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RISK ANALYSIS AMONG FOOD CROPS: A STUDY WITH SPECIAL REFERENCE TO KERALA

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Abstract

Kerala is one of the most progressive State of India. The State has made massive contribution in the development of agriculture field particularly after the green revolution. The share of agriculture in net state domestic product declined from 26.2 per cent in 1993- 94 to 11.5 per cent in 2004-05 but the sector plays an important role in the state economy. The experience of the last ten years shows that an increase in the real NSDP of agriculture in a year is regularly followed by a decline in NSDP the next year further, the magnitude of fluctuation is quite high; it ranged between 10.41 per cent to 16.76 per cent during the period 2000-01 to 2012-13. The lowest decline observed in agricultural income was close to 10.41 per cent. The share of agricultural production sector in Total Primary Sector at NSDP shows a fluctuating trend. In 2009-10 shows the lowest contribution i.e. 10.41% but the maximum share was during 2000-01 i.e. 16.76. With this magnitude of fluctuations in farm incomes, it becomes very risky to make investments in farm production, and farmers are forced to follow a conservative approach. The present paper analyzes the instability and the growth in food crops area, production and Yield during the period 2002-2012 of Kerala State, for this purpose Co-efficient of variation, Coppock's Instability and Compound Growth Rate was worked out to find out instability associated. The study estimates risk associated with crop area, production and productivity of major food crops in Kerala.

Keyword: NSDP, Coefficient of Variation, Coppock's Instability Index and Compound Growth Rate.

Part-I

Introduction

Agriculture plays an essential role in the process of economic development of less developed countries like India. Besides providing food to nation, agriculture releases labour, provides saving, contributes to market of industrial goods and earns foreign exchange. Agricultural development is an integral part of overall economic development. Since independence India has made much progress in agriculture. Indian agriculture, which grew at the rate of about 1 percent per annum during the fifty years before

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Independence, has grown at the rate of about 2.6 percent per annum in the post-Independence era. Expansion of area was the main source of growth in the period of fifties and sixties after that the contribution of increased land area under agricultural production has declined over time and increase in productivity became the main source of growth in agricultural production. Another important facet of progress in agriculture is its success in eradicating of its dependence on imported food grains. Indian agriculture has progressed not only in output and yield terms but the structural changes have also contributed. All these developments in Indian agriculture are contributed by a series of steps initiated by Indian Government. Land reforms, inauguration of Agricultural Price Commission with objective to ensure remunerative prices to producers, new agricultural strategy, investment in research and extension services, provision of credit facilities, and improving rural infrastructure are some of these steps. Notwithstanding these progresses, the situation of agriculture turned adverse during post-WTO period and this covered all the sub sectors of agriculture. The growth rates in output of all crops decelerated. The deceleration in the growth of agricultural output was not witnessed for such a long period as seen in recent years. The increase in vulnerability in agricultural income at macro level is indicated by recent slowdown in growth along with increased volatility of the growth rate. In Kerala, Agriculturist suffer various risks such as social risks, the threat of economic risk and natural calamities etc. these risks seriously affect the sustainable development of agricultural sector. The objective of this paper to analyse the growth rate and instability of food crops in Kerala.

1.2 Objectives of the study

1.2.1 To analyze the growth and instability in area, production and yield in major food crops in Kerala.

1.3 Methodology

Following methodology was adopted for the purpose of the study.

1.3.1 Source of Data

The study is based on secondary data.
The Secondary data of area, production and yield (productivity) of food in Kerala for 13 years from 2000-01 to 2012-13 were utilized for this study. The data were collected from Ministry of Agriculture, Govt.of India, RBI Bulletin, Economic Review (Various years), State Planning Board. Thiruvananthapuram, Kerala. Reports and documents of agriculture insurance schemes from the Directorate of Agricultural Office Thiruvananthapuram, Kerala.

1.4 Operational definition

Food crops include rice, tapioca, banana, other plantains, vegetables, cereals, pulses and grains

1.5 Tools for analysis

Compound Annual Growth Rate (CAGR) is used to estimate the growth area, production and Productivity. Coefficient of variation (CV) worked out for measuring the variability in area, production and yield. Simple CV does not explain properly the trend component inherent in time series data. Therefore the extent instability or risk in area, production and yield was calculated by Coppock's Instability index (CII).

PART-II

Risk in Indian Agriculture

Agriculture is the backbone of Indian economy. Nearly 70% of the people depend on this sector for their livelihood. But it is also a gamble with nature. This sector is subject to many risks and uncertainties such as variable climatic conditions, natural disasters, unpredictable yields and prices, poor rural infrastructural facilities, defective marketing systems and lack financial service. Instability in the farmer's income ultimately results in poverty for the farmers and makes the agriculture sector unviable. Most of the farmers engaged in agriculture are small and marginal and lack the knowledge to manage these risks. Though many risk mitigating strategies have been taken up by the Government, due to inadequate implementation, all these programs have not been successful.

Growth and Instability Analysis of Food Crops in Kerala

Kerala is one of the most progressive State of India. The State has made massive contribution in the development of agriculture field particularly after the green revolution. The share of agriculture in net state domestic product declined from 26.2 per cent in 1993- 94 to 11.5 per cent in 2004-05 but the sector plays an important role in the state economy. At the time of First World War agriculture contributed two-thirds of the national income in India. After the initiation of planning in India the share of agriculture has persistently declined on account of the secondary and tertiary sectors of the economy. From 59.2 per cent in 1950-51 the share of agriculture in GDP at factor cost declined steadily to 34.9 per cent in 1990-91 and further to 24 per cent in 2003-04.

Agricultural output in Kerala is subject to extreme fluctuations. The experience of the last ten years shows that an increase in the real NSDP of

agriculture in a year is regularly followed by a decline in NSDP the next year further, the magnitude of fluctuation is quite high; it ranged between 10.41 per cent to 16.76 per cent during the period 2000-01 to 2012-13. The lowest decline observed in agricultural income was close to 10.41 per cent. The share of agricultural production sector in Total Primary Sector at NSDP shows a fluctuating trend. In 2009-10 shows the lowest contribution i.e. 10.41% but the maximum share was during 2000-01 i.e. 16.76. With this magnitude of fluctuations in farm incomes, it becomes very risky to make investments in farm production, and farmers are forced to follow a conservative approach. The time series annual data for the period 2002-03 to 2012-13 for major food crops, viz. Rice, Pulses, Sugar Crops, Spices, Fresh fruit, Dry fruit, Tapioca, Tubers and Vegetables etc. has been used to estimate the Growth, variation and instability in the crop area, production and yield for the following two periods: Period 1(Xth plan)—2002-03 to 2006-07 and Period II(XIth plan)—2007-08 to 2011-12.

PART-III

The pace of agricultural development of Kerala can be ascertained through a measuring growth in area, production and yield of food crops in Kerala. Compound growth rates of area, production and yield of the selected crops for each period were estimated to study the growth in area, production and yield of these crops. High growth in production accompanied by low level of instability for any crop is desired for sustainable development of agriculture. An index of instability was computed for examining the nature and degree of instability in area, production and yield in Kerala.

Analysis of Growth Performance of Major food Crops in Kerala

Table 1

CAGR of total Area, Production and Productivity of food crops in Kerala

Year	Total food grains	Sugar crops	Spices	Fresh fruit	Dry fruit	Tapioca	Tubers	Vegetables	Total food crops
Area									
Phase I	-4.591	-6.667	-4.69	0.2	-3.343	-3.921	179.268	-5.541	6.078
Phase II	-3.536	15.027	4.39	38.4	-5.351	-4.209	-6.854	-3.343	-2.761
Overall	**-2.761**	**9.746**	**-2.57**	**12.86**	**-7.596**	**0.501**	**48.736**	**-3.729**	**-0.499**
Production									
Phase I	-0.399	-34.819	9.09	24.11	-9.154	0.904	-12.015	0.702	-0.399
Phase	0.2	10.407	1.005	0.702	-8.698	-1.193	-8.149	-1.98	0.2

II									
Overall	**-1.98**	**3.252**	**0.2**	**6.078**	**12.862**	**0.3**	**-11.662**	**-1.686**	**-1.98**
Productivity									
Phase I	3.458	-43.33	4.603	-10.32	-4.113	5.022	-68.494	6.503	0.904
Phase II	3.149	18.294	5.866	0.501	-5.446	3.149	-1.292	1.41	2.327
Overall	**2.634**	**-6.012**	**2.84**	**-6.012**	**-4.113**	**3.977**	**-40.548**	**2.02**	**1.918**

The entire period has been divided into two sub-periods viz., 2002-03 to 2006-07 and 2007-08 to 2012-13 to examine the differential performance of various food crops in different periods in Kerala. Among crops, the total food grains (rice, jowar, ragi, pulses and grains etc.) during the study period registered negative growth rate in Area. Growth in production was lower than the productivity. These indices provide an idea about the growth in area, production and productivity of food crops in Kerala showed a decreasing trend over the study period i.e.2002 to 2012.The percentage change of food crops over the year during the study period for the area, production and productivity of food crops in Kerala had negative values except CAGR of Area during Phase I (6.078), Production (0.2) in Phase II and CAGR of Productivity in both Phases and overall periods are 0.904, 2.327 and 1.918 respectively. The state as a whole growth in productivity (1.918 %) contributed more towards growth in production (-1.98 %) than by growth in area (-0.499 %).

Table 2

Coefficient of variation of total Area, Production and Productivity of food crops in Kerala

Year	Total food grains	Sugar crops	Spices	Fresh fruit	Dry fruit	Tapioca	Tubers	Vegetables	Total food crops
Area									
Phase I	**6.37**	**44**	**7.89**	**60.41**	**8.82**	**7.37**	**126.35**	**9.93**	**11.99**
Phase II	**5.42**	**11.45**	**10.18**	**4.81**	**10.65**	**8.39**	**12.25**	**5.85**	**4.46**
Overall	**14.73**	**34.57**	**12.11**	**38.53**	**25.05**	**11.5**	**67.21**	**12.31**	**9.39**
Production									
Phase I	**7.01**	**61.91**	**16.42**	**34.77**	**15.21**	**3.08**	**21.62**	**2.44**	**11.43**
Phase II	**6.14**	**20.68**	**2.87**	**3.67**	**18.1**	**4.24**	**16.65**	**3.49**	**2.79**
Overall	**9.46**	**41.69**	**12.16**	**23.08**	**36.56**	**3.74**	**39.23**	**6.12**	**7.95**
Productivity									
Phase I	**7.67**	**69.9**	**9.15**	**35.3**	**7.3**	**8.35**	**87.77**	**10.57**	**5.63**

Phase II	6.03	25.48	14.71	2.95	10.5	5.15	6.01	3.12	5.19
Overall	9.13	60.53	13.13	33.86	13.22	11.82	150.88	7.96	7.38

The Coefficients of Variation clarified the disquieting trend in area, production and productivity. The state as a whole, the area of total food crops variations were 11.99% in Phase I, 4.46% in Phase II and 9.39% over the 10 year period. Productivity variations of the total food crops had more influence on production fluctuations (7.95 %) than by CV in area (9.39%). Among the food crops the area and production of tubers were highly insufficient over the 10 year period where as the less variability was observed in area production and productivity during the period II. CV in the area (11.5%), production (3.74%) and productivity (11.82%) of Tapioca has less variation compared to other food crops in Kerala.

(d) The extent of risk or instability in Area, Production and productivity of food crops in Kerala

Instability in area, production and yield has been studied at state level. Indian agriculture is known for its diversity. There is lot of variation in climatic conditions, natural resource endowments, institutions, infrastructure, population density and several other factors across states. Because of these variations, pattern of agricultural growth and development and response to various stimulus and inducements varies. Accordingly, instability in agriculture is expected to show the risk involved in agricultural production.

Table 3

Coppock's Instability index (CII) of total Area, Production and Productivity of food crops in Kerala

Year	Total food grains	Sugar crops	Spices	Fresh fruit	Dry fruit	Tapioca	Tubers	Vegetables	Total food crops
Area									
Phase I	37.9	74.71	39.06	59.81	37.91	38.47	162.97	38.84	41.37
Phase II	39.19	43.14	40.78	38.86	42.16	39.38	38.39	37.91	37.87
Overall	38.72	59.97	40.78	52.34	40.8	39.03	110.34	38.42	40.32
Production									
Phase I	41.17	47.39	41.44	44.73	43.29	38.56	42.96	39.75	36.79
Phase II	41.48	53.5	39.33	38.93	40.67	38.8	41.43	37.73	36.79
Overall	41.6	57.97	40.88	43.93	42.56	38.69	42.33	39	36.79
Productivity									

Phase I	**40.19**	**75.09**	**39.77**	**55.14**	**42.62**	**38.72**	**145.66**	**41.55**	**36.79**
Phase II	**39.19**	**46.24**	**42.02**	**38.56**	**40.22**	**37.94**	**39.97**	**38.32**	**36.79**
Overall	**39.8**	**71.37**	**41.24**	**49.21**	**42.44**	**38.51**	**112.06**	**40.34**	**36.79**

The Instability in area under total food crops declined from 41.37 (Phase I) to 37.87 (Phase II) but the overall risk factor among the area was increased. The instability in production and productivity of total food crops remain constant at all the periods under study. These indicates that as compare to area, production and yield under the food crop is highly insignificant among the 10 years of period which result in low productivity to the food crop growing farmers.

The state as a whole, Overall instability of total food crops is higher in area than production and yield. Whereas the instability is lower in the case of area especially total food grains followed by vegetables, dry fruit and spices. But production and yield is highly instable throughout the periods under the study among all types of food crops.

PART-IV

Findings and Conclusion

Findings

1. The state as a whole, the area of total food crops variations were 11.99% in Phase I, 4.46% in Phase II and 9.39% over the 10 year period. Productivity variations of the total food crops had more influence on production fluctuations (7.95 %) than by CV in area (9.39%).
2. The Instability in area under total food crops declined from 41.37 (Phase I) to 37.87 (Phase II) but the overall risk factor among the area was increased.
3. Among the food grains, the grains have higher coefficient of variation (143.39%) than paddy and pulses. The overall instability in area is also higher to grains (76.68%).
4. The Compounded Annual Growth Rate of production of total food grains shows a negative growth rate
5. The overall Compounded Annual Growth Rate of productivity of total food grains shows a positive growth at lower rate except pulses (-0.2).

Conclusion

From data analysis of 10 year of area, production and yield of food crops in Kerala show that there was a decrease in the utilization of area for food crops cultivation. There is much fluctuation in terms of production, but it shows significant growth during period II. But overall growth of yield doesn't show much variation over 10 year period. Thus this concludes that the

Kerala state faced a higher rate of instability in area, production and productivity.

References

1. Binswanger H.P. (1980). Attitudes Towards Risk: Experimental Measurement in Rural India. American Journal of Agricultural Economics. 62 (3) : 174-82.
2. Jodha N.S. (1981).Role of Credit in Farmers Adjustment Against Risk in Arid and Semi-Arid Tropical Areas of India. Economic and Political Weekly. XVI (22&23).Jain, RCA (2004): Challenges in Implementing Agriculture Insurance and Re-insurance in Developing Countries, The Journal, January-June, pp14-23.
3. Robinson L.and P. Barry (1987), The Competitive Firm's Response to Risk, New York: MacMillan (p.13)
4. Rao C.H.H., S.K. and K. Subbarao.(1988) : Unstable Agriculture and Droughts-Implications for Policy. New Delhi: Vikas Publishing House Pvt.Ltd.
5. Eldin M, Milleville (1989),p Risk in agriculture. Paris, France: Editions de l'ROSTOM, Institut Francais de Recherche Scienctifique pour le Development en Cooperation. 1989.
6. FAO Report (1990)
7. Anderson J.R., Dillon J.L. (1992) Risk analysis in dryland farming systems, Farming System Management Series. 1992 (2) FAO, Rome.
8. Blank S.C, C.A. Carter and J. McDonald (1992) "Is the market failing agricultural producers who wish to manage risks?", Comtemporary Economic Policy 15:103-112.
9. Economic review of various years, Thiruvanthapuram ,Govt of Kerala.