Dynamic of Cropping Pattern Changes in Selected Block of Virudunagar District, India

Sathishkumar M. [a++*], Sivananthan J. [a] and Jayaprabha J. [a++]

[a] *Kalasalingam School of Agriculture and Horticulture, Kalasalingam Academy of Research and Education, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

Original Research Article

ABSTRACT

The assessment in dynamic of cropping pattern in several regions is vital part for a much-improved insight intothe farming development method. The present study was commenced to inspect the dynamicsof cropping pattern in Kariapatti block of the virudhunagar district of Tamil Nadu. The data analyzed with the help of Markov chain by year wise and for all years with analyzed as transitional probability matrix for dynamic changes. The main findings from the study exposed that any type of crops did not hold its area. But, the acreage of the crops was simultaneously changing from one set of crops to another set throughout the season. The cereals (cholam) area was observed to be more stable and the less area observed in gingelly and sunflower crops. Indicated that the cropping pattern of the region moves towards diversification from cholam to cotton followed by groundnut, sugarcane, paddy and maize, gingelly and green gram and sunflower in Kariapatti block. The reducing trend has been observed in the uncultivable land. This specifies that the area for cultivation has increased in Kariapatti. There is a greater possibility for deciding within the choice of crops to place the agriculture on the base of property growth that has to be supposed about in analysis and extension programmes.

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++ *Assistant Professor;*
Corresponding author: E-mail: sathishkumar@klu.ac.in;

1. INTRODUCTION

India has a variety of cropping systems across agro-climatic zones, for the most part founded on soil type, precipitation, environment, technologies innovation, strategies and existing financial circumstance of the cultivating local area/farming community [1]. Throughout the long term, there is an adjustment of agrarian farm, 75% of farmers are working small and marginal land holdings capacity and having a weak access to critical production resources. It is expected that India will have the biggest agricultural labour manpower supply dominated by under 25 years young people. Larger part of the Indian youths are lives in villages and are occupied with farming exercises [2].

Agriculture is the primary and predominant sector in the economy state of Tamil Nadu. It will directly and indirectly uphold around 70% of the populace other than contributing almost 55% of state income, which sufficiently makes sense of the over economy of the state on agriculture sector. The monetary development of the state relies to a great extent upon the advancement of agrarian area, the improvement of which turns out to be more significant with regards to the exceptionally supposed improvement in auxiliary areas with the introduction of arranged improvement of food grains impressively [3]. The development of three significant food crops, in particular paddy, jowar, ragi, bajra, maize, and pulses contributes a significant piece of the food grain in the State and records for 84% of the total crop grown region. Paddy is the most cultivable crop in Tamil Nadu and is found in three sorts to be specific Kuruvali, Thaladi, and Samba that oscillates from one season to another [4].

The cropping pattern assumes a crucial part in deciding the degree of farming creation and reflects the agricultural economy of an area/district. The cropping pattern of a district exposes the extent of area of land under various yields at a point of time, the rotation of crops and the region under various harvests. The cropping patterns changes in reality of space and time. A change or dynamic in cropping pattern proposes an adjustment of the extent of region under various yields which depends, generally, on the facilities accessible to raise crops in the given agro-climatic zones [3]. The cropping pattern and

the advances in that trust upon large number of factors like precipitation, availability of irrigation water, type of soil, farming innovation, climate and the development of agro-businesses [5]. The cropping pattern change in India was a focal point of the studies during 1970s whena number of investigations on all-India, states and district level exist [4].

In a diversification study on in growth rates, [7] observed that the cropping pattern change in Orissa has leaned toward oilseeds and heartbeats especially sesamum, groundnut and mung bean. Further, Rao and Parwez [6] additionally revealed that the portion of grains in the gross cropped area declined throughout the long term and the decay was primarily due to a bigger declining portion of sorghum and pear millet in rainy season. Along these lines, the change in cropping pattern has inclined toward the development more gainful harvests. The investigation of the spatial and temporal difference in cropland and cropping pattern utilizing remotely sensed information is of basic significance to farming sciences [8].

Understanding in changes of cropping systems overtime and reasons connected with the changing of cropping patterns of a specific region might direct the extension workers, researchers and policy makers to take more time to improve environment and livelihood on schedule. The current review was intended to report the dynamics of changing in cropping patterns in Virudhunagar district of Tamil Nadu from 2009-10 to 2018-19 and to recognize the purposes behind the shifting in that. The purpose of the present study is to highlight on dynamic changes in the cropping pattern in Virudhunagar district. The article is ordered as follows: After this introduction, Section 2 presents the methodology; Section 3 reviews eight major crops during 2009 to 2019 in the virudhunagar district, and the results and discussion are presented, respectively, in Sections 4; The last section draws concluding remarks.

1.1 Objective

- To find the area under major crop
- To find the Transitional Probability Matrix of major crop

Table1. Transitional probability matrix for area under in major crop categories, 2009 - 10 to 2018 - 19

Major Crop Categories	Paddy	Chola m	Maize	Greengram	Groundnu t	Gingelly	Sunflowe r	Cotton	Sugarcan e
Paddy	0.1009	0.1032	0.0968	0.0982	0.1036	0.0911	0.0908	0.1066	0.1009
Cholam	0.2049	0.2034	0.1879	0.1798	0.2093	0.1836	0.1722	0.2218	0.2049
Maize	0.1643	0.1729	0.1632	0.1840	0.1961	0.1804	0.1690	0.1502	0.1643
Greengram	0.1697	0.1703	0.1765	0.1854	0.1797	0.1916	0.1880	0.1557	0.1697
Groundnut	0.1630	0.1605	0.1639	0.1618	0.1607	0.1662	0.1654	0.1633	0.1630
Gingelly	0.0678	0.0666	0.0729	0.0684	0.0557	0.0671	0.0752	0.0667	0.0678
Sunflower	0.0596	0.0563	0.0648	0.0561	0.0420	0.0578	0.0671	0.0593	0.0596
Cotton	0.0696	0.0668	0.0740	0.0664	0.0529	0.0623	0.0722	0.0763	0.0696
Sugarcane	0.0586	0.0489	0.0472	0.1278	0.1089	0.0784	0.0642	0.1178	0.1872
Steady State Probability	0.0997	0.1958	0.1749	0.1770	0.1625	0.0669	0.0567	0.0666	0.0997

2. METHODOLOGY

Markov chain analysis was used to study the dynamic changes in the cropping pattern, capturing the shift in the area under different crop categories over a period of 47 years. The probability of retaining the particular crop and the shift was interpreted by studying the diagonal and off diagonal elements of transitional matrix. The transitional probability matrix for the dynamic changes in the cropping pattern in the study area was estimated using the data on area under major crop categories from 2009-10 to 2018-19. The nine major crop categories considered for the analysis Paddy, Cholam, Maize, Greengram, Groundnut, Gingelly, Sunflower, Cotton, Sugarcane.

3. RESULTS AND DISCUSSION

The transitional probability matrix for dynamic changes in the area under major crop categories in the Kariyapatti, Virudunagar district was estimated and the results of Markov chain model are presented in Table 1.

The tables revels that diagonal elements represent the probability of retention of existing area under different crops. For example, the probability of retention of existing area under cholam was estimated at 20per cent which was the highest, followed by Sugarcane (18.72 per cent), green gram (18.54 per cent), maize (16.32 per cent), groundnut (16.07 per cent), paddy (10.09 per cent), cotton (7.63 per cent) and tuber gingelly (6.71 per cent) and sunflower (6.71 per cent).

But the probability of shift in area from cholam was maximum to cotton (22.18 per cent) followed by groundnut (20.93 per cent), sugarcane (20.49 per cent), paddy (10.09 per cent) and maize (18.79 per cent), gingelly (18.36 per cent) and green gram 17.98 (per cent) and sunflower (17.22 per cent).

However, the paddy gained cholam 20 per cent from maize, 10 per cent from paddy, 16 per cent from maize and groundnut, 17 per cent from greengram, 6 per cent from sunflower and sugarcane, 7 percent from cotton.

The groundnut and maize crop was found to be moderately stable whereas the maize could retain at 19.61 per cent to groundnut. Though, the shift in area from maize was 18.04 per cent to gingelly and greengram, 17.29 per cent to

cholam, 16.90 per cent to sunflower, 16.43 per cent to paddy and sugarcane, 15.02 per cent to cotton.

The probability of retention of gingelly (6.71 per cent) and sunflower (6.71 per cent) were negligible in the study area. The major competing category for these crops was cereals, as the farmers in this district primarily depend on cholam cultivation. This would be correlated with the results on the performance of these crops in the study area.

The estimated steady state probability reveals that if the cropping pattern continues, in the future around 20 per cent of area will be under cholam, 18 per cent under greengram, 17 per cent under maize, 16 per cent under groundnut, 10 per cent under paddy and sugarcane, 7 per cent under gingelly and cotton, 5 per cent under sunflower.

4. CONCLUSION

The cropping pattern of the Kariapatti Block had shownas a significant change. The purpose of Cropping pattern at makingthe best use of the available land, self- sufficiency and outputsin agricultural crops as a result of higher output per unit of land and perworker should certainly be welcomed. In the cropping pattern, Cereals engaged in a dominant spot of the Kariapatti Block and the area under pulses were increased. In future, majorly cholam will hold its area as compare to the other pulses, millets, oilseeds and cash crops. Because, it was a major competing category and alsofarmers in this district primarily depend on cholam cultivation. The actual struggle in accepting a well cropping pattern is thatfarmers may not have suitable amount of money to invest andtherefore the farmers should know the new innovative techniques. To accomplishthe demands of growing population, land andagricultural potential must be advanced for the overall expansion.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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