PADDY CULTIVATION IN THE KUTTANAD REGION OF KERALA: AN ANALYSIS OF TREND IN AREA, PRODUCTION AND PRODUCTIVITY

THOMAS K C
Assistant Professor,
Department of Economics,
St. Stephen's College, Uzhavoor, Kottayam,
Kerala, India.

Abstract : Kuttand is known as the 'Rice bowl of Kerala' and is the largest wetland ecosystem on India's west coast. The area, production and productivity of paddy cultivation in India from 2009-10 to 2018-19 shows an increasing trend over the years. The periods 2010-11 and 2011-12 show a sudden increase in production and productivity of paddy in India, which then shows a downward trend in the subsequent years and the recovery started from 2016-17. Though the absolute value of area and production in Kerala shows a decline, their average decadal growth trend slightly rises over the last 10 years. The productivity of paddy in Kerala (2920 kg/hectare) is greater than Indian average (2659 kg/hectare) in 2018-19. A record level of paddy production was attained in the year 2018-19 in the Kuttanad region. Over the last few years a new spirit of revival has been seen among paddy farmers all over the state, especially in the wetlands of Kuttanad region. Policy initiatives of the central, state and local governments have helped to revive Kerala's paddy cultivation.

IndexTerms **- Kuttanad, Paddy, Area, Production, Productivity, Wetlands.**

I. INTRODUCTION

Rice continues to be the staple food of the people of Kerala, while the food habits of the people of Kerala have undergone a paradigm change. It covers 7.46% of the total cultivated area of the state (Economic Review, 2016). Paddy farms and paddy farming have influenced people's culture from time immemorial. The economic, social, political, environmental and ecological structures of Kerala are centred around rural paddy farmers' livelihoods. In Kerala, the area and production of paddy has continuously decreased and its growth rate has been negative since the 1990s. Over the last few years, however, a new spirit of revival has been seen among paddy farmers all over the state, especially in the wetlands of Kuttanad.

Paddy cultivation in Kerala is mainly carried out by the Group Farming Samithies, known as Padasekhara Samithies. It is estimated that an area of about 1.75 lakh ha is under about 6850 Padasekhara Samithies. The low land availability and high cost of other production factors such as farm labour, fertiliser, etc the excessive reliance on unpredictable international commodity prices and the monsoon vagaries have resulted in low farm viability in Kerala. However in terms of rural livelihood options, food security, raw materials for the food processing industries and exports rural agriculture is very important. Several initiatives have been undertaken in the state to encourage the production of crops, animal husbandry, fisheries and wetland conservation in Kerala (Economic Review, 2012).

Kuttanad is known as the 'Kerala rice bowl' and is the largest wetland ecosystem on India's west coast. The population of wetland farmers is deprived of a decent living standard. The deltaic formation of Kuttanad lies 0.6 to 2.2m below mean sea level. The region ranges from a latitude of 9° 17' to 9° 40' N and a longitude of 76° 19' to 76° 33' E, covering an area of 1100 sq.km (Manorama Thampatti, 1999). Though the region is dependent on paddy, the livelihoods of people are supported by coconut, inland fisheries and livestock. This paper deals with the trend in the area, production, productivity of paddy and analyses the importance of Kuttanad region in the changing scenario.

II. OBJECTIVES

The objective of the study is to analyse the trends in area, production and productivity of paddy cultivation in India, Kerala and the Kuttanad region.

III. METHODOLOGY

The present analysis is made on the basis of time series data of India, Kerala and three districts of Kuttanad from 2009-10 onwards. Data compiled in tables and analysed with the help of trend line and bar diagram. Relevant data is obtained from the Directorate of Economics and Statistics, Kerala Economic Review and Economic Survey of various years.

IV. REVIEW OF LITERATURE

P M Thomas (2002) recorded that the area under cultivation and paddy production had been declining in the state at alarming rates since the mid-70s. During the year 1960-61, paddy growing areas in Kerala amounted to 33.16 percent of its total cropped area (TCA). It decreased to 18.38 percent in 1990-91 and decreased further to 12.10 percent in 1998-99.

The changes in the growth trend of rice in Kerala over time and through seasons were studied by Job and Nandamohan (2004), between 1975-76 and 1998-99, and for autumn, winter and summer. Data on area, production and productivity were compiled using time series. The results of the study showed that the area under rice and production showed significant negative trends and positive productivity trends.

Looking at the long-term pattern of paddy cultivation in Kerala, the reasons for the long-term decline in paddy cultivation are explained by Jayan Thomas (2011). Although Kerala only produces less than 15% of the requirements, the relatively efficient system of public distribution has ensured that food grains are available to the citizens of Kerala at reasonable rates. In addition, paddy cultivation in many regions is carried out in a way that enriches the unique geographical and ecological features of these regions. It also found that the area and output of paddy cultivation in Kerala increased by 5,000 hectares and 69,300 tons, respectively, between 2007-08 and 2009-10. The study found that the share of paddy crops in Kerala's gross cultivated area has continuously decreased to 32.1 percent (1965-66), 25.5 percent (1985-86), 16.4 percent (1995-96) and 12.01 percent (1995-96) (2003-04).

The Compound Growth Rates for area, production and productivity are estimated by N Karunakaran (2014) for the period from 1960-61 to 2009-10. The study finds that, due to price and non-price factors such as agro-climatic conditions, labour supply, irrigation facilities, soil fertility, cultivation costs, price levels, profitability, mechanisation, etc the diversification of crops in terms of variation in acreage allocation took place. Furthermore the study warns of the paddy supply demand deficit in Kerala in the years to come.

H. Athira and N. Kishore Kumar (2017) analyses the shifting pattern in the cultivation of rice and provides the variables leading to Kerala's change in rice cultivation. The research describes the variables as factors that are technical, economic, social/ecological and political. The key reasons are the seasonal scarcity of agricultural labour, insufficient irrigation facilities and wild animal attacks.

Abraham (2019) made a district wise study of paddy cultivation in Kerala and pointed out the lack of an effective land use policy that resulted in food insecurity and the rapid disappearance in Kerala of agriculture and related activities. The study analyses the change in paddy production by the area effect, yield effect and the effect of interaction.

In this report, the analysis is mainly limited to literature on the field, production and productivity of paddy in India, Kerala and three Kuttanad districts. The studies examined are organised in chronological order so that we can trace the historical development of the methods used, the progress in the process of data coverage and estimation and the contribution to the stock of knowledge of each piece of study. The earlier studies focused primarily on trends in paddy cultivation at the state level and only a few studies attempted to study the variations in area, production and productivity of paddy in Kerala at the district level especially focussing Kuttanad region.

V. AREA, PRODUCTION AND PRODUCTIVITY OF PADDY CULTIVATION: TREND IN INDIA AND KERALA

Agriculture and allied activities in a rural economy like India plays a fundamental role to achieve food security, poverty alleviation, livelihood security and overall sustainable development. India is predominantly a rural economy with two third population and 72.4 percent workforce residing in rural areas, constitutes 46 per cent of national income (Census India 2011). However the growth of the non-agricultural sector in rural India has not brought significant employment gains or reduction in disparity in worker productivity. As high as 70 percent of rural households of India still depend on agriculture for their livelihood with 82% of farmers being small and marginal (Source: FAO, India at a glance).

V.1. AREA, PRODUCTION AND PRODUCTIVITY OF PADDY CULTIVATION: INDIA

The area, production and productivity of paddy cultivation from 2009-10 to 2018-19 shows an increasing trend over the years. In terms of area, the paddy occupies an area of 41.92 Million Hectares of land in 2009-10, which has increased to 43.79 Million hectares by 2018-19. The production of paddy in Indian economy shows that it was 89.09 Million Tonnes in 2009-10 which has become 106.65 Million Tonnes by 2013-14 and further increased to 116.42 Million Tonnes by 2018-19. Though a mild decline reported during the middle of the decade, paddy production reflects an increasing trend in India over the years. The periods 2010-11 and 2011-12 show a sudden increase in production and productivity of paddy in India, which then shows a downward trend in the subsequent years and the recovery started from 2016-17 periods onwards.

Table 1: All India Area, Production and Productivity of Paddy over the years from 2009-10 to 2018-19

Year	Area (Million Hectares)	Area Growth	Production (Million Tonnes)	Production Growth	Productivity/Yield (Quintal/Hectare)	Productivity Growth
2009-10	41.92	-7.94	89.09	-10.17	21.25	-2.43
2010-11	42.86	2.24	95.98	7.73	22.39	5.36
2011-12	44.01	2.68	105.30	9.71	23.93	6.88
2012-13	42.75	-2.86	105.23	-0.07	24.61	2.84
2013-14	44.14	3.25	106.65	1.35	24.16	-1.83
2014-15	44.11	-0.07	105.48	-1.10	23.91	-1.03
2015-16	43.50	-1.38	104.41	-1.01	24.00	0.38
2016-17	43.99	1.13	109.70	5.07	24.94	3.92
2017-18	43.77	-0.50	112.76	2.79	25.76	3.29
2018-19	43.79	0.05	116.42	3.25	26.59	3.22

Source: Directorate of Economics and Statistics, Government of India

The above table-1 shows the annual growth trends of area, production and productivity of paddy cultivation in India over the last 10 years from 2009-10 to 2018-19 periods. The overall trend in growth rate with respect to area, Production and Productivity shows an upward movement over the years (Fig-1).

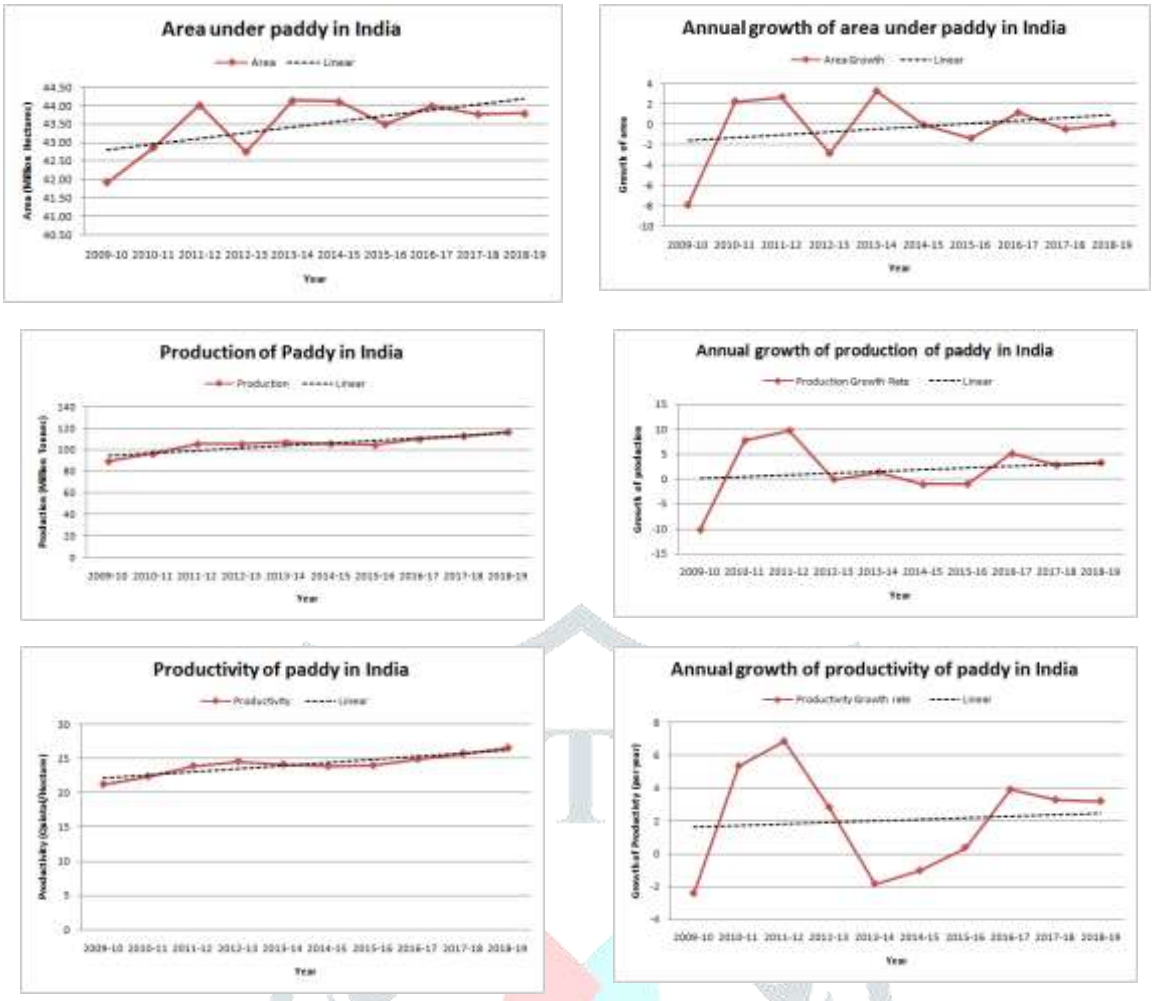


Fig.1: Area, Production and Productivity of Paddy in India

The growth in area, production and productivity during the 2009-10 over 2008-09 is -7.94, -10.17 and -2.43 respectively. This growth trend becomes 0.05, 3.25 and 3.22 in terms of area, production and productivity by 2018-19 periods over 2017-18 periods. The growth trend in production and productivity during the 2011-12 periods over 2010-11is at it's highest rate of 9.71% and 6.88% respectively. A negative growth trend in the area of paddy was seen during five periods, that is, in 2009-10, 2012-13, 2014-15, 2015-16 and 2017-18. Similarly, the growth in the production of paddy also exhibits a negative trend during the years 2009-10, 2012-13, 2014-15 and 2015-16. Productivity of paddy was negative during 2009-10, 2013-14 and 2014-15. Currently, in the last year 2018-19, the area, production and productivity growth trend seems to be negligible as 0.05, 3.25 and 3.22 compared to the previous year 2017-18 which exhibits a growth trend of -0.50, 2.79 and 3.29 respectively in the area, production and productivity of paddy.

V.2. Area, Production and Productivity of Paddy Cultivation: KERALA

Kerala state which had a low base in food production is facing serious challenges in retaining its meagre area under cultivation. Kerala agriculture economy is undergoing structural transformation from the mid seventies by switching over a large proportion of its traditional crop area which was devoted to subsistence crops like rice and tapioca to more remunerative crops like banana and plantations. (Source: State Planning Board, GoK).

The paddy output in terms of area has decreased even after enacting The Kerala Paddy land and wetland conservation act 2008 as well as enhancing the procurement price. The paddy procurement has extended to all districts from 2012. After a long period of continuous decline, the area under paddy increased from171398 ha in 2016-17 to 198026 ha in 2018-19 (Source: State Planning Board, GoK).

A detailed analysis about the area, production and productivity of paddy in Kerala is significant. Following table explains the area, production and productivity of paddy crops in Kerala over the last ten years.

Table 2: Area, Production and Productivity of Paddy Cultivation in Kerala (From 2019-10 to 2018-19)

Year	Area (in '000ha)	Area Growth	Production (in'000 Tonnes)	Production Growth	Productivity (in kg. /ha)	Productivity Growth
2009-10	234.013	-0.11	598.337	1.37	2557	1.47
2010-11	213.187	-8.90	522.738	-12.63	2452	-4.11
2011-12	208.160	-2.36	568.993	8.85	2733	11.46
2012-13	197.277	-5.23	508.299	-10.68	2577	-5.71

2013-14	199.611	1.18	564.325	11.02	2827	9.70
2014-15	198.159	-0.73	562.092	-0.40	2837	0.35
2015-16	196.870	-0.65	549.275	-2.28	2790	-1.66
2016-17	171.398	-12.94	436.483	-20.53	2547	-8.71
2017-18	189.086	10.32	521.310	19.43	2757	8.24
2018-19	198.026	4.73	578.256	10.92	2920	5.91

Source: Compiled from Economic Review of various years, Government of Kerala

Table-2 and figures-2 show the area used for paddy crop in Kerala was 234013 hectares in 2009-10 which declined to 198026 hectares in 2018-19. -12.94 fall in the annual growth in the area of paddy cultivation reported during 2016-17 over 2015-16, which is the largest since 2009-10. The next two years 2017-18 and 2018-19 witnessed a positive annual growth rate in the area of paddy, 10.32 and 4.73 respectively. Though the absolute value shows a decline, the average decadal growth trend slightly rises over the last 10 years.

Fig.2: Trend in Area, Production and Productivity of Paddy in Kerala

The production level of paddy crops in Kerala shows a declining trend over the years from 2009-10 to 2018-19, ie, from 598337 MT to 578256 MT. Fall in the annual growth in the production of paddy was reported during 2010-11, 2012-13, 2014-15, 2015-16 and 2016-17 as -12.63, -10.68, -0.40, -2.28 and -20.53 respectively. Though the year 2016-17 marked the highest fall in the annual growth of production of paddy the next two years, 2017-18 and 2018-19, made significant improvement in the annual growth of paddy production as 19.43 and 10.92 respectively.

The productivity of paddy in Kerala shows an improvement in the productivity rate over the last ten years from 2557 kg./ha in 2009-10 to 2920 kg./ha in 2018-19. Productivity has been showing more or less a positive growth trend during the alternative years since 2009-10. A remarkable annual growth in productivity reported during the last two years, 2017-18 and 2018-19 as 8.24 and 5.91 respectively.

The productivity of paddy cultivation in Kerala (2920 kg/hectare) is greater than Indian average (2659 kg/hectare) in 2018-19. It is still relatively low when compared with Punjab (5728 kg/hectare), Telangana (3138 kg/hectare), Andhra Pradesh

(3022 kg/hectare), and Tamil Nadu (3191kg/hectare) in 2014-15. A comparison with other countries shows that, according to the Food and Agriculture Organization paddy yield in China was 6556 kg/hectare and in Indonesia, 4895 kg/hectare) (FAO, 2010). Clearly, therefore, there is much scope for improvement of productivity levels in paddy cultivation in Kerala and in the rest of India. (Jayan Jose Thomas).

V. 3. AREA, PRODUCTION AND PRODUCTIVITY OF PADDY CULTIVATION: THREE DISTRICTS COVERING KUTTANAD REGION IN KERALA

In its physical aspects as well as in the conditions that govern the agricultural life of the people, Kuttanad is markedly distinct from the rest of the country (Pillai,1940). Kuttanad Paddy Development Project gives a clear distinction of Kuttanad into Upper Kuttanad, Lower Kuttand and Kayal Lands comprising 31 villages spread over Kottayam, Pathanamthitta and Alappuzha (KLDC, 2000). It is a deltaic region formed by 4 rivers viz, the Manimala, Achancoil, Pamba and Meenichil. The Kuttanad system is a complex mosaic of fragmented agricultural landscapes divided in three structures: wetlands used for paddy activities and fish catching, garden lands used for coconut, tubers and food crops plantation and water areas used as inland fishing and shells. Wetlands are created thanks to the construction of polders with bunds and its dewatering (FAO). A permanent solution to the flood problem in Kuttanad was addressed by Thottappally Spillway commissioned in 1955. The saline water intrusion, a serious issue of paddy cultivation in Kuttanad region after the subsidence of North Eastern monsoon was checked by Thanneermukkom Salt Water Barrage. out of the total land area in Kuttanad region 49.4% are wetlands. These wetlands lie 0.5 to 2 meters below MSL and are protected by ring bunds and reclaimed from backwaters. They remain waterlogged throughout the year and are used for cultivating paddy. (Santhosh T Varghese, 2002).

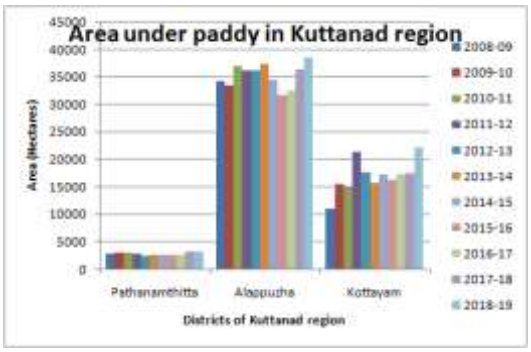
Paddy cultivation in Kuttanad is not possible during June, July and August due to incessant monsoon. It is also not possible from February to May during which brine invasion assumes alarming proportions. Thus Kuttanad is shaped as a single punja crop region.

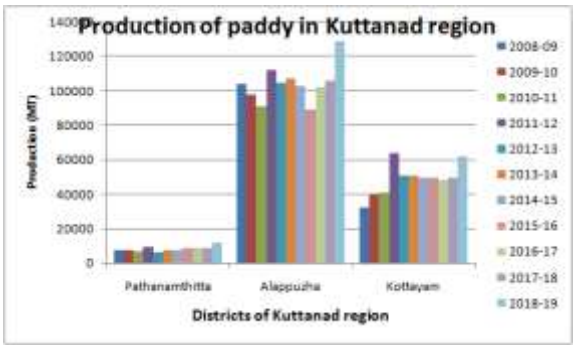
Table 3: Area, Production and productivity of Paddy in three districts covering Kuttanad Region in Kerala

Year	Area (Hectares)			Production (Tonnes)			Productivity (Kg/ha)		
	Pathanamthitta	Alappuzha	Kottayam	Pathanamthitta	Alappuzha	Kottayam	Pathanamthitta	Alappuzha	Kottayam
2008-09	2681	34143	10951	7399	104250	32154	2760	3053	2936
2009-10	2996	33440	15474	7738	97976	39413	2583	2930	2547
2010-11	2986	37060	14775	6627	91325	40969	2219	2464	2773
2011-12	2802	36251	21410	8989	111980	63579	3208	3089	2970
2012-13	2280	36195	17571	6041	104593	51019	2650	2890	2904
2013-14	2468	37402	15746	7554	106866	50729	3061	2857	3222
2014-15	2592	34415	17295	7573	103095	49393	2922	2996	2856
2015-16	2534	31724	16272	8396	89335	49506	3313	2816	3042
2016-17	2640	32453	17216	8837	102439	48030	3347	3157	2790
2017-18	3087	36325	17426	8843	105676	49509	2865	2909	2841
2018-19	3168.77	38623.02	22172.05	11675.81	128560.20	61917.15	3685	3329	2793

Source: Compiled from various Economic reviews, govt. of Kerala

The table-3 indicates that the area under paddy in the three districts of Kuttanad namely Pathanamthitta, Alappuzha and Kottayam during the year 2009-10 is 2996 ha, 33440 ha and 15474 ha respectively. In the year 2018-19, the three districts of Kuttanad region marked the highest level of area under paddy farming as 3168.77 ha, 38623.02 ha and 22172.05ha respectively. Pathanamthitta, Alappuzha and Kottayam account for 32.30 percent of the total area under paddy cultivation in Kerala, their individual shares being 1.60 percent, 19 percent and 11.20 percent respectively in 2018-19.





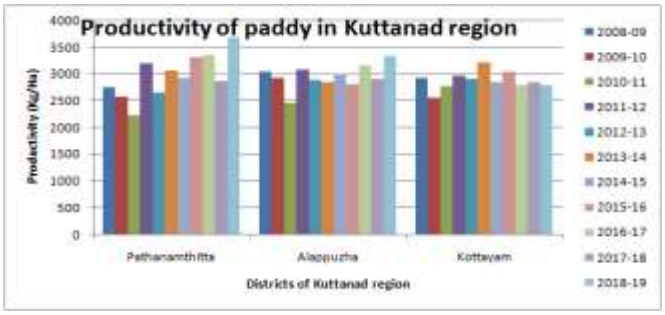


Fig.3: Area, Production and productivity of Paddy in three districts covering Kuttanad region in Kerala

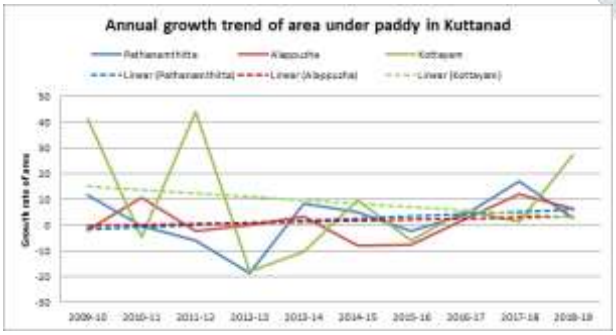
A record level of paddy production was attained in the year 2018-19 in the Kuttanad region as 11675.81Tonnes, 128560.20Tonnes and 61917.15Tonnes respectively. Pathanamthitta, Alappuzha and Kottayam together account for about 34.96 percent of the total production of paddy in the state, their individual shares being 2.02 percent, 22.23 percent, and 10.71 percent respectively. As usual Palakkad district occupies the first position in the production of rice 37.23 percent and lowest in Idukki district 0.27 percent in the year 2018-19.

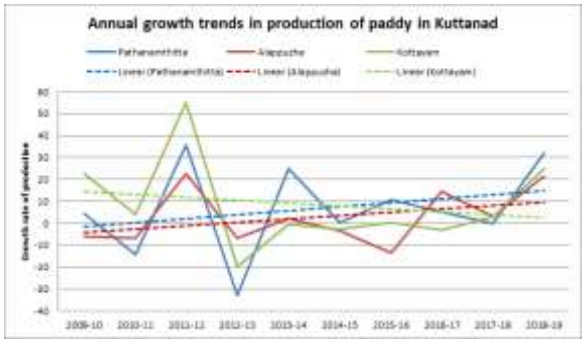
Productivity of paddy in the three districts of Kuttanad region during 2018-19 is 3685 Kg/ha, 3329 Kg/ha and 2793 Kg/ha respectively. It is an improvement over the productivity reported in Kuttanad region except in Kottayam district compared with the previous year 2017-18.

Table 4: Annual Growth Trends in Area, Production and Productivity of Paddy in the Three Districts Covering Kuttanad Region in Kerala

Year	Area			Production			Productivity		
	Pathana mthitta	Alapp uzha	Kottay am	Pathana mthitta	Alapp uzha	Kottay am	Pathana mthitta	Alap puzha	Kotta yam
2009-10	11.75	-2.06	41.30	4.58	-6.02	22.58	-6.41	-4.03	-13.25
2010-11	-0.33	10.83	-4.52	-14.36	-6.79	3.95	-14.09	-15.90	8.87
2011-12	-6.16	-2.18	44.01	35.64	22.62	55.19	44.57	25.37	7.10
2012-13	-18.63	-0.15	-17.93	-32.80	-6.60	-19.75	-17.39	-6.44	-2.22
2013-14	8.25	3.33	-10.39	25.05	2.17	-0.57	15.51	-1.14	10.95
2014-15	5.02	-7.99	9.84	0.25	-3.53	-2.63	-4.54	4.87	-11.36
2015-16	-2.24	-7.82	-5.92	10.87	-13.35	0.23	13.38	-6.01	6.51
2016-17	4.18	2.30	5.80	5.25	14.67	-2.98	1.03	12.11	-8.28
2017-18	16.93	11.93	1.22	0.07	3.16	3.08	-14.40	-7.86	1.83
2018-19	2.65	6.33	27.24	32.03	21.66	25.06	28.62	14.44	-1.69

Source: Estimated (Table.3)





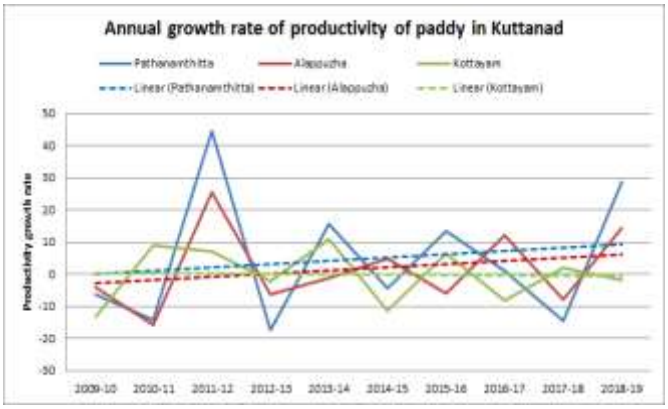


Fig.4: Annual Growth in Area, Production and Productivity of Paddy in the Three Districts Covering Kuttanad Region in Kerala

In 2009-10 Kottayam recorded 41.30 percent annual growth in the area of production. Though other two districts recorded a negative growth in area, 44.01 percent growth was reported by Kottayam in 2011-12 which was the highest. In 2012-13, all the three districts reported decline in area under paddy and Pathanamthitta marked the highest decline i.e., -18.63 percent followed by Kottayam (-17.93). In 2015-16 marked a negative growth in area in all the three districts i.e., Pathanamthitta, Alappuzha and Kottayam as -2.24, -7.82 and -5.92 respectively. During the period 2016-17, 2017-18 and 2018-19 all the three Pathanamthitta, Alappuzha and Kottayam districts of Kuttanad reported a positive growth in the area of paddy.

The above table-4 reveals a positive growth in production among the three districts during 2017-18 and 2018-19. During 2011-12 Kottayam reported the highest growth in production (55.19) followed by Pathanamthitta (35.64) and Alappuzha (22.62). A high growth in production was reported by Pathanamthitta (32.03) followed by Kottayam (25.06) and Alappuzha (21.66) in 2018-19. During the year 2012-13 all the three districts experienced a negative growth in the production of paddy. Pathanamthitta (-32.80) recorded the highest fall in annual growth in production followed by Kottayam (-19.75) and Alappuzha (-6.60).

The above figure-4 depicts a fluctuation in the productivity of paddy in all the three districts of Kuttanad. Pathanamthitta made a significant annual growth in the productivity of paddy, 44.57 percent in 2011-12 and 28.62 percent in 2018-19. Alappuzha's highest annual growth reported is 25.37percent in 2011-12 and 10.95 percent by Kottayam in 2013-14. The highest negative growth was also reported by Pathanamthitta -17.39 percent in 2012-13 followed by Alappuzha -15.90 percent in 2010-11. Kottayam's highest negative growth reported as -13.25 percent in 2009-10. A remarkable fact revealed by the above table is during 2012-13 all the three districts experienced a negative growth in Area, Production and Productivity of paddy.

VI. CONCLUSION

Paddy cultivation in Kerala is primarily for domestic use, apart from commercial cultivation. From the point of view of the state, paddy cultivation is very important with its major contribution to food security and livelihoods. This extremely important role in the economic development of paddy cultivation makes it vital to analyse trends in its location, output and productivity in India and Kerala. This study is also important to understand the role and significance of the paddy sector in any economy and also in the life of a large number of individuals who have depended solely on this sector for their livelihood and sustenance. Over the past few years, the policy initiatives of the central, state and local governments have helped to revive Kerala's paddy cultivation.

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