



PROCEEDINGS OF THE

Workshop cum Brain-Storming on Post Harvest and Value chain Management of Large Cardamom in Khangchendzonga Landscape

30th June 2020, Sikkim, India



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**Khangchendzonga Landscape Conservation and Development
Initiative (KLCDI)-India**

Abbreviations

ATREE	Ashoka Trust for Research in Ecology and the Environment
FPO	Farmer producer organization
ICIMOD	International Centre for Integrated Mountain Development
ICRI	Indian Cardamom Research Institute
IFFCO	Indian Farmers Fertiliser Cooperative Limited
KCC	Khangchendzonga Conservation Committee
KL	Khangchendzonga Landscape
KLCDI	Khangchendzonga Landscape Conservation and Development Initiative
MLAS	Mutanchi Lom Aal Shezum
MSME	Micro, Small and Medium Enterprises
NHB	National Horticulture Board
NIHE	G.B. Pant National Institute of Himalayan Environment
SU	Sikkim University
TMI	The Mountain Institute

Background

The fragile ecosystems of the Himalayan region are facing various impacts of climate change in the form of shift of habitats, loss of biodiversity, and environmental degradation. Large cardamom (*Amomum subulatum* Roxb.), a climate dependent crop, is one of the main cash crops of KL-India and facing apathy in current scenario of change strained by climatic perturbations, spreading of diseases (viral and fungal origin) and declining agronomic yield. In a longer run, these changes may have sever impacts on the livelihoods of

dependent communities. Therefore, there is a need to improve the resilience of people to both climatic and non-climatic threats and promote adaptive capacity by investigating, prioritizing and cross leaning of good practices of post-harvest and value chain management of large cardamom at regional as well as landscape level.

Realizing this, the Khangchendzonga Landscape Conservation and Development Initiative (KLCDI)-India programme of G.B. Pant National Institute of Himalayan Environment (NIHE), supported by International Centre for integrated Mountain Development (ICIMOD) has organized a Webinar-cum-Brainstorming event on 30th June 2020 to understand the current situation and future perspectives in large cardamom farming. The event provided an opportunity to discuss on strengthen linkages among farmers of large cardamom and diverse experts and enterprises.

Objectives

- To develop stakeholder's network on large cardamom by synergizing with relevant institutions across KL-India
- To identify best crop management practices, including; nutrient and pest management, irrigation management, post-harvest techniques, etc.
- To assess and identify opportunities for large cardamom based value chain development and management

Expected outcomes

- Established stakeholder's network on large cardamom in KL-India for knowledge sharing between experts and farmer groups, especially during COVID-19 pandemic period.
- Documentation on best practise for large cardamom crop management and adaptation approaches to climate change.
- Improved understating on possibilities in large cardamom based value chain products their management.

Highlights

- A Workshop cum Brain-Storming was organized for Post-Harvest and Value chain Management of Large Cardamom in the Khangchendzonga Landscape on 30th June 2020
- About 30 large cardamom based farmers from different parts of Sikkim, and Darjeeling and Kalimpong (West Bengal) have participated in the event
- About 18 panellists including scientists, academicians, researchers and policy makers from KL-India, including regional landscape programme manager from ICIMOD, Nepal, participated in the event.
- A total of fourteen presentations were made in three sessions

starting with an Inaugural remark by the Director, NIHE.

- Following the presentations, an interaction among cardamom experts from ICRI, NHB, TMI, horticulture department, Sikkim University and progressive farmers of KL-India was done. Various issues related to decreasing production yield, disease, value-chain development and market linkages were discussed.
- Concluding remarks were given by the chairs of each session and certificates of participation were distributed to the all the progressive farmers those attended the event.

Opening session

Dr. R. Joshi, Head, NIHE, SRC addressed the online 'Workshop Cum Brain-Storming on Post-Harvest and Value chain Management of Large Cardamom in the Khangchendzonga Landscape'. In his welcome address he expressed his gratitude towards all resource persons and other participants- progressive farmers and associated enterprises for their active participation in the workshop. He highlighted the overall objective of the workshop and requested farmers to share their experiences and problems regarding large cardamom management with the experts/resource persons present in the workshop and take benefit of the programme.

Dr. R.S. Rawal, Director, NIHE in his inaugural remarks mentioned that the workshop will be beneficial for farmers and associated enterprises. He

emphasized that the large cardamom is the niche product of the Sikkim and Darjeeling –Kalimpong Himalaya which provides livelihood security of the rural community. However, at present due to climatic factors and other unfavourable conditions, the crop is facing apathy resulting in declining agronomic yield affecting livelihood of the farmers which needs to be improved in the region. He therefore, instructed the organizers / scientific communities to come up with the knowledge product which will be beneficial for the stakeholders especially farmers to cope up with the prevailing drastic conditions for the crop.

Dr. K. S. Gaira, Investigator, KLCDI- India expressed his gratitude to all the members associated with the online workshop. He mentioned three niche products of the region, large cardamom, Yak and Ecotourism. Connecting to the workshop topic he requested farmer participants to share their problems on post-harvest management of the large cardamom among the experts team present in the forum and to get benefited. He also mentioned the current scenario of large cardamom in the region and pointed out some valid reasons why farmers have lack of interest towards large cardamom cultivation at present days those were due to hardship, less production and more disease infestations; as a result farmers are not getting benefit from the crop as earlier days. Further, he mentioned three points, first to identify the best practice of large cardamom cultivation and to adopt the same, secondly value addition of the crop is equally important in order to get the appropriate price in national and international markets, hence to discuss and work for value addition is very

important and finally, the problems faced by farmers in large cardamom cultivation and marketing. He told that different farmers may have different problems on large cardamom cultivation; therefore interaction among large cardamom growers of different areas is very important, for which farmers association of different areas is essential so that they can interact with each other and discuss their problems and solutions. Therefore, in order to get proper solution to these problems this stakeholder's meet is arranged.

Technical session

Session one: Best practices for large cardamom crop management (including nutrient and pest management, irrigation management, post-harvest techniques, etc.) and adaptation to climate change

Dr. Laxuman Sharma (Associate Professor, Department of Horticulture, Sikkim University) chaired the session I. He briefed about the session's topic to the respective panellists and coordinated the session in synergy with the session moderator Dr. K.S. Gaira. All the panellists were invited for their talk.

Panellist, Dr. T.N. Deka (Head, Indian Cardamom Research Institute, Gangtok) mentioned that, beside Sikkim other states like Nagaland, Manipur, (Darjeeling and Kalimpong districts) of West Bengal are also cultivating large cardamom satisfactorily. For good production planting materials should be good and healthy for which care should be taken from its seedling nursery. He also emphasized that special care should be taken during flowering time in order to

get good production in which pollinators (Bumble bees) plays a vital role. Besides this, irrigation and manuring are other important aspects to be taken care of for good production. He suggested farmers to dig a small pit in between four plants where rainwater will accumulate which helps to provide good moisture to the plants during the months of September - February and mulching in the large cardamom fields is equally important to conserve moisture and to provide proper nutrients to the plants for better production. He also stated that emphasis should be given on productivity, that is more production in less area, in this context he informed that there is a scheme in Spices Board i.e. productivity award of Excellency which is given to those farmers whose productivity is exceptionally high. Further he talked about value addition which is important for getting better price. Therefore, it is important to work for high income generation. He also spoke about various schemes of Government regarding licence for doing business which is very important for doing business. In this aspect, he told, farmers can approach Spices Board for getting different licence like Traders licence, Exporter licence, Auctioneer licence etc.

Panellist, Mr. B.L. Dahal (Additional Director, Horticulture Department, Government of Sikkim) pointed out some important facts for large cardamom management in the region. He mentioned first of all farmers should be provided with disease free, healthy planting materials for cultivation in their fields, secondly he emphasized on management system, as large cardamom used to cultivate in forest areas with other plants where weeds are

common problem hence clean cultivation with proper weed management is very important. Beside this, nutrient management is essential for the crop, he mentioned. Further, he stressed on irrigation which is very important factor. Since large cardamom is shallow rooted crop and requires regular irrigation, but this region face prolonged dry months i.e. about 7 months as a result there will be moisture stress to the crop which will invite several diseases. In order to combat this problem he suggested farmers to make trench across the slope of the large cardamom fields which will retain water, such stagnant water will provide moisture to the crop during these prolonged dry months. He also talked about value addition and said we should work for large cardamom oil production, several materials from large cardamom stalks etc. Mr. Dahal also informed about Sikkim government's important steps for marketing of the large cardamom outside the state. He added that, the state government's policy/ joint venture with Indian Farmers Fertiliser Cooperative Limited named 'IFFCO Sikkim' for large cardamom exporting from the state is in progress and will be implementing soon, in which packing and branding will be done in the state, before sending the materials outside the state.

Panellist, Dr. Ghanashyam Sharma (Programme Manager, The Mountain Institute, Gangtok) showed his books with photographs on details of large cardamom cultivation, value addition etc. He mentioned that the book is in English as well as in local Nepali language which will be helpful for the regional farmers for cultivation and post-harvest management of the crop. Dr.



Large cardamom (*Amomum subulatum*) seedlings ready for plantation

Sharma requested G B. Pant Institute to appeal Director General of ICIMOD to allow for producing sufficient copies of these books so that they can be distributed to all the farmers/large cardamom growers of the region. He also highlighted on pollination, for which bee keeping should be encouraged. Beside bumble bees honey bees also help in pollination of the large cardamom and this fact is also incorporated in his book he added. He said that other crops like kiwi, beans and other various crops can be cultivated in between or nearby large cardamom fields in order to invite the pollinators. He mentioned that there is problem in storing of large cardamom after harvest and there are no co-operatives of farmers which is essential to sort out these problems collectively. He also talked about the fact that in some places farmers produce enough seedlings but there will be no buyers of their seedlings and another problem is transportation and mishandling of these seedlings. He supported the suggestion of Mr. Dahal of making trenches between the large cardamom plants and told it helps in providing moisture to the plants. He mentioned about storage problem after harvesting of crops. Some farmers used to keep their large cardamom for 2-3 years waiting for the good price, but longer keeping will make it dry and there will be huge loss in total weight, therefore proper storage system should be there and should work for this. Dr. Sharma emphasized on disease management problem in the state, he told that viral diseases Chirkey and Phurkey are still there in farmers' field with other various diseases like root rotting etc. He therefore, requested Spices Board to work for these diseases, since the department is in this region from several

years and working for the disease management, but so far not effective measures have been brought out to control the diseases he added, and also appealed Spices Board that there should be National Mission to eradicate these diseases from the farmers' fields. He requested that, in large cardamom growing areas of Himalayas a comprehensive large cardamom policy should be prepared by government of India including all these details with the purpose of providing benefits to the farmers/large cardamom growers.

Panellist, Dr. Sarala Khaling (Regional Director, ATREE, Gangtok) discussed about pollination and told that best practice for pollination management is not yet studied in large cardamom growing regions of Sikkim, Darjeeling as well as in Nepal. No literature from these regions mentioned about pollination management of this crop, whereas, for small cardamom in South India, sufficient pollination management best practices identified. Hence, in large cardamom growing regions also such best practices should be identified, for which scientific research should be carried out. She pointed out three best practices of small cardamom practicing by farmers of Western Ghat, first to identify the pollinators and document all of them, second, to study about those plants which are preferred by these pollinators and to manage those plants around large cardamom field so that their habitat will be around the large cardamom and third point she mentioned was large cardamom growers should be in touch with those who are involved in research and developmental activities and told that these practices

can be implemented in large cardamoms.

Concluding remarks of session one

Dr. Laxuman Sharma, summarizing the session mentioned that, it is necessary to understand the wide gaps between a normal farmer and a progressive farmer who in limited area are producing higher yield. Therefore, it is essential to find out the measures that which intervention is needed to fill up this gap, whether training program is sufficient or demonstration or any other intervention is required. He said that providing healthy planting materials to the farmers is also important. Proper study on pollinators is very important he mentioned. Talking about irrigation, he told trench making in large cardamom field is new technology and it is effective measures and also talked about lack of post-harvest management, and improved *bhatti* for large cardamom drying. Dr. Sharma mentioned that no such improved and effective large cardamom drying *bhatti* is in practice, in which after drying also colour retention will be there, it is important issue of post-harvest management of large cardamom and should work on it, he added. He also highlighted that in past large cardamom cultivation practices used to be in forest areas but at present farmers cultivate this crop in their field and put manure unlike past, it may be considered as best practice. Value addition is another important aspect and by-products like oil extraction from seeds and making composting from plant stalks. He informed about IFFCO Sikkim through which local farmers will get premium price as packaging and branding will be

done inside the state which also saves from duplication. Farmers can be educated through literature regarding cultivation and post-harvest management of the crop, as in most of the places there is lack of literature extension where such literature will be useful. Farmers' co-operative organization is important, through which price realization, price fixation can be done. He talked about mishandling of plant materials during transportation; hence, good practice in this regard is also essential. To formulate comprehensive large cardamom policy and to strengthen linkage of farmers with research and extension is vitally important he concluded with these points discussed during the session.

Session two Issues and opportunities for large cardamom based value chain development and management

Dr. T.N. Deka (Head, Indian Cardamom Research Institute, Gangtok) chaired the session II. He briefed about the session's topic to the respective panellists and coordinated the session in synergy with the session moderator Dr. Aseesh Pandey. All the panellists were invited for their seven minute talk.

Panellist, Dr. Laxuman Sharma (Associate Professor, Department of Horticulture, Sikkim University) Panelist talked about challenges for value chain, those are scarcity of resources and scope to increase the yield so need to focus on productivity of the crop. For price realization there are multiple intermediaries and lack of conspiracy and traceability in the pricing of large cardamom and huge conspiracy in the marketing of large cardamom and regional farmers are getting much less

price although some efforts on this is from NERAMAK, Sikkim State-Cooperative Supply and Marketing Federation Limited (SIMFED) etc., but the farmers are not getting the price which they deserve. Further he talked about quality losses during transportation which needs to be addressed and curing is another aspect, he also emphasized to work on desirable colour for getting the premium price.

Panellist, Dr. K. S. Gaira (Investigator, KLCDI-India, NIHE, SRC) mentioned that for value addition, it is essential to ensure the pollination and nutrient management in large cardamom for both quality and quantity of harvest. He mentioned about ineffective traditional drying techniques, which are old traditional bhattis in which quality will degrade and farmers get minimum price, therefore it is essential to work on post-harvest management in order to produce good quality large cardamom for getting better price. He also mentioned that good market linkages should be provided to the farmers for better marketing.

Panellist, Ms. Tshering U. Bhutia (CEO, Khagchendzonga Conservation Committee, Yuksam) presented her views on farmers' inaccessibility of scientific community, they are not well aware about the diseases/pests management practices. Therefore the scientific communities should involve those farmers while arranging such programmes on diseases management etc. and through on-farm training programmes they can be educated but organizing one programme will not be sufficient; experts should go to the farmers' field to train them. She also mentioned that scientific departments used to facilitate farmers under certain project schemes, but after

the completion of the project /budget the beneficiaries left unattended, in this regard she told such things to be avoided but repeated follow up in this regard is essential. Manuals and literature distribution to farmers is not sufficient to educate them, rather on-farm training is needed. She also pointed out the fact that farmers are sometimes unaware of the actual market rate and used to sale their large cardamom in very less price to the vendors, who in turn make huge profit out of it. Therefore, the farmers should be educated to categorize their produces so that they get good price for their best category's large cardamom. She also requested experts to work for alternative better drying methods in place of traditional bhatti for bulk drying retaining all the desirable qualities including colours so that the farmers get good price for the produces.

Concluding remarks of session two

Dr. T. N. Deka, concluded the session summarizing the important points discussed in the session and regarding requirement of improved drying system he informed about SAWO dryer developed from Nagaland which is under scheme, farmers of this region can take advantage of it. He also informed that Spices Board is working for 'Spice complex' near Pakyong, East Sikkim. The land for the same was handed over by state government. Dr. Deka also talked about international marketing system, for which traders in Siliguri deal with it. He informed that there are 5 different grades of large cardamom and specifications under each grade is mentioned in the leaflet which will be available in Spices Board, in this context he requested

farmers to get informed of these things as well. Finally, he emphasized farmers to take advantage of facility of exporters' license and traders' license for marketing of the large cardamom.

Session three: Developing stakeholder's network on large cardamom for knowledge sharing and developing resilience

Dr. Nakul Chhetri (Regional Programme Manager, Transboundary Landscape Programme, ICIMOD, Nepal) chaired the session and highlighted some important points to be focussed on. He mentioned that in the international markets four types of large cardamom like black, green white and large cardamom are traded together as large cardamom. The cultivation of black, green and white cardamoms with some other varieties practiced in South East Asian countries in large scales whereas the production volume of large cardamoms in Eastern Himalayan region is less comparing to SE Asian countries. Therefore, while considering overall cardamom trade, large cardamom occupies minimum position. But earlier no other producers of large cardamom were there hence there was huge demand of large cardamom but at present due to large scale production of other cardamoms from SE Asian countries there are more supply of cardamoms in international markets. In the context of large cardamom cultivation he told that in Eastern Himalayan region also its cultivation practice is increasing, as previously it was in limited areas. Sikkim was the pioneering state of large cardamom cultivation, but at present it extends up to many north eastern states including Nagaland. Likewise in Eastern Nepal, earlier only two

districts were involved in its cultivation practice but at present 36 districts are involved in large cardamom cultivation. Hence, supply of large cardamom also increased but demand decreased. Therefore, it is essential to work for positioning of Eastern Himalayan large cardamom as unique product from the Himalayan region. He emphasized on collective market networking among large cardamom growing Eastern Himalayan countries and said that, it should start from local level, for which first of all it is important to strengthen Sikkim's network then Bhutan, Nepal respectively. Such collective effort facilitates in moving forward to negotiate the marketing strategy. For this, it is necessary to support SAARC initiatives, in which Nepal has already initiated. In this regard, decision of regional compatible policy is needed, he stated.

Panellist, Dr. Rajesh Joshi (Head, NIHE, Sikkim Regional Centre) highlighted the reasons behind decline of large cardamom cultivation practices and production in Sikkim, this is due to change in land use pattern, loss of genetic diversity, alternative source for more income generation, rural to urban migration of youths and overall impact of this is loss of traditional system of large cardamom cultivation. Hence, trans-disciplinary convergence of knowledge is necessary. To bring different stakeholders in a single platform and to share knowledge, perspectives and resources to the end beneficiaries / farmers is essential, he also mentioned that various research was done in past in these issues, which are available in scattered form and to collect all those including

traditional practices, value chain, market linkages etc. and bring them together to share the same among the end beneficiaries or the farmers is very important. Through this network farmers can share their good traditional practices including climate change adaptation so that the other farmers will get benefitted following those effective practices. In this context, he added other helping networks for farmers are line agencies like Micro, Small and Medium Enterprises (MSME), who have different schemes for farmers so that the benefits of these schemes can be provided to the farmers. He emphasized that, there is need to recognize traditional knowledge system for cultivation of large cardamom and documentation with different communities. He also mentioned that there should be online feedback mechanism or sharing of knowledge between farmers, practitioners, researchers, communities and departmental organizations as well as training and capacity building programs on online platform, which is essential during such unforeseen scenario like present COVID situation and some others in future when close interaction will be unfeasible. He also proposed to make mobile WhatsApp group of farmers with various stakeholders, departments like GB Pant National Institute of Himalayan Environment, Cardamom Research Institute as well as ICIMOD involving other experts from Sikkim, so that whenever farmers need any assistance, solution and support can be provided instantly to the farmers.

Panellist, Dr. Sarala Khaling (Regional Director, ATREE, Gangtok) mentioned that after forming network between different stakeholders it should be

functional. If such network based on agricultural practices is functional in Nepal or Bhutan it is essential to look upon. And also to see effective and functional network around, in this context she mentioned about tea in Arunachal Pradesh. She expressed that it is equally important to get any institutional lessons in this respect and mentioned that to involve private partners in the network. Most of them are young entrepreneurs who use digital technologies and their views, ideas and way of working are completely different and business oriented, whereas the same is lacking in scientific communities. Therefore, their involvement will enrich this networking.

Panellist, Dr. T.N. Deka (Head, Indian Cardamom Research Institute, Gangtok) mentioned that large cardamom growing is grown in Myanmar also besides India, Nepal and Bhutan. *Amomum subulatum* is the large cardamom promoted by Spices Board. However, it is known that other *Amomum* spp are also available, in the large cardamom growing areas which are wild in nature.

Panellist, Tshering U. Bhutia (CEO, Khangchendzonga Conservation Committee, Yuksam) mentioned that while making network it should be done from grassroots level before involving all groups together from farmers to experts and scientific communities. She emphasized, first to form group among farmers level and with buyers and traders for pricing and marketing in order to make farmers aware of actual market prices. In addition, she suggested forming of network for value addition in local level by producing different innovative products and their packaging from the

different parts of large cardamom involving self-help groups, through trainings; it will empower these groups and improve their economic status as well.

Concluding remarks of session three

Dr. Nakul Chettri, in his concluding remarks mentioned that there are some good practices where organizations are working on providing fair market price so that the farmers get appropriate rate of their product, in this connection he gave an example of such organization of Kalimpong, (i.e. Kalimpong Krishak Kalyan Sangathan, KKKS) which works on this aspect. He emphasized on proper networking and linkages. He further highlighted that, it is very important to work for positioning of large cardamom as an important brand product of Eastern Himalaya. Dr. Chettri, mentioned that it is also essential to form WhatsApp group or provisioning information online for farmers to interact with experts so that they can discuss their problems, and there should be telephonic discussion of farmers with experts which will be helpful in solving their problems to some extent. He finally concluded by saying that Taplejung Proceeding on large cardamom value chain is could be shared among the group of the present online workshop for more information.

Interactive session

After each technical session, an interactive session was conducted in which progressive farmers from Kangchendzonga Landscape, India

(Darjeeling and Kalimpong districts of West Bengal and all four districts of Sikkim state) have participated and interacted with the experts for their issues and suggestions regarding the large cardamom. Few of them are highlighted below:

Progressive farmer, Tika Ram Adhikari (Lower Luing, Ranka, East Sikkim) mentioned his problem on large cardamom farming and asked for solution of the plant decay problem in his large cardamom field. Dr. T. N. Deka suggested Mr. Adhikari to maintain cleanliness in the crop field and told him to contact spices board and ensured him to provide all the information and solutions related to his problem.

Progressive farmer, Mr. Aita Hang Subba (Lower Mukrung, Lungyok, West Sikkim) inquired about possibility to get in touch with different government departments like agriculture, horticulture etc. to get guidance and support in large cardamom cultivation. He also informed that, due to continuous drop in large cardamom prize, farmers of his area are giving up large cardamom farming practices, hence, he enquired that in future they will get better price or not, so that they can decide whether to carry on this farming practice or will look for some other alternatives. Mr. Subba in his query also mentioned that whether Sikkim's Seremna large cardamom can be filed for patenting. Answering farmers' queries Dr. Ghanashyam Sharma suggested them to apply properly decomposed dried manure in large cardamoms. He also instructed them how to apply the manures. He told, after harvesting of large cardamom it should be applied at base of each plant after light digging

around the plant without disturbing the roots and to cover with plant residues. He also informed that in Taplejung area of Nepal farmers used to construct cattle sheds above the large cardamom fields and during rainy season manures from cattle sheds rolled down with rain water to large cardamom fields, such technique can be adopted in this area, he added. Dr Sharma also mentioned that application of manures in large cardamoms twice a year is sufficient, that is just after harvesting and before the start of rainy season which should be before flowering, and this will ensure better yield. Further, Dr. T.N. Deka also answered farmers' queries and informed that the farmers can contact Spices Board offices near to them which are located in different areas such as Kalimpong and Sukia in Darjeeling district, likewise Geyzing, Jorhang and Mangan in Sikkim beside Gangtok, where from they can get ideas on different schemes of government and to get benefit. He also added that, value addition is very important to get maximum economic benefit from the crop and talked about various marketing schemes. He said that interested farmers can contact Spices Board for detailed information, further he informed that Sikkim's large cardamom got GI Tag and told that this large cardamom has become GI Product.

Progressive farmer, Mr Uttam Rai (Dharey Gaon Sopakha West Sikkim) enquired about pest management in large cardamom and asked how to keep the plants free from its pests. She also enquired about appropriate manures for cardamoms. Dr. T.N. Deka talking on pests management issue Dr. Deka informed that caterpillars are one of the common pests of this crop and first

infestation occurs in May June. Larvae deposition occurs on back of leaves which should be removed manually.

Conclusion

The online workshop during such unforeseen situation of COVID-19 pandemic also received good participation from different parts of KL India. The progressive farmers from different parts of Sikkim and Darjeeling got the opportunity of interacting with resource persons / experts, where they placed their queries related to large cardamom farming and post-harvest management of this crop through online platform. Most of their queries were answered by experts present in the forum and provided guidance for departmental interactions in future whenever needed. Thus, the participants had the opportunity to learn from each other by sharing their knowledge and experiences. All the representatives present in the workshop emphasized on requirement and developing improved techniques for drying of large cardamom in order to get best quality product for premium price. Through the large cardamom growers it was came to the notice that, at present due to various diseases and pests, crop yield has drastically dropped comparing to earlier days; likewise the market price has also been dropped and due to such reasons there is less interest among farmers to continue large cardamom cultivation practices. Therefore, through this online workshop, it was revealed that there is an urgent need to encourage large cardamom growers and facilitate them to continue this practice. Moreover, there is imperative need to make

combine effort to establish large cardamom as a unique product of eastern Himalayan region, so that it will not lose its identity among other South East Asian large cardamoms (white, green and black) in international market.

Discussion on best practices for large cardamom management brought some important aspects to be focused on. One of the significant aspects was pollination management practices for both quality and quantity yield. Issues on value chain development and management for this crop was also addressed in the forum. One of those was traditional drying technique will degrade the quality of the large cardamom which needs to be replaced by improved dryer. In this context, it was suggested that SAWO dryer developed from Nagaland may be adopted in this region. The forum also discussed on developing regional branding, marketing strategies, and hence farmers were informed about exporters' and traders' licence for marketing of large cardamom. Discussion also highlighted developing stakeholder's networks and linkages for knowledge sharing to promote large cardamom. It was suggested that, beside scientific community, farmers, departmental organizations, it is equally important to involve private partners in this network to enrich the group in all aspects.

Key recommendations and follow-up actions

Session I Best practices for large cardamom crop management (including nutrient and pest management, irrigation management, post-harvest techniques, etc.) and adaptation to climate change

1) Aggregation of cardamom capsules through farmer producer organization (FPOs) / nongovernmental organizations (NGOs) for better marketing

2) Shared information on upcoming spices complex in Sikkim

3) Available grades of large cardamom capsules,

4) Importance of packaging for better income and outreach

5) Importance of having traders / auctioneer / exporter licence from Spices Board.

Session II Issues and opportunities for large cardamom based value chain development and management

1) Productivity to be increased through better management (farm to customer)

2) Pollination and quality of capsules

3) Curing of capsules and modern / improved drying system availability

4) Linkages among stakeholders (farmer to end user)

5) Management of viral disease like Chirke

Session III Developing stakeholder's network on large cardamom for knowledge sharing and developing resilience

1) Need of market price fixation so that the farmers get appropriate rate of their product

2) Exchange of best practices across the Khangchendzonga Landscape (KL) - India as well as across all large cardamom growing areas

3) Develop a medium to bridge gap between farmers and scientists/ policymakers (via WhatsApp group etc)

Programme and panel

Program	Resource person
Welcome address (11:30-11:35 am)	Dr. R. Joshi (Head, SRC)
Inaugural remark (11:35-11:45 am)	Dr. R. S. Rawal (Director, NIHE)
About the programme (11:45-11:50 am)	Dr. K.S. Gaira (Investigator, KLCDI-India)
Technical session (11:50-12:55pm)	Three sessions
Vote of thanks (12:55-01:00pm)	Dr. Aseesh Pandey (Manager, KLCDI-India)
Patron	Dr. Ranbeer S. Rawal , Director, NIHE
Convener	Dr. Rajesh Joshi , Head, GBPNiHE, Sikkim Regional Centre
Co Convener(s)	Dr. Kailash S. Gaira and Dr. Aseesh Pandey
Key Panellists	Dr. Nakul Chettri , Regional Landscape Program Manager, ICIMOD, Nepal Dr. T.N. Deka , Head, Indian Cardamom Research Institute Dr. Laxuman Sharma (Associate Professor, Sikkim University) Dr. Ghanshyam Sharma (Program Manager, TMI, Gangtok) Dr. Sarala Khaling (Regional Director, ATREE) Mr. B.L. Dahal (Add Director, Horticulture Department, Govt. of Sikkim) Mr. Ugen Palzor Lepcha (MLAS, Dzongu) Ms. Tshering U. Bhutia (KCC)
Panellists	Mr. Manoj Subba (Department of Horticulture)
Partners organizations	: Khangchendzonga Conservation Committee (KCC), Yuksam : Horticulture and cash crops development department Krishi Bhawan, Tadong : Indian Cardamom Research Institute (ICRI) : National Horticulture Board, Sikkim : ATREE, Gangtok : Department of Horticulture, Sikkim University

Agenda

SN	Program	Resource person
Session I	Best practice for large cardamom crop management (including nutrient and pest management, irrigation management, post-harvest techniques, etc.) and adaptation to climate change	Chair: Dr. Laxuman Sharma Panelist: Dr. T.N. Deka Mr. B.L. Dahal Dr. Ghanshyam Sharma Dr. Sarla Khaling Key farmers: Mr. Tika Ram Adhikari Mr. Uttam Rai Mr. Janak Lal
	Moderation: Dr. K.S. Gaira	
Session II	Issues and opportunities for large cardamom based value chain development and management	Chair: Mr. T. N. Deka Panelist: Dr. Laxuman Sharma Dr. K.S. Gaira Ms. Tshering U. Bhutia Key farmers: Mr. Ashim Subba Mr. Krishna Luitel Mr. Navin Pohkrel
	Moderation: Dr. A. Pandey	
Session III	Developing stakeholder's network on Large cardamom for Knowledge sharing and developing resilience	Chair: Dr. Nakul Chettri Panelist: Dr. Rajesh Joshi Dr. Sarala Khaling Mr. Rinzen Lepcha Dr. T.N. Deka Key farmers: Mr. Sonam Sherpa Ms. Sanchmaya Limboo Mr. Sangdup Lepcha
	Moderation: Dr. R. Joshi	

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