A Comparative Account of Coconut Cultivation in Assam and Kerala

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Coconut is considered to be a crop of coastal regions but it also grows well in inlands like Assam. The crop assumes considerable significance in the national economy in view of rural employment and income generation. Major share of the coconut production is contributed by millions of small and marginal farmers who form the backbone of coconut culture in the country.

The strength of coconut palm lies more with its utility aspect. The crop has the ability to adapt to a wide range of soil types and environmental conditions. Assam with its inland riverine ecosystem has an area of 21,300 ha under coconut cultivation (2003-04) and produces 154.3 million nuts (7244 nuts/ha), while coastal Kerala has the largest area in the country with an area of 9.062 lakh ha producing 5484 million nuts (6052 nuts/ha). This indicates that coconut productivity in Assam is as good as that of Kerala. However, the percentage of land under coconut cultivation is only 1.1 per cent in Assam, which is very less in a place where the productivity is relatively good. On the other hand in Kerala the land under coconut cultivation is 46.9 per cent of the total area. This indicates that albeit good productivity, the status of coconut cultivation is poor in Assam. This could either be due to socio-economic considerations or due to the dominant influence of the physical environment on coconut cultivation in Assam. Earlier studies on these aspects are very few.

Climatologically and geographically Assam is a humid sub-tropical region with occasional flash floods, while Kerala is a humid tropical region. In this study the primary objective was to determine whether lower area under coconut cultivation in Assam was moderated by the physical environment or whether socio-economic factors had a major role to play in coconut cultivation in the state. For this purpose, two coconut growing sites viz., Kamrup district in Assam and Kasaragod district in Kerala were chosen as the study sites. The northern and southern parts of the Kamrup district are characterized by extensive alluvial plains interspersed with small isolated hillocks, while Kasaragod district is flanked by Western Ghats in the east and the Arabian Sea in the west.

Study Area

The study region covers the Kamrup district of Assam and Kasaragod district of Kerala. Kamrup district is situated between 25°43'N and 26°51'N latitude and 90°36'E and 92°12'E longitude with the Brahmaputra river dissecting the district in the middle. The district is bordered by Golpara district and Nalbari district on the west, Darrang district on the east, Arunachal Pradesh on the north and Meghalaya on the south. It has a total geographical area of 4345 sq.km.

Kasaragod is the northern most district of Kerala situated between 11°30'N and 12°48'N latitude and 74°56'E and 76°30' E longitude, bordered on the north and east by the Dakshin Kanada district of Karnataka; on the south by the Kannur district of Kerala and on the west by the Arabian Sea. The district has a total geographical area of 1961sq km.

India is divided into eight zones of coconut growing areas based on suitability of soils, climate and yield performance. In this classification, Kasaragod comes under 3rd zone, which is characterized by the climatic limitation such as prolonged dry period for 4-5 months and yield medium level (4000-6000 nuts /ha/year). (Thampan 1981)

Kamrup and Nowgong districts of Assam come under the Zone 8 where the climate and soil are only marginally suitable and the yield realized in these areas range from medium to high (5000-15000 nuts /ha/year)

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Parameters Used for Study

Geographical Parameters

Physiography

Physiographically the northern and southern parts of the Kamrup district are characterized by extensive alluvial plains interspersed with small isolated hillocks which are the extensions of the Meghalaya plateau. The alluvial river plains are formed by the Brahmaputra river and its tributaries. The drainage system of the district is represented by the river Brahmaputra and its tributaries in the north, namely-Barnadi, Puthimari, Sessa, Baralia and Nona. All these rivers originate from Bhutan Hills. In the south, the rivers originating from the Khasi hills of Meghalaya are Kalang, Digaru, Kulsi, Boko and Singra. The district is bounded by the foot' hills of Bhutan in the north. In the south, there is large number of hillocks standing in the midst of the plains.

Kasaragod district is flanked by the forest covered Western Ghats in the east and the Arabian Sea in the west. Demarcating the north and the south are two rivers – the Talapadi and the Trikaripur. Grey rocks and barren land admix dense vegetation as well as calm lagoons are visible through the coconut palms along the coastal belt. Numerous small lakes and backwater run through this narrow coastal district of Kasaragod drained by Chandragiri, Kuppam, Kariamcod, and Manjeshwar rivers.

Climate

Kamrup district's climate is sub-tropical with moist, rainy summer and dry cold winter. Maximum temperature in summer is 38.5° C and in winter it is 10°C, with an average humidity of 75 per cent. The rainfall data for the 10 years (1992-2002) are given in the *Table-1* and *Fig 1* and *2*, show the comparative rainfall and temperature in Kamrup and Kasaragod. In Kamrup the annual rainfall ranges between 1500 mm to 2600mm. But it has four distinct seasons, pre-monsoon (March-May), monsoon (June-August), post monsoon (Sept-Nov.) and winter (Dec-Feb). Kasaragod district comes under humid tropical climate with an annual rainfall ranging from 3000 mm to 3500 mm. which is more than that of Kamrup, but the total rain is concentrated mainly in five months (May to September). The period from November to March is totally dry.

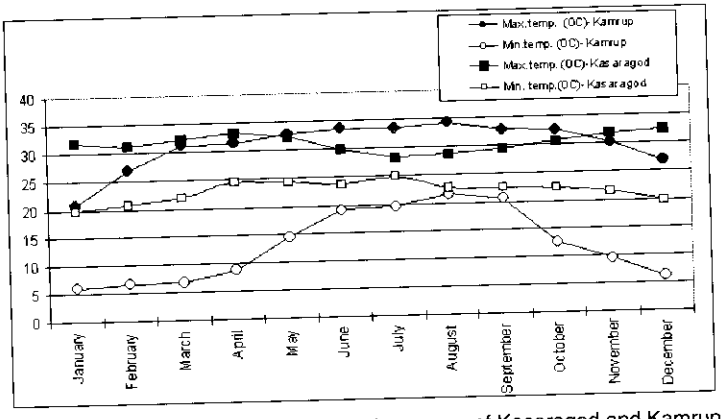

Fig. 1 Maximum and minimum temperature curve of Kasaragod and Kamrup District when it is very less but not totally dry. Though both the districts show identical trend in the case of rainfall, Kasaragod experiences almost 1000 mm rain from July to August, whereas in Kamrup it never exceeds 300mm. This clearly indicates that even without proper irrigation Kamrup has better production potential of coconut than Kasaragod.

Table 1. Monthly rainfall (Mean of 10 years, 1992-2002) in mm

Months	Kamrup	Kasaragod
January	15.12	0.28
February	20.50	0.60
March	73.03	6.38
April	122.84	25.39
May	271.00	235.00
June	295.80	894.76
July	281.00	1058.14
August	299.00	645.90
September	172.07	214.50
October	118.30	232.73
November	11.61	80.39
December	3.31	14.53
Total	1682.72	3408.60

Source; Division of Statistics: CPCRI (Kasaragod & Kahikuchi)

Soil

The soil of Kamrup district is mostly alluvial and laterite soil is found only in the southern foot' hill regions. But the soil of Kasaragod district can be divided into three divisions. In the uplands it is laterite, in the midland the soil is a red ferruginous loam of laterite origin with an admixture of clay and sand and the coastal strip is sandy.

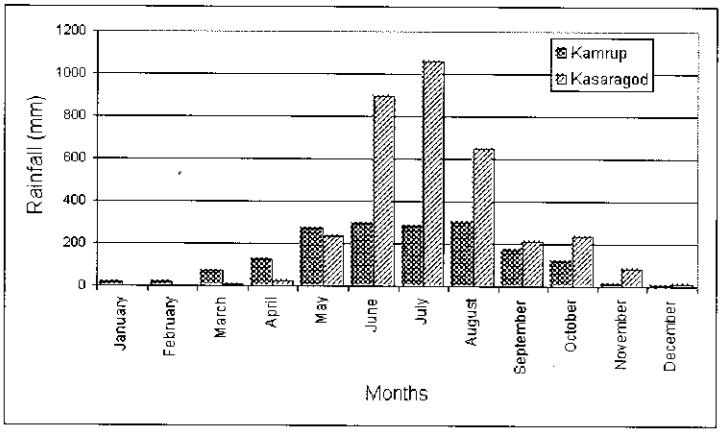

Fig 2. Bar diagram showing comparative rain fall in Kamrup and Kasaragod district

Natural Disasters

In Kamrup district, flood is a common occurrence in the low lying areas during May to August every year. In some years, flood during the later part of September- October also occurs. The occurrence of flood in the district is due to the inundation by the river Brahmaputra and its tributaries. Due to poor drainage system Guwahati city also encounters localized flood in rainy days, where as in Kasaragod, drainage system is very good with no water logging and no floods as all the rivers drain into the Arabian Sea or the backwater. Natural calamity like cyclone sometimes occurs as a result of low pressure developed over the landmass.

Cropping pattern of Kamrup district, Assam

A survey was undertaken during March 2002.At the time of survey, it was noticed that in Kamrup, rice is cultivated mainly in two rice seasons, Kharif (June-Sept) and Rabi (Oct-Jan). Double cropped system is also practiced for rice and vegetable cultivation.

The area under kharif crops are more than that of rabi crops. Since Boro paddy being the flood resistant rice, it is grown in the flood plain areas during the kharif season. Rabi crops are grown in the seasonally flood affected areas. The fertile alluvial soil along the Brahmaputra is suitable for vegetables. Mustards and pulses are grown in the winter season after the recession of flood. At the southern side of the district, a large area is occupied by the forest, and the forest comprises of lots of timber wood varieties.

Table 2 Monthly minimum and maximum temperatures (mean 10years)

Months	Kamrup		Kasaragod	
	Max.temp. (°C)	Min.temp. (°C)	Max.temp. (°C)	Min. temp.(°C)
January	20.7	6.0	31.9	19.8
February	26.8	6.5	31.3	20.6
March	31.2	6.7	32.3	21.8
April	31.4	8.7	33.2	24.4
May	32.8	14.5	32.4	24.2
June	33.7	19.2	29.9	23.6
July	33.4	19.5	28.3	24.9
August	34.2	21.4	28.7	22.7
September	32.9	20.5	29.5	22.4
October	32.7	12.5	30.6	22.3
November	30.3	9.6	31.9	21.5
December	26.8	6.2	32.4	19.8

Source; Division of Satistics: CPCRI (Kasaragod & Kahikuchi)

Cropping pattern of Kasaragod district, Kerala

Coconut occupies a unique position in the farming community of Kasaragod especially along the coastal belt. In the last decade, Kerala faced 50 per cent short of food crops because commercial crops are cultivated more than the food crops, mainly rice. The state has a unique cropping pattern. It accounts for 92 per cent of India's rubber production, 45 per cent of coconut production, 60 per cent of tapioca production and almost 100 per cent of lemon grass oil production. The district of Kasaragod also has experienced impact of paddy land conversion to cash crops. Coconut cultivation is occupying the largest cropped area followed by rubber and cashew.(Muralidharan 1999)

The eastern tract comprises of forests and hilly areas. The forests comprises of a variety of timber with teak and other trees. The hilly areas are mostly cleared and put to private cultivation; the important crops being rubber, cashew and ginger. In the skeletal plateau areas, cashew trees are cultivated, while in some patches, arecanut, pepper and cocoa are grown. In the coastal tract, paddy, coconut, arecanut, cashew, tobacco, vegetables and tapioca are cultivated.

Socio-economic impact of coconut in both the districts

Ten villages in Kamrup viz., North Guwahati, Changsari Baihata, Mandakata, Sajanpur, Ganeshmandir, Borka, Ranichowki, Hajo, Panitima,

Chayagaon and ten villages in Kasaragod district viz., Anantapura, Madhur Changala, Bekal, Chamunadi, Chettanchal, Panathedi, Ranipuram Perrya, Kozhihatta were surveyed and in each village at least 10 households were selected and primary data was collected by using the schedules.

Results and Discussion

When the physiography of both the districts are considered the temperature curve (*Fig. 1*) shows that the temperature of Kamrup district varies seasonally. While in Kasaragod the minimum temperature is never below 20°C in Kamrup, during summer months (June to Sept.) the minimum temperature is around 20°C. Coconut grows well at high temperature, the optimum being 20-35°C (Thampan-1981). In Kamrup, winter season during December -February may adversely affect coconut growth.

From *Fig. 2* it is evident that Kamrup has a very heavy rainfall distributed almost evenly through out the year except during November, December and January.

Flood is a common phenomenon in the low lying areas during May to August every year. In some years, flood also occurs during the later part of September- October. This might possibly be the reason for avoiding cultivation of plantation crop as floods cause serious damage to the crops. (Majid, S.1959). In contrast, this type of disaster is very rare in Kasaragod. Both the districts have sandy laterite clay soil and very deep well drained forest clay soil which are well suited for coconut cultivation (Thampan, 1981). These aspects of soil along with favourable climate show that both the districts have potentiality for coconut cultivation.

The cropping pattern followed is completely different in both the districts. For instance, in Assam the whole system is based on rice cultivation. Three different rice seasons exists and vegetables are grown after the recession of the flood in winter. Contrarily, in Kasaragod, plantation crops are common. Here hilly areas are mostly cleared and put to cultivation of crops like rubber, cashew and coconut. The standard scenario is rubber in the hill top, coconut in the slope and cashew in the lying areas. Almost all the paddy lands have been converted to coconut and arecanut plantations. (Ratnambal *et al* 1995)

The socio-economic survey (*Table 3*) indicates that the position of coconut in Kamrup is not as strong as in Kasaragod as most of the farmers in Kamrup have small holdings and the main crop is paddy. Coconut is planted mostly in the kitchen garden. Coconut leaves are used for thatching or as fuel. Income is obtained only through selling of mature nut. Copra is not commonly produced. According to Chowdhury *et al* (2000) the productivity of the crop is 74 nuts/ palm/year.

In Kasaragod, the main crop is coconut and the economy is based on coconut. All parts of the plant is used for food and value added products preparation. The main cooking oil is extracted from coconut. Most of the families produce their own oil and coconut is the main ingredient of their cooking. Besides 'toddy', an alcoholic drink and 'neera' a non alcoholic health drink are tapped from coconut tree. Leaves, shells and all the parts are used in some way or other and the coconut producers earn money by selling tender nut and mature nuts. It is evident from the *Table 3*, that the small holders use the leaves/ husk/shell more for domestic purpose (84.7/ 89.0/ 96.53 per cent) rather than selling (6.6 / 0.0 / 3.47 per cent) whereas the large holders use it comparatively less for domestic purpose (58.5 /41.6 / 72.42 per cent) and they sell more (18.0 / 46.1/ 27.58). In both the districts the holding size represent the state or the country as a whole, small holdings are majority, large holdings are very less (only 5 per cent) whereas marginal holdings are also higher than medium sized holding.

During survey it was observed that almost all the houses in Kamrup have arecanut plants (about 30-50), whereas the number of coconut plant was only 2 or 4 or utmost 10, just sufficient for own consumption. People are of the view that each plant gives almost 150 to 200 nuts per year and they harvest coconut only two to three times per year, unlike Kasaragod where harvesting is done in every alternate months.

So from the above discussion it is clear that though the productivity is good in Kamrup, coconut cultivation is not taken up on a large scale. Kamrup district has only 5.46 per cent of area under plantation crops consisting of tea, arecanut and coconut and the percentage of area under coconut among the plantation crops is only 17 per cent of the area under plantation crops. The farmers of Kerala grow mainly cash crops like cashew, rubber and coconut. Coconut is the raw material for the main edible oil of the people of Kerala. Besides they produce variety of value added coconut derived products also. Owing to the historical and climatic reasons, the state has developed commercial agriculture more than subsistence agriculture.

Table 3. Socio economic survey of coconut in Kamrup and Kasaragod district

District	% of holdings			
	Small (.05—0.2) ha	Medium (0.2-0.8)ha	Large (0.8) ha &above	Marginal 0.05ha
Kasaragod	44.1	23.5	5.3	27.0
Kamrup	50	15	5	30
Average size (ha)				
Kasaragod	0 .12	0.43	1.42	0.04
Kamrup	0.10	0.35	1.44	0.03
Number of coconut holdings				
Kasaragod	7446	4329	985	
Kamrup	N.A	N.A	N.A	
Approximate Area under coconut (ha)				
Kasaragod	879	1854	1394	
Kamrup	N.A	N.A	N.A	
% share of area				
Kasaragod	21.3	44.9	33.8	
Kamrup	Very less in the Kitchen garden, only 3 to 7 average no. of palms			
% of consumption of nuts Culinary purposes				
Kasaragod	37.5	19.5	99.4	19.4
Kampur	N.A	N.A	N.A	N.A
Nuts sold				
Kasaragod	44.8	51.7	44.3	47.2
Kamrup	50	50	30	Not sold
Nuts used for making copra				
Kasaragod	17.3	22.6	21.3	21.1
Kamrup	Copra is of not in use			
Nuts used as tender nut				
Kasaragod	0.4	0.2	0. 3	0.3
Kamrup	Only in medicinal purpose. Sometimes as drinks			
Farm gate price of coconut			Farm gate price of tender nut	
Kasaragod	2.75		3.50	
Kamrup	Generally Rs. 10; a pair		Rs 5.	
Utilization of coconut leaves / husk / shell % Domestic purpose				
Kasaragod	84.7/ 89. 0/ 96.53	74.7/ 70.7 / 86.44	58.5 /41.6 / 72.42	
Kamrup	100 % Sold	100	100	
Kasaragod	6.6 / 0.0 / 3.47	15.8 /23.8 / 13.56	18.0 /46.1/ 27.58	
Kamrup		N.A Toddy tapping		
Kasaragod	Average number of palms - 4, Revenue - Rs. 143.8/palm			

In Kamrup, the main crop is paddy which occupies 68.59 per cent of the total cultivable land and over 70 per cent of the states' population depend on agriculture for livelihood (Kaul 1999). The continuous dependence on seasonal monsoon for irrigation is another characteristic feature in Kamrup's agriculture where net irrigated area is 58239 ha, which is only 32 per cent of the total cultivable area. However, in Kasaragod, irrigated land is still lower (21.43 per cent of the total cultivated area). But the crops grown here do not require much irrigation. Therefore, considering the fact that Kamrup is climatically suitable for coconut cultivation, coconut can be popularised.

In hilly areas of Kasaragod, the important crops are rubber and cashew but, in between coconut cultivation is taken up in the terraces. In the coastal areas, coconut is grown intervened by patches of cocoa, tobacco and paddy. Coconut is mostly intercropped with black pepper, cocoa, cinnamon, clove and coffee. It was observed that when coconut is intercropped, the production of nut per palm increases. Besides, mixed farming provides coconut farmers with a higher return per hectare than does monoculture. (Sairam, *et al.*, 1997)

The choice of intercrop on coconut land is very much influenced by the environmental factors such as type of soil and climate and also depends on the individual farmer and the availability of the market for the products. Farmers of Kamrup can adapt this protocol to produce seasonal vegetables and sometimes pepper and betel leaf(pan) which gives them some additional income. The suitability of the coconut for inter and multi-cropping is well established as the palm does not utilize the total soil, water and light resources available (Burgess1981, Nair, 1979). Nath (2000) has studied the coconut based

intercropping model in Assam and found it has increased the productivity as a whole.

Overall, it is apparent that Assam has immense potentiality for coconut, which is a relatively better cash crop and well suited to areas under rainfed condition. In the long run, increasing area under coconut intercropped with other compatible crops would boost the economy of Assam.

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