

Impact of climate change on Agriculture: A case study of Nutmeg Production in central Kerala

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Abstract:

This study refers to the production of Nutmeg in Kerala for last 5 Years and the impact of climate change in the production of it. The production of Nutmeg can give a significant impact on other production areas as this being a raw material for the different purposes. By analyzing the data given by local farmers in central Kerala and secondary data from relevant sources, the paper gives idea about how climate change occurred recently will affect the production of Nutmeg. The Study concluded the effects occurred due to floods, cyclones and continuing uncertainties in climate like Mist in the economy of Kerala especially the farmers and cultivation of Nutmeg.

Keywords: Nutmeg production, climate change, Monsoon and Nutmeg production

I. INTRODUCTION

Spices are non-leafy parts of plants used as a flavoring or seasoning. They are used to add flavor to foods and beverages, and as herbal medicines. Asia is known as the 'Land of Spices' as it is the place of origin, production, consumption and export of most spices. Out of the world's 70 plant species grown as spices, 13 are considered major spices produced in Asia. While considering INDIA, Agriculture is important for the obvious reason of its centrality, given that it accounts for a large share in GDP (gross domestic product) (16%), and an even larger share in employment (49%). Perhaps it is even more important because, as the experience of the last few years illustrates, it has the potential to hold back Indian development: poor agricultural performance can lead to high inflation, rural distress, and political restiveness. South west monsoon is popularly known as "**Real Finance minister of India**" as it affects all spheres of agriculture especially Nutmeg cultivation. Nutmeg is an evergreen tree, which grows to a height of 60 feet. The tree yields two spices - the dark coloured nut and the bright red mace that covers it. The tree originally from Indonesia, Nutmeg trees start flowering in the third year, and are thought to reach their peak yield in 20 years. . Nutmeg cultivation in Kerala is concentrated in the Thrissur, Ernakulam and Kottayam districts. The climatic conditions of Kerala suit nutmeg, and it is grown in homesteads in the State as an intercrop. Planting is usually done at the start of the rainy season. Nutmeg thrives in a tropical climate with humid conditions the year around and a temperature range of 77 to 95 degrees Fahrenheit. The plants grow best in climates with at least 60 inches of annual rainfall. Appropriate drying facilities are required for processing nutmeg. In Kerala, the nuts, are usually dried in the sun, and hence their quality suffers. The problem is complicated by the fact that, the harvest season in the State coincides with the rains, increasing the chance of mould formation. As the agriculture is deeply related to variations in climate, the drastic change in climate may affect the production. The agricultural products especially Spices made a role in Indian Exports to account foreign currency which in turn will affect the overall development of the India. The study refers to the effects of climate change in production of Nutmeg specialized Spices which grows mostly in central Kerala especially Thrissur and Enakulum districts.

2. Research Methodology

The research design used in this study is Descriptive research design. It involves observing and describing the behavior of the subject without influencing it any way. The study takes certain variables in the climate of Kerala to illustrate the factors affecting the production of Nutmeg in Central Kerala. The taken factors are Rainfall and mist. In the study, the monthly rainfall data from 2013-2014 to 2018-2019 is taken in to consideration. The depended variable is production of Nutmeg.

3. Data Analysis

This study is mainly based on secondary data that have been collected from the database maintained by Spices Board of India, Department of Economics and Statistics in Kerala, APEDA(Agricultural and processed food products Exports Development Authority), Indian Meteorological Department, ENVIS Centre:Kerala state of environmental related issue. Kerala has been blessed with humid tropical wet climate where the production of Spices like Pepper, Cardamom, Nutmeg will be high. But due to some uncertainties in climate occurred in last year, the production effects adversely. The data collected from local farmers of Nutmeg in central Kerala substantiate the relationship between the yield of Nutmeg and factors like Rainfall, mist water availability etc. From the data it can be analyzed that the change in the price of the Nutmeg in Kerala market is related lack of demand in global market as the most of our production is exporting to other countries. In adverse climate the quality of the Nutmeg is not up to mark of export quality where the demand of nutmeg from Kerala is low in international market. As a result it will badly affect the economy of India as a whole. The data of climate and individual production of Nutmeg is collected from farmers.

Table:1 The response from Nutmeg farmers in the district of Thrissur and Ernakulam

Year	Mist	Rainfall	Production
2013-2014	Above Average	Good	Above Average
2014-2015	Average	Average	Average
2015-2016	Average	Average	Average
2016-2017	Below Average	Below Average	Below Average

The Table 1 can be evaluated by the secondary source of data:

Table: 2 The production of Nutmeg in Kerala for last 4 Years:

Year	Production of Nutmeg in Tonnes	Production Area(in Hectres)	Production per unit area
2013-2014	13212	6524	0.673
2014-2015	14193	6828	0.688
2015-2016	14902	6796	0.687
2016-2017	13746	6920	0.622

Table: 3 The Production of Nutmeg in Thrissur and Ernakulam Districts:

Year	Production in Tonnes		Production Area(in Hectres)	
	Thrissur	Ernakulam	Thrissur	Ernakulam
2013-2014	4031	4799	6524	6101
2014-2015	3978	5599	6828	6145
2015-2016	4171	5751	6796	6614
2016-2017	4011	4967	6920	6575

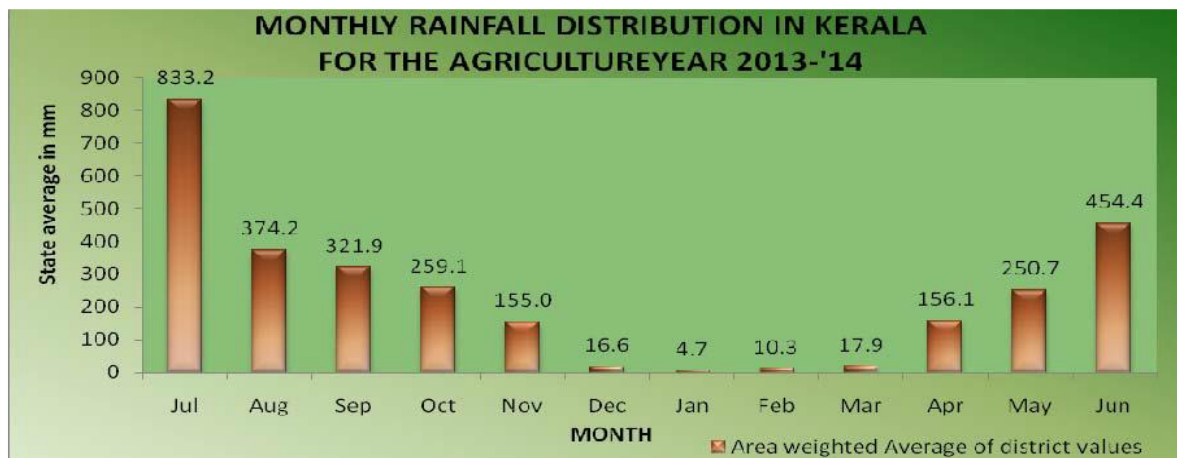


Figure:1 Summary of Rainfall 2013-2014

The Monthly rain distribution in Kerala for the agricultural year 2013-2014 is given above. The rain fall is high on month of July 2013(833.2mm) where as 454.4mm in the month of June 2014.

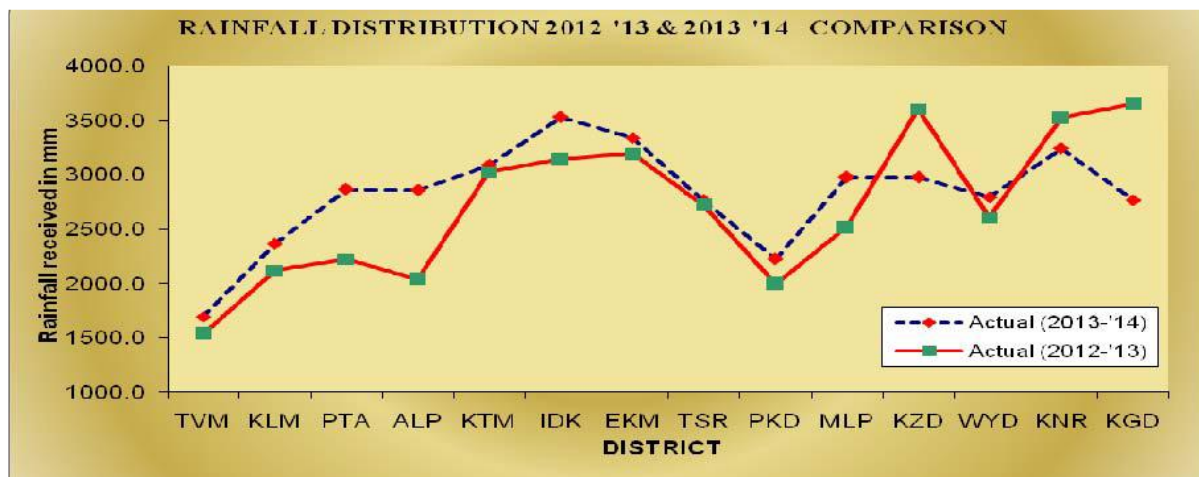


Figure 2: Comparison of rainfall 2012-2013

The Figure 2 shows the comparison of the rainfall distribution in the agricultural year 2012-2013 to that of 2013-2014. The rainfall is high in the year 2013-2014 for central Kerala especially Thrissur and Ernakulum districts.

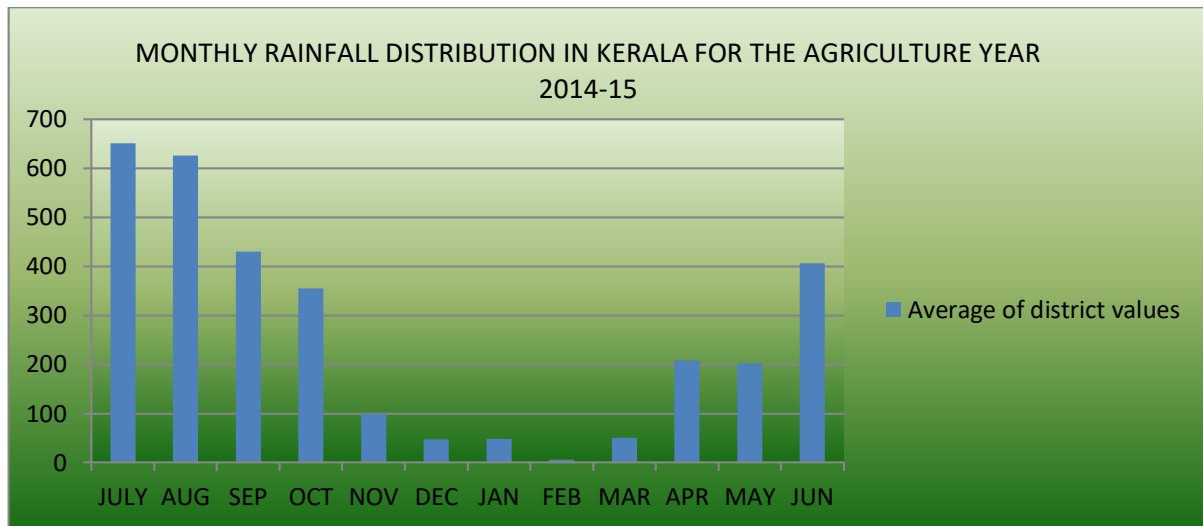


Figure 3: Rainfall 2014-2015

The Figure 3 shows the monthly distribution of rainfall in the agricultural year 2014-2015. The rainfall is high (651.7mm) in the month of July and 626.7mm in the month of August. The rainfall is 430.5mm in the month of September 2014. In June 2015, Kerala received a rainfall of 406.2mm.

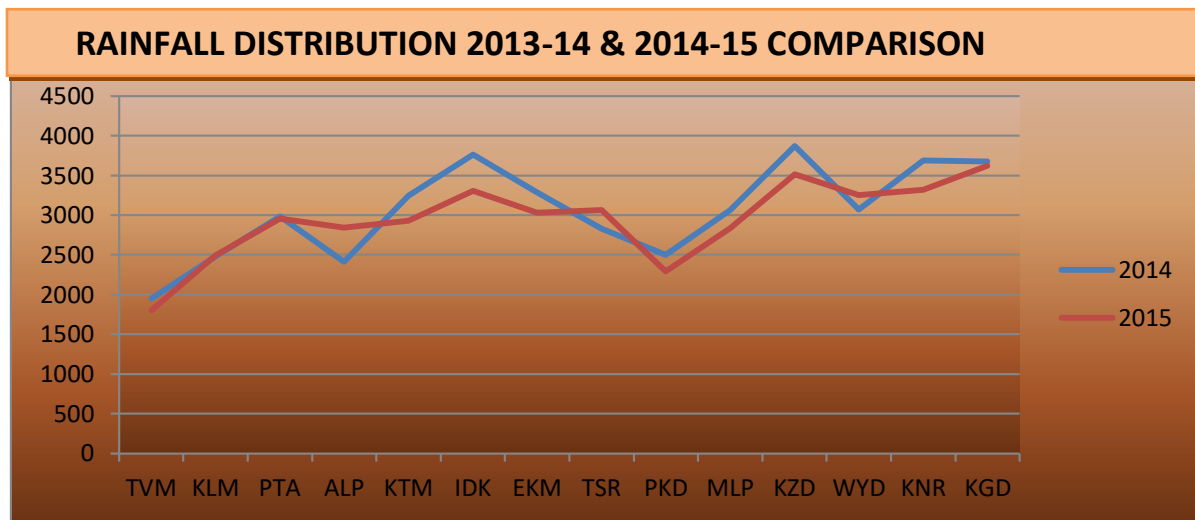


Figure 4: Comparison 2013-14 & 2014-2015

The Figure 4 shows the comparison of rainfall distribution in the districts of Kerala. The rainfall is high during the year 2013-2014 for the Ernakulum and 2014-2015 for the year Thrissur. The average rainfall is high for the year 2013-2014 in all districts compared to 2014-2015.

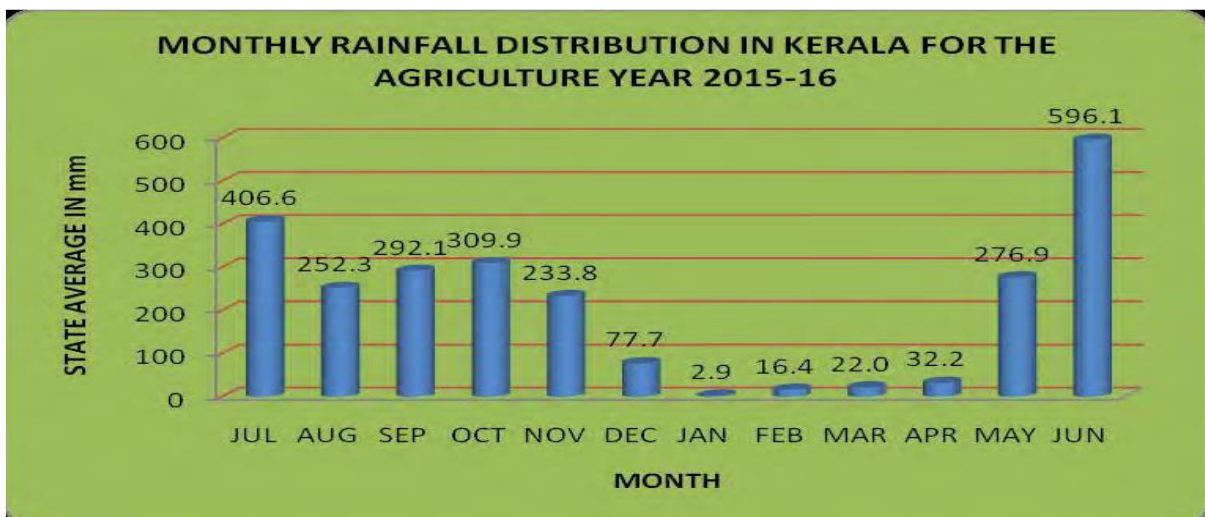


Figure 5: Rainfall 2015-2016

The Figure: 5 shows monthly rainfall distributions for the year 2015-2016. Kerala received a rainfall of 406.6mm for the month of July 2015. Also the rainfall is 596.1mm for the month of June in the year 2016.

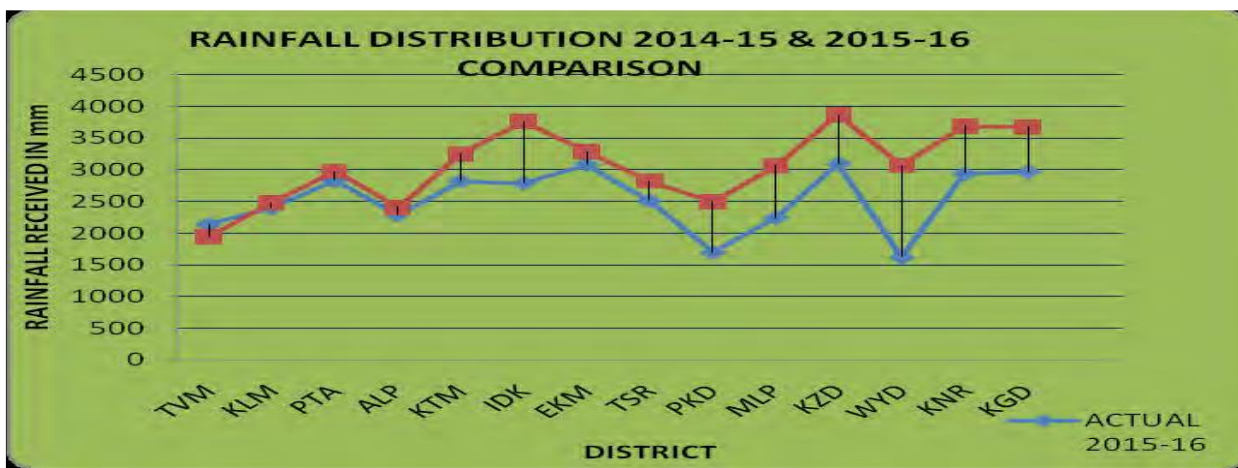


Figure 6: Comparison 2015-2016

The Figure: 6 shows the comparison of rainfall in all districts of Kerala. The rainfall is low when compared to previous year.

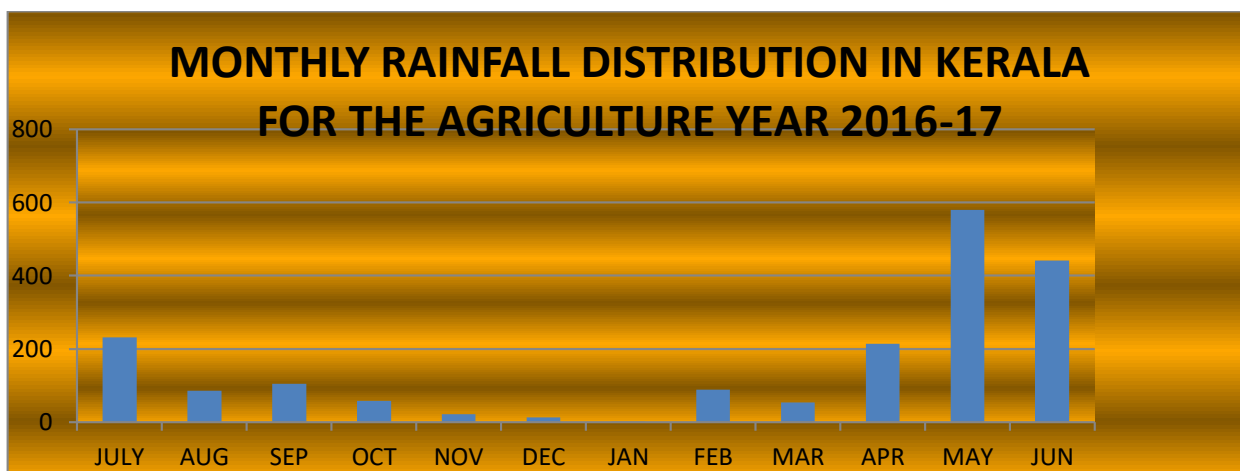


Figure 7: Rainfall 2016-2017

The Figure:7 shows Monthly rainfall distributions for the year 2016-2017. Month July of the year 2016 received a rainfall of 231mm. In the month of June 2017, the rainfall is 441.5mm.

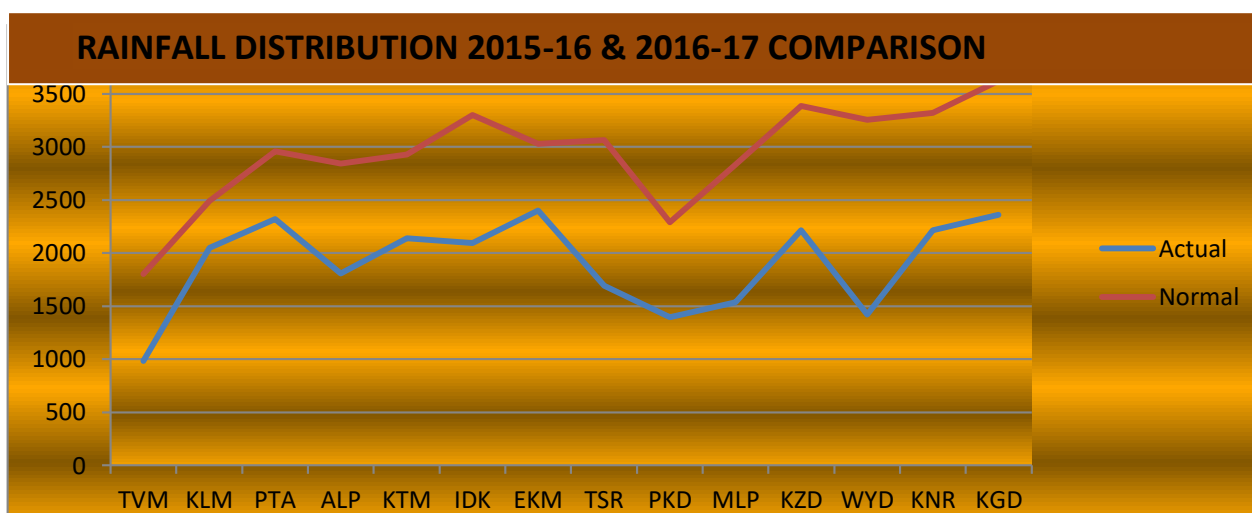


Figure 8: Comparison 2016-2017

The Figure 8 shows the comparison of year 2015-2016 and 2016-2017. The data shows the rainfall received is low when compared to that of previous year.

Export of Nutmeg From India:

Year	Export of Nutmeg from India
2013-2014	4450
2014-2015	4475
2015-2016	4050
2016-2017	5070

4. Findings:

From the above data we can analyze that the production in the year 2015-2016 is high and Area of production is high 2016-2017. But the production in the year 2016-2017 is not increasing as per increase in area of production. From the data given by farmers mist is above average in the year 2013-2014. Export of Nutmeg from India is high in the year 2016-2017. Rainfall is high in the year 2013-2014. From the data, it can be find that the rainfall received in Kerala for the year 2016-2017 is very poor when compared to that of 2015-2016. The production during the agricultural year 2016-2017 is low when compared to that of previous year. The data given by farmers for the year 2016-2017 is below average rainfall, Mist and Production. Since area of production is increasing year by year, also the returns from existing trees has to be increased, we can't see a gradual increase in production with these factors. As a result we can inferred that the production is highly depended on the availability of rainfall and mist.

5. Conclusions

After records of exports, Nutmeg production has shows decline due to the climate factors affecting the production and the price of Indian variety is varying in the global market. Due to the non availability of data in Government sites, the period from 2017-2018 and 2018-2019 is not taken into consideration for the study. But these years shows a variable rainfall. In year 2018, flood occurs and production affects adversely. Kerala produces in an average of 14000 tones where as the flood in 2018 had made a production of less quality crops which will reduce the export of crops.

6. Suggestions:

The Nutmeg is a crop where farmers can yield high benefits. Under suitable mist and rainfall, the production of Nutmeg is high where high quality products can hit the global market. The High winds and typhoons, which are common in the tropics, can destroy the plants. Too much sun can scorch young seedlings' leaves, so many farmers intersperse shade trees with nutmeg trees on their farms. Nutmeg plants can also suffer from fruit rot, thread blight and other fungal infections. Black, white and shield scale insect can cause the leaves of young plants to wilt. Proper Crop conservation techniques can protect the cultivation of Nutmeg.

7. References:

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