

REVITALIZING AGRICULTURE: CULTIVATION INNOVATIONS IN INDIA'S NORTHEAST REGION

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ABSTRACT

The changing agricultural landscape in Nagaland, part of India's Northeast region, has led to intriguing shifts in crop preferences and production trends. Cultivation innovations play a vital role in transforming agriculture, involving high-yield crop varieties, advanced practices, and crop diversification for resilience. The study emphasized the role of expanded cultivation areas in boosting food crop production. The secondary data sources obtained from Agriculture Directorate Economics and Statistics survey report were examined to identify trends in the cropped area, production, and yield for major crop types in Nagaland over a specified period. The study revealed a remarkable 71% growth in gross cropped area from 1998-1999 to 2012-13, highlighting the increasing significance of agriculture. Significant progress in irrigation facilities, covering 22% of the net sown area, was observed. Crop preferences showed a decline in foodgrain dominance, with rice decreasing from 80.3% in 1999-2000 to 68.9% in 2014-15. Conversely, oilseeds and pulses gained prominence, while non-cotton fibre crops and pulses witnessed notable production growth. However, Cotton production faced a considerable decline during the same period. Overall, it concluded the need to adopt strategies for agricultural revitalization in Nagaland, addressing challenges faced by declining crops like Cotton, promoting high-yield varieties, and implementing innovative agricultural practices for sustainable development. Cultivation innovations are essential for enhancing the resilience of the agricultural sector and ensuring food security in the region

Keywords: Revitalizing Agriculture, Indian Northeast Region, Crop preferences, Cultivation trends

INTRODUCTION

Agriculture has been the backbone of India's economy for centuries, providing sustenance to a large portion of its population. The cultivation innovation aspect of agricultural practices in Nagaland, India's Northeast region, has been the focus of significant research and analysis. As the region faces geophysical constraints and limited cultivable land, the need for innovative approaches to farming becomes imperative. Over the years, Nagaland's agricultural landscape has witnessed intriguing shifts in crop preferences and production trends, with certain crops experiencing notable growth while others have faced significant decline.

Agriculture in Northeastern Region (NER) has distinct characteristics with limited cultivable land due to geophysical constraints, resulting in low cultivated area (ranging from 2.2% to 35.4%). Nagaland, with its undulating hills, rolling grasslands, and abundant natural beauty, has long relied on agriculture as a primary source of livelihood. However, the dominance of traditional agricultural practices and the vulnerability of rice-dominated farming have posed challenges to the sector's productivity and sustainability. Traditional practices like shifting cultivation (Jhum) persist, further impacting productivity. Though agricultural diversification exists, it contributes negligibly to

economic development, reflected in the region's low per capita income (Rs. 7979 in 2001, 17% below the national average) [1]. The need for cultivation innovations arises from the necessity to address these challenges and tap into the region's immense potential for agricultural development.

The Northeast region (NER) is characterized by diverse landscapes and limited cultivable land, necessitating vertical intensification rather than horizontal expansion. To harness the abundant opportunities for societal welfare, the following strategies are proposed: Firstly, improve rice productivity by promoting the adoption of High-Yielding Varieties (HYVs) in states like Arunachal Pradesh, Nagaland, and Mizoram, and enhancing agricultural inputs and technologies tailored for small farmers [2]. Secondly, expand the cultivation of boro rice in Assam, Nagaland, and other states where feasible, and encourage different varieties of rice with potential growth in Nagaland through market incentives [3]. Thirdly, capitalize on the region's high rainfall through rainwater harvesting initiatives, involving active community participation for increased crop yields and intensified agriculture [3]. Lastly, leverage the NER's agricultural diversification potential by adopting region-specific approaches and land types. This study aims to analyse the trends in the cropped area, production, and yield for major crop types in Nagaland, focusing on the role of cultivation innovations in driving agricultural development.

METHODOLOGY

The study employs secondary data analysis to understand agricultural cultivation and production in Nagaland, a state in India's Northeast region with unique geographical characteristics, contributing 0.5% of the country's land area and 0.16% of the total Indian population, experiencing changes in population, literacy rate, and cultural diversity over time. The secondary data is collected from two authoritative sources: "Land Use Crop Production Statistics for Nagaland" from the Directorate of Economics and Statistics, Ministry of Agriculture, Government of India [7], and the "Statistical Handbooks of Nagaland" from 2011 to 2014 [8]. The data is analyzed to identify trends in land use, crop production, and agricultural practices, with a focus on proposing cultivation innovations and strategies for revitalizing agriculture in the region.

RESULTS

The findings of the study shed light on the cultivation innovation aspects that can address the geophysical constraints limiting cultivable land in Nagaland, India's Northeast region. The low percentages of cultivated area compared to the national average indicate the need for innovative approaches to maximize agricultural productivity. The study emphasizes the vulnerability of rice-dominated agriculture, which necessitates the adoption of cultivation innovations to enhance resilience and yield.

As shown in Figure 1, the geographical area of Nagaland is reported to be 1658 thousand hectares. Over the years, the cropped area has shown a steady rise, encompassing approximately 30% of the total area in 2012-13, which marks a significant increase from 17.2% recorded in 1998-99. This indicates a remarkable 71% growth in the gross cropped area during this period. Moreover, there has been noticeable progress in irrigation facilities, with the area under irrigation expanding from 67 thousand hectares in 2003-04 to 85 thousand hectares in 2012-13. On average, this constitutes about 22% of the net sown area. These data points illustrate the changing agricultural landscape in Nagaland and emphasize the growing importance of agriculture in the region.

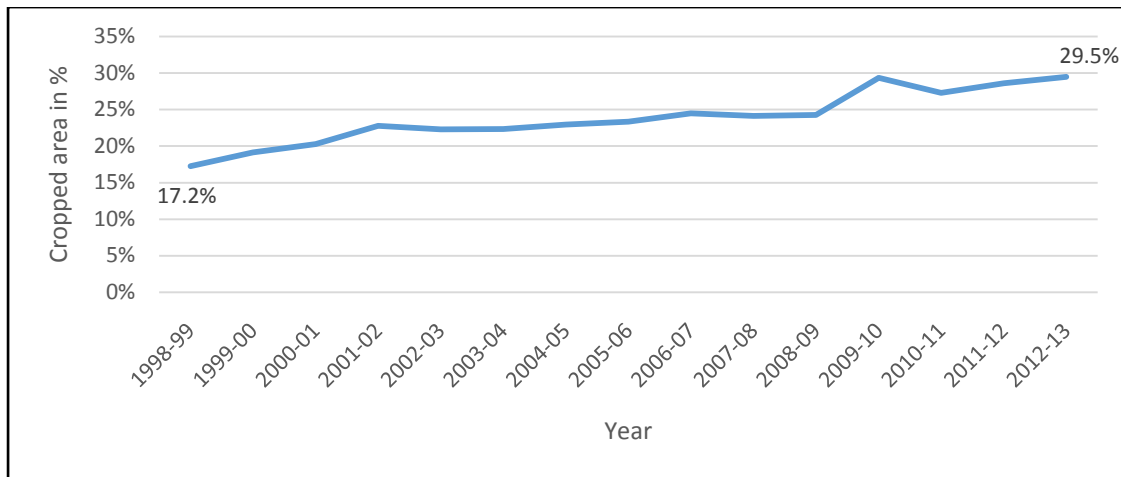


Figure 1: Representation of crop area from 1998-2013

Table 1: Major crop-types classification

Food crops	
<i>Food Grain</i> (Cereals + Coarse Cereals)	Cereals Rice and Wheat Coarse Cereals Maize, Jowar, Bajra, Barley, Ragi, and Other millets
<i>Pulses</i>	Pigeon pea+ Gram+ other pulses
<i>Oilseeds</i>	Mustard and Rapeseed, Groundnut, Sunflower, Soy Bean, Niger seeds, Lin seed, castor oil, seasmum, and others
<i>Sugarcane</i>	
Non-Food Crops	
<i>Jute and Mesta</i>	
<i>Cotton</i>	

Table 1 reveals interesting shifts in crop preferences over the years in Nagaland. In 2014-15, food grain dominated the cropped area, accounting for approximately 68.9% (a decrease from 80.3% in 1999-2000). Following food grains, oilseeds, and pulses held prominence. Notably, there has been a significant rise in the production of non-cotton Fibre crops like jute and Mesta, as well as Pulses since 1999-2000. Conversely, cotton production has experienced a considerable decline.

Table 2: Change in Yield (in %) 1999-2000 to 2014-15

Crop category	Yield in t/ha (tons per hectare)		Change in Yield (in %)
	1999-2000	2014-15	
Food grain	1.09	1.52	39.8
Rice	1.49	2.35	58.4
Oilseed	1.08	0.86	-20.4
Pulses	0.96	1.06	10.0
Spices#	6.05	9.12	50.7
Sugarcane	50.00	43.52	-13.0
Tuber	10.83	12.96	19.7
Cotton	1.40	0.59	-58.2
Fibre (non-cotton)	1.39	1.35	-2.5
Total	2.73	4.06	48.6

Table 2 shows the yield trends of major crop types in Nagaland from 1999-2000 to 2014-15 revealing interesting patterns. Rice has shown remarkable growth in yield during this period. On the other hand, both oilseed and sugarcane have experienced a negative trend in yield. It is noteworthy that the increase in the production of food crops can be primarily attributed to an expansion in cultivated areas extensification rather than a significant improvement in yield.

Table 3: Consolidated change in Area, Production, and Yield 1999-00 to 2014-15

Crop category	Area (%)	Production(%)	Yield(%)
Food grain	51.6	127.7	39.8
Rice	31.9	104.6	58.4
Oilseed	107.7	124.9	-20.4
Pulses	335.7	606.4	10.0
Spices#	3.4	34.9	50.7
Sugarcane	625.0	531.0	-13.0
Tuber	164.9	191.5	19.7
Cotton	-52.0	-80.0	-58.2
Fibre (non-cotton)	1776.9	2075.0	-2.5
Total	76.7	184.9	48.6

Table 3 illustrates about innovative cultivation aspects such as area, production, and yield for major crop types grown in Nagaland distinct. Pulses have emerged as the standout performer among the major crop types, exhibiting the highest increase in area, production, and yield. On the other hand, non-cotton Fibre crops, including jute and Mesta, have experienced considerable growth in both area and production, but their yield has declined. In contrast, cotton has faced a decline in all aspects, with reductions in area, production, and yield. These observations provide valuable insights into the agricultural dynamics in Nagaland, highlighting the varying performance of different crop categories and raising important considerations for further agricultural development in the region.

DISCUSSION

Agricultural trends in Nagaland reveal significant changes in the cropping pattern and agricultural landscape over the years. The geographical area of Nagaland spans 1658 thousand hectares, and the cropped area has shown remarkable growth, increasing from 17.2% in 1998-99 to approximately 30% of the total area in 2012-13, indicating a 71% expansion in the gross cropped area during this period. This indicates a growing emphasis on agriculture in the region. The trends in food production show interesting shifts in crop preferences. Food grain has been the dominant crop, but its share decreased from 80.3% in 1999-00 to 68.9% in 2014-15. On the other hand, oilseeds and pulses have gained prominence, and there has been a notable rise in the production of non-cotton Fibre crops like jute and mesta, as well as pulses since 1999-00. However, cotton production has experienced a considerable decline. According to (Birner & Anderson, 2007)[4] there has been a noticeable increase in the prominence of oilseeds and pulses. These crops have gained traction, suggesting a growing recognition of their importance in the region's agricultural landscape. Additionally, there has been a significant rise in the production of non-cotton Fibre crops like jute and mesta, as well as pulses. This diversification of crops may be attributed to various factors such as changing market demands, climatic conditions, and government policies promoting alternative crops.

Analysing the yield trends of major crop types from 1999-00 to 2014-15, rice stands out with remarkable growth, while oilseed and sugarcane have witnessed a negative trend in yield. The increase in the production of food crops can primarily be attributed to an expansion in cultivated areas (extensification) rather than a significant improvement in yield. Similarly, a study done by (Singh & Swanson, 2016)[5] revealed that rice is the dominant crop in NER, occupying around 70% of the cultivated area and contributing to 75% of the total food production. The agricultural sector plays a significant role in supporting around 70% of the state's population. Efforts have been made to

introduce non-rice and non-jhum crops, but policies promoting plantation and cash crops have had limited success, and some land has become unusable, affecting food security.

In recent trends, pulses have shown exceptional growth in area, production, and yield, while non-cotton fibre crops like jute and Mesta have seen substantial growth in area and production but a decline in yield. On the other hand, cotton has faced a decline in all aspects. According to Anderson, (2014)[6] local food production systems and farmers' ecological knowledge, especially jhum cultivation, play a crucial role in optimizing nutrient utilization and ensuring optimal vegetative growth. Changes in crop production, with increased area and production but decreased yield, are observed in major crop types, except rice, due to urbanization, globalization, and changing food preferences.

In summary, the study discusses the crucial role of cultivation innovations in revitalizing agriculture in Nagaland and India's Northeast region. The observed shifts in crop preferences and production trends underscore the importance of adopting innovative agricultural practices, promoting high-yield varieties, and encouraging crop diversification. By leveraging cultivation innovations, the region can overcome geophysical constraints, enhance agricultural productivity, and ensure sustainable economic development.

CONCLUSION

In conclusion, the study "reveals significant changes in Nagaland's agricultural cultivation landscape. The region has witnessed a substantial increase in the gross cropped area and notable progress in irrigation facilities, highlighting the growing significance of agriculture. Crop preferences have shifted, with a decrease in the dominance of food grains, particularly rice, and a rise in oilseeds and pulses production. However, concerns arise from the considerable decline in cotton production. The study emphasizes the need for agricultural revitalization through strategies like promoting high-yield varieties and innovative practices. Leveraging the region's agricultural diversification potential and encouraging market incentives are crucial steps to ensure sustainable development and food security in Nagaland and the Northeast region of India.

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