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भारत

SPICE INDIA

October 2019, Vol. 32, No.10

ANNUAL SUBSCRIPTION ₹120



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PAGE LAYOUT, DESIGN & PRINTING

Print Express

44/1469 A, Asoka Road

Kaloor, Ernakulam 682 017

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Email: printexpresskochi@gmail.com

 facebook.com/SpicesBoardIndia

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SPICE INDIA

www.indianspices.com

Volume 32

Issue 10

October 2019



Spice India published simultaneously in
ENGLISH, MALAYALAM, TAMIL, KANNADA, TELUGU, HINDI & NEPALI

SUBSCRIPTION RATES

One year - ₹ 120, Five years - ₹ 500

Subscription may be sent either by
M.O. or Bank Draft drawn in favour of
The Secretary, Spices Board, Kochi

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S. V. Rangaswamy & Company Private Limited
50/865-A, "Aishwarya" Changampuzha Samadhi Road, Edappally, Cochin.
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Recognition of Prior Learning Training Programmes for Empowerment of Spice Farmers

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Launched in 2015, Prime Minister's Kaushal Vikas Yojana (PMKVY) is the flagship scheme of Ministry of Skill Development and Entrepreneurship (MSDE) instituted to develop, improve and certify skill of Indian youth. A component for assessment and certification of individuals with prior learning experience or skills was also introduced under PMKVY by the name Recognition of Prior Learning (RPL).

Spices Board is implementing the project titled 'Recognition of Prior Learning (RPL) training programmes for the empowerment of farmers engaged in Spices cultivation and processing' funded by National Skill Development Corporation (NSDC) under the Ministry of Skill Development and Entrepreneurship, Govt. of India. The total financial outlay for the project is Rs.5.31 crores.

The NSDC is the nodal agency to promote skill development. NSDC has been set up as a part of National Skill Development Mission to fulfil the growing need in the country for skilled manpower

across various sectors and to narrow down the existing gap between the demand and supply of skills. 412 job roles have been identified and 32 sector skill councils (SSC) have been registered under PMKVY under various sectors. One such sector skill council is Agriculture Skill Council of India (ASCI).

Spices Board, as the Project Implementing Agency (PIA), is currently implementing RPL project in 18 states of India where spice crops are largely grown (720 RPL programmes with 25 trainees per batch covering 18,000 beneficiaries). The project is being implemented in the states of Sikkim, Arunachal Pradesh, Mizoram, Manipur, Meghalaya, Tripura, Nagaland, Karnataka, Assam, Kerala, Tamil Nadu, Andhra Pradesh, Telangana, Rajasthan, Gujarat, Madhya Pradesh, Bihar and Uttar Pradesh. Objective of the project is to recognize and certify a person's existing skill sets, knowledge and experience gained either by formal, non-formal or informal learning in the spice sector.



Candidates of RPL Training programme at Wayanad

Training programmes are conducted in seven different job roles viz.

1. Nursery Worker (AGR/Q0807)
2. Spice Crop Cultivator (AGR/Q0603)
3. Plant Tissue Culture Technician (AGR/Q8101)
4. Vermi Compost Producer (AGR/ Q1203)
5. Organic Grower (AGR/Q1201)
6. Medicinal Plants Grower (AGR/ Q0901)
7. Pack House Worker (AGR/Q7503)

One hundred and thirteen officials of Spices Board has already got themselves certified as Certified Trainers on the above said job roles, after undergoing Training of Trainers (ToT) programmes conducted by ASCI and these officials are conducting the RPL training programmes all over the country.

The three days training programme (2 days training and 1 day evaluation) is implemented by the Regional/ Zonal/ Field Offices of Spices Board. Trainees are provided with a job role kit

consisting of study materials, writing pad, pens T-shirt and cap. Trainees are also provided with Accidental Insurance Coverage under Pradhan Mantri Suraksha Bima Yojana (PMSBY scheme-1) for 3 years. Based on the assessment conducted on the third day, successful trainees are felicitated with certificate and rupees 500/- in their registered bank account. The Training programme is conducted free of cost.

Spices are one of the major exported agricultural commodities from India. India also has the largest domestic market for spices in the world. Indian spices are the most sought-after globally, given their exquisite aroma, texture and taste. Break through technological developments are opening up immense potential and possibilities in every realm, almost every day. Spices are grown in all the states of India. It is understood that the day to day workers and farmers engaged in the spices industry, despite of their practical knowledge lack technical training, which may immensely help them for skill development. Candidates identified in the proposal are not aware about the industry trends, current employability scenario, and benefits of skilling/ training. They are just following the family occupation/ traditional



Plant tissue culture technician

Practical session on vermicompost production

working methods. The project on "Recognition of Prior Learning (RPL) for empowerment of farmers engaged in Spices cultivation" aims at connecting working candidates with the national training framework and giving them recognition globally.

Key outcomes/benefits post completion of RPL amongst spice farmers in proposed states are:

1. The project will **empower** the spice workers/processors through **up skill training** to enhance their efficiency which will result in up gradation of skill & certified pool of workforce required for the spice sector. The Skill certificate/Skill card will help them to get **better opportunities/entrepreneurship** as it is widely accepted by industries now. There will be a development of **entrepreneurial abilities and soft skills** among self-employed farmers and increase in **self-**

employment opportunities and also **wage earning opportunities** among rural masses after quality training during RPL.

2. The skill programme will be designed as an '**on the job training**' to the **spice nurseries, tissue culture technique, organic production techniques and pack house workers and processing labourers** in the spice industry. By this, Spices Board aims to **enhance the workers' awareness** on these important areas, and thereby **increase in quality of spices production / processing/** and provide employees with the opportunities to **acquire new skills**, and in turn it will equip them to get associated with those lines, and **enable to earn them better pay packages**.
3. RPL will improve the competencies of **non-traditional farmers** who may not have had the opportunity to do further study



Trainees planting tree saplings in Spices Park



RPL candidates with certificates

after dropping out from School /college by **bridging the gap and upgrading the skills.**

4. **Latest Farm Technologies coupled with Effective Agronomic Solutions** will lead to the adoption of **sensible low-cost technology** amongst farmers which will **reduce production cost/loss** by following correct farming procedures & demand led production of better **quality produce.**
5. **Formal recognition of skills and competencies** of farmers and their certification will assist in availing credit facilities for the agriculture development of their farm.
6. **Value chain linkage** [like market access, e-marketing, processing & export opportunities etc.] will lead to **increase in**
7. **income** of farmers.
7. Farmers will be trained about **risk management, crop insurance, financial and digital literacy** which will lead to increased income with reduced risk.
8. It will help improve the **aspirational value of Agriculture Skills** among the rural youth. It will also enhance farmers **pride and self-esteem and increase confidence** in the individual that they are now skilled and recognised.
9. It will help unemployed youth who will undergo training & certification via RPL to **enter labour market.**

As on date, two thousand one hundred and eleven (2111) spice farmers were trained under this unique certified training programme across the country.



DISTRIBUTION OF CERTIFICATES TO SUCCESSFUL PARTICIPANTS OF RPL TRAINING PROGRAMME



RPL Candidates from Amaravathy, Idukki along with Shri D Sathyan IFS, Secretary Spices Board and Dr. A. B. Rema Shree Director (Res & Dev) after certificate distribution

Certificate distribution ceremony for the successful participants of the Recognition of Prior Learning (RPL) training programme was conducted at Indian Cardamom Research Institute (ICRI), Myladumpara on 3rd April 2019. Shri D Sathyan IFS, Secretary, Spices Board gave away the certificates to nearly 100 farmers from different parts of Idukki district who completed the training programme for 'Nursery Worker' and 'Organic Grower'.

Speaking at the occasion, Shri D Sathyan IFS, Secretary, Spices Board congratulated all the certificate winners and urged the farmers to use their skills for the betterment of spices sector and better livelihood. Dr. Rema Shree A B, Director (R & D) Spices Board presided over the function and threw light on the recognition of prior learning and its importance in promoting skill development in Indian spice sector. Dr. Dhanapal K, Scientist-D addressed the gathering and stressed the importance of recognition of skills.

Dr. John Jo Varghese, Scientist-C welcomed the gathering and Dr. K Pradip Kumar, Scientist-C proposed the vote of thanks.

The RPL training programmes were conducted at Upputhara, Amaravathy, Peermade and Myladumpara earlier. The first training programme was conducted at Upputhara during 2nd January 2019 to 4th January 2019 on 'Nursery Worker' job role and 29 farmers were trained. The second training programme on 'Nursery Worker' job role was conducted at Amaravathy during 8th to 11th January 2019 and had a turnout of 43 participants. The third training programme on 'Nursery Worker' was conducted at ICRI, Myladumpara with 41 participants during 6th to 8th March 2019. The RPL Training Programme conducted at Peermade during 12th to 14th February 2019 was for Organic Grower which had 22 participants. The programmes were conducted under the leadership of Smt. Vijeeshna V, Assistant Director, Spices Park,

Puttady and Shri.Harikrishnan S, Sr. Agriculture Demonstrator, ICRI Myladumpara.

The 'Recognition of Prior Learning Programme' organized through a five-stage process viz. mobilization, counselling and pre-screening, orientation, final assessment and certification, mark sheet and pay out distribution to candidate, identifies the pre-existing skills of the participants and enhances it through training and certification. The project aims to align the competencies of the un-regulated workforce of the country to the standardized National Skills Qualification Framework (NSQF), to enhance the employability opportunities of an individual



Successful RPL trainees

as well as provide alternative routes to higher education and to provide opportunities for reducing inequalities based on privileging certain forms of knowledge over others.

Potential candidates are counselled about RPL and its benefits. After counselling, a pre-screening test is conducted to ascertain the job role which matches the prior knowledge and existing skill sets of the potential candidates. Pre-screening test involves collection of supporting documentation/ evidences from the candidates and a candidate self-assessment. After which, all candidates are mandatorily provided orientation of 12 hours which include 6 hours of domain specific training, 4 hours of training on soft skills and entrepreneurship, and 2 hours on familiarization with the assessment processes

and methods. Knowledge gaps identified during the counselling stage are also addressed during the orientation.

Assessment of candidates is conducted by the assessment bodies accredited by the Sector Skill Councils (SSCs). Under this programme, the candidates are assessed on both Core as well as Non-Core NOSs [National Occupational Standards. NOSs describe best practices by bringing together performance criteria, knowledge and skills pertaining to a job role. A set of NOSs related to a specific job role is called Qualification Pack (QP). Qualification Pack for every Job Role is pegged at a NSQF Level.] of a Qualification Pack (QP). Core NOSs carry

70% weightage and Non-Core NOSs carry 30% weightage in the total assessment score of the candidate. SSCs choose to conduct offline as well as online assessment depending upon the characteristic of the sector

and availability of online modules. SSC upon approving the result issues the certificate to successful candidates. Pass percentage in the assessment exam for job roles of NSQF level 1, 2, 3 is 50% and for job roles of NSQF level 4 and above is 70%. A candidate who achieves greater than or equal to the pass percentage for a QP is awarded the PMKVY RPL Certificate, Mark sheet and a candidate pay-out of Rs.500. A candidate who achieves less than the pass percentage mentioned for a QP, but at least 30% or above of the total score, receives only mark sheet and candidate pay-out of Rs.500. A candidate, who scores less than 30% of the total score, shall receive only the mark sheet and is further encouraged to undergo Short Term Training under PMKVY.



A. Shainamol, IAS

Took charge as Director (Finance)

Smt A. Shainamol, IAS assumed charge as Director (Finance) of the Spices Board on 28th August 2019. She belongs to the 2007 batch of IAS from the Cadre of Himachal Pradesh. She holds a PG Degree in Economics. She started her career Asst Commissioner (Development) at Nahan, Himachal Pradesh. Thereafter she served as Sub Divisional Magistrate of Kullu district in Himachal Pradesh. Then she was the Additional Deputy Commissioner, Shimla and Additional Director (Industries) in Shimla, Himachal Pradesh.

In 2014, she proceeded on inter-cadre deputation to the State of Kerala. Her first posting in Kerala was as the Director, Employment and Training. She won the hearts as the District Collector of Kollam and Malappuram districts. Later on, she served as Managing Director of Kerala Water Authority. While serving the challenging role as Additional Commissioner, State Goods & Services Tax Dept, Govt of Kerala she proceeded on Central deputation and joined Spices Board as Director (Finance).



Up Skilling The North East

North East India has suitable agro climatic conditions for production of an array of unique and indigenous spices that are highly sought after. Since the spices are mainly grown by adopting indigenous practices, the spices in NE region are considered as organic by default. By implementing the Recognition of Prior Learning (RPL) training programmes in the region, Spices Board is expecting to harness the skills and practices of the farming community for their socio-economic upliftment.

Considering the peculiarities and existing farming practices in the North East, trainings were provided in the job roles of Organic Grower, Nursery Worker and Vermicompost Producer. Trainings were arranged based on the need

for adaptation of farming techniques, which are sustainable from environmental, production, and socio-economic points of view; at the same time, conserving the available natural resources also. Taking into account the need for understanding the problems and prospects of 'scientific, technology driven farming' and incorporation of the same into the existing traditional cultivation practices without exploiting the natural resources, the curriculum of the training programmes were carefully designed to suit the requirements of the region for betterment of the farming community.

Training programmes in the job role of 'Organic Grower' details the concepts of scope and opportunity of organic farming, scope and need of organic farming in Indian agricultural

scenario, selection of crop and farming practices, seed selection and treatment, soil nutrient management, soil health management, understanding the weed biology and weed control, understanding and adoption of good irrigation systems, integrated pest and disease management, understanding the physical admixture during harvesting, and methods & handling of harvested crops etc. Further, there were also sessions on quality assurance and certification process, risk management in compliance of standards, participatory guarantee system, documentation in third party and PGS certification, documents needed for sale of organic produce and traceability, the business of organic farming, understand the economics and connect with the market, market intelligence and direct marketing.

The job role of nursery worker includes understanding the scope importance and role of nursery and a nursery worker, objectives of a good nursery, types and phases of nurseries and their lay out and carrying out the nursery chores and maintenance of nursery. In all the job roles a session is dedicated for maintenance of health and safety at work place.

Spices Board has conducted around 32 programmes in the above job roles in the North Eastern States of Assam, Meghalaya, Nagaland, Arunachal Pradesh, Tripura and Sikkim. Details of programmes conducted are given in the table below;

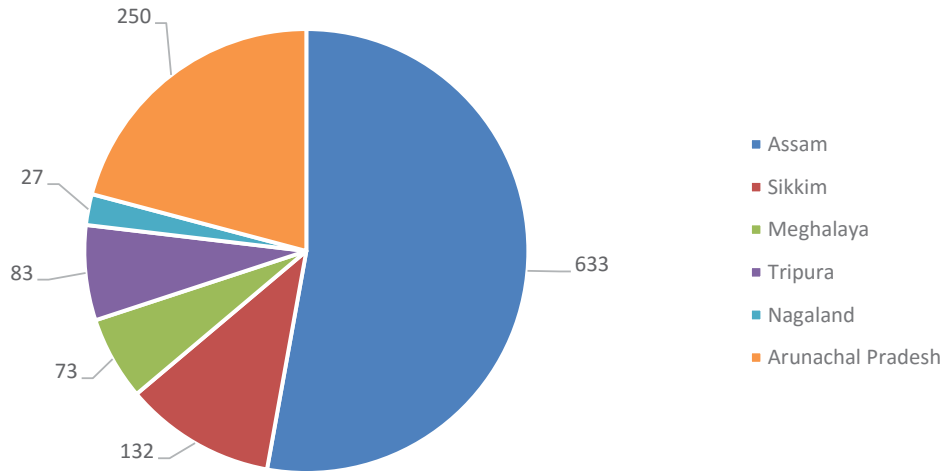
Around 1200 farmers were successfully trained under these RPL training programmes acknowledging and recognizing their preexisting

State	No of Trainings Conducted			Total
	Organic Grower	Vermicompost Producer	Nursery Worker	
Assam	16	1	-	17
Arunachal Pradesh	4	-	1	5
Sikkim	3	1	-	4
Tripura	2	1	-	3
Nagaland	1	-	-	1
Meghalaya	1	1	-	2
Total				32

The job role of 'vermicompost producer' deals with understanding the usage and market demand for vermicompost, role of a vermicompost producer, identification of appropriate site and preparation of bed for vermicompost production, inoculate earthworms in prepared unit and management of vermicomposting process, identifying the maturity of vermicompost and harvest using approved procedures. In addition to it, basic entrepreneurial activities for small enterprises are also taught to the trainees.

skills. The Board intends to train 5500 farmers under this project from the North Eastern states before March 2020. Spices Board looks forward to empowerment of rural farmers through certification of their skills and capabilities by providing scientific and technical knowhow which will enable them for better occupational and living opportunities in the agriculture sector and there by promoting the spice industry as a whole. By this programme, competencies of the un-recognized workers of the country will be

CANDIDATES TRAINED UNDER RPL TRAINING IN NE



aligned with the standardized NSQF framework, enhancing the career/employability opportunities available to them. The recognizable certification process of RPL will improve the visibility of the less aspirational/popular job roles amongst the youth of the country, as it will provide a sense of pride and social recognition. This will help in

sustaining the Indian growth story and reap the benefits of demographic dividend.

More details on the Qualification Packs & Model Curricula are available at <http://www.asci-india.com/National%20Occupation%20Standards.php>



Demonstration of Vermicompost at Bagma, Khupilong on 6.8.19



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SUCCESS STORY OF RPL PROGRAMME IN ASSAM

Introduction

Bodoland Territorial Area District (BTAD) is a set of four districts namely Kokrajhar, Udalguri, Chirang and Baksha covering an area of about 8,822 km² within Assam. It is an autonomous administrative unit in the extreme north on the bank of the Brahmaputra River.

The economy of BTAD is largely based on agriculture. Urbanization of the BTAD is slower compared to other parts of the Assam.

Major crops cultivated in BTAD area are rice, maize etc. Horticultural and plantation crops like Arecanut, Black Pepper, Banana, Coconut, Lemon, Pineapple, Orange etc. are also cultivated. Vast area of agricultural land is also used in cultivating vegetables such as cabbage and cauliflower. Spices such as turmeric, ginger coriander, chilli and mustard are cultivated regularly.



Shri Dithakananda Hazarika, ACS, Sub Divisional Officer (Revenue), Bhergaon Subdivision inaugurating the programme

Most of the crops and vegetables are cultivated without the use of chemical fertilizers. The farmers have been practicing organic farming since ages. Modernization of agricultural sector has not much affected the traditional way of cultivation in BTAD. The people of BTAD are lagging behind in commercializing their organic products due to lack of connectivity.

In order to recognize those farmers who have been practicing organic farming Government of India has initiated RPL programme under PMKVY, a flagship scheme of Ministry of Skill Development and Entrepreneurship. The main objective of this scheme is to provide the farmers with additional ideas on the method of organic farming which will be helpful in boosting the productivity.

Considering the above points Spices Board Guwahati planned to conduct RPL programme at Bhergaon in Udalguri District of Assam.



Distribution of training kits to farmers

RPL TRAINING PROGRAMME AT BHERGAON, ASSAM

Spices Board Regional Office, Guwahati conducted RPL programme under PMKVY (Pradhan Mantri Kaushal Vikas Yojana) at Bhergaon sub division, Udalguri District of Assam which comes under Bodoland Territorial Area Districts (BTAD). Major crops grown in the area are rice, turmeric, ginger, vegetables and black pepper on small scale. People speak Bodo and Assamese language. The programme was conducted from 7.1.2019 to 8.1.2019 and assessment was done on 22.1.2019.

The two day training programme was inaugurated by Shri Dithakananda Hazarika, ACS, Sub Divisional Officer (Revenue), Bhergaon Subdivision. Shri Dharmendra Das, Asst Director, Spices Board was the trainer for the programme. The programme was for the farmers of Abad Agro Producer Company Ltd, Udalguri who are mostly tribal.

These farmers were regularly motivated by the Spices Board. Spices Board has assisted this FPC through the installation of turmeric boiler under Export

Oriented Production Scheme. 96% of the farmers are tribal from the backward district of Assam

With the motivation from Spices Board this FPC has submitted a project under the scheme " Processing / semi processing centres" of Semi Processing & Processing Mission of Industries and Commerce Department for Chief Minister Samagra Gramya Unnayan Yojana (MSGUY), Govt of Assam.

As a result of motivation and orientation given to the farmers during the RPL programme and follow up done by Spices Board, the directors of Abad FPC decided to start commercial cultivation of organic turmeric for 100 Ha and planting was already done during the season 2019-20. Further the farmers are also planning to elaborate the packaging and sales in local market. Spices Board is also motivating the FPC members by giving exposure to various buyer seller meets, exposure visits and exhibitions to make them a successful farmer Producer Company. Recognition of farmers of FPC through RPL programme and stall certificate distribution also motivated the farmers.



A view of practical session



A view of training



Preparation of bioagent(Panchagavya) by farmers



RPL team with examiner and Spices Board team (22.1.2019)



Certificate distribution on 9.3.2019



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RPL Training Programme On 'Organic Grower' Job Role

Dr. John Jo Varghese¹, Dr. A. B. Rema Shree², Jithumol Rajan³ and Priya K.S³

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'Organic Grower' (AGR/Q1201) is a nationally accredited (NSQF Level-4) job role undertaken by Agriculture Skill Council of India (ASCI). The course curriculum covered topics such as:

- ▶ Undertake planning for Organic Farming
- ▶ Seed Selection and Treatment under Organic Farming
- ▶ Soil Nutrient Management under Organic Farming
- ▶ Weed control under Organic Farming
- ▶ Irrigation Management under Organic Farming
- ▶ Integrated Pest and Disease Management under Organic Farming
- ▶ Harvest and Post-harvest Management under Organic Farming

- ▶ Undertake Quality Assurance & Certification in Organic Farming
- ▶ Undertake Business of Organic Farming
- ▶ Maintain Health & Safety at the workplace

Spices Board conducted twenty seven Recognition of Prior Learning (RPL) training programmes on the job role 'Organic Grower' benefitting 929 spice farmers in various states all over India during January to September 2019 as part of the project on "RPL for empowerment of farmers engaged in Spices cultivation".

Details of 'Organic Grower' trainings conducted				
Sl. No:	States where RPL trainings were conducted	Number of RPL training programmes conducted	Number of participants assessed	Number of participants certified
1	Kerala	15	472	427
2	Assam	8	304	278
3	Tamil Nadu	1	47	38
4	Karnataka	1	45	45
5	Sikkim	2	61	57
Total		27	929	845

RPL is a key element under Pradhan Mantri Kaushal Vikas Yojana (PMKVY) scheme of the Ministry of Skill Development and Entrepreneurship (MSDE). The three days training programme included theory as well as hands on trainings (two days training and one day evaluation) which was conducted by the officers of Spices Board who are certified trainers of ASCI. Trainees were provided with a job role kit consisting of study materials, writing pad, pen, T-shirt and cap. They were also provided with Accidental Insurance Coverage under Pradhan Mantri Suraksha Bima Yojana (PMSBY scheme-1) for 3 years. Trainees were also given awareness about the industry trends, current employability scenario, and benefits of skilling/ training.

The assessment was conducted by NSDC approved assessment agency. It included tab based theory exam, practicals and *viva-voce*. Successful trainees were felicitated with certificate, mark list and Rs.500/- in their registered bank account. Working lunch, tea and snacks were also provided during the training. The Training programme was free of cost.

The three days long 'Organic Grower' job role RPL training programmes were conducted in Kerala, Assam, Tamil Nadu, Karnataka and Sikkim where 845 spice farmers were successfully certified by National Skill Development Corporation (NSDC), MSDE, Govt. of India. Through the RPL training programmes, spice farmers were connected with the national training framework giving them global recognition.



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R Sureshkumar, Deputy Director (K&T), Spices Board, Bodinayakanur, Tamilnadu
Resmi. R, Assistant Director, Spices Board, Rajakumari, Kerala

The common processing unit installed by Rajakumari Spices Producer Society (RSPS) financed by Spices Board under social security programme was inaugurated on 26th September 2019 by Shri D Sathiyam, IFS, Secretary, Spices Board at Kuruvila City, Rajakumari, Idukki district, Kerala. Rajakumari Spices Producer Society is one of the societies enrolled under Spices Board in 2016, with a strength of 25 spice producers.





RPL Certificate Distribution



Shri Paul Joseph Paruthippallil, President, Rajakumari Spices Producer Society presided over the function. Spices Board Secretary Shri. D, Sathiyam, IFS, officially inaugurated the society by lighting the lamp. In his inaugural address, he highlighted the role of common processing units at the community level to ensure the quality of various spices produced in our country. Spices Board is constantly encouraging the farmers all over India to start producer societies in the community level equipped with processing facilities at production centers to ensure the quality and hygiene of spices by primary processing.

Under the social security scheme of the Spices Board, the Board has financially assisted

Rajakumari Spices Producer Society for the purchase and installation of cardamom dryer, cardamom washing machine, cardamom grading machine, cardamom polishing machine, computer systems and accessories and office furniture. Dr. A. B. Rema Shree, Director (Research & Development), Spices Board delivered the keynote address. Shri Baby Kannikkattu, President, Spices Planters Association, Rajakkad and Smt Sherly Wilson, Block Panchayath Member, Rajakumari felicitated the occasion.

Shri. P.P Joy, senior most member of the society welcomed the gathering. Shri Joy George Kurishingal, Secretary Rajakumari Spices Producer Society proposed the vote of thanks.





Culantro : In The Bay Islands

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Underutilized spices of horticultural importance are found in almost all the regions of our country. Most of the times, such spices are collected from the wild or are deliberately planted in the backyard to meet the family requirements. These spices are generally not traded as they are commonly known only to the villagers/ tribal populations who have been using these spices for their varied applications. A large number of such underutilized spices have been commonly used as fruits, vegetables, seasonings, dyes, medicinal drugs etc. Lesser known spices are no exception to this and a number of such spices are grown for meeting the demand of some particular regions.

Culantro, Burmese coriander, Broad *dhaniya* and *bada dhaniya* are the common names of *Eryngium foetidum*, which is grown in the Andaman and Nicobar islands. This spice is native to Mexico and tropical parts of the America and is grown in various parts of the tropical world. Leaves of this underutilized spice possess peculiar aroma akin to cilantro or common coriander (*Coriandrum sativum*). This spice is hardy and is popularly consumed in the islands and North Eastern states of our country. As the spice is commonly propagated through seeds, large variations are seen at different areas especially in terms of leaf morphology, serration on leaf margins and leaf aroma. Both serrated and non serrated types are available, however, the former types pose difficulty in intercultural operations.

No major pests or diseases are noticed in the crop.

Regular weeding needs to be carried out to avoid competition with the crop. For harvesting, fully grown plants could be completely uprooted from the soil or foliage could also be cut down near ground during early morning hours

It is found as a weed in some parts of our country but is not cultivated as a commercial crop in regions. Due to its wider adaptability, it can perform well under average management conditions. It is a potential crop for open conditions as well as places with partial shade. Shade tolerance capacity makes it a suitable intercrop in existing coconut and Arecanut gardens. Considering the fact that more than half of the cultivated area in the islands is



Close up look of a culantro plant

under plantation crops, culantro could be popularized. The plants exhibit profuse growth and flowering under island conditions. However, long rainy season in the islands sometimes poses difficulties in crop management. Under such conditions, cultivation of culantro under protected conditions could be taken up. Studies conducted at the authors' institute suggested the suitability of low cost polyhouses for commercial cultivation of this crop. The growing condition has been noticed to alter the crop duration as crops grown in open condition tend to mature later (4-5 months) than those cultivated in the polyhouse (about 3 months). Further, polyhouse cultivation has been reported to improve leaf size and aroma quality.

Upon maturity, leaves turn a bit tough and inflorescence is borne from the centre of each plant, in which tiny seeds are set. Seeds turn blackish brown upon maturation and get separated from the inflorescence. The separated seeds will germinate within two to three weeks thereby spreading the plants in the surroundings. Before shedding, seeds should be collected for sowing in well prepared land. Being shallow rooted plant, surface of the soil should be loosened and added with organic manures such as vermicompost and farmyard manure.



Profuse growth and flowering in culantro when grown as an intercrop in arecanut plantation

Naturally germinated small seedlings can also be used for transplanting in the field. Farmers in the islands sometimes provide manures before planting and harvesting to meet the nutrient requirement of the crop.

No major pests or diseases are noticed in the crop. Regular weeding needs to be carried out to avoid competition with the crop. For harvesting, fully grown plants could be completely uprooted from the soil or foliage could also be cut down near ground during early morning hours. They are then washed and packed in banana leaves to maintain freshness during transportation. Under island condition, produce could be stored for about 4-5 days at room temperature with roots dipped in water. Refrigerated storage with proper packaging is also possible.

Of the various parts of Andaman and Nicobar islands, the spice is cultivated by a few farmers in South Andaman island only. Field surveys in North and Middle Andaman islands suggested that the spice is commonly used by the settler communities there, but is rarely cultivated

or brought to market. Port Blair is the most populated city in the South Andaman island, which has considerable population of settlers from the mainland as well as a floating population in the form of government servants and tourists. This population creates the demand for most of the agricultural produce including culantro and hence, farmers could get good prices for their produce.



Freshly harvested seeds of culantro



Commercial cultivation of culantro as intercrop in coconut garden at a farmer's field in South Andaman

A farm woman in South Andaman island- Smt. Chellamma, is growing this crop and supplying the produce to the city market. She is cultivating the crop in poly house and she gets a monthly profit of up to Rupees One lakh from an area of 300 sq.m. She is also cultivating culantro as an inter crop in coconut gardens. Moisture conservation through mulching, use of organic manures, poly house cultivation and control of soil/ nutrient leaching by using coconut husks surrounding the beds are properly taken up by her which makes the cultivation a profitable venture. She is getting about Rs. 150-190/- per kilogram as wholesale price in Port Blair market. Retailers, on the other hand, sell the produce at high prices of Rs. 300-400/- per kg. At times, when the supply of the produce is not sufficient, thee it is sold for Rs. 500 per kg.

To create awareness among the farmers, various training and demonstration programmes are being organized by ICAR - CIARI, Port Blair and ICAR - KVK, South Andaman, which are well received by the island farmers. Demonstration blocks of culantro in the arecanut plantation have also been established for the benefit of the farming community of these islands. The crop



Culantro as a source of livelihood for small farmers in Middle Andaman Island

has shown profuse growth when grown in the inter spaces of arecanut. Seeds and planting materials of culantro are also distributed to the needy farmers at various occasions to promote the cultivation of this crop. Being a hardy and profit earning crop of short duration its cultivation is being promoted in the islands especially as inter crop in plantation crops. For promoting its cultivation in urban areas, pot culture in terrace gardens is also promoted and it helps to meet the family requirement.





Spices Beyond it is Flavour

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Spices have been virtually indispensable in the culinary art of flavouring foods since antiquity. Spices are aromatic vegetable substances, as a whole, as in the broken or ground form, whose significant function in food is seasoning rather than nutrition. Spices are esoteric food adjuncts that have been in use for thousands of years to enhance the sensory quality of foods and the quantity and variety consumed in tropical countries is particularly extensive. These spice ingredients impart characteristic flavour, aroma and pungency to foods. Spices enhance the sensory quality of foods. Volatile oil in spices is responsible for the aroma and flavour and oleoresin contribute the pungency. Nearly all the spices except chilli and vanilla, that we use in cooking originated in Asia.

Beyond the flavour of spices

Apart from flavouring and seasoning, spices are widely used in a) Indigenous medicines, b) Pharmaceuticals, c) Nutraceuticals, d) Aroma therapy, e) Preservatives, f) Beverages, g) Natural colour, h) Perfumes, i) Cosmetics and pharmaceutical j) Pesticides, botanicals and thus, play a significant role in the economy of the producing country. These properties are due to the diverse array of chemicals synthesised by these spices.

Phytoconstituents in spices

In general, these phytochemicals functioning to attract beneficial and repel harmful organisms, serve as photoprotectants and respond to environmental changes.

Table1: Major classes of photochemical that contribute to the properties of spices

Class of phytochemicals	Source
Terpenes	
Monoterpenes	Cumin, fennel and caraway
Tetraterpenes (carotenoids)	Paprika and saffron
Sesquiterpenes	Cinnamon, ginger and turmeric
Terpene derivatives	Coriander
Phenylpropanoids	
Cinnamic acid	Cinnamon
Eugenol	Clove
Vanillin	Vanilla bean
Diarylheptanoids	
Curcumin	Turmeric
Sulfur compounds	
Thiols, sulfides, di and polysulfides	Garlic and Asafoetida

Spices in the Indigenous System of Medicine (ISM)

There is a long history of the use of spices in the traditional medicines of India. The indigenous system of medicine has given an extra special

place to spices because of their unique medicinal properties. Spices stimulate digestion and this property of spices was mainly used in ayurveda. Spices have a lot of other medicinal qualities, thereby proving the saying “**let my food be the medicine**” (Selvan and Kumar, 2005).

Spices in Ayurveda

In the recent past there has been increasing interest in the biological effects of spices, as they are safe and cause no side effects to humans. Currently, more than 25 spices are used in ayurvedic formulations. Among the spices, black pepper, turmeric, ginger, garlic, nutmeg, cardamom, fenugreek and saffron are important ingredient of several indigenous preparations.

Trikatu : is a combination of three pungent spices products, namely dried black pepper, long pepper and ginger. It is used to improve the digestion and bronchial problems.



Multi-beneficial Physiological Effects of Spices

In the past two to three decades, many more beneficial physiological effects of spices have been experimentally documented, and it suggests that the use of these food adjuncts is extended beyond taste and flavour. The salient features of a variety of health beneficial physiological effects of common spices so far documented are summarized here.

Table 2: Experimentally documented beneficial health effects of spices

Beneficial health effect	Spices
Lowering of blood cholesterol	Garlic, fenugreek, turmeric, red pepper
Dissolution of cholesterol gallstones	Curcumin, capsaicin
Protection of erythrocyte integrity in hypercholesterolemic condition	Curcumin, capsaicin, garlic
Hypoglycaemic potential	Fenugreek, garlic, turmeric, cumin
Amelioration of diabetic nephropathy	Curcumin, fenugreek
Antioxidant effect	Turmeric, capsaicin, eugenol
Anti-inflammatory and anti-arthritis	Turmeric, Capsaicin, eugenol
Antimutagenic/cancer preventive	Turmeric, garlic, ginger, mustard
Digestive stimulant action	Curcumin, capsaicin, piperine, ginger, cumin, ajowan, fennel, coriander, mint
Antimicrobial	Turmeric, garlic, asafoetida

Hypocholesterolemic Effect

Consumption of a high fat diet may lead to an increase in serum cholesterol and plasma fibrinogen levels which in turn may result in decreased fibrinolytic activity and blood coagulation time. These changes of serum cholesterol levels and of lipoproteins in relation

to atherosclerosis leads to coronary heart disease. It can be prevented by using spices like fenugreek, red pepper, turmeric, garlic and ginger. Dehydrated garlic powder containing a standardized level of the parent sulphur compound, allin, which is effectively used in daily diet with a relatively low and acceptable dosage of 300-900mg/day reduces 10-13 per cent blood cholesterol in humans.

Antidiabetic Potential

Diet has been recognized as a corner stone in the management of *Diabetes mellitus*. Fenugreek, garlic, turmeric, chilli and cumin were studied for their antidiabetic potential, but human trials are limited to fenugreek. An addition of fenugreek seeds to the diets of diabetic patients resulted in a fall in blood glucose and improvement in glucose tolerance. Daily diet of fenugreek seeds (25-50 g), garlic (5-6 cloves) and turmeric (1 pinch) by human beings could serve as an effective therapy in the prevention and management of long term complication of diabetes.



Digestive Stimulant Action

Spices are well recognized to stimulate gastric function. They are generally believed to intensify salivary flow and gastric juice secretion, hence aid indigestion. Spices like turmeric, ginger, black pepper, cardamom, mint, ajowan, cumin, fennel, coriander, asafoetida and garlic are used as ingredients of commercial digestive

stimulants as well as of home remedies for digestive disorders like flatulence, indigestion and intestinal disorders.

Spices stimulate bile acid production by liver and its secretion into bile. Some spices are shown to stimulate pancreatic digestive enzymes like lipase, amylase, trypsin and chymotrypsin, which play a crucial role in food digestion. A few spices have been shown to have beneficial effect on the terminal digestive enzymes of small intestine. Thus spices act as digestive stimulants by enhancing biliary secretion of bile acids, which are vital for fat digestion and absorption and by stimulating the activities of pancreatic and intestinal enzymes involved in digestion.

Black Pepper and Piperine :

As Bioavailability Enhancer

Black pepper, the most widely traded spice of the world is the dried mature berries of the spices *Piper nigrum* L. often referred to as 'King of spices'. Piperine is an alkaloid responsible for pungency of black pepper, along with chavicine (an isomer of piperine). It has also been used in some forms of traditional medicine and as an insecticide. It is shown to possess bioavailability enhancing activity with various structurally and therapeutically diverse drugs.



Bioperine (Sabinsa) from Black Pepper

Bioperine is the product of piperine, it is a standardized extract obtained from South Indian black pepper. The product bioperine is patented

in the US. Piperine content in the natural black pepper is 3 to 6 per cent, but bioperine contain not less than 95 per cent piperine. It is bioavailability enhancer for nutrients and clinical studies substantiate its safety and efficacy for nutritional use. Bioperine is co-administered with various nutrients, it is proven that when bioperine is taken either with vitamin, mineral or nutritional ingredients a greater amount of the supplemented nutrient is absorbed by the body of both humans and animal.

Hydroxy Citric Acid:

A Natural Anti Obesity drug

Kokam and cambodge are the only natural sources of hydroxy citric acid (HCA). It is a potent metabolic regulator of obesity. These unique acids lower the blood lipids such as cholesterol and triglycerides, by triggering fatty acid oxidation in the liver via thermogenesis.



Antioxidant activity

Spices have been investigated for their antioxidant potency in food systems for many years. Processes of spices prevent free radical formation, remove radicals before damage can occur, repair oxidative damage, eliminate damaged molecules or prevent mutations and are important mechanisms in cancer prevention.

Spices extracts also have been shown to inhibit lipid per oxidation. Among the spices, ginger exhibited highest antioxidant property. Interestingly, the antioxidant activity of the extracts was retained even after boiling for 3 min, suggesting that, unlike many antioxidants, the antioxidant, in the spices were heat stable.

Antimicrobial Activity of Spices

Spices and herbs have been used for thousands of centuries in preserving food. Some spices are used in pickles and also to prevent food spoilage.

Table 3: Antimicrobial properties of spices

Inhibitory effect	Spices
Strong	Cinnamon, clove, mustard and garlic
Medium	All spice, caraway, coriander, cumin, rosemary, sage, oregano and thyme
Weak	Black pepper, red pepper and ginger

Nutraceutical

Dr. Stephen De Felice coined the term "Nutraceutical" from "Nutrition" and "Pharmaceutical" in 1989. Nutraceutical can be defined as, "a food or part of a food that provides medical or health benefits, including the prevention and/or treatment of a disease".

Spices- as natural preservative

Natural preservatives are the chemical constituents extracted from natural sources that



offer intrinsic ability to protect products against microbial growth. These include essential oil constituents, flavonoids, phenolic compounds etc.

A growing awareness among consumers towards the health aspects has increased due to their interest on natural products. There is more emphasis on the use of natural preservatives as an alternative to chemical preservatives. Mode of action of these natural preservatives is the inhibition of microbial growth, oxidation and certain enzymatic reactions occurring in the foodstuffs. Essential oils, flavonoids and phenolic compounds present in the spices possess the preserving action (Singh *et al.*, 2010).

Currently pharmaceutical, food and meat industries are emphasizing more on spice derived preservatives. Clove, garlic, ginger, cinnamon, thyme, oregano and rosemary are mainly used as preservative agents. *In vitro* test with *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Escherichia coli* and *Candida albicans* found inhibition in growth of microbes against the spice extracts (Syed *et al.*, 2010).

Aroma chemical: some spice oils can be easily converted into aroma chemicals. For example: Eugenol present in clove can be easily converted into a starter material for vanillin, which is present in vanilla. This starter material is natural.

Spices are the natural and necessary components of our daily nutrition, beyond their role in imparting flavour to our food. They have many beneficial physiological effects. The optimum consumption of spices is not only proved to be safe, but also leads to offer various beneficial effects. Spices possess more than one health beneficial property and there is also a possibility of synergy among them in their action and a spiced diet is likely to make healthy life.



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Buyer Seller Meet on Seed Spices

at Agriculture College Nagaur Rajasthan

A Buyer Seller Meet on Nagauri Pan Methi and seed spices was organized at Agriculture College Campus, Nagaur on 24th January 2019. Shri Mohan Ram Choudhary, M.L.A., Nagaur presided over the programme. Vice Chancellor of Agriculture University Jodhpur Dr. Balraj Singh was chief guest of the occasion. Shri Banwari Lal Agarwal, Secretary, Grain and Seeds Merchant Association, Nagaur, felicitated the meeting. The objective of the programme was to facilitate a direct contact between the Exporters/Traders & Farmers. MLA also explained the relevance of Geographic Indication Registration for Nagauri Pan Methi.

M.L.A. Shri Mohan Ram Choudhary, Nagaur in his address, advised the farmers to adopt innovative good agricultural and organic practices

in their farm and to produce better quality spices which will increase their income as the quality goods will be sold at premium prices. He also requested the traders and farmers to attend such programmes in future to have better business contacts for marketing their crops. He urged the farmers to avoid indiscriminate/unscientific use of fungicides, pesticides & chemical fertilizers which are the reasons behind poor quality of the final produce. Further, he demanded better production and productivity, keeping an eye on quality parameters to boost the export. He also advised the state and central agencies for making a special mandi for Fenugreek in Nagaur where farmers can come and sell their produce, and where bidding can be carried out, which is not being done presently.

The BSM meet witnessed more than 220 numbers of participants.

Among these, about 55 participants are exporters/traders from various part of the country. During the interactive session with buyers and sellers, the exporters were given opportunity to present their requirements before the farmers

Details on overall scenario of spices export with special reference to Fenugreek seed/leaves and seed spices was presented by Vice Chancellor Dr. Balraj Singh, on current scenario of seed spices cultivation in Rajasthan.

The BSM meet witnessed more than 220 numbers of participants. Among these, about 55 participants are exporters/traders from various part of the country. During the interactive session with buyers and sellers, the exporters were given opportunity to present their requirements before the farmers. The farmer representatives also expressed their practical difficulties in fulfilling the desired international quality standards and sought the assistance of other stakeholders in sorting out the issues.

Mr. T. Raja Shekhar Reddy from M/s. ITC Ltd. Agri Business Division, Guntur suggested to adopt good agricultural practices and produce spices with IPM. M/s. S.R.K. Spices Pvt. Ltd. informed that they are interested to procure Cumin, Fennel, Coriander, Fenugreek, from Nagaur. Similarly, M/s. A. K. Goyal Exports, from Abohar,

M/s. Parag Industries, from Jodhpur, M/s. Vishnu Dall Mill From Bikaner, M/s Longi Industries, Bikaner, M/s. Hiral Agro Products, Bikaner, M/S Sunrise Trading Corporation from Nokha, M/s. Radhika Agro Industries from Jodhpur, M/s. Jay Shree Trading Company from Jodhpur, M/s. Akarta International from Jaipur, M/s. Shri Mangilal Parihar Krishi Farm from Jodhpur, M/s. Neminath Traders, Gandhi Chowk, Nokha and M/s. American Waves India Pvt. Ltd. from Delhi also informed their willingness to procure Nagauri Pan Methi, Fenugreek Seed/Cumin/Fennel from the primary producers directly.

During the networking session, ten of round tables were arranged in the hall where all the



buyers were given the opportunity to directly interact with the sellers and to exchange contact details. As per our discussions with the buyers and sellers, it is estimated that a transaction of 150MT (appx.) has been done during the networking session and it may likely go upto 250 MT for Nagauri Pan Methi and seed spices.

A display of samples brought by farmers and traders was also arranged at the venue.

Shri B. N. Jha, Deputy Director (Marketing) Spices Board, Kochi, welcomed the gathering. A vote of thanks was proposed by Dr. Johncy Manihottam, Assistant Director, Spices Board, Jodhpur.



Training Programme On Quality Improvement of Chilli

Quality Improvement Training Programme (QITP) on Chilli was conducted at Meeting Hall office, on 18th September 2019 at Lakshmipuram Village, Mogullapally Mandal, Professor Jayashankar Bhupalpalli District, Telangana State. The Regional Office, Spices Board, Warangal in Telangana State organized the training programme

DR E Sreenivas, Coordinator DAATTC, Warangal handled a class on Scientific Cultivation and Disease Pest management in Chilli. Sri J Kishore, Professor Jayashankar Bhupalpalli District conducted a class; Sri Ramachary, Professor Jayashankar Bhupalpalli delivered a lecture on post harvest operations and quality improvement of Chilli and on the schemes of Horticulture department. The programme was felicitated



by Sri Thirupathi, Village Sarpanch.

DR G Lingappa, Deputy Director, Spices Board, Warangal welcomed the gathering. He explained the details of the services and subsidies given by the Spices Board to farmers. Sri Maloth Guruprasad, Agriculture Demonstrator, R.O Warangal proposed a vote of thanks.





Calendar of Operations November 2019

Timely planning and execution of farm operations based on agro climatic conditions of the area is important for successful farming for higher productivity and sustainability. To facilitate this a calendar of operations in respect of important spice crops for November is given below.

Cardamom

Nursery

- Observe for germination of seeds if sown in the previous month.

Agronomic Measures

- Once sprouting is observed remove the mulch material and cover inter spaces thinly with sliced mulch materials.
- Overhead pandal to be erected to protect the seedlings from direct sunlight.
- Irrigation may be done to bed nursery/polybag nursery/sucker nursery based on necessity.
- To control damping off/ seedling rot diseases in nursery, soil drenching with 0.2% copper oxychloride or 0.2% mancozeb may be taken up.
- As bio-control measure, Trichoderma or Pseudomonas or Bacillus species may be applied in the soil.
- For controlling leaf rot disease, spray 0.3% mancozeb and for controlling leaf spots spray 0.2% bavistin after noticing early symptoms.



Main Field

- Mulch the base of the plants with organic waste materials.
- If excess weed growth is noticed in young plantations, go in for slash weeding between inter spaces and clean weeding at the base of the plants.
- The weeded materials can be used as mulch.

Pest Management

- To check incidence of root grubs, beetles may be trapped by nets.
- Towards Integrated Pest Management, dry leaves may be pruned.

Disease Management

- Adequate drainage facility to be provided wherever necessary to avoid incidence of fungal disease if North East monsoon continues.
- Keep constant vigil for any katte virus affected plants to uproot and destroy.
- For controlling leaf rust and chenthal & leaf spots, spray 0.25% Mancozeb.
- If symptoms of stem lodging are noticed, spray

0.2% Bavistin on pseudo stem.

- ▶ Root rot and leaf yellowing can be controlled by foliar spray and soil drenching with 0.2% Bavistin or Carbendazim + Mancozeb.
- ▶ If symptoms of capsule brown spot (Anthracnose) are noticed, spray with 0.2% Bavistin.
- ▶ Drenching of 1% Pseudomonas+1% Trichoderma. both @1litre/100 Litre to control soil-borne diseases.

Harvest and Post-harvest Operations

- ▶ Harvesting can be continued with a gap of 25 to

30 days depending upon the weather conditions and maturity of capsules. Ensure right maturity for better out-turn.

- ▶ Wash harvested capsules thoroughly before drying in curing chamber.
- ▶ Timely removal of water vapour from curing chamber and maintaining proper temperature during curing will result in better green colour of the produce.
- ▶ Clean and store the cured cardamom at 10% moisture level in black polythene lined gunny bags and inside wooden boxes.

Large Cardamom

Nursery

- ▶ One round weeding may be attended in sucker nursery. After weeding, the nursery beds may be mulched properly with dried leaves to prevent weed growth and as a soil moisture conservation measure.
- ▶ If any symptoms of disease / pest infestation are noticed, it may be controlled immediately.
- ▶ Depending on the rainfall condition, irrigation may be provided.



Main Field

- ▶ Repairing of modified Bhatti if not completed, may be done depending upon the necessity, and firewood may be collected and kept ready.
- ▶ Harvesting may be done when the crop is fully matured. Maturity can be assessed when the capsule of the top most spike turned dark brown and when the capsule come out easily while pulling.
- ▶ The mother clump after harvesting can be collected and destroyed by burning in isolated place to minimize the infection of pest and

disease.

- ▶ The harvested spikes may be heaped overnight and capsules may be separated for curing.
- ▶ The cured capsules may be rubbed on wire mesh for cleaning and removal of calyx (tail).
- ▶ After processing, the moisture content in the dried capsules should not be more than 10% for better shelf life.
- ▶ After removal of tails from the capsules, the dried cardamom should be kept in polythene lined jute bags and stored on wooden platform to avoid absorption of moisture.
- ▶ Chirke and foorkey infected plants may be destroyed by uprooting / burying at regular intervals.
- ▶ Regular inspections may be carried out to observe caterpillar / shoot borer incidence. If any may be handpicked and destroyed mechanically.
- ▶ If blight or any fungal diseases are noticed 0.2% of COC may be applied.
- ▶ Phytosanitary measures should be followed after harvesting to reduce the disease inoculum.
- ▶ If sufficient moisture is not available in the soil, the cardamom plants may be irrigated.

Pepper

Agronomic Measures

- ▶ Selection and labelling of mother plants for collecting cuttings may be continued.
- ▶ The runner shoots may be protected from spreading on the ground by coiling it on temporary support.
- ▶ Provide protection to young vines from direct sunlight by covering with coconut/arecanut fronds/dried leaves etc.
- ▶ Trailing and tying of vines around the standards may be continued.
- ▶ If excess weed growth noticed, resort to slash weeding in the inter spaces and clean weeding at the base of the standard, without damaging root portion of the vines and mulch the base.



Pest Management

- ▶ In more shaded plantations there is likelihood of pollu beetle attack, which can be controlled by proper shade regulation.
- ▶ If pollu beetle attack is severe spray quinalphos 0.05%.

Disease Management

- ▶ Vines affected by little leaf disease or phyllody may be uprooted and destroyed.

Harvest and Post Harvest Operations

- ▶ In lower elevations harvesting can be started.
- ▶ Harvest spikes on attaining full maturity.
- ▶ For drying use only clean and hygienic surfaces like clean bamboo mats, concrete yards or polythene sheets.

Vanilla

Agronomic Measures

- ▶ Vanilla planting with stem cuttings/tissue culture plantlets/rooted cuttings can be continued on already planted standards.
- ▶ Continue trailing of vines on support trees wherever necessary.
- ▶ Provide sufficient mulch materials at the plant base to allow the roots to spread.
- ▶ Protect young vines from direct sunlight.
- ▶ Cut off the growing end of vanilla vine having enough growth by about 10-15 cm length to induce flowering, if not done during previous month.



Pest and Disease Management

- ▶ Soil application of trichoderma @ 0.5 kg./plant at the root zone and spraying of pseudomonas (0.2%) on the foliage are recommended to arrest spread of fungal diseases.
- ▶ Vanilla vines showing any viral symptoms are to be removed immediately and destroyed.

Harvesting and Processing

- ▶ Harvest the vanilla beans as soon as pale yellowing observed at the distal end of the beans.
- ▶ Cure the harvested beans following Bourbon method or sell the green beans immediately after harvest.

Ginger

- ▶ Selection of disease-free plants for collecting seed ginger can be done.
- ▶ Weeding, earthing up the beds and mulching may be done depending on requirement.
- ▶ Water stagnation should be avoided by providing sufficient drainage.
- ▶ If soft rot disease is noticed dig out the affected plants and drench beds with 1% Bordeaux mixture.



Turmeric



- ▶ Selection of disease-free plants for collecting seed turmeric can be done.
- ▶ Weeding, earthing up beds and mulching may be done depending on requirement.
- ▶ To avoid water stagnation, proper drainage may be ensured.
- ▶ Rhizome rot if noticed can be controlled by drenching 0.3% dithane M 45.
- ▶ If incidence of leaf spot noticed, spray either with 1% bordeaux mixture or 0.2% dithane M45 (200 g/100 l of water).

Chilli

- ▶ Spray copper oxychloride 3g/litre of water to control die back and fruit rot diseases.
- ▶ Change the lure of pheromone traps for monitoring pod borers.
- ▶ N.P.V. @ 200 L E. per acre can be applied to control pod bores.
- ▶ Apply second dose of fertilizer (i.e. 50:20 kg/ ha. of nitrogen & potash).



- ▶ Irrigate once in 20-25 days in black soils and 10-15 days in red loamy soils.

Fennel (Kharif Transplanted)

- ▶ Crop should be irrigated at an interval of 15- 20 days if optimum moisture is not available in the soil.

Fennel (Rabi Transplanted)

- ▶ Irrigation may be given as per need.
- ▶ Top dressing of 22.5 kg. nitrogen per ha. may be done.
- ▶ Inter cultural operation and hand weeding may be done during second week



Fennel (Rabi Drilled)

- ▶ Irrigation may be given as per need.
- ▶ Top dressing of 22.5 kg. nitrogen per ha. may be done by the middle of the month.
- ▶ Inter cultural operation and hand weeding may be done during second week.

Coriander

- ▶ Thinning of plants may be done to maintain the plant spacing at about 5-10 cm. in broad casted crop.
- ▶ First weeding may be carried out during second fortnight. After thinning



& weeding crop should be irrigated followed by a second irrigation after 20-25 days.

- ▶ 20 kg. nitrogen per ha. should be top dressed.

Cumin



- ▶ Soil should be brought to fine tilth by 2-3 ploughing followed by planking.

- ▶ Beds of 4 m x 3 m size with provision of irrigation channels should be prepared. 12-15 kg seeds after seed treatment may be sown during 1st week of the month by broadcasting or in rows drilled at 30 cm. apart.

▶ 15-20 MT farm yard manure per ha. should be mixed into the soil at the time of land preparation.

- ▶ Light irrigation should be given just after sowing of seeds and repeated after 6 -10 days for proper germination of seeds.

Fenugreek

- ▶ Soil may be brought to fine tilth by 2-3 ploughing followed by planking.
- ▶ 10-15 MT farm yard manure per ha. may be mixed into the soil at the time of land preparation.



- ▶ 10-15 kg. seeds may be sown during 1st fortnight of the month by broadcasting or drilling in rows at 30 cm apart. To hasten germination, seeds may be soaked in water for 6-8 hrs. before sowing.

Celery



- ▶ Nursery bed may be prepared for sowing seed.
- ▶ 500-600 kg of farm yard manure per 200 sq.m nursery area may be mixed in soil at the time of land preparation.

- ▶ 2 kg seed may be sown in the nursery beds during 1st fortnight of the month.
- ▶ Nursery bed may be irrigated soon after sowing and repeated after 5-8 days.
- ▶ Irrigation may be continued at an interval of 10-15 days to keep the soil moist.
- ▶ Weeding may be done in nursery to check weed growth.

Monthly Average Prices of Spices for September 2019



SPICE	CENTRE	GRADE	PRICE RS/KG
Black Pepper	Kochi	Ungarbled	326.65
		Garbled	346.65
Cardamom small	Vandanmettu/		
	Bodinayakanur	Bulk e-auction	3039.78
Cardamom (L)	Gangtok	Badadana	466.67
	Gangtok	Chotadana	416.67
Chillies	Virudhunagar		122.50
	Guntur		127.06
Ginger(Dry)	Kochi	New	225.00
	Kochi	Old	265.00
Turmeric	Kochi	Salem	75.00
		Agmark	80.00
	Chennai	Erode	95.00
Coriander	Chennai	Rajasthan Green	90.00
	Chennai	Deluxe	87.50
Cumin	Chennai	Ordinary	168.37
Fennel	Chennai	-	92.87
Mustard	Chennai	Small	44.37
Garlic	Chennai	Medium	114.37
Clove	Cochin	-	610.26
Nutmeg(with shell)	Cochin	-	205.00
Nutmeg(without shell)	Cochin	-	370.00
Mace	Cochin	-	700.00

Prices are collected from secondary sources like Agricultural Produce Market committees, Kirana Merchants Association, India Pepper and Spice Trade Association, Licensed Cardamom Auctioneers etc

All India Cardamom E- Auction Sales And Prices For September 2019 Compared With September 2018

PERIOD	September 2019		September 2018	
	Quantity sold	Average price	Quantity sold	Average price
	(Kg)	(Rs./Kg.)	(Kg)	(Rs./Kg.)
First week	298112	2869.73	564139	1249.76
Second week	306380	3067.59	724655	1310.07
Third week	401367	3289.23	716574	1254.33
Fourth week	402358	2928.10	383537	1257.33
Fifth week	64574	2838.17	306008	1248.18
Total	1472791	3039.78	2694913	1268.09

Source: Auction reports received from licensed cardamom Auctioneers

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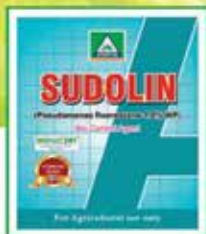
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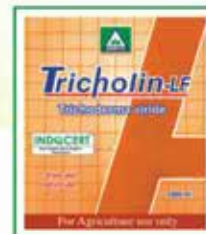
- **Azospirillum**
- **Azotobacter**
- **Rhizobium**
- **Phosphate solubilizing bacteria**
- **Potash solubilizing bacteria**
- **Zinc solubilizing bacteria**
- **Vesicular arbuscular mycorrhiza (Vam)**
- **Gluconacetobacter**
- **Methylobacterium**

- Bio Control Agents —————
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 - **Trichoderma viride**
 - **Paecilomyces lilacinus**



- **BIO COMPOSTER : Composting Micro Organisms**
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