



Research Article

LAND USE PATTERN AND PRODUCTIVITY OF PRINCIPAL CROPS IN NAGALAND

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Abstract: Agriculture plays a significant role in the Indian economy and the performance of this sector is vital for inclusive growth of the country. Agriculture not only contributes to the overall growth of the economy but also provides a vital livelihood base, employment and food security to the majority of the country's population. Even though the state is endowed with rich natural resources, these resources could not be fully tapped due to lack of capital, human-capital, and many other factors. Thus, agriculture becomes the main sources of income, employment and livelihood for majority of the people and the economy of the state becomes dependent on agriculture. The main aim of the paper is to examine the land use pattern, production and productivity of some principal crops in Nagaland. The finding shows that major parts of land use is being occupied by the cultivation of cereal crops, however, the annual compound growth rate of land use pattern show that cultivation of oilseeds has the highest average growth rate. On production side, the annual compound growth rate of commercial crops comes to be the highest. The productivity per hectare for commercial crops was also the highest among all the other principal crops.

Keywords: Land Use, Production and Productivity

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Introduction

Agriculture plays a significant role in the Indian economy and the performance of this sector is vital for inclusive growth of the country. Agriculture not only contributes to the overall growth of the economy but also provides a vital livelihood base, employment and food security to the majority of the country's population. The people of Nagaland before the advent of British who lived in a republican village state depends their livelihood on agriculture. Thus, we can say that the village economy of the Nagas was agricultural economy. After India's independence, Nagaland was created as the 16th state of Indian Union on 1st of December 1963. The state is bounded by Assam in the North and West, by Myanmar and Arunachal Pradesh in the East and Manipur in the South and runs more or less parallel to the left bank of Brahmaputra. It has a population of 1,980,602, out of which rural population comprises of 1,406,861 (71.03%). These 71.03% of the rural population dwells in 1,428 recognized villages [1]. The total worker in Nagaland accounts for 37.42% of the total population. Out of this, 59.76% of the working force are engaged in agriculture and allied activities [1]. Even though the state is endowed with rich natural resources, these resources could not be fully tapped due to lack of capital, human-capital, and many other factors. Thus, agriculture becomes the main sources of income, employment and livelihood for majority of the people and the economy of the state becomes dependent on agriculture. Thus, the development of Nagaland and Nagaland economy leans on the progress and development of the village economy or agricultural economy. The development of agriculture is usually measured by its productivity. Agricultural productivity is defined as the "ratio of index of local agricultural output to the index of total input used in farm production". Other things being equal, it is, therefore, a measure of efficiency with which inputs are utilized in production. Among the three categories of input; land, labor and capital, productivity of land is a very important factor of agriculture because it is the most permanent and fixed factor. Thus, a study on the land use pattern becomes important as it will highlight some of the important trends in the development of state agriculture [2,3].

Presently the state of Nagaland state has a total area of 1657900 hectares out of which an area of 1651530 hectares are under forest, barren, grazing follow and agriculture land [4]. The reported area under different land utilization shows that forest in the state covers 52.25% of the total area. The land under non-agricultural use, barren and uncultivable land accounts for .15%, permanent pasture, grazing land, land under tree crops and groves and cultural wasteland constitute 5.4%, follow land constitute 9.23% and total crop area accounts for 31.44%. From the total crop area, principal crop areas occupy 82.13% as on 2016-17.

Objectives of Study

The main objective of this paper was to analyse land use pattern, trends, production and productivity of principal crops in the state.

Materials and Methods

The data from statistical handbook of Nagaland (2001-17) was used to analyse the trends, production and productivity of the principal crops. The principal crops in the state are divided cereals, pulses, oilseeds and commercial crops.

Cereals: The crops under cereal includes, jhum paddy, terrace rice cultivation paddy, maize, jowar, small millets, jobber, bajra, wheat, barley and oats.

Pulses: The crops under pulses include tur/arhar, urd/mong, naga dal, cow pea, beans, rajmal, kholar, horse gram, pea, lentil, gram and black gram.

Oilseeds: The crops under oilseeds includes, ground nut, soyabean, perilla, castor, sesamun, sunflower, mustard and linseeds.

Commercial crops: This crop includes sugar cane, cotton, jute, tea, ramie, mesta, tapioca, colocossia, yam ginger and potato.

Results and discussion

Land use under different crops: from [Table-1], it can be seen that the cultivation of total principal crops rose from 261964 hectare in 2000-01 to 428150 hectare in 2015-16.

Land Use Pattern and Productivity of Principal Crops in Nagaland

Table-1 Area under different principal crops

Year	Cereal			Pulses			Oil seeds			Commercial and others			Total principal crop area	Growth Rate
	Area	Percentage to total principal crop area	Growth rate	Area	Percentage to total principal crop area	Growth rate	Area	Percentage to total principal crop area	Growth rate	Area	Percentage to total principal crop area	Growth rate		
2000-01	202674	77.37%		25500	9.73%		23430	8.94%		10360	3.95%		261964	
2001-02	222500	70.49%	9.78%	35000	11.09%	37.25%	50500	16.00%	115.54%	7650	2.42%	-26.16%	315650	20.49%
2002-03	218000	70.31%	-2.02%	30000	9.68%	-14.29%	61000	19.67%	20.79%	1070	0.35%	-86.01%	310070	-1.77%
2003-04	233140	68.76%	6.94%	30000	8.85%	0.00%	61270	18.07%	0.44%	14660	4.32%	1270.09%	339070	9.35%
2004-05	228280	66.56%	-2.08%	28680	8.36%	-4.40%	64500	18.81%	5.27%	21530	6.28%	46.86%	342990	1.16%
2005-06	234200	65.96%	2.59%	29710	8.37%	3.59%	68637	19.33%	6.41%	22540	6.35%	4.69%	355087	3.53%
2006-07	256880	67.58%	9.68%	37500	9.87%	26.22%	70210	18.47%	2.29%	15510	4.08%	-31.19%	380100	7.04%
2007-08	250440	66.91%	-2.51%	30060	8.03%	-19.84%	75980	20.30%	8.22%	17800	4.76%	14.76%	374280	-1.53%
2008-09	244940	64.87%	-2.20%	33860	8.97%	12.64%	63620	16.85%	-16.27%	35140	9.31%	97.42%	377560	0.88%
2009-10	252310	59.98%	3.01%	24610	5.85%	-27.32%	104210	24.77%	63.80%	39560	9.40%	12.58%	420690	11.42%
2010-11	264400	67.09%	4.79%	34430	8.74%	39.90%	65840	16.71%	-36.82%	29400	7.46%	-25.68%	394070	-6.33%
2011-12	264730	66.65%	0.12%	34940	8.80%	1.48%	66280	16.69%	0.67%	31240	7.87%	6.26%	397190	0.79%
2012-13	267050	65.96%	0.88%	36200	8.94%	3.61%	66820	16.50%	0.81%	34820	8.60%	11.46%	404890	1.94%
2013-14	273300	66.65%	2.34%	36750	8.96%	1.52%	67100	16.36%	0.42%	32930	8.03%	-5.43%	410080	1.28%
2014-15	279200	66.41%	2.16%	37000	8.80%	0.68%	67300	16.01%	0.30%	36930	8.78%	12.15%	420430	2.52%
2015-16	285340	66.64%	2.20%	37490	8.76%	1.32%	67870	15.85%	0.85%	37450	8.75%	1.41%	428150	1.84%
CAGR 2000-16			3.06%			8.45%			10.59%			30.56%		4.92%

Sources: Statistical hand book of Nagaland 2002-17. CAGR: Compound Annual Growth Rate

Table-2 Production of different crops

Year	Cereal			Pulses			oilseeds			Commercial and others			Total principal crop production	Growth rate
	Production	Percentage to total principal crop production	Growth rate	Production	Percentage to total principal crop production	Growth rate	Production	Percentage to total principal crop production	Growth rate	Production	Percentage to total principal crop production	Growth rate		
2000-01	302610	76.69%		20960	5.31%		27100	6.87%		43910	11.13%		394580	
2001-02	323620	62.46%	6.94%	29650	5.72%	41.46%	53650	10.35%	97.97%	111220	21.47%	153.29%	518140	31.31%
2002-03	360000	58.31%	11.24%	28000	4.54%	-5.56%	75000	12.15%	39.79%	154400	25.01%	38.82%	617400	19.16%
2003-04	385260	57.11%	7.02%	28900	4.28%	3.21%	69960	10.37%	-6.72%	190450	28.23%	23.35%	674570	9.26%
2004-05	382910	51.63%	-0.61%	23080	3.11%	-20.14%	82810	11.17%	18.37%	252800	34.09%	32.74%	741600	9.94%
2005-06	381940	47.16%	-0.25%	35767	4.42%	54.97%	63550	7.85%	-23.26%	328540	40.57%	29.96%	809797	9.20%
2006-07	391110	48.72%	2.40%	45000	5.61%	25.81%	63030	7.85%	-0.82%	303680	37.83%	-7.57%	802820	-0.86%
2007-08	446260	51.00%	14.10%	35460	4.05%	-21.20%	67000	7.66%	6.30%	326270	37.29%	7.44%	874990	8.99%
2008-09	475520	56.20%	6.56%	39590	4.68%	11.65%	72130	8.52%	7.66%	258956	30.60%	-20.63%	846196	-3.29%
2009-10	322440	45.04%	-32.19%	29680	4.15%	-25.03%	86020	12.02%	19.26%	277700	38.79%	7.24%	715840	-15.40%
2010-11	531860	51.74%	64.95%	36460	3.55%	22.84%	67530	6.57%	-21.50%	392170	38.15%	41.22%	1028020	43.61%
2011-12	533270	52.08%	0.27%	37170	3.63%	1.95%	67720	6.61%	0.28%	385800	37.68%	-1.62%	1023960	-0.39%
2012-13	558510	50.25%	4.73%	40450	3.64%	8.82%	68900	6.20%	1.74%	443680	39.92%	15.00%	1111540	8.55%
2013-14	583680	53.11%	4.51%	41600	3.79%	2.84%	69300	6.31%	0.58%	404350	36.79%	-8.86%	1098930	-1.13%
2014-15	608870	52.29%	4.32%	42400	3.64%	1.92%	69500	5.97%	0.29%	443630	38.10%	9.71%	1164400	5.96%
2015-16	633790	53.02%	4.09%	43110	3.61%	1.67%	70020	5.86%	0.75%	448400	37.51%	1.08%	1195320	2.66%
CAGR 2000-16			7.23%			4.13%			6.62%			7.66%		7.21%

Sources: Statistical hand book of Nagaland 2002-17. CAGR: Compound Annual Growth Rate

However, the compound annual growth rate shows that the average annual land use for principal crops increased at 4.92%. It can also be seen from the table that there was a wide fluctuation in the year-wise growth rate in area under principal crops. It ranges from -6.33% during 2010-11 to 20.49% during 2001-02. Among the principal crops, cereal occupies the largest area under cultivation. It rose from 202674 hectare in 2000-01 to 2853540 hectare during 2015-16. Its share in the total principal crop area is still high even though it decrease from 77.37% in 2000-01 to 66.64% during 2015-16. The year-wise growth rate in area shows a wide fluctuation ranging from -2.5% during 2007-08 to the highest growth rate during 2001-02 (9.78%). The annual average growth rate for 15 years was 3.05% which is lower than the annual average of total principal crops. The area under pulses cultivation rose from 25500 hectare in 2000-01 to 37490 hectare during 2015-16. Its share in the total principal crop area was the highest during 2001-02 (11.09%) and the lowest was during 2009-10 (5.85%). The year-wise growth rate in area shows a wide fluctuation ranging from -27.32% (2009-10) to 37.25% (2001-02). The annual average growth rate for 15 years was 8.45% which is higher than the annual average of total principal crops. The area under oilseeds rose from 23430 hectare in 2000-01 to 67870 hectare during 2015-16. Its share in the total principal crop area was 8.94% during 2000-01 which rose to 24.77% during 2009-10 but then it decrease to 15.85% during 2015-16. The year-wise growth rate in area shows a wide fluctuation ranging from -36.82% (2010-11) to 115.54% (2001-02). The compound annual average growth rate was 10.59% which is higher than the annual average growth of total principal crops. The area under commercial crops decreases from 10360 hectare in 2000-01 to 1070 hectare during 2002-03. After 2002-03 it started increasing and reached 37450 hectare during 2015-16. Its share in the total principal crop area decreases during the first three years but then it started increasing and it was 8.75% during 2015-16. The year-wise growth rate in area shows a wide fluctuation ranging from -86.01% (2002-03) to 1270.09% (2003-04). The compound annual average growth rate was 30.56% which is highest among the principal crops.

Table-3 Productivity per Hectare (in MT)

Year	Cereal	Pulses	Oil Seeds	Commercial Crops	Principal Crops
2000-01	1.49	0.82	1.16	4.24	1.51
2001-02	1.45	0.85	1.06	14.54	1.64
2002-03	1.65	0.93	1.23	144.30	1.99
2003-04	1.65	0.96	1.14	12.99	1.99
2004-05	1.68	0.80	1.28	11.74	2.16
2005-06	1.63	1.20	0.93	14.58	2.28
2006-07	1.52	1.20	0.90	19.58	2.11
2007-08	1.78	1.18	0.88	18.33	2.34
2008-09	1.94	1.17	1.13	7.37	2.24
2009-10	1.28	1.21	0.83	7.02	1.70
2010-11	2.01	1.06	1.03	13.34	2.61
2011-12	2.01	1.06	1.02	12.35	2.58
2012-13	2.09	1.12	1.03	12.74	2.75
2013-14	2.14	1.13	1.03	12.28	2.68
2014-15	2.18	1.15	1.03	12.01	2.77
2015-16	2.22	1.15	1.03	11.97	2.79
CAGR 2000-2016	2.68%	2.26%	-0.76%	7.17%	4.2%

Production of different crops

The total production of principal crops rose from 394580 metric ton (MT) in 2000-01 to 1195320 metric ton (MT) during 2015-16 as shown in [Table-2]. The year wise growth rate in production shows the highest growth during 2010-11 (43.61%) and the lowest during 2013-14 (-1.13%). The compound annual growth rate shows that the total production of principal crops grow at 7.2%. Among the principal crops, cereal production rose from 302610 MT (2000-01) to 633790 MT (2015-16). Its share in the total production was above 50% except for three years (2005-07 and 2009-10). The compound annual growth rate of production in cereal for 15 years was 7.23% which is slightly higher than the growth rate of principal crops. The year-wise growth rate shows fluctuation from -2% to 9% during the entire period. The production for pulses rose from 20960 MT in 2000-01 to 43110 MT during 2015-16. Its share in the total principal crop Production fluctuates in between 3% to 6% during the same period. The year-wise growth rate in

production shows a wide fluctuation ranging from -1.6% (2015-16) to 25.81% (2006-07). The annual average growth rate for 15 years was 4.13% which is lower than the annual average production growth rate of total principal crops. The production under oilseeds rose from 237100 MT in 2000-01 to 70020 MT during 2015-16. Its share in the total principal crop production was 6.87% during 2000-01 which rose to 12.02% during 2009-10 but then it decrease to 5.86% during 2015-16. The year-wise growth rate in production shows a wide fluctuation ranging from -21.5% (2010-11) to 97.97% (2001-02). The compound annual average growth rate was 6.62% which is lower than the annual average growth rate of total principal crops. The Production under commercial crops decreases from 43910 MT in 2000-01 to 448400 MT during 2015-16. Its share in the total production of principal crop increases from 11.13% during 2001-02 to 37.51% during 2015-16. The year-wise growth rate in production shows a wide fluctuation ranging from -20.63% (2008-09) to 153.29% (2001-02). The compound annual average growth rate was 7.66% which is higher the annual average growth rate of principal crops.

Productivity Per Hectare (in Metric Tonne)

The productivity per hectare is shown in [Table-3]. From the table we can see that the productivity of the total principal crops rose from 1.51 metric tonne per hectare during 2001-02 to 2.79 metric tonne per hectare during 2015-16. Its annual productivity growth rate comes out to be 4.2%. The productivity of cereal rose from 1.49 MT per hectare (2000-01) to 2.22 MT per hectare during 2015-16. The annual productivity growth rate comes out to be 2.68% which is lower than the average annual productivity of the principal crops. The productivity of pulses rose from .82 MT per hectare in 2000-01 to 1.15 MT per hectare during 2015-16. Its annual productivity rate is 2.26% which is lower than the average rate of the total principal crops. The productivity of oilseeds shows that it fluctuates over the years from 1.28 MT per hectare during 2004-05 to .8 MT per hectare during 2007-08. The annual productivity rate comes out to be -.76% for 15 years. Among the principal crops, commercial crops have the highest productivity rate for the whole period. Its highest productivity was 144.3 MT per hectare during 2002-03. The annual productivity rate is 7.17% which is higher than the annual productivity rate of the total principal crops.

Conclusion

From the discussion we can see that the highest area sown and produce among the principal crops is that of the cereal crops because most of it are the staple crops for the people of the state. But the state being mostly hilly terrains and the cultivation of these cereal crops through jhuming is taking a toll on the environment as well as soil erosion. Therefore, it is suggested that foot hill areas be used for cultivation of cereal crops and the hill areas be used for vegetable cultivation as it takes less acres for production. Production of pulses, oilseeds and other commercial crops should be encouraged as the product of the state are purely organic and has a good marketing opportunities.

Application of research: Study of pattern and productivity of principal crops in Nagaland

Research Category: Agriculture Economics

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Ethical approval: This article does not contain any studies with human participants or animals performed by any of the authors.

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