

IMPACT OF FLOOD ON RICE YIELD IN KUTTANAD, KERALA

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Abstract

This paper seeks to examine the impact of the flood on the yield of paddy in Kuttanad, Kerala by repeatedly assessing the yield in pre and post-2019 floods. A paired t-test was used to compare the difference in mean yield of 30 padashekarams pre and post-flood. The mean pre-flood yield was 6.47 tonnes per hectare against 7 in the post-flood season, a difference of 0.6 tonnes per hectare which were statistically significant. The surprisingly higher yield of paddy post-flood is inter alia attributed to a large deposit of fertile silt in the fields and the consequent enlargement in fertility.

Keywords : *Flood, rice yield, paddy cultivation*

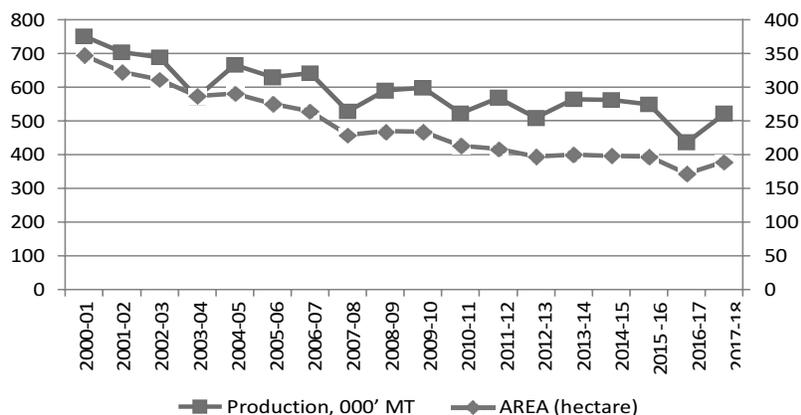
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Introduction

Rice being the staple food in the state, paddy is a major food crop of Kerala accounting for 7.46% of the total cropped area. Palakkad and Alappuzha are the major districts where rice cultivation is present. Alappuzha, the smallest district in Kerala is well endowed with backwaters and is a major tourist destination in India. It is named the 'Venice of the East'. Kuttanad in Alappuzha is noted for below-sea-level biosaline paddy cultivation and is designated as Globally Important Agricultural Heritage System by Food and Agriculture Organization.³ Kuttanad is called the rice bowl of Kerala. There are two cultivational seasons in Kuttanad for rice namely, Virippu and Puncha. Virippu is cropped during April-May to Sept-Oct while Puncha during Oct-Nov to Feb-March. An examination of the trend (Kerala Economic Review 2019) shows that there was a steady decline in paddy cultivation in Kerala. This has got economic, ecological, and social implications for the region (Thomas 2011).

The state witnessed a decline in food production as part of the structural changes undergone by the economy. Paddy production registered a decline of 2 lakh tonnes in the last two decades. This along with a shift in cropping pattern in favour of cash crops has posed a serious threat to the food security of the state (Maneesh & Deepa 2016). Kerala is now heavily dependent on other states for its food requirements. Low farm income and prices, higher wage rates, labour shortage and disinterest of youth in farm operation are some of the reasons for the shrinking paddy production (Cheeran & Saji 2015). The state also witnessed a vast conversion of wetlands for construction (Abraham 2010). The decline in paddy cultivation has also lead to serious issues of climatic changes and ecological sustainability.

Fig 1: Paddy Production and Area of cultivation in Kerala 2000-01 to 2017-18



Source: Kerala Economic Review, Various Issues

Sampling of water analysis was done with special care, ensuring that there was no external contamination of water samples. For analysis, Sterilized plastic bottles were used which were sterilised by boiling for 15 minutes and rinsed with distilled water. Effectiveness of sterilization was checked with each run by using sterilization strips inside sampling bottles. During sample collection, some air space was left in the bottle to mix probably before examination.

Kuttanad, being below the sea level, usually floods during the monsoon submerging half-grown paddy in the fields. Kerala witnessed two consecutive floods in 2018 and 2019. The flood of July-Aug 2018 is considered the severest flood in the state in nearly a century taking 683 human lives and causing property damage worth Rs.400 bn. The flood in Aug 2019 in the state happened as a result of the heavy monsoon rain triggered by a depression formed in the North-West Bay of Bengal. 470 people died and property damage worth Rs.40 bn was estimated. Kuttanad was the worst hit in both the floods. In this setting, we seek to examine the impact of the flood on the yield of paddy in Kuttanad.

Data

The Secondary sources of data were collected from the Kerala state department of agriculture, Supplyco, and Kerala Economic review. Primary data was collected using a survey schedule from stakeholders of 30 padasekharams⁴ randomly selected from Champakkulam, Edathua, Muttar, Pulinkunnu, Ramankary, and Veliyanad Panchayaths of Kuttanad taluk⁵ in Alappuzha.

Profile of the farmers

87.5 percent of the respondents were male. The mean age of the respondents was 51. The respondents had a mean farming experience of 21 years. 43% of the respondents were educated upto the secondary level. 83% of them were educated upto the higher secondary level only. 52.5% of the respondents were Christian while 35.0 were Hindus and the remaining subscribed to Islam. 45% belonged to BPL households. 50% of the farmers cultivated on their land while 35% leased while 15% cultivated on both.

Nature of farm activities

The majority of the farmers had small landholdings with 52% reported having a land size of fewer than 3 acres. The small and marginal individual holdings were summated together and cultivated on a cooperative basis under the headship of padashekhara samithis⁶. All the respondents engaged in Puncha, the second crop while a third of them engaged in Virippu, the first crop. 80% used hybrid seeds, 10% used traditional seeds and the remaining tried both. The farmers used both chemical and organic fertilisers. The respondents had multiple sources of irrigation. 80.0%

relied on rivers, 53% relied on canals while 3% on ponds. The mean fallow period was 4.6 months. The main source of income in households came from farming activities for 41.8% of the respondents. Apart from farm activities, the respondents reported having diversified their livelihood from casual labor and private enterprises. 45% had farm activities other than rice. This included Livestock, duck, fish, etc. The vast majority of the farmers depended on their own source of funds while 32% of the respondents depended upon money lenders for meeting their expenses. 16% had loans from banks while 8% were indebted to other sources. The funds were mostly utilised for land operation and land improvements. All of the farmers enumerated relied on mechanised harvesting techniques.

The produce was procured by Supplyco, the civil supplies corporation of the state. The respondents shared the opinion that institutional support is vital in keeping the farming remunerative and in the management of the agro-ecological system.

Results

Puncha cultivation post-flood rose from 23,000 ha to 30,500 ha cultivated by 32,000 farmers which added to economies of scale. The flood-induced reduction in magnesium and boron was remedied. Better seed varieties Uma (29,500ha) and

$$\text{Yield} = \frac{\text{Production in Tonnes}}{\text{Hectare}}$$

A paired t-test was used to compare the difference in mean yield of thirty padashekarams pre and post 2019 floods. As shown in Table 1, The mean pre-flood yield was 6.47 tonnes per hectare against 7 in the post-flood season, a difference of 0.6 tonnes per hectare which was statistically significant ($t(29) = -5.648$, $p < 0.01$) as reported in Table 2.

	Mean	N	Std. Deviation	Std. Error Mean
Pre-flood	6.4687	30	.34773	.06349
Post-flood	7.0500	30	.42487	.07757

Source: Survey Data

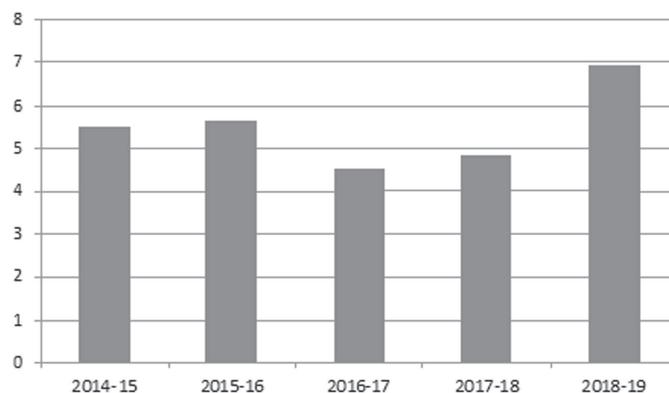
Paired Differences	Mean	Std. Deviation	Std. Error Mean
	-5.6333	.56574	.10329
95% Confidence Interval of the Difference			
	Lower	-7.9458	
	Upper	-3.7208	
t		-5.648	
df		29	
Sig. (2-tailed)		.000	

Source: Survey Data

Supplyco procured a record breaking 6.94 lakh ton paddy in the post flood harvest in Kerala, an excess of 2.1 lakh ton over the previous year. As depicted in Fig 2, the

procurement crossed the 6 lakh ton mark in 2018-19 and broke the previous peak of 2015-16. 1.94 lakh tons were procured from Alappuzha, an excess of 48,000 tons from the district in comparison to the previous year.

Fig 2: Paddy Procured in Kerala (tonnes)



Source: Supplyco (2019)

The surprisingly higher yield of paddy post-flood is attributed (Ameerudheen 2019) to a large deposit of fertile silt to the amount of 3-20cm in the fields and the consequent enlargement in the fertility. Moreover, with the pancha crop calendar, the harvest was completed before the influx of saline water in the fields. The back-to-back flood in the area and bund breach was suggested to lessen soil acidity and the organic sedimentation has augmented the calcium levels. The decayed crops served to be organic manure which was accompanied by lower pest attacks and diseases. Further, the flood-induced break in the farm process lowered the nutrient depletion in the soil. This was evident from the fact that farmers in lower Kuttanad saw a larger yield in comparison to their counterparts in upper Kuttanad.

Summing Up

The climatic events and the consequent ecological changes in Kuttanad have resulted in supply shocks in paddy cultivation in the area. On the one hand, there is a drastic fall in the area and production of paddy leaving serious concerns for the issue of food security. On the other hand, ecological changes have increased the volatility of the yield. Loss of crop in a season was followed by a bumper crop which was succeeded by an extended fallow period. Such an extremity in weather events has

challenged the very sustainability of farming practices in Kuttanad. The impact of recurrent floods is to be palliated through deepening and

protection of side bunds and better management of Thotappally spillway operation. State-initiated programmes to revive paddy cultivation and recover wetlands and water bodies aimed at ecological restoration and flood control are to be devised in collaboration with the local bodies and social organisations to bring in resilience in post-flood Kuttanad.

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