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CROPPING PATTERN OF NORTH EASTERN GHAT AGRO CLIMATIC ZONE OF ODISHA: AN OVERVIEW

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Abstract– Odisha is primarily an agrarian economy and agriculture plays an important role in the overall development of the state, which remains underdeveloped and traditional and prone to natural calamities like droughts, floods and cyclones. With bountiful of natural resources like fertile soil, organic rich climate and rich heritage, North Eastern Ghats agro-climatic zone of Odisha is one of the most fascinating areas of the state. Cropping pattern, the yearly sequence and spatial arrangement of crops and fallows on a given area and connotes the crops grown in a particular area in an agricultural year. The present study was undertaken to analyze the cropping pattern of the concerned zone. Markov Chain analysis was employed to know the structural changes in the cropping pattern in North eastern ghat ACZ over a period of 13 years (2008-09 to 2020-21). It is revealed from the study that, paddy, maize, ragi, mung, biri, arhar, kulthi, til were the major crops grown in NEG ACZ. Among the others, crops like Niger, mustard, cotton, sweet potato, other vegetables, chilli, turmeric, ginger, sugarcane and groundnut are coming. Paddy crop retain 59.9 % area, where as other crops like maize retains 54.2%, ragi 70.5 %, mung 60.5%, biri 46.8 %, arhar 5.3 % and other retain 49.4 % respectively.

INTRODUCTION

Agriculture, the primary sector of the economy has continued to serve as the lifeline for Odisha as well as for India. Odisha is primarily an agrarian economy and agriculture plays an important role in the overall development of the state, which remains underdeveloped and traditional and prone to natural calamities like droughts, floods and cyclones. Odisha has a geographical area of 1,55,707 sq. ks and is divided into 10 Agro-Climatic Zones on the basis of soil structure, humidity, elevation, topography, vegetation, rainfall and other Agro-Climatic factors .

With bountiful of natural resources like fertile soil, organic rich climate and rich heritage, North Eastern Ghats agro-climatic zone of Odisha is one of the most fascinating areas of the state. This zone is characterized by hot and moist, sub-humid climate. The average rainfall is 1597 mm. The North Eastern Ghats region of Odisha spread over Kandhamal, Gajapati, Rayagada, part of Ganjam and small patches of Koraput which endowed with potentially rich natural resources at the same time are subjected to inherent problems like undulating topography, fragile steep slopes, shifting cultivation, large scale deforestation, intense rainfall, heavy runoff and severe soil erosion leading to continuous land degradation. These areas basically depend on rain water for cultivation and more than 70 % area are rainfed mostly in Kandhamal, Rayagada and Gajapati and some how irrigation is available in the 11 blocks of Ganjam which are coming under the selected zone.

So far as crop coverage is concerned, Rice is the principal food crop in the state in all the 10 ACZs in two distinct season kharif and rabi. Out of the total cultivated area Rice covers around 70% of the total cultivated area. Rice is the major cereal crop grown in the zone under different ecological settings. Cropping pattern, the yearly sequence and spatial arrangement of crops and fallows on a given area and connotes the crops grown in a particular area in an agricultural year. It has significant bearing on widening the geographical inequalities in income distribution and to assess the extent and gravity of the consequences of such situation, knowledge of the dynamics of cropping pattern is essential. As the

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market price is a driving factor, it motivates the farmers for deviating from the recommended cropping pattern. Farmers cultivate such crops which fetch high market price irrespective of the recommended crops and agro-climatic conditions.. The present study aims to analyse the present cropping pattern in NEG ACZ and the spatial changes in cropping pattern over the last 20 years with an objective to identify reasons for deviation in cropping pattern.

MATERIALS AND METHODS

The study use both primary and secondary data the primary data is collected through pre tested interview schedule during 2020-21 production period. Stratified purposive sampling method was used for selection of district, block, village and farmer. 10 farmers from each 6 villages are selected from the zone making the sample size to 120. Primary data on cropping pattern like which crop was grown in which season, how much area is diverted to each crop, what are the constraints in the existing cropping pattern and the time series data pertaining to cropping pattern was collected for the period 2008 to 2020 from the Department of Agriculture, and farmers welfare, Odisha.

Markov chain model

The direction of change in cropping pattern was analysed by using First Order Markov Chain Approach. The Lindo Software was used for the purpose. Markov Chain Analysis is the estimation of the transitional probability matrix 'P' whose elements, Pij indicate the probability of shifting area from one crop 'i' to another crop 'j' over time. The diagonal element Pij where i=j, measures the probability of a crop retaining its share. The average area shifted to a particular crop was considered to be a random variable which depends only on the area under past crop, which can be denoted

Algebraically as:

$$Ejt=\sum_{i=1}^{n} [Ei_{t-1}]p_{ij} + e_{jt}$$

RESULTS AND DISCUSSION

Systematic understanding of cropping pattern changes over the years is very important, for the farmers to get better returns and It has also significant bearing on widening the geographical inequalities in income distribution. In some region there is long-term changes in the cropping pattern and that could be due to the development of irrigation infrastructure which is a great solution for rainfed areas, whereas other factors like climatic factor, soil condition, availability of inputs led to short term changes in cropping pattern. To assess the extent of the consequences of such situation, the agriculture department recommends suitable cropping pattern for the specific agro-climatic situation.

The major crops of the Zone are Paddy, maize,

Table 1. Cropping pattern in NEG ACZ

Season	Crops	Rainfed Condition	Irrigated Condition	Total Area
Kharif	Paddy	112.47	262.54	375.01
	Maize	42.98	17.29	60.27
	Ragi	22.78	15.19	37.97
	Black gram	27.22	1.71	28.93
	Green gram	6.5	0.14	6.64
	Groundnut	4	6.24	10.24
	Sesamum	22.09	0.5	22.59
	Total Vegetables	11.65	35.21	46.86
	Total Spices	18.27	5.73	24
Rabi	Paddy	366.54	3.64	370.18
	Maize	0	2.53	2.53
	Ragi	0	1.69	1.69
	Black gram	31.6	1.71	33.31
	Green gram	116.17	8.75	124.92
	Groundnut	1.82	9.33	11.15
	Sesamum	10.4	0.64	11.04
	Total Vegetables	0	43.29	43.29
	Total Spices	0	9.37	9.37

Table 2. Transitional Probability Matrix (TPM) for shift in cropping pattern for Period - I (2008-09 to 2020-21)

Crops	Total Paddy	Maize	Ragi	Mung	Biri	Arhar	Kulthi	Til	Others
Total Paddy	0.599	0.000	0.000	0.095	0.000	0.051	0.000	0.000	0.254
Maize	0.000	0.542	0.000	0.000	0.000	0.000	0.000	0.028	0.430
Ragi	0.000	0.000	0.705	0.127	0.101	0.000	0.067	0.000	0.000
Mung	0.121	0.000	0.000	0.605	0.000	0.046	0.000	0.037	0.192
Biri	0.000	0.000	0.219	0.112	0.468	0.173	0.000	0.028	0.000
Arhar	0.190	0.418	0.000	0.000	0.000	0.053	0.284	0.055	0.000
Kulthi	0.000	0.000	0.000	0.000	0.274	0.000	0.000	0.726	0.000
Til	0.000	0.000	0.000	0.106	0.563	0.000	0.331	0.000	0.000
Others	0.474	0.032	0.000	0.000	0.000	0.000	0.000	0.000	0.494

Ragi, Black gram, green gram, arhar, kulthi, groundnut, sunflower, sesamum and mustard. There is a diverse cropping pattern in the zone with cereals, pulses, oilseed crops, commercial and other. Sugarcane, cotton and onion sweetpotato, turmeric, ginger being the important commercial crops in the zone. Paddy crop account us the highest share of cropped area (37.9%), followed by green gram (12.24 %).

Analysis of cropping pattern in the study area

Markov Chain analysis was employed to know the structural changes in the cropping pattern in North eastern ghat ACZ over a period of 13 years (2008-09 to 2020-21).

The results of the transition probability matrix for major crops of North eastern ghat Agroclimatic Zones are presented in Table 2. It is revealed from the Table that, paddy, maize, ragi, mung, biri, arhar, kulthi, til were the major crops grown in NEG ACZ. Among the others, crops like Niger, mustard, cotton, sweet potato, other vegetables, chilli, turmeric, ginger, sugarcane and groundnut are coming. Paddy crop retains 59.9 % area, whereas other crops like maize retains 54.2%, ragi 70.5 %, mung 60.5%, biri 46.8 %, arhar 5.3 % and other retain 49.4 % respectively. kulthi and til crops lost 100 per cent area to other crops. While, maize crop lost 43 per cent to other crops. However gains 41.8 % and 3.2 % from arhar and other crops respectively. Ragi crop lost 12.7%, 10.1 %,6.7% to mung, biri and kulthi respectively however gains 21.9% from biri. Mung crop retain 60.5 % and lost 12.1 % to paddy, 4.6 % to arhar, 3.7 % to til and 19.2 5 to other crops. However it gains 9.5%, 12.7 %, 11.2%, 10.6% from total paddy, ragi, biri and til respectively.

CONCLUSION

It is concluded that, in NEG ACZ the major crop is paddy so maximum area of paddy are retaining In the zone mostly cereals and pulses are grown by the farmers and so far as cultivation of commercial crops are concerned the zone is lagging behind. Though it has a very good scope for cultivation of high valued vegetables and other commercial crops, as the zone is endowed with conducive climate for cultivation of these crops, but still the farmers are not encouraged to grow these crops as water resource is scarce in this area. So optimum use of resources is the need of the hour for this zone. As the Govt is encouraging for cultivating millets through Odisha Millets mission, so the stakeholders are taking ragi as a major crops also and its maximum area is also retaining . In NEG ACZ the farmers are following mainly traditional agricultural techniques so there is a need to bring the discipline among the farmers of the study area through proper training and guidance in order to make them not only stick to only cereals and pulses but also high valued crops .And optimum use of scarce resources should be taken care of.

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