



ECONOMICS OF PINEAPPLE CULTIVATION UNDER CLIMATE VARIABILITY IN KERALA, INDIA

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Abstract

Pineapple is a plant which can survive in most of the climatic conditions except severe frost and drought. But the quality of the fruit is affected by temperature variations which leads to price fluctuation and market failure situation. The objectives of the study are to analyse different climatic conditions like rainfall and temperature variations on pineapple cultivation in Kerala. Secondary data for the last few years has collected from various sources to evaluate the relation between these two. It was found that changes in climate condition has significant impact on pineapple cultivation, price fluctuation and diseases during flowering stage. The optimal growth of pineapple requires temperature variation from 15°C to 32°C. The fruit should be protected from direct sunlight if temperature is too high. Water should be drained during heavy rainy season to avoid waterlogging. Only 5% of the plant went under water during severe flood in Kerala but 50% of the same affected by various diseases after flood which lead to a situation of degradation of the fruit.

Keywords: Flood, Mulching, Rainfall variation, Temperature condition, Vazhakkulam Pineapple

Introduction

The origin of pineapple is in Brazil and it spread to other parts of the world gradually. Demand for Pineapple shows an increasing trend year after year. Major percent of it still consumed as fresh fruit (around 50%). There are some value-added products of pineapple like Pineapple Jam, Juice, Candy, Jellies, Preserves and vinegar. Trade of Fresh pineapple all over the world got doubled during last one decade. Costa Rica, Philippines, Brazil, Thailand, Indonesia, India, Nigeria, China, Mexico and Colombia are the first ten producers of pineapple in the world. The leading exporters of Pineapple are Costa Rica, Netherland, Philippines, Belgium and United States. Whereas leading importers are United States, Netherland, China, Germany, and Spain. The most demanded varieties of Pineapple in the international market are the MD2, Smooth Cayenne and Queen. MD2 variety is developed by Costa Rica.

Portuguese people introduced pineapple in India in the year 1548 AD. In the world, India is in the sixth position for its pineapple cultivation, but its share in the global market is just 8%. India produces 1341000 t. pineapple per year and it uses 84000 hectares of its main land area for cultivation. Nepal, Maldives, UAE and Saudi Arabia are the main pineapple exporting destinations of India. In India we cultivate two main varieties of pineapple called 'Kew' and 'Mauritius'. In north-eastern states they specialise in Kew variety where as in southern parts of the country people concentrate in the cultivation of Mauritius variety of pineapple. Queen variety is the best which can be used for preparing pineapple Juices, concentrates, squashes and pulps. The main pineapple producing states in India are Assam, West Bengal, Karnataka, Meghalaya and Kerala. Largest area of pineapple production is in the states of Assam and per hector productivity is high in West Bengal. Around 40 years back commercial cultivation of pineapple began in India. Warm and humid climate is preferable for pineapple cultivation. So, India is a better place to start pineapple cultivation. It can be cultivated in heavy rainfall areas too. If

its too hot cultivators have to irrigate the plant in between. It can be grown as an intercrop also.

In Kerala contribution of agriculture and allied sectors to Gross State Domestic Product was 30% in 1990-91 but it decreased up to 10.38% in 2014-15. Mauritius variety of pineapple is grown in Kerala. It has been showing increasing demand world-wide because of its flavour, sweetness and quality. April – May and August – September are the main seasons for pineapple cultivation in Kerala. It is cultivated as a pure crop and inter-crop along with coconut and rubber plantations. It cannot be cultivated in high temperature and frost conditions. Lower elevation area and plains are suitable for pineapple cultivation. Little bit acidic and well-drained soil is preferable and at the same time it can be sandy or alluvial in nature. Neither totally shaded area nor bright sunshine is good for cultivation. Pineapple growth will be stimulated with heavy rainfall. The field will be well prepared before planting. If rainfall is average then the cultivator should irrigate the plant in the predefined intervals as the situation demands.

Vazhakkulam, a place near Moovattupuzha in Ernakulam district is famous for pineapple cultivation in Kerala and all over the world. It is the biggest pineapple market in India. In September 4, 2009 it got registered in the GI Registry, Chennai, (GI. No. 130) under agriculture and horticulture product. Pineapple is locally known as 'Kannara'. Yield is expected around 12 months here. It is unique in its taste because of its low acidic and high sugar content and that is the reason behind the world wide demand for vazhakkulam pineapple. Pleasant smell, crispy flesh, golden yellow colour and slightly narrowed shape make its different from other pineapple varieties. This paper briefly explains the effect of climatic variation on pineapple cultivation in Kerala.

There are only a few studies comparing climate change to pineapple cultivation. Williams *et al.* (2017) made a comparative analysis of climate and changes in pineapple cultivation in Ghana. He found that variables like temperature and rainfall had different impact on pineapple

cultivation. Effect of rainfall will be having varying impact during planting and growth stages. Rainfall and pineapple yield didn't produce higher correlational features in his study. There is a risk factor in the variability of rainfall pattern connected to pineapple cultivation in Ghana and the growth of the crop depends on the availability of moisture content in environment.

Conceptual Framework

Objectives of the Study

- To know how climatic conditions, affect pineapple production.
- To analyse the climatic factors affecting pineapple cultivation in Kerala.
- To evaluate the impact of rainfall and temperature variations on pineapple cultivation in Kerala.

Materials and Methods

Pineapple cultivation in Kerala is mainly concentrated at Vazhakkulam area in Ernakulam district, which is famous all over the world in the name Vazhakkulam pineapple. Secondary data is used to analyse the climatic change on pineapple production.

Results

The climatic condition which is preferable for pineapple cultivation is warm and humid climate. The optimal growth of pineapple requires temperature variation from 15°C to 32°C. Very high temperature is totally unfavourable. It is mostly grown in the lower elevation areas of the country. It can even survive in drought because of its capacity to store water in its cells. But at the same time water logging can't be tolerated by pineapple plants. If there are chances of water logging, adequate drainage should be ensured to preserve the optimum pH range of soil. Direct exposure to sunlight is not good during flowering season. Cultivators used to cover pineapple fruits with dry leaves to protect it from direct sunlight. This process is called Mulching. The area which is selected for pineapple cultivation should be 1,100 m above the sea level and it should not be in a frosty area. If adequate rainfall is not there the plant should be irrigated in regular intervals, normally in a gap of 20 days.

Production of pineapple in Kerala

The leading ten pineapple producing countries in the world are Costa Rica, Philippines, Brazil, Thailand, Indonesia, India, Nigeria, China, Mexico and Colombia. India produces 1341000 t. pineapple per year and it uses 84000 hectares of its main land area for cultivation. Nepal, Maldives, UAE and Saudi Arabia are the main pineapple exporting destinations of India.

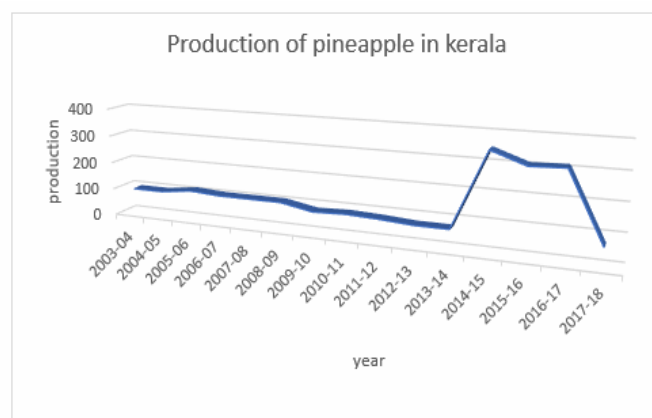
In India it is cultivating in Assam, West Bengal, Kerala, Meghalaya, Manipur, Tripura, Nagaland, Mizoram and Arunachal Pradesh. Vazhakkulam pineapple from Kerala has worldwide demand because of its taste uniqueness. Entire pineapple cultivation is concentrated in the Vazhakkulam area in Ernakulam district. 80% of its production will be trading to other parts of the country and even in the world market. It may be because of its taste difference and worldwide demand vazhakkulam pineapple got Geographical Indication Registration.

Kerala had 7.81% share in the Indian pineapple production in 2003-04, which showed a stagnant trend up to 2013-14 and it accounted a sudden rise in production up to 348.06 thousand tonnes with a share of 17.54% in the Indian domestic market. In 2017-18 production of pineapple declined to just 69.72 thousand tonnes with a mere negligible share of 4.10% in the domestic market.

Table 1 : Production of Pineapple in Kerala

Sl. No.	Year	Production ('000 tonnes)	% Share in Indian Pineapple Production
1	2003-04	95	7.81
2	2004-05	95	7.83
3	2005-06	109.33	8.66
4	2006-07	102.45	7.52
5	2007-08	102.40	8.42
6	2008-09	102.40	7.64
7	2009-10	80.80	5.83
8	2010-11	85.53	6.04
9	2011-12	80.78	5.39
10	2012-13	72.86	4.64
11	2013-14	72.86	4.20
12	2014-15	348.06	17.54
13	2015-16	305.67	15.89
14	2016-17	310.32	16.74
15	2017-18	69.72	4.10

Source : National Horticulture Board, Government of India



Source : National Horticulture Board, Government of India

Fig. 1 : Production of Pineapple in Kerala

Season wise climate condition and pineapple production in Kerala

Once pineapple is planted it produces the fruit in 12 months' time. During Winter season temperature varies between 18°C to 28°C where as average rainfall is 25mm. Pineapple plant will be in its developing state during this period. It should be irrigated frequently if there is no adequate rainfall. Summer is the harvesting season of pineapple normally before the monsoon starts. Pineapple survive in all season but it should be managed properly time to time. During hot period farmers used to cover up the fruits with dry leaves and during rainy season they take measures to avoid water logging.

Table 2 : Season wise Normal Temperature and Rainfall in Kerala

Season Temperature and Rainfall	Winter (November – February)	Summer (February – May)	South West Monsoon (June – September)	North East Monsoon (October – November)
Average Temperature (Maximum)	28°C	36°C	30°C	35°C
Average Temperature (Minimum)	18°C	32°C	19°C	29°C
Average Rainfall	25 mm	135 mm	2250-2500 mm	450-500mm

Source: Economic Review, IMD, Trivandrum, Government of Kerala

Average Monthly Rainfall and Pineapple cultivation in Kerala

Planting process will be completed towards the end of minor rainy season because the plant does not require much rainfall during initial few months. But it should be irrigated if the temperature is too hot, otherwise it may affect the plant size and growth. It will be leading to a hike in the cost of cultivation if there is no adequate rainfall. Sometimes water resources may not be available in the hilly areas.

Average rainfall is just 14.6mm in the month of January in Kerala but it is 687.2mm in July. Even though pineapple survive in all climatic conditions neither drought nor deluge condition is good for pineapple cultivation. April – May is the main season for pineapple cultivation in Kerala. It will be cultivated in August – September also. Flood which occurred in Kerala in 2018, affected the pineapple cultivators. Not much plant went under water but later 50% of its plants affected by severe diseases.

Table 3 : Average Monthly Rainfall in Kerala

Month	Rainfall (mm)
January	14.6
February	16.6
March	36.1
April	110.9
May	252.6
June	653.2
July	687.2
August	404.7
September	252.3
October	270.7
November	158.6
December	45.9

Source : ENVIS centre, Kerala State Council for Science, Technology and Environment

Discussion

Flood in Kerala in the year 2018 affected majority of the agricultural products in the state. In the case of pineapple only 5% of plants went under water, but majority of it affected by different diseases and even it had led to the deformation of the crop. Normally there are different grades of pineapple - A grade, B grade and C grade. Flood seriously affected the quality of pineapple which lead to a severe price fall. According to a scientist in the Pineapple Research Station at Vazhakkulam in Kerala, pineapple plants had affected by severe diseases because of heavy rains and deluge. They anticipated a 20% decline in production due to deformation and weight loss of the product. It had led to a situation of deficient demand condition because of lack of demand from main markets like Karnataka, Gujrat and

Maharashtra. The cultivators had to sell their products at very low price because of this situation.

The huge deluge in Kerala in 2018 made a fall in the supply of pineapple like all other crops which lead to a price hike. Then the Mumbai fruit merchants decided to boycott the Vazhakkulam pineapple by arguing that it is an 'artificial jacking up of prices by pineapple dealers in Kerala'. They also alleged that the dealers are deliberately hoarding their product to make a price hike. But the Pineapple Merchants association at Vazhakkulam denied it. "There is no question of hoarding, but there is a drastic fall in the supply after the Ramzan season," Baby John, President of the association, told Business Line. "The demand for the Vazhakkulam variety has been going up in and outside Kerala and hence the price has also been on the rise." If they can increase the shelf life of pineapple then many of the problems can be managed. The joint effect of extremely hot summer and deluge lead to plant decaying and fungus infections.

Conclusion

This study analyses the impact of climate variability on pineapple cultivation. The summer rain has brought down the prices of Vazhakkulam pineapple, the extra sweet variety now cultivated across Kerala, by about one-fourth. The price for the 'green' (unripe) has tumbled to ₹23 a kg from ₹30 according to the latest news. For the Vazhakkulam farmers loss incurred will be around Rs. 200 crores at a rough estimate. The loss is not just about crop loss- the manure applied has been washed away in the rain water and the plants would take only 20% of the manure applied to it. Research station at Vazhakkulam helps farmers to improve their pineapple cultivation. Recently Kerala government had declared a support price of ₹17 to help farmers from price fluctuation. As agriculture is the base of Indian Economy further government support for the same will be highly appreciable.

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