive trend except for flowers which have seen negative productivity due to inadequate technologies.**(Singh & Sharma, 2020)** the study reveals that pineapple farmers in Nagaland face major issues including unreliable seeds, unavailability of skilled labour, inadequate irrigation, unsuitable inorganic fertilizers, and pest and disease problems. Marketing challenges include quality deterioration from hand grading, lack of packing materials and transportation facilities, inaccurate weighing, low prices, and insufficient market information. **(Singh & Sharma, 2021)** the primary obstacles faced by the

farmers in horticulture crop production include a lack of quality seeds and planting materials, labour issues, irrigation challenges, pest and diseases, and problem with manures, fertilizers, and plant protection chemicals. In terms of marketing their crops, farmers struggle with inadequate transportation, limited market information, social challenges, and issues with grading and packaging.

Materials and Methods

The data collection was carried out through a questionnaire administered to farmers in specific villages, namely Molvom and Bungsang for pineapple farmers, and Kughovi and Henvi farmers. A total of 120 respondents participated, with 60 respondents from each crop according to farm size as classified by the latest Agricultural Census (2015-16), from Ministry of Agriculture and Farmers Welfare, Government of India. The questionnaire was designed to gather comprehensive information about the area under cultivation and the production output for both pineapple and cabbage. Additionally, it sought to capture farmers' perspectives on the challenges they face in their agricultural practices, asking them to rank their issues based on their personal experiences. Secondary data was sourced from authoritative publications such as the Statistical Handbook of Nagaland by the Directorate of Economics& Statistics, Government of Nagaland, and various reports from the Ministry of Agriculture & Farmers Welfare, Government of India, including the "Horticulture Statistics at a Glance" and "Agricultural Statistics at a Glance 2022". These secondary sources provided a broader context and additional validation for the findings from the primary data collection, ensuring a comprehensive understanding of the agricultural landscape of Nagaland.

Compound Annual Growth Rate

The CAGR was employed to determine the annual growth rate of fruits and vegetables in Nagaland and to compare it with the growth trends in India from 2012-13 to 2021-22. This analysis allowed for a clear understanding of the growth trajectory of horticulture crops in the region, providing insight into whether the agricultural sector in Nagaland is keeping pace with national trends or facing unique challenges that hinder its development.

$$\text{CAGR} = \left(\frac{Ending\ Value}{Beginning\ Value}\right)^{\left(1/No\ of\ years\right)} - 1$$

Garrett Ranking Technique

To identify the problems faced by the farmers, the Garrett ranking technique was employed. This technique involves respondents ranking a set of given problems based on their experiences and preferences. The objective is to determine the most significant factors

influencing the respondent in their agricultural practices. In this technique, the ranking provided by the respondents are converted into scores using a specific formula. This formula calculates the percent position of each rank, which indicates its relative position in terms of percentage as seen in Table 1.

$$Percent\ position = \frac{100(Rij - 0.5)}{Nj}$$

Where,

Rij= Rank given for the i^{th} variable by the j^{th} respondents.

Nj= Number of variables ranked by j^{th} respondents.

The calculated percent positions are then converted into scores using a table provided by Garrett and Woodworth (1969). This table correlates percent positions with specific scores, allowing for the standardization of ranks across different respondents. Once converted, the scores for each problem are aggregated by summing the individual scores assigned by all respondents. The total score for each problem is then calculated, followed by the mean score which is obtained by dividing the total score by the number of respondents. The problems are then ranked based on their mean scores. The problem with the highest mean score is considered the most significant, as it reflects the highest cumulative impact according to the respondents. This systematic method qualities the severity of each problem, providing an objective comparison and prioritization of the challenges faced by the farmers.

Table 1 Percent positions and Garrett Values

Ranks	100(Rij-0.5)/Nj	Calculated value	Garrett Value
1	100(1-0.5)/11	4.55	83
2	100(2-0.5)/11	13.64	72
3	100(3-0.5)/11	22.73	65
4	100(4-0.5)/11	31.82	60
5	100(5-0.5)/11	40.91	55
6	100(6-0.5)/11	50.00	50
7	100(7-0.5)/11	59.09	46
8	100(8-0.5)/11	68.18	41
9	100(9-0.5)/11	77.27	36
10	100(10-0.5)/11	86.36	28
11	100(11-0.5)/11	95.45	17

Source: Author's computation according to Garrett ranking conversion table.

Results and Discussions

The area under fruit cultivation and production in Nagaland has been unstable, with several years of significant declines as shown in Table 2. The area, starting at 67.49 hectares

in 2012-13 saw a sharp decline in 2013-14 (-40.11%) and continued to decrease overall, except for a few years like 2015-16 (4.78%) and 2019-20 (48.10%). The Compound Annual Growth Rate (CAGR) for the area in Nagaland is -0.77%, indicating a slight overall decline. Fruit production in Nagaland also experienced volatility. Production started at 299.71 thousand metric tons in 2012-13, peaking in 2013-14 (37.61% increases) before experiencing several declines, including a significant drop in 2020-21 (-34.28%). The CAGR for fruit production in Nagaland is 0.64%, indicating modest growth despite the fluctuations. The negative CAGR in area indicates a shrinking cultivation space, while the slightly positive CAGR in production suggests that yield improvements or shifts to more productive crops may have mitigated the area reduction.

Nationally, the growth trend for fruits has been more stable, with consistent increase in both area and production. In contrast to Nagaland's area, the area under fruit cultivation in India shows a steady increase. The area has grown from 6982 in thousand hectares in 2012-13 to 7049 thousand hectares in 2021-22, with a CAGRA of 0.10 %. The percentage change year-over-year is relatively minor, with positive growth in most years. Production also shows a more consistent upward trend. From 81285 thousand metric tons in 2012-13 to 107242 thousand metric tons in 2021-22, the CAGR is 2.81 percent. This steady growth reflects the expansion of fruit cultivation and improved productivity at a national level. The positive CAGR values for both metrics indicate ongoing expansion in the horticulture sector, driven by policies, technological advancements, and possibly increased demand.

Table 2 Growth Trend of Fruits in Nagaland and India

	NAGALAND Area in hectare Production in '000 metric tons				INDIA Area in '000 hectare Production in '000 metric tons			
Year	Area	Percentage Change	Production	Percentage Change	Area	Percentage Change	Production	Percentage Change
2012-13	67.49	-	299.71	-	6982.00	-	81285.00	-
2013-14	40.42	-40.11	412.43	37.61	7216.30	3.36	88977.10	9.46
2014-15	40.24	-0.44	413.85	0.35	6242.30	-13.50	86283.00	-3.03
2015-16	42.17	4.78	413.06	-0.19	6301.00	0.94	90183.00	4.52
2016-17	37.67	-10.67	391.21	-5.29	6373.00	1.14	92918.00	3.03
2017-18	33.11	-12.09	308.03	-21.26	6510.00	2.15	96447.00	3.80
2018-19	33.94	2.49	310.93	0.94	6597.00	1.34	97967.00	1.58
2019-20	50.26	48.10	463.11	48.94	6774.00	2.68	102080.00	4.20
2020-21	32.65	-35.05	304.36	-34.28	6930.00	2.30	102481.00	0.39
2021-22*	34.74	6.42	319.52	4.98	7049.00	1.72	107242.00	4.65
CAGR		-0.77		0.64		0.10		2.81

Source: *Author's computation and data from Statistical Handbook of Nagaland, Directorate of Economics & Statistics, Government of Nagaland and author's computation. Horticulture Statistics at a glance, Horticulture Statistics Division, Cooperation & Farmers' Welfare, Ministry of Agriculture &Farmers' Welfare, Government*

of India. ***Note:*** **3rd Advance estimate Agricultural Statistics at a Glance 2022, Ministry of Agriculture & Farmers Welfare, Department of Agriculture & Farmers Welfare, Government of India.*
% indicates percentage change.

The area and production of vegetables in Nagaland have both shown instability, with significant year-to-year fluctuations as shown in Table 3. Starting at 47.41 hectares in 2012-13 in Nagaland, the area saw both increase and decrease over the years. Notably, there was a sharp decline in 2020-21 (-35.46 percent) after a major increase in 2019-20 (47.65 percent). The overall trend indicated instability, with a negative CAGR of -1.32 percent, suggesting a slight decline in the cultivated area over the period. Vegetable production in Nagaland also experienced significant volatility. Starting at 568.08 thousand metric tons in 2012-13, production peaked in 2019-20 with a 48.46 percent increase but then dropped sharply in 2020-21 (-34.72 percentage). The overall CAGR for production in Nagaland is -2.24 percent, indicating a decline in production over the period. The negative CAGR for both area and production indicate an overall decline in vegetable and output, suggesting challenges such as environmental factors, market access, or infrastructure issues.

Nationally, the growth trend for vegetable cultivation and production has been positive, with steady increases in both area and production. In contrast with Nagaland, the area under vegetable cultivation in India has generally increased, although the growth rate varied from year to year. Starting at 9205 thousand hectares in 2012-13, the area grew to 11348 thousand hectares by 2021-22, with some minor fluctuations along the way. The CAGR for India is 2.12, reflecting a consistent increase in the area dedicated to vegetable cultivation. India's vegetable production shows a steady upward trend. Beginning at 162187 thousand metric tons in 2012-13, production increased consistently to reach 204835 thousand metric tons by 2021-22. The CAGR for production in India's is 2.36 percent, highlighting steady growth in the country's vegetable production.

Table 3 Growth trends of Vegetable in Nagaland and India

Year	NAGALAND Area in hectare Production in '000 metric tons				INDIA Area in '000 hectare Production in '000 metric tons			
	Area	Percentage Change	Production	Percentage Change	Area	Percentage Change	Production	Percentage Change
2012-13	47.41	-	568.08	-	9205.00	-	162187.00	-
2013-14	51.09	7.78	606.01	6.68	9396.10	2.08	162896.90	0.44
2014-15	53.15	4.03	638.77	5.41	9493.70	1.04	167058.50	2.55
2015-16	51.23	-3.61	626.10	-1.98	10106.00	6.45	169064.00	1.20
2016-17	46.77	-8.72	528.93	-15.52	10238.00	1.31	178172.00	5.39
2017-18	42.67	-8.76	455.25	-13.93	10259.00	0.21	184394.00	3.49
2018-19	40.04	-6.16	453.12	-0.47	10073.00	-1.81	183170.00	-0.66
2019-20	59.12	47.65	672.70	48.46	10310.00	2.35	188284.00	2.79
2020-21	38.16	-35.46	439.16	-34.72	10859.00	5.32	200445.00	6.46

2021-22*	41.49	8.72	452.93	3.13	11348.00	4.50	204835.00	2.19
CAGR	-1.32		-2.24		2.12		2.36	

Source: *Author's Computation and data from Statistical Handbook of Nagaland, Directorate of Economics & Statistics, Government of Nagaland and author's computation. Horticulture Statistics at a glance, Horticulture Statistics Division, Cooperation & Farmers' Welfare, Ministry of Agriculture &Farmers' Welfare, Government of India.*

Note: **3rd Advance estimate Agricultural Statistics at a Glance 2022, Ministry of Agriculture & Farmers Welfare, Department of Agriculture & Farmers Welfare, Government of India.*

% indicates percentage change.

a. Empirical Evidences from Field Study

Nagaland's horticulture sector, especially fruits and vegetable cultivation, has faced negative growth trends in both cultivated area and production in recent years. This trend sharply contrasts with India's national horticultural growth, which has been consistently steady and positive. To examine the challenges contributing to this decline, an empirical field study was conducted in Dimapur, focusing on the issues faced by pineapple and cabbage farmers in Nagaland. They face a range of significant challenges that hider their productivity and profitability, primarily stemming from issues related to pests and diseases, lack of inputs, and inadequate access to financial and scientific resources. Cabbage farmers, for example, struggle with infestations due to insufficient pest management techniques, leading to decreased yields and quality. Limited access to credit further prevents farmers from investing in better seeds, modern equipment, and essential resources, keeping them reliant on traditional practices that fail to maximize crop yield or protect soil health. Additionally, a lack of training in integrated pest management (IPM), efficient water use, and modern farming practices exacerbates these issues, leaving crops susceptible to diseases and farmers unable to adopt cost-saving, productive techniques.

Marketing and infrastructure limitations compound these struggles, particularly with the absence of proper storage facilities, which forces farmers to sell produce at low prices immediately after harvest. The lack of organized marketing channels and a transparent pricing system exposes them to exploitation by middlemen, driving down income and discouraging investment in quality inputs. Poor irrigation and transportation facilities create further barriers, making crop production unpredictable and limiting access to markets, which ultimately reduces the competitiveness of their produce. Without government subsidies on essential inputs or reliable communication systems, farmers face elevated costs and reduce profitability, hindering sustainable agricultural growth.

The challenges identified among the farmers have been further substantiated through Garrett's ranking method. This statistical approach allowed for a systematic analysis of the issues based on farmers' experiences and perspectives. This method not only validates the

identified challenges but also provides a clear hierarchy of issues, emphasizing where interventions are most needed to support the farmers in overcoming these obstacles and improving their agricultural productivity.

b. Garrett Ranking

The analysis in table 4, for pineapple farmers highlights the prioritization of various challenges across different farm sizes. The most critical issue identified is the problem of pest and diseases, consistently ranking highest across all groups, indicating a widespread and urgent need for effective pest management strategies. Inadequate credit facilities also rank high, particularly affecting small and semi-medium farmers, underscoring the necessity for improved financial support to enable investments in better inputs and infrastructure. The lack of scientific knowledge ranks third, especially impacting semi-medium and medium farmers, suggesting a need for enhanced education and training on modern farming techniques. Other significant issues include the absence of marketing infrastructure, intensive training, and inadequate subsidies on inputs, with varying degrees of importance among different farm sizes. Lower priority problems, such as lack of storage facilities, irrigation facilities, and inputs, still present challenges but are less critical overall. Similar study conducted on pineapple growers(Singh & Sharma, 2020) (Sharma *et al*., 2016) and discussed the constraints faced by the farmers hindering their production and hence reduce income.

Cabbage Farmers

The analysis in table 5 identifies the most pressing challenges cabbage farmers face, categorized by farm size. The most critical issue is the problem of pests and diseases, consistently ranking highest across all groups, highlighting the urgent need for effective pest and disease management strategies. Inadequate credit facilities are other significant challenges, particularly affecting semi-medium and medium farmers, underscoring the necessity for improved financial support to enable investments in better inputs and infrastructure. The lack of irrigation facilities also ranks high with medium farmers feeling the impact most intensely, indicating the need or reliable irrigation systems to ensure consistent water supply. The absence of marketing infrastructure is a notable concern, especially for medium farmers, as it is crucial for selling produce at fair prices and accessing broader

Table 4 Problem perceived by the pineapple farmers in Dimapur

	Marginal			Small			Semi-Medium			Medium			All size		
Problems	Respondents	Score	Rank	Respondents	Score	Rank	Respondents	Score	Rank	Respondents	Score	Rank	Respondents	Score	Rank
Inadequate Storage Facilities	5 (62.50)	18.83	11	19 (90.48)	18.05	11	12 (66.67)	17.85	11	8 (61.54)	20.30	11	50 (83.33)	18.83	11
Lack of Scientific Knowledge	1 (12.50)	55.50	4	2 (9.52)	57.33	3	2 (11.11)	54.92	3	3 (23.08)	55.35	3	15 (25.00)	55.75	3
Inadequate Credit Facilities	3 (37.50)	77.50	1	14 (66.67)	79.33	1	8 (44.44)	76.23	2	6 (46.15)	74.20	2	34 (56.67)	76.77	2
Inadequate Marketing infrastructure	1 (12.50)	51.83	5	3 (14.29)	50.67	5	4 (22.22)	53.77	5	4 (30.77)	48.45	6	13 (21.67)	50.72	4
Inadequate intensive training	1 (12.50)	55.67	3	1 (4.76)	53.10	4	3 (16.67)	54.92	3	4 (30.77)	48.30	7	10 (16.67)	50.55	5
Lack of irrigation facilities	5 (62.50)	33.33	10	12 (57.14)	38.67	9	9 (50.00)	37.08	10	1 (7.69)	50.30	5	3 (5.00)	41.85	8
Lack of inputs	2 (25.00)	37.50	9	12 (57.14)	38.00	10	4 (22.22)	40.69	8	8 (61.54)	40.45	9	3 (5.00)	38.95	10
Problem of pests and diseases	3 (37.50)	77.50	1	7 (33.33)	75.67	2	8 (44.44)	78.77	1	6 (46.15)	80.80	1	34 (56.67)	78.23	1
Lack of effective price system	3 (37.50)	51.67	6	7 (33.33)	49.38	7	3 (16.67)	49.15	6	4 (30.77)	45.60	8	2 (3.33)	48.12	7
Inadequate subsidies on inputs	4 (50.00)	46.67	7	7 (33.33)	49.90	6	4 (22.22)	47.85	7	1 (7.69)	52.30	4	6 (10.00)	49.93	6
Lack of transportation and communication	1 (12.50)	43.33	8	5 (23.81)	39.76	8	3 (16.67)	40.54	9	2 (15.38)	38.50	10	12 (20.00)	40.30	9

Total Respondents	8	21	18	13	60

Source: Field Survey 2021-22

Table 5 Problems perceived by the Cabbage Farmers in Dimapur

Problems	Marginal			Small			Semi-Medium			Medium			All Size		
	Respondents	Score	Rank	Respondents	Score	Rank	Respondents	Score	Rank	Respondents	Score	Rank	Respondents	Score	Rank
Inadequate Storage Facilities	15 (48.39)	53.65	4	2 (11.11)	44.42	7	1 (12.50)	58.13	4	3 (100.00)	45.00	7	33 (55.00)	51.75	7
Lack of Scientific Knowledge	10 (32.26)	52.46	6	8 (44.44)	46.23	5	4 (50.00)	51.50	6	2 (66.67)	51.33	6	33 (55.00)	52.20	5
Inadequate Credit Facilities	11 (35.48)	75.31	1	7 (38.89)	64.62	2	1 (12.50)	74.88	2	1 (33.33)	75.67	1	23 (38.33)	74.28	2
Inadequate Marketing infrastructure	15 (48.39)	53.65	4	1 (5.56)	48.46	4	3 (37.50)	48.75	7	2 (66.67)	55.00	4	33 (55.00)	53.25	4
Inadequate intensive training	16 (51.61)	51.54	7	5 (27.78)	45.77	6	2 (25.00)	52.50	5	2 (66.67)	52.67	5	33 (55.00)	51.80	6
Lack of irrigation facilities	14 (45.16)	70.35	3	6 (33.33)	63.00	3	4 (50.00)	69.88	3	2 (66.67)	71.00	3	32 (53.33)	70.65	3
Lack of inputs	13 (41.94)	22.50	10	11 (61.11)	20.96	10	3 (37.50)	19.75	11	2 (66.67)	20.67	11	30 (50.00)	22.50	10
Problem of pests and diseases	10 (32.26)	74.62	2	11 (61.11)	67.00	1	3 (37.50)	75.25	1	1 (33.33)	73.33	2	25 (41.67)	75.07	1
Lack of effective price system	14 (45.16)	38.23	8	6 (33.33)	34.88	8	5 (62.50)	37.25	9	2 (66.67)	39.00	8	36 (60.00)	38.60	8
Inadequate subsidies on inputs	13 (41.94)	22.50	10	3 (16.67)	18.85	11	3 (37.50)	25.25	10	2 (66.67)	24.33	10	30 (50.00)	22.50	10
Lack of transportation and communication	14 (45.16)	37.77	9	4 (22.22)	32.35	9	2 (25.00)	38.75	8	2 (66.67)	37.00	9	36 (60.00)	37.40	9

Total respondents	31	18	8	3	60

Source: Field Survey 2021-22

markets. The need for intensive training is emphasized particularly for semi-medium and medium farmers, to enhance skills in crop management and modern farming techniques. The lack of scientific knowledge affects small and semi-medium farmers more, hampering their ability to adopt modern farming practices. Other issues such as inadequate storage facilities, an ineffective price system, and insufficient transportation and communication, also present significant challenges. Problems like lack of inputs and inadequate subsidies on inputs, although lower in priority, still impact farmers. Similar study and findings have been found in (Kumar *et al*., 2019) (Singh & Sharma, 2021) (Sri *et al.*, 2022) and analysed the farmers constraints.

Conclusion

The study underscores the contrast between the overall growth in India's national horticulture sector and the specific struggles faced by Nagaland, particularly in fruit and vegetable cultivation. While India has generally seen a positive trajectory in horticultural area expansion and production, Nagaland has encountered significant setbacks, reflected in its negative growth rates. This is particularly evident in the performance of key crops like pineapple and cabbages, where farmers have experiences substantial challenges. The study reveals significant challenges faced by horticulture farmers in Nagaland, including inadequate quality seeds, unreliable irrigation, pest and diseases management issues, lack of scientific know-how and no storage facilities. Marketing obstacles further exacerbate these problems, with farmers struggling with poor transportation infrastructure, insufficient market information, and inadequate grading and packaging practices. These challenges collectively hinder productivity profitability, and overall growth of the horticulture sector in the region. To address these issues, several measures are recommended. Firstly, improving access to high quality seeds and planting materials through government support and private sector collaboration is essential. Training programs should be establishes to enhance farmers' skills and knowledge, ensuring timely availability of skilled labors. Investments in reliable irrigation infrastructure, such as drip irrigation systems, can mitigate water-related challenges and improve yields. Integrated pest and disease management practices, along with the promotion of organic fertilizers, can enhance crop health and sustainability. Additionally, developing efficient marketing infrastructure, including better transportation and logistics, can reduce post-harvest losses and ensure timely delivery of produce to markets. Establishing farmer cooperatives and market information systems can empower farmers with better price negotiations and access to market trends. Lastly, implementing standardized grading and packaging systems will improve the marketability of produce, ensuring farmers receive fail prices for their crops. By adopting these measures, the

horticultural sector in Nagaland can achieve sustainable growth, enhancing the livelihoods of farmers and contributing to the region's economic development.

References

Agarwal, P. K., Yadav, P., & Kumar, S. (2016). Horticultural Crops in India-Growth, Instability and Decomposition Approach. *Agricultural Situation In Inida*, *73*(1), 26–30.

Government of Nagaland. (2023). Nagaland Statistical Handbook 2023. In *Directorate of Economics and Statistics, Government of Nagaland*. Government of Nagaland.

Karmakar, K. G., & Banerjee, G. D. (2013). *Horticultural Boom in Nagaland ,*. https://nagalandjournal.wordpress.com/2013/03/28/horticultural-boom-in-nagaland-special-feature/ retrieved on 5th April, 2024

Kumar, A., Sumit, Yadav, M. K., & Rohila, A. K. (2019). Constraints faced by the farmers in production and marketing of vegetables in Haryana. *Indian Journal of Agricultural Sciences*, *89*(1), 153–160. https://doi.org/10.56093/ijas.v89i1.86198 retrieved on 17th August, 2024

Mog, K., Singh, S. H., Majumder, A., Chandra, B., & Viswavidyalaya, K. (2017). A Statistical Study on Pineapple in North-Eastern States of Inida for sustainable policy development. *RASHI*, *2*(2), 46–51.

Ravekar, S. F., Tayade, P. M., & Jakate, M. M. (2015). Economics and marketing of cauliflower and cabbage in Hingoli district of Marathwada region of Maharashtra state. *International Research Journal of Agricultural Economics and Statistics*, *6*(2), 403–409. https://doi.org/10.15740/has/irjaes/6.2/403-409 retrieved on 25th July, 2024

Sharma, A., Kichu, Y., & Chaturvedi, B. K. (2016). Economics and Constraints of Pineapple Cultivation in Dimapur District of Nagaland. *The Journal of Rural and Agricultural Research* , *16*(1), 72–75.

Singh, T. M., & Sharma, A. (2020). Constraints Faced by the Pineapple Crop Growers at Various Levels of Farms in Selected Districts of Nagaland and Manipur States. *International Journal of Current Microbiology and Applied Sciences*, *9*(7), 2684–2695. https://doi.org/10.20546/ijcmas.2020.907.316 retrieved on 16th May, 2024

Singh, T. M., & Sharma, A. (2021). Constraints faced during the Production and Marketing of Cabbage and Potato Crops: A Comparative Study of Manipur and Nagaland States of India. *Plant Archives*, *21*(2), 345–350.

Sri, K., Choudhury, A., Singh, R., & Sethi, B. (2021). An analysis of area, production and productivity of cabbage in Meghalaya. *Indian Journal of Hill Farming*, *34*(I), 50–56.

Sri, K., Choudhury, A., Yumnam, A., Singh, R., & Dek, N. (2022). An Assessment of Constraints Faced by Cabbage Growers in the East Khasi Hills District of Meghalaya: India. *International Journal of Plant & Soil Science*, *34*(20), 722–729. https://doi.org/10.9734/ijpss/2022/v34i2031213 retrieved on 11th May, 2024.