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Problems of cardamom cultivation in Idukki district, Kerala

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Abstract
The spices of Kerala date back to thousands of years in the history of the state. In the ancient times, Kerala rose to fame all around the world solely on the basis of the riches brought into the state, because of its monopoly over spices. Musiri, the ancient port of Kerala became the base of world spice trade, almost ages ago. It is sometimes said the Western colonization in India, was the attempt of the West to control the spice trade from the state. The arrival of Vasco Da Gama in India and its spice trade was the result of the same. Major spices in Kerala includes, pepper, cardamom, ginger, cinnamon, turmeric, clove, nutmeg etc. Kerala is the largest producer of small cardamom in India.
Within India, Kerala is the spice garden. As spices cultivation is the means of living for a large number of agricultural households in Kerala, spices trade is of crucial significance to their earnings, well-being and living standards. Cardamom renowned as the 'Queen of spices' is a tiny spice that attracted the consumers to a greater extent. More than 80 per cent of the production of the spice in the country is restricted to Kerala. But the spices trade in Kerala is now handicapped by a number of problems. The growers of cardamom are also facing declining profit margins due to price pressure. Therefore, it is time for all those concerned with Indian spice industry to make earnest efforts to overcome the problems faced by the spices sector, or else our dominant position in the global spice market may be further relegated to the background.

Keywords: agriculture, cardamom, problems, ecology, climate change

1. Introduction
The economy of Idukki district is primarily agricultural and its sole physiographic individuality and climatic feature favours the cultivation of spices, especially cardamom. Now, it became only a cherishing the fact that Idukki district was once the leading producer of cardamom in the country which made the nation to become the leading producer and exporter of cardamom in the world until 1980's. To add, it's not feasible to substitute the cultivation with any other crop in the CHR area, since the existing laws do not permit to do so except tea, coffee, vanilla and black pepper which demand similar climatic conditions as that of cardamom. In a study conducted (Murugan, 2012) [2] to analyse the productivity trend of the crops like cardamom, coffee, tea and pepper in CHR area from 1990-2007, the one which showed a tremendous increase in its production was only cardamom. When the productivity of coffee improved to a little, both black pepper and tea had shown a trend of stagnant production. It means that cardamom is more adaptive to climate changes compared to other permitted crops in CHR area. Thus, it necessitates the sustainability of cardamom cultivation in the region. We have the best quality cardamom and its demand is also high and therefore the farmers are trying their level best to improve the production, but our cardamom sector is facing a total doom due to diverse reasons. It also became a major topic of discussion in almost every modes of communication.
The output of cardamom is influenced exclusively by the physiography and the specific climatic parameters of the region. Hence, the depletion of natural forests, constant encroachments, weather change, water shortage, drought, flood, soil erosion etc. has enough potential to threaten the cultivation of cardamom. When the impact created by adverse market price, increased cost of production, competition from international markets, piling of agricultural debts etc. hit the farmers intensely it would further shatter the economic backbone of the farmers especially with small and medium sized holdings. The crop loss due to the infestation of pests and diseases multiplies the burden by reducing the yield of cardamom. Thus, not only the farmers, but the livelihood and future of thousands of people who are engaged in cardamom related activities including the traders, exporters, labourers etc. depends on the success and prosperity of its cultivation. It was this factor which inspired the researcher to address the causes of farm distress properly so as to take fruitful steps to solve the issues.

2. Scope of the study
Idukki is basically known as a non-industrial district. Its economy is entirely based on agriculture. The district is notable for cultivation of largest area under various spices, particularly small cardamom, and contribution of large shares of these produces. For this reason Idukki is called the 'Spices District' of India. Cardamom is one of the few agricultural commodities produced in India which has significant export orientation. The unique terrain, soil and agro-climatic conditions of the district are most suitable for growing cardamom cultivation. The cardamom grown in Idukki falls under the category of "small cardamom", *Elettaria cardamom*, which is a crop native to the region. The region within Idukki district, where cardamom was growing in wild state and found ideal for its cultivation is called Cardamom Hill Reserve (CHR) forest. The district of Idukki contributes more than 70 % to the cardamom production in India. All the crops are foreign exchange earners to the country and hence very important to the economy. Even slight change in climate has a substantial influence on the agricultural development in the district. Hence, the present study has been made to

analyse the problems and prospects of cardamom cultivation in Idukki district.

3. Objective of the study

The specific objective of the researcher includes the following:

1. To identify the ecological problems of cardamom cultivation in Idukki district
2. To recognize the socio-economic issues disturbing cardamom farmers
3. To distinguish the technological problems of cardamom cultivation in the study area

4. Methodology

The unit selected for the study is the Cardamom growers of Idukki district. Purposive sampling is employed to select sample Taluks and blocks where the area under cardamom cultivation is more. In Idukki, except the taluk of Thodupuzha, all other taluks such as Udumbanchola, Peermade and Devikulam are important centres of cardamom production. Among the four taluks, Udumbanchola is having maximum area under cardamom cultivation including the Cardamom Hill Reserve region. Out of the eight Community Development Blocks in the district, four were taken for sample survey based on the acreage of area under the cardamom cultivation. From each blocks in Idukki district, the growers were selected using Stratified Sampling Method. The researcher considered a total of 600 respondents (almost 10% of the population) i.e., 150 each from Kattappana, Idukki and Adimali blocks. For more detailed analysis, the growers were categorized into three stratums - Large farmers (above 5 acres), Medium farmers (2-5 acres) and Small farmers (upto 2 acres). A field survey was conducted to collect primary data from growers by using Structured Interview schedule. The schedule was mainly devised in such a way so as to elicit information regarding area under cultivation, quantity of output, yield per unit of land, cultivation practices followed, harvesting methods, processing techniques, storage details, pattern of marketing, instability of market price, financial and credit facilities available and various other problems encountered by them in production and marketing of cardamom.

Apart from the structured schedule survey, the researcher also had some official interactions related to the topic with higher officials in cardamom research stations and institutes in Myladumpara and Pambadumpara, Auction centre in Puttady, District spices board in Kattappana, District Agricultural farm in Arickuzha, Spices board in Ernakulam, Indian Institute of Spices Research in Kozhikode etc. to have their valuable comments and views on the past, present and future of cardamom cultivation. The members in Cardamom Growers Association shared their concerns about the difficulties they are facing in the cultivation. Also, the researcher enjoyed the period of field visits in the cardamom plantations and processing units which helped to get direct experience of the problems faced by the farmers. The opinion of the experts and other officials were also included along with literature review to have wide angle of the issues persisting in the cardamom cultivation in the study area.

5. Study area

Idukki is the second largest district in Kerala (the largest being Palakkad). Sprawling over an area of 4476 sq. kms, the district constitutes 12.9% of Kerala. A land-locked and the largest highland district, Idukki is one of the most nature-rich areas of Kerala and it is geographically known for its mountainous hills, dense forests, plantations scrublands and grasslands, situated mostly in the lofty hills of Western Ghats. The district of Idukki was formed on 26th January 1972. It has four Taluks.

6. Problems of cardamom cultivation

After the successful schedule survey and numerous field observations in detail, the researcher got to know various problems of cardamom cultivators in the study area from planting to marketing and its reasons were diverse. Based on its nature, these problems were categorized under three major heads likely Ecological problems, Socio- economic problems and Technological problems.

6.1 Ecological problems upsetting cardamom cultivation

The term 'ecological problem' is today mostly used to describe different environmental problems. After all, ecology is top environmental science. Major ecological problems recognized are listed below:

6.1.1 Erratic climate and its uneven distribution

It is a fact that climate is one of the prime factors which determine the life of a crop and so is for cardamom. The amount of temperature and rainfall are the major drivers of its growth, nutrient supply, pest infestation as well as the productivity. Any fluctuation in the climatic parameters may adversely affect its yield. Cardamom is highly a weather sensitive crop and hence excessive heat or rain may damage its growth. As the distinctive undulating topographic characteristic of the district attribute to areal and seasonal variations in these climatic parameters, it obviously influences the spatial pattern of cardamom cultivation. Being located in the eastern side of the Western Ghats, Marayoor and Kanthalloor are virtually lies in rain shadow region where cardamom cultivation is not possible. On the contrary, the entire taluk of Udumbanchola where large proportion of cardamom cultivation persists has all the favourable climatic conditions for its growth.

While having a talk, Dr. Muthuswamy Murugan, the Director of Cardamom Research Station, Pampadumpara said, the seasonal flowering habit of cardamom in recent years indicates the impact of climate change on cardamom phenology. According to him, the crop was used to flower only for a period of six months from June to December up to the early 1990s, and after beginning of 2000, it has been flowering throughout the year. And hence, the number of harvests has increased from five to nine per year. He considers it as one of the major reasons for the manifold increase in the productivity of cardamom. It is obvious that increased usage of pesticides and fertilizers can only boost the crop yield, can't do anything to raise its number of harvests.

To add with, the researcher came across repeated remarks from many cultivators on the changing climate in the district. According to them, both extreme summer and poor monsoon damages the crop widely. Apart from rainfall and temperature, they were also worried about the intensity of other climatic phenomena like wind, cloud, humidity, hail, mist etc. The cultivators complained miserably that the strong dusty winds, cloudless sunny days, increased soil and atmospheric humidity due to prolonged rainy days, long misty winter nights, unexpected hailstorms etc. devastated

their fields many times over the years. Out of 600 cultivators surveyed, 89% of large farmers claimed that climate change is the primary challenge they are confronting in cardamom cultivation. Moreover, 84% of medium and 76% of small farmers were also alleged the same. The rest who believed weather has only a little role were more anxious about price fluctuations, reduced marketing opportunities, lack of subsidies, crop diseases etc. Generally, even if we consider the climate change as an effect of global warming, the extensive depletion of natural forests in the district might have contributed to the weather changes undoubtedly that being witnessed today. The microclimatic conditions in the cardamom ecosystem often welcome unwanted intruders to flourish and impose damages to the crops which lead to a substantial reduction in its yield.

6.1.2 High vulnerability of crops to pests and diseases

Climate variability can affect agricultural pests as well. Because temperature, light and water are the major factors controlling the growth and development of pests (Rosenzweig *et al*. 2001). Like any other crops, diseases in the cardamom plantations are also occur mostly due to the presence of viral or fungal pathogens or pest-borne. The study says, the occurrence and spread of these diseases are directly related to the weather condition of a region. The plant diseases are more during monsoon season when heavy rain coupled with high relative humidity results several infestations. The infested capsule may lose its weight and quality and therefore it may fetch only very low price in the market. However, the crop loss depends on the growth stage at which the infestation occurs; which means, the late infestation creates only a gradual failure whereas the early infestation results in the total crop loss.

According to the farmers their fields were most affected by fungal diseases. Fungi live in air as well as soil which make their attack feasible on both leaves and roots. Major fungal diseases reported from the cardamom plantations in Idukki were capsule rot, rhizome rot, seedling rot, leaf spot, brown spot, leaf rust, clump rot etc. These diseases mostly affect the leaves, rhizomes and capsules of the crop whereas the damages of clump rot may reach upto its roots. Poor drainage facility provided in the fields during rainy season increases the intensity of these diseases.

Since the viruses are not visible to naked eyes, the farmer will get to know about it only when the crop gets damaged with its infestation. Major viral diseases affecting cardamom crops in the study area were mosaic (also known as 'katte'), nilgiri necrosis, cardamom vein clearing (or 'kokke kandu') etc. The virus, Nilgiri necrosis was first reported from the Nilgiri tracts of Tamil Nadu and thus it got that name. In Idukki, it was found mainly in Valparai in Anamalai, lower Palani and Munnar areas. The leaves of the infected plant may change to whitish, yellowish or sometimes to reddish brown and finally it may lead to its shedding. Most difficult phase of the farmers is that the disease can never be cured and the immediate removal of the viral infected plant is the only preventive method they can do to avoid its further transmission.

While 'Njallani' is an outstanding and widely acclaimed variety for its fruitful suckering, flowering, greater yield and superior quality bold green capsules under remarkable input responsiveness, its weakness lies in susceptibility to all major fungal diseases and insect pests (M S Swaminathan research foundation, 2008) [1] Increased nutrient supply led to increased vulnerability to pests and diseases, which triggered increased applications of fungicides and pesticides in the fields. To solve this, farmers practiced the application of fungicides and pesticides upto 15 rounds in a year though they are recommended to use only 8 rounds. It not only increased the production cost, but also deteriorated the ecology of the region.

6.1.3 Massive deforestation in the cardamom growing tracts

Evergreen forest tracts of Western Ghats are the natural habitat of cardamom in Idukki district. Presence of sufficient forest cover is essential for the luxuriant growth of cardamom since it helps to obstruct intensive insolation during summers and retains enough soil and atmospheric humidity by giving perpectual shade throughout the year. The wise selection of shade trees and its regulation is considered as a vital process in cardamom cultivation. Because, the shade trees like Karana, vayana, murikku, kanikonna, vaka, veetti, anjili etc. perform as a breeding site for bees which are the major pollinators of cardamom crop. Also, the leaf mulches of the shade trees protect the top soil as well as enrich the soil nutrients. Moreover, shade growth is necessary to control pest attacks, since most of the pest breeds multiplies faster under high temperature and low humidity.

An expert committee appointed by the Government of Kerala in 1996 and headed by V. Gopinathan, then Conservator of Forests, had earlier warned the adverse ecological impact of clearing of undergrowth and shade regulation in CHR area. Another expert Committee headed by N. Chandrasekharan Nair also repeated this warning in 2002. Later the reports of Gadgil, Kasthurirangan and Swaminathan commission, also showcased the requirement of vital policies and immediate actions to save the district from ecological deterioration.

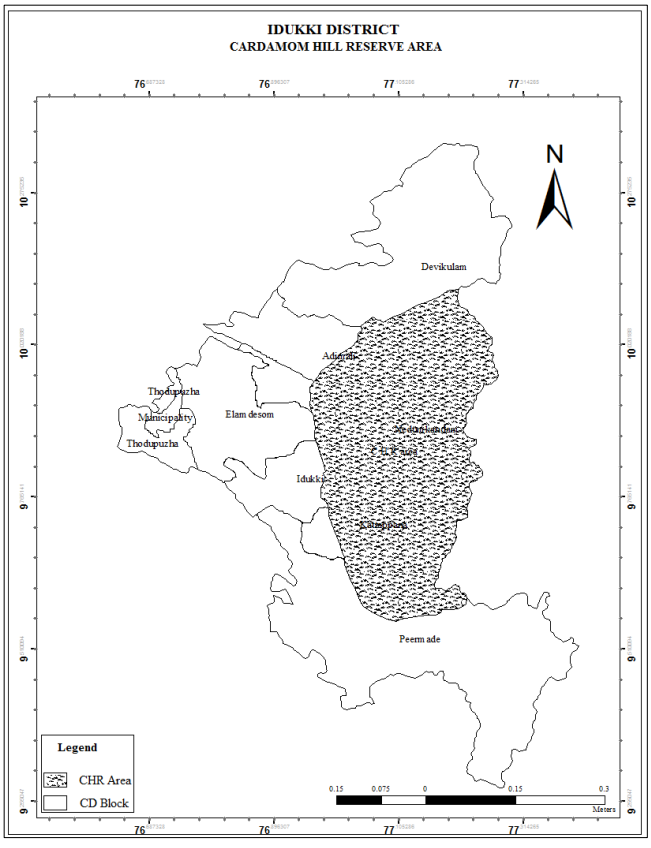

Fig 1

On the contrary, the felling of trees in and around the cardamom plantations for drying process is common in the district. Drying 1kg of cardamom needs 4 kg of wood. The survey results had shown that though only 56% of large farmers use firewood for drying cardamom, 84% of medium as well as 89% of small farmers depend chiefly on this method. The rest were using driers working with electricity, gas or diesel. The unpredictable interruptions, high cost of production etc. were the factors limiting the farmers to adopt these methods. For self-consumption, sun drying was preferred by 2% of the small farmers since it reduces the capsule quality. However, the use of firewood for drying cardamom over the years has led to the serious depletion of trees in CHR forest. Finally, the uncontrolled deforestation accelerated the incidence of landslides and soil erosion in the region.

6.1.4 Unprecedented magnitude of soil erosion and landslides

In agriculture, soil erosion refers to the wearing and tearing away of a field's topsoil by the natural or physical forces of water, wind or through the forces associated with farming activities such as tillage. It is a naturally occurring process that affects all landforms. (Jim Ritter 2012). Mostly, prolonged torrential rain in an area results in the episode of soil erosion and landslides. Since more than 80% of the land in Idukki district comes under highland category (Figure No: 2.4) with hilly and mountainous terrain having moderate to steep slopes, the frequency and intensity of soil erosion and landslides are much severe here. Though natural, these may also get accelerated with human actions like faulty methods of cultivation, unscientific construction of roads and buildings, uncontrolled deforestation, unregulated grazing, lack of proper soil and water management etc.

In Idukki, most of the roads in high ranges were constructed by cutting soil columns vertically and the untreated slope left the area highly susceptible to landslides. During the field visits in a monsoon season, bundles of fallen cardamom bushes into these roads were a heart breaking scene. Many cardamom cultivators were also upset as they have to shift their output from the field to the processing centres immediately after the plucking of capsules so as to retain its colour and quality; but the lack of any other modes of transport and the less frequent parallel roads in the district hinders to transfer their products and services in time. Not only the farmers, but the day to day life of everyone in the area may get affected when the dislodged materials accumulated blocks the road traffic. Even if afforestation is one of the methods to prevent soil erosion, the plantation of eucalyptus trees may promote the erosion, since it hinders the under growth.

6.1.5 Adversities due to excessive eucalyptus cultivation

Extensive cultivation of eucalyptus and acacia trees in and around the cardamom growing tracts were started under the Social Forestry scheme to meet the increasing firewood and timber demand for the drying the cardamom. The timber was also used to feed the pulpwood factories. Later, the state government had directed the forest department not to create eucalyptus plantations way back in 2011 saying that it would have a serious impact on the ground water levels of the region. But, the programme failed to execute well. Large eucalyptus trees were planted in both private as well as forest lands especially at Kottakkambur, Vattavada, Nedumkandam Cheruthoni, Idukki and Kattappana areas. It's spreading started squeezing the rich water table of the district and therefore, significant water shortage is reported from these areas (Singadurai S 2013) [3]. Environmentalists say that each tree is a bore well itself sucking ground water as fast as it grows. The water table studies also indicated the fall in its level, particularly during summer months.

6.1.6 Scarcity of water in the cardamom plantation areas

A study conducted by the central ground water department to analyse the block-wise ground water resources and its development in Idukki district shows that Nedumkandam and Kattappana blocks are 'critical' whereas the remaining blocks are under 'safe' category. The increased number of bore wells in these areas compared to the rest of the district also justifies the same (Singadurai S, 2013) [3]. It appeared to be correlated well with the increasing deforestation on one hand and planting of acacia and eucalyptus trees on the other.

Though most of the plantation has their own huge wells to irrigate during dry season, the scarcity of water in these wells during severe summers is a major concern, especially to the large farmers. Around 73% of the large cardamom farmers of the district complained that they had experienced significant water shortage in the fields especially during peak summers. 54% of medium and 38% of small farmers were also had the same opinion. While the remaining said, they managed to irrigate with the available water, though it was little struggle some. However, severity of water shortage at the time of cultivation may definitely affect the crop growth as well as its output.

6.2 Impact of socio-economic problems in cardamom cultivation

Chief socio-economic problems affecting cardamom cultivation is discussed in detail below.

6.2.1 Enduring land encroachments in Idukki district

The rising encroachments in the district are a major area of concern. As per the revenue reports in 2017, Idukki ranks first in land encroachments in the state. At Chinnakanal village of Devikulam taluk alone over 1,500 acres of land were found encroached. Though land encroachments are reported from all the taluks in Idukki district, more encroachments are exposed from Kannan Devan Hills in Devikulam taluk (The Hindu, May 6, 2017).

A report by Mathrubhumi on May 10, 2017 stated that Kerala Revenue Minister E Chandrashekharan informed in state assembly that the Idukki district tops in the state in terms of land encroachments. He also revealed that out of 370 hectares of land encroachments across the state; 110 acres of government land had encroached in Idukki district alone.

"Cardamom Hill Reserve is an ecologically sensitive as well as fragile area. However, unauthorised constructions, large-scale destruction of trees, miscellaneous cultivation and land conversion in CHR have been continuing and these are the major reasons for the man-animal conflicts, frequent flash floods and landslips in Idukki district," says Dr. M Murugan, the Director of Cardamom Research Institute at Pambadumpara against encroachments in the reserve.

6.2.2 Lack of skilled laboures

Like other plantation crops, cardamom is also highly labour intensive in nature. Only skilled labours could recognize the precise time of harvest and distinguish the matured capsules.

Cardamom in Idukki is reputed for its superior quality with bold size and green colour. So, plucking of immature capsules may result in reducing its quality.

Post harvest operations like washing, curing, grading etc. are also important requirement to fetch good price for the produce and hence require skilled labours. Much care and attention is essential in curing to achieve the reputed green colour and quality.

Recently, the district witnessed a constant fall in number of labourers coming from Tamil Nadu to work in cardamom plantations. Because, now the workers are getting the same wage (350 per day) in their state, like the way they were getting in Kerala. So, it will not be profitable for them to travel such a long distance to Kerala border to work in the plantations. For the workers, it is a waste of time, energy and money.

6.2.3 Lack of an open market facility

Despite being a major crop of the district and affecting the economy of farmers to significant scale, cardamom has no open market facility. The cardamom cultivators in Idukki district started demanding for it from a long ago, but everything went vein. Therefore, the cultivators have to depend entirely on the agents and traders for marketing which force them to sell their product at low price. The farmers believed that shifting into the open market system would help them to acquire a reasonable price for their commodity.

6.2.4 Fluctuating market price

The cardamom crop suffered two consecutive droughts and a heavy rainfall together with heavy price fall from 2011 to 2015. The price fall made farmers incapable of annual investment, which demanded Rs 75,000-1, 50,000/ha. Lack of investment reduced the yield and made the crop more vulnerable to stress. Low yield and low price made the livelihood distressful with mounting debt. Average auction price of cardamom in Kerala from 2005-06 to 2014-15 is given below.

Average auction price of Cardamom (2005-06 to 2014-15)

Table 1

Year	Average price (in Rs/kg)
2005-06	487.84
2006-07	490.43
2007-08	503.48
2008-09	538.16
2009-10	876.62
2010-11	968.22
2011-12	645.61
2012-13	686.89
2013-14	617.60
2014-15	610.23

***Source*:** Spices Board, Cochin, 2016

The above table shows how fluctuating the price of cardamom is! The price was only Rs.487.84 per kilogram in 2005-06 which increased to Rs. 968.22 in 2010-11. But again the price declined to the rate of Rs.610.23 in 2014-15. Not only annual, but unexpected monthly variations can also be seen in the price of cardamom. For example, the average price in 2017 is Rs.750 a kg in November from Rs.900 during March-April.

A correlation study conducted by the researcher to analyse whether there exist any relationship between annual production and price of cardamom does not suggest any clear relationship between them. Therefore, it can be concluded that the price is also influenced by many extraneous elements like import, export, domestic use, festive demand, weather, capsule size, colour etc. Due to the price fluctuations, sometimes the farmers keep the capsules in the store anticipating higher price in future, which is not at all advisable. However, cardamom cultivators found it very difficult to tally the low market price with its rising production cost.

6.2.5 Escalating production cost

A study conducted by Spices board to estimate the total production cost of cardamom stated that it range from 75,000 to two-fold higher per hectare. According to the farmers, cost of every kilogram of capsule comes to around Rs.800 (M S Swaminathan research foundation 2008). Huge expense is needed for mechanizing the field. Though machines are available for most of the post-harvest processes like washing, drying, curing, grading, packing etc due to its huge cost only large farmers could able to afford it. However, mechanisation is simply not possible in harvesting which force even the small farmers to hire labour for certain operations. Here comes other issue like rise in wages, labour strikes, lack of skilled labours etc. On the other hand, the prices of pesticides, insecticides, fungicides, fertilizers etc. which are essential for the crop growth are also increasing. In order to meet the production cost, even the small farmers have taken bank loans for a huge amount. Under such circumstances, any adverse fall in prices or crop loss on any count do hit the farmer severely and may entrap them in huge debt.

While the high yielding varieties like Njallani opened up new opportunity to increase yield many-fold, the crop demanded far higher plant nutrients and higher application of fungicides and pesticides. Many farmers applied far higher nutrients than the recommended dose taking advantage of the nutrient responsiveness of new varieties. The recommended 8 rounds of fungicide and pesticide application a year were often ignored and gone upto 15 rounds. Such intensified production practices and excessive use of plant protection chemicals over the years have accelerated the production cost. Also it adversely affected the soil health as well as the ecology of the study area. In the view of their shattered economy, it is important that the farmers have to be compensated for their crop losses.

6.2.6 Lack of financial assistance

Finance is the pre-requisite for efficient functioning of any cultivation and so is cardamom. Though a subsidy of 20 per cent per hectare is provided by the Spices Board, only 30 per cent of growers get the benefit of it and there is no financial assistance from other agencies. The growers have to spend about Rs. 22,500 per hectare for replanting and nursing of the new pants which will start bearing only after a lapse of 18 months or 2 years (Ibid.). This leads the farmers to borrow funds from money lenders which added their distress.

Moreover, the Kerala State Electricity Board (KSEB) is levying industrial tariff on farmers using electricity for cardamom drying at household level while the same KSEB supplies power at agricultural tariff for dewatering in Kuttanadu. Denying power at affordable rate may push the farmers to use fuel wood which would be further disastrous.

6.2.7 Farmer's suicide

The Farm crisis in Idukki has led to many farmer suicides over the last few years. Huge escalation of farmer's debt due to high production cost, low price of cardamom, labour charge etc were the major reason for the crisis. The adverse climatic phenomena further shattered the economic backbone of many farmers' especially small and medium sized holdings and left them incapable of crop replanting. To escape from this state of helplessness and burden of farm debt, many farmers chose to commit suicide. The inability of repaying loans or less probability to have a good harvest etc might be the reasons for their suicide. According to the Kerala state farmers' debt relief Commission, at Thiruvananthapuram, 89 of such cases were reported from Idukki district alone for the period from 2000-15.

6.3 Technological problems disturbing cardamom cultivation

Cardamom cultivators in Idukki district are also disturbed by several technological problems which are illustrated below:

6.3.1 Non-issuing of soil health cards to all farmers

A permanent record of soil health is very important for improving and monitoring the soil health. This demands short interval soil analysis (once in 2-3 years) or medium interval (once in 8-10 yrs) analysis for micronutrients and application of manures and fertilizers (organic/inorganic) in accordance with the evolving crop-soil dynamics. Now only some large farmers are having such cards. Hence establishment of a system of soil health card (SHC is a mini book) is recommended for every farm holding. All soil related data of the farm are to be recorded on real time basis in this card. Each household may be charged a token credit of Rs 5 towards this card. Sustainable farming requires continuous maintenance and monitoring of soil health. Therefore, these cards should be given to all the farmers cultivating cardamom to attain the proper use of the programme as well as to help them in the soil management.

6.3.2 Less popular research institutes

The Indian Cardamom Research Institute (ICRI) at Myladumpara and Cardamom Research Station at Pampadumpara are the two major research institutes in Idukki district which were established with the mandate to undertake researches especially on cardamom cultivation. Other institutes in the state like Indian Institute of Spices Research (IISR) at Kozhikode are also doing studies on various spices including cardamom. But the cardamom cultivators are not satisfied with the performances of these institutes. They neither succeeded in developing acceptable verities of cardamom nor assisted the farmers enough. Though CRS and ICRI released new cardamom varieties suitable to the district, it is sad that IISR couldn't develop even a single variety fit for the region (CRS varieties are PV 1 and PV 2, and ICRI varieties are ICRI- 1, ICRI 2, ICRI 5 and ICRI 6). However, none of these varieties could gain acceptance among farmers.

On the other end, the farmers gained enormous skill in selecting and creating superior varieties from the locally available germplasm over the years. Out of these, the 'Njallani' variety developed by a local farmer, Sebastian Joseph has become highly popular due to its high yield capacity. Moreover, Njallani has the ability to withstand more with the pests and crop diseases compared to those developed by the research institutes. All these have placed the research institutions at low esteem among the cardamom farmers. According to the survey, around 76% of the farmers in Idukki were found to be using Njallani variety in their fields. When 22% of them preferred other farmers varieties, only 2% chosen research institute bred varieties. Many farmers complained also about the technical inadequacy of field staff in providing solutions to their problems.

6.3.3 Lack of marketing know-how regarding 'Auction system'

Cardamom marketing conducted under APMC Act is through a process of auction at designated locations. Farmers and traders participating in auction have to be registered under this Act by the Spices Board of India. This created unfriendly practices such as exclusion of several small farmers from the market, compelling them to sell their produce to middlemen, and formation of trade lobby to deny fair price to farmers. While the recent introduction of Cardamom growers ID card and e-auction are the steps in forward direction, but some farmers are still unfamiliar with the new system of auction.

6.3.4 Impacts of cardamom import

Indian cardamom has special reputation in the international markets because of its superior quality. In order to satisfy the domestic demand, India also used to import a huge quantity of cardamom from other countries. The mixing of the imported, cheap and inferior quality cardamom with Indian cardamom influences unfavorably on its price.

6.3.5 Need of acquiring the patent of Idukki cardamom

The small cardamom produced in India is very unique and superior. Therefore, its global market interest is high and has got highest price in the international market. Presently, the brand 'Alleppy Green' cardamom has set a widely recognized high benchmark for cardamom quality. By the name many misinterpreted Alleppy as the geographical indication of superior cardamom. But, actually, Alleppy region does not produce any and it is just a historical trade point of Idukki cardamom. So it would be more appropriate if we get the patent of geographical indications under the brand title 'Idukki Green'. Because, nowadays, the traders found misusing the brand by mixing it with the cardamom imported from abroad. Only the patent of Idukki cardamom would provide economic advantage to the farmers of this region.

Each one of the above mentioned problems need equal preference. Because, it would make changes not only in cardamom cultivation, but also would impact seriously on the ecology of surrounding regions with cascading effects on the people, their agriculture, livelihood and everything in the district. Majority of the problems which may devastate the cardamom sector like flood, drought, landslide, soil erosion and even price fluctuation, crop diseases etc. have relations with climate change in one way or the other. All these factors may restrict the new investments into the sector. But, if we can put forward proper solutions to these problems, it will revive the entire agricultural sector of the study area.

7. Conclusion

Like all other crops, cardamom also has several problems inherent and incidental to its cultivation. The farmers in Idukki district also face several struggles in this sector from the land preparation to its marketing. Undoubtedly, the

distinctive climatic parameters could have played momentous role in the flourishing of cardamom cultivation in the district. But, the changes in climate have already sent worrying signals on the sustainability of its cultivation over the years which may push the crop into an edgy future. Therefore, the study highlights the need for further investigations on micro-climate studies for improving the growth and yield of the cardamom. If the economy of Idukki can sustain with cardamom, then, it will remain as unique in the developmental literature as the spices crop of a region has lead to its economic upliftment which is very exceptional.

Cardamom is one of the few agricultural commodities produced in India which has significant export orientation. The superior quality cardamom which is being produced in India has huge demand both in the national as well as international markets. But because of the peculiar parameters essential for its growth, the cultivation is limited only to very few pockets in the country, where Idukki ranks the prime position. So, in order to recapture India's past glory in its production and trade, superfluous concern should be given by the government and other responsible agencies to tackle the issues persisting in the cultivation of cardamom. For that, rigorous attempts should be taken to improve its productivity not only through developing high yield varieties, but also through the process of constraint mitigation.

8. References

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