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District-Disparities of Agricultural Development in Karnataka, India

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A B S T R A C T

The research was undertaken to study the spatio-temporal variation in agricultural development in Karnataka. The shift in area of the five major food groups in Karnataka within ten years. The research was based on secondary data of ten years (2005-06 to 2014-15) on area of cereals, pulses, oilseeds, fruits, vegetables and others in Karnataka from different sources like DES Bangalore and websites. The statistical tool used for analysis is Markov Chain. The analysis of shift in area of groups was shown that the highest retention area was noticed in oilseeds fallowed by cereals, others, pulses and fruits. Less retention of area was noticed in case of vegetables and vegetables lost its major area to pulses. Fruits lost its major area to others.

Introduction

Karnataka is the India's eighth largest state in terms of geographical size accounting for 5.83 percent of geographical area, 5.1 percent of total population and 6.21 percent of the GDP of the country. Karnataka has varied topography based on physiographic features, the state is divided into ten-agro climatic zones, two third of geographical area of Karnataka is under arid and semi arid conditions.

Agriculture in Karnataka has occupied around 12.31 million hectares of land, this comes to 64.6 percent of the total area. Karnataka is one of the major producers of rice among all other states in India. Karnataka has largest rainfed area next only to Rajasthan. About 70% people of the state live in villages and 71% of the total population is agriculture dependent. 59% of total coffee produced in the country comes from Karnataka, whereas the state is also a major producer of ragi. The major crops grown in the state are rice, ragi, jowar, maize and pulses besides oilseeds and number of cash crops. The share of agriculture in the state GDP is around 16% which is higher than the current national average of all these states in India. Food grain production in Karnataka is 6,08,596 tonnes which is a contribution of 6.94% of the total food grain production.

India's population relies on agriculture (58.40%) as their primary means of livelihood. Karnataka is home of 6.11 crore inhabitants

(2011 Census) which accounts for 5.05% of India's population. Karnataka has 5.83% of India's geographical area. The state's population has grown by 15.7%. During the last decade, while its population density has risen from 276 in 2001 to 319 in 2011, indicating an increase of about15.6% (economic survey 2014-2015). In the present study, an attempt was made on the major food groups of Karnataka by taking their respective area and study was conducted to analyse the pattern of shifting of area of food groups.

Materials and Methods

The present research was based on Secondary data of thearea cultivated was collected from the website DES, Bangalore and www.indiastat.com for a period of 2005-06 to 2015-2016. The entire Karnataka was considered for the purpose of study. The data includes Information about area of cereals, pulses, oilseeds, fruits, vegetables and others.

The statistical tools used to estimate the shift in area is Markov Chain

Markov chain

Stochastic model (Markov Chain) was used for the analysis of shift occurred in the area under cultivation of cereals, pulses, oilseeds, fruits, vegetables and others. LINGO Software was used for solving Markov Chain Analysis.

Goal of Markov chain analysis is the estimation of the transitional probability matrix p. The element P_{ij} of this matrix indicates the probability that crops will switch from i^{th} crops to j^{th} crops with the passage of time. The diagonal p_{ij} measures the probability that share of crops would be retained in successive time periods. Hence, the examination of the diagonal element indicates the loyalty of shifting area of selected crops to particular crops.

$$E_{jt} = \Sigma E_{jt-1} * P_{ij} + e_{jt} \; (i = 1,2,\ldots..n)$$

Where,
i and j are food group, t is time period
E_{jt}= Area under j^{th} food group during period t
E_{it-1} = Area under i^{th} food group during period t-1
P_{ij}= Probability of shifting area from i^{th} food group to j^{th} food group.
e_{jt} = The error term which is statistically independent of e_{it-1}, and
n= Number of groups.

The transitional probabilities P_{ij} which can be arranged in a (c*r) matrix, had the following properties;

$0 \leq P_{ij} \leq 1$ $\quad \sum_{i=1}^{n} P_{ij} = 1$

Thus, the expected area shares of each food group during particular period 't' is obtained by multiplying the area to the selected food group during the previous period (t-1) with the transition probability matrix (P).

Results and Discussion

Markov chain analysis of cultivated area of cereals, pulses, oilseeds, fruits, vegetables and others (others includes crops like horticulture and commercial crops) was shown by probability transitional matrix.The transitional probability matrix of area under cultivation of food groups of Karnataka state was given in Table 1 and Figure 1. Highest retention of area was noticed in case of oilseeds (79.42%) followed by cereals (49.77%), others (18.15%), pulses (15.98%), fruits (7.75%) and there was less retention of area was noticed in case of vegetables (6.07%). Vegetables lost its major area to pulses (82.83%). Pulses lost its major area to cereals (60.40%). Cereals lost its major area to others (33.69%). Oilseeds has lost its major area to cereals (20.58%). Fruits lost its major area to others (92.25%). Others group gained its area by cereals (28.35%), pulses (34.56%) and oilseeds (11.03%).

The direction of area of food groups in Karnataka state was studied by estimating transitional matrix using the stochastic model (Markov Chain Analysis). The transitional matrix were depicted a broader idea of change of the direction of area over period of ten years (Table 1 and Fig. 1). Six major food groups like cereals, pulses, oilseeds, fruits, vegetables and others (commercial crops, spices etc.) were considered for the research study. The diagonal elements in a transitional probability matrix provide the information on the probability retention of the area. While row element indicates the probability of loss in area on account of crops. The column element indicates the probability of gain in area from other groups. The highest retention of area for oilseeds (79.42%) prove that it attracted the farmers. After oilseeds, cereals (49.77%), others (18.15%) and pulses (15.98%) have shown higher retention of area for food groups. Cereals lost their major area to others (33.69%) and gained area from pulses (60.40%) and oilseeds. Pulses gained area from vegetables (82.83%). Fruits lost its area to others (92.25%). Vegetables lost its area to pulses (82.83%).Others lost its area to pulses (34.56%). Cereals are also second most growing food groups and demand and price of this group is more in Karnataka (Saraswati *et al*., 2012).

Table.1 Transitional probability matrix of food groups in Karnataka

Food Groups	Cereals	Pulses	Oilseeds	Fruits	Vegetabales	Others
Cereals	**0.4977**	0.1654	0.0000	0.0000	0.0000	0.3369
Pulses	0.6040	**0.1598**	0.0000	0.1420	0.0943	0.0000
Oilseeds	0.2058	0.0000	**0.7942**	0.0000	0.0000	0.0000
Fruits	0.0000	0.0000	0.0000	**0.0775**	0.0000	0.9225
Vegetabales	0.1717	0.8283	0.0000	0.0000	**0.0000**	0.0000
Others	0.2835	0.3456	0.1103	0.0012	0.0778	**0.1815**

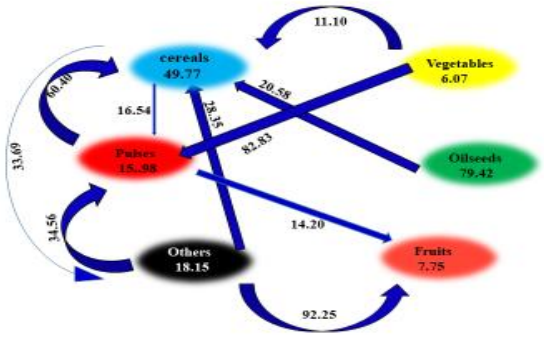

Fig 1 : Retention and shifting of areas among Food groups in Karnataka state.

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References

Abdul Shaban and Bhole, L. M., 1999, Development and disparities in Maharashtra-A spatio-temporal Analysis. *Indian J. Region. Sci.*, 31(1): 56-69.

Kusuma, D. K. and Basavraj, H., 2014, Stability analysis of mango export markets of India: Markov chain approach. *Karnataka J. Agril. Sci.*, 27 (1): 36-39.

Lazri, M., Ameur, S., Brucker, J. M., Lahdir, M. and Sehad, M., 2015, Analysis of drought areas in northern Algeria using Markov chains. *J. East Syst. Sci*., 124 (1): 61-70.

Mahadevaiah, G. S., Ravi, P. C. and Chengappa, P. G., 2005, Stability analysis of raw cotton export markets of India – Markov chain approach. *Indian J. Agril. Econ. Res. Rev.*, 18 (2): 253-259.

Mukhopadhyay, A., Mondal, A., Mukherjee, S., Khatua, D., Ghosh, S., Mitra, D. and Ghosh, T., 2014, Forest cover change prediction using hybrid methodology of geo informatics and Markov chain model: A case study on sub-Himalayan town Gangtok, India. *J. Earth Syst. Sci.*, 123 (6): 1349-1360.

Nema, A. K., Bisen, S. R. and Singh, T., 2013, Markov chain approach – dry and wet spell rainfall probabilities in planning rain fed rice based production system. *Indian J. Dryland Agric. Res. Dev*., 28 (2): 16-20.

Nethravathi, A. P. and Yeledhalli, R. A., 2016, Growth and instability in area, production and productivity of different crops in Bengaluru division. *Int. J. Agric. Environ. Biotechnol.*,9(4): 599-611.

Saraswathi, P. A., Basavaraja, H., Kunnal, L. B., Mahajanashetti, S. B. and Bhat, A. R. S., 2012, Growth in area, production and productivity of major crops in Karnataka. *Karnataka J. Agric. Sci.*, 25 (4): 431-436.

Satishkumar, M., Harishkumar, H. V., Ramesh and Rangegowda, R., 2016, Growth, export performance and competitiveness of Basmati and non- Basmati rice of India- A Markov chain approach. *Int. J. Agric. Environ. Biotech.*,9 (2): 305-311.

Shree, J. S., Sridhar, S. and Kiran, M., 2016, Changing direction of trade of buffalo meat in India - An application of Markov chain analysis. *Int. J. Appl. Pure Sci. Agric*., 2 (10): 128-132.

Singh, M., 2010, Projection of potato from India - A Markov chain approach. *Potato J.*, 37 (1): 48-55.

Sivasankari, B. and Rajesh, R., 2015, A study on growth and direction of black pepper trade in India - A Markov chain approach. *Trends Biosci.*,7 (20): 3200-3205.

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