# वार्षिक रिपोर्ट ANNUAL REPORT 2019-20



सुपारी और मसाले विकास निदेशालय कृषि एवं किसान कल्याण विभाग कृषि सहकारिता एवं किसान कल्याण विभाग

भारत सरकार, कालीकट- 673005, केरल

Directorate of Arecanut and Spices Development Ministry of Agriculture & Farmers Welfare Department of Agriculture, Co-operation & Farmers Welfare Government of India, Calicut - 673005, Kerala, India

# ANNUAL REPORT 2019-20



## DIRECTORATE OF ARECANUT AND SPICES DEVELOPMENT

Ministry of Agriculture and Farmers Welfare (Department of Agriculture, Cooperationand Farmers Welfare) Government of India Calicut, Kerala 673 005



DASD Annual Report 2019-20

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## PREFACE

The Directorate of Arecanut and Spices Development, a subordinate office under Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture & Farmers Welfare, Government of India has the distinction of successfully implementing Central Sector Schemes on Spices, Arecanut and Medicinal & Aromatic Plants over the plan periods with the cooperation of State Departments, State Agricultural Universities, ICAR Institutes etc. During 2005-06, the Government of India launched National Horticulture Mission (NHM) to give further impetus to encourage growth in production of horticultural crops including spices. Since the inception of NHM, the Directorate is coordinating and monitoring the overall activities on the development of spices in the country. The Directorate also supplements the developmental efforts of the State Govts by making available nucleus planting materials of various high yielding varieties of spices and aromatic crops across the country.

The integrated approach adopted for implementing NHM/MIDH programmes helped the objectives of enhanced production and productivity of spices in the country and reflected in the official statistics of area and production of spices in the country. The production of spices which was 3.8 million tonnes from an estimated area of 2.3 million ha during the year 2005-06 has increased to around 10.14 million tonnes from 4.3 million ha in 2019-20. Foreign exchange earnings through Spices export have crossed 3 billion US \$ in 2019-20 for the first time in the history. This gives me immense satisfaction in bringing out the Annual Report of the Directorate for the year 2019-20.

The Report carries all the activities undertaken by the Directorate in improving the spices production scenario at national level. Augmenting production of good quality planting materials across the country had been one of the major programmes of the Directorate. Dissemination of technologies through frontline demonstration plots, farmers training programmes, seminars and workshops and accreditation of nurseries have been given the highest priority.

I take this opportunity to thank Dr. B.N.S. Murthy, Horticulture Commissioner for giving adequate support. I also thank my colleagues for their cooperation in achieving the goals set by the Directorate.

(Homey Cheriyan) Director

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## **1. INTRODUCTION**



The Directorate of Arecanut and Spices Development was established on 1st April, 1966 at Calicut in Kerala, as a subordinate office under Ministry of Agriculture and Farmers Welfare, Government of India to look after the development of spices and arecanut at national level. This responsibility was earlier shouldered by Central Spices and Cashewnut Committee and Indian Central Arecanut Committee, which were abolished in 1965 consequent to the recommendations of Agricultural Research Review Team.

### 1. Mandate

The Directorate of Arecanut and Spices Development, Calicut is a national level Institution responsible for development of spices, aromatic plants, betel vine and arecanut grown in the country.

### The mandate of the Directorate is as follows.

- \* Assessment of the developmental needs of the crops entrusted to it.
- \* Formulation of Central Sector/Centrally Sponsored Schemes and implementation of the same either directly or through the State Governments, Agricultural Universities etc.
- \* Monitoring the implementation of Central Sector/Centrally Sponsored Schemes and coordinating the development activities.
- \* Rendering technical assistance to State Governments and other agencies on commodity development programmes.
- \* Collection and compilation of statistics of area, production, export, import, prices etc. and dissemination of the same to the Central and State Governments and other agencies.
- \* Keeping liaison with the Research Institutes and extension agencies and acting as a two-way channel in the transfer of technology.
- \* Undertaking the publicity and propaganda works relating to the commodities.
- \* Assisting the Central and State Governments on all matters relating to the development of the commodities.
- \* Accreditation of spices nurseries.



Fig. 1. Office of the Directorate of Arecanut and Spices Development

### 2. Organizational Structure

The Directorate is headed by a Director supported with two Deputy Directors, one Assistant Director, one Research Officer and other supporting staff viz. Superintendent, Senior Technical Assistants, Statistical Investigator, Technical / Marketing/ Statistical Assistants along with other administrative staff.

In accordance with the mandate, the Directorate has four Sections viz. Development, Marketing, Economic Research & Statistics, Publicity and Administration.



Fig. 2. Organizational Structure

## 3. Staff

## a. Staff strength as on 31-03-2020

| Sl. No. | Name of the post           | Group<br>A/B/C/D | Sanctioned<br>Strength | In Position |
|---------|----------------------------|------------------|------------------------|-------------|
| 1.      | Director                   | A                | 01                     | 01          |
| 2.      | Deputy Director            | A                | 02                     | 02          |
| 3.      | Assistant Director         | A                | 01                     | -           |
| 4.      | Research Officer           | A                | 01                     | -           |
| 5.      | Superintendent             | В                | 01                     | 01          |
| 6.      | Statistical Investigator   | В                | 01                     | 01          |
| 7.      | Senior Technical Assistant | В                | 02                     | 02          |
| 8.      | Junior Translator          | В                | 01                     | 01          |
| 9.      | Technical Assistant        | С                | 03                     | 02          |
| 10.     | Marketing Assistant        | С                | 03                     | 02          |
| 11.     | Statistical Assistant      | С                | 01                     | 01          |
| 12.     | Artist Photographer        | С                | 01                     | 01          |
| 13.     | Computor                   | С                | 01                     | -           |
| 14.     | Stenographer Grade II      | С                | 03                     | 03          |
| 15.     | Upper Division Clerk       | С                | 04                     | 03          |
| 16.     | Lower Division Clerk       | С                | 06                     | 04          |
| 17.     | Staff Car Driver (OG)      | С                | 01                     | 01          |
| 18.     | Multi Tasking Staff        | С                | 06                     | 06          |
|         | TOTAL                      |                  | 39                     | 31          |

## b. STAFF IN POSITION as on 31-03-2020

| SI. | Name                      | Designation                |
|-----|---------------------------|----------------------------|
| 1.  | Dr. Homey Cheriyan        | Director                   |
| 2.  | Dr. Femina                | Deputy Director            |
| 3.  | Shri Babulal Meena        | Deputy Director            |
| 4.  | Shri C. Shunmuga Sundaram | Superintendent             |
| 5.  | Smt. C.V.Divya            | Senior Technical Assistant |
| 6.  | Dr. J.S. Remya            | Senior Technical Assistant |
| 7.  | Shri K. Manojkumar        | Statistical Investigator   |
| 8.  | Dr. P.N. Jyothi           | Junior Translator          |
| 9.  | Shri C.F.Gedam            | Artist Photographer        |
| 10. | Smt. M.K. Suma            | Technical Assistant        |
| 11. | Smt. K. Thejas Das        | Technical Assistant        |
| 12. | Smt. K. Ushakumari        | Marketing Assistant        |
| 13. | Smt. K.S. Kanchana        | Marketing Assistant        |
| 14. | Smt. Sruthi Sreekumar     | Statistical Assistant      |
| 15. | Shri P.R. Anil Kumar      | Stenographer Grade II      |
| 16. | Shri O.P. Haridasan       | Stenographer Grade II      |
| 17. | Shri M.P. Unnikrishnan    | Stenographer Grade II      |
| 18. | Shri P. Vinod Kumar       | Upper Division Clerk       |
| 19. | Shri T. K. Damodaran Nair | Upper Division Clerk       |
| 20. | Shri P. Baiju             | Upper Division Clerk       |
| 21. | Shri K.V. Rajesh          | Lower Division Clerk       |
| 22. | Shri Palash Kanti Mollick | Lower Division Clerk       |
| 23. | Shri T. Srikumar          | Lower Division Clerk       |
| 24. | Shri Satish Kumar         | Lower Division Clerk       |
| 25. | Shri Ranjith M            | Staff Car Driver           |
| 26. | Shri E. Ajithkumar        | Multi Tasking Staff        |
| 27. | Shri K.S. Santhos         | Multi Tasking Staff        |
| 28. | Shri K.V. Chandran        | Multi Tasking Staff        |
| 29. | Shri T. Pramoth Kumar     | Multi Tasking Staff        |
| 30. | Shri P.P. Sureshkumar     | Multi Tasking Staff        |
| 31. | Shri L.Sujeesh            | Multi Tasking Staff        |

## 4. Plan and non-plan budget

## (a) Non-plan budget for 2019-20

| Particulars of sub-head and name of the scheme etc.<br>1/2401 | Sanctioned<br>budget<br>(Rs. in lakhs) | Expenditure<br>(Rs. in lakhs) |
|---|--|-------------------------------|
| 550501- Salaries  | 295.52                                 | 265.02                        |
| 550502- Wages   | 1.23                                   | 0.92                          |
| 550506- Medical treatment                                     | 3.64                                   | 0.11                          |
| 550511- Domestic Travel Expenses                              | 18.82                                  | 15.45                         |
| 550513- Office Expenses                                       | 22.08                                  | 15.93                         |
| 550516- Publications  | 5.40                                   | 2.46                          |
| 550526- Advertising & Publicity                               | 1.50                                   | 0.50                          |
| 550527- Minor Works   | 12.00                                  | 1.5                           |
| 96- Swatchhta Action Plan                                     | 1.15                                   | 0.38                          |
| Total   | 361.34                                 | 302.27                        |

(b) Plan budget under Mission for Integrated Development of Horticulture (MIDH) 2019-20

| Particulars of Sub-Head and<br>name of the Scheme etc. | Sanctioned budget (Rs. in lakhs) | Expenditure (Rs. in lakhs) |
|--|----------------------------------|----------------------------|
| MIDH   | 1100                             | 1096                       |

## 5. **RIGHT TO INFORMATION (RTI) IN DASD**

During the year 2019-20, the Directorate received requests under various provisions of RTI Act seeking various kinds of information. During the year, Shri Babulal Meena, Deputy Director was designated as Central Public Information Officer (CPIO) and Director was the Appellate Authority. The details of RTI requests received and disposed off is as under:-

| Total number of RTI<br>requests received | Total no. of<br>request disposed<br>off | Total no. of request in<br>which information was<br>denied | Total no. of appeals<br>received |
|--|---|--|----------------------------------|
| 10                                       | 10                                      | NIL  | NIL                              |

### 6. VIGILANCE AWARENESS WEEK

In accordance with the instructions received from the Ministry of Agriculture and Farmers Welfare, Vigilance Awareness Week 2019 was observed in the Directorate during the period from 28<sup>th</sup> October to 2<sup>nd</sup> November, 2019. Posters and Banners were prepared and displayed in prominent places of the Directorate. On 28<sup>th</sup> October, 2019 all the Officers and staff assembled in the Office. Dr. Homey Cheriyan, Director, DASD addressed the staff explaining the importance of eradicating corruption and to raise public awareness regarding the threat caused by corruption. Afterwards, the Director administered the integrity pledge to all the staff at 11.00 am on 28<sup>th</sup> October, 2019.

A Vigilance Awareness class was organized in the Directorate on 31st October, 2019. Shri Ganesh Kumar, Circle Inspector of Police of Vigilance & Anti-corruption Bureau (Special Cell), Kozhikode, gave a lecture on Vigilance Awareness through power point presentation. The staff of Regional Science Centre and Planetarium, Calicut and Central Marine Fisheries Research Institute, Calicut also attended the Vigilance Awareness Class.



Fig. 3. Staff taking integrity pledge



Fig. 4. Shri Ganesh Kumar, CI of Police of Vigilance & Anti-corruption Bureau (Special Cell), Kozhikode taking the class



Fig. 5. A view of the class



### 7. SWACHHTA HI SEWA CAMPAIGN

"Swachhta Hi Sewa Campaign" was held in the Directorate from 16<sup>th</sup> September to 2<sup>nd</sup> October, 2019 with various programmes. Banners on Swachhta Hi Sewa Campaignwas prepared and exhibited in prominent places of the Directorate. All the Officers and Staff of the Directorate has taken the Swachhta Hi Sewa Campaign Pledge on 16<sup>th</sup> September, 2019 at 10.00 AM.

A plastic waste collection shramdan was arranged by the Directorate at Sarovaram Bio Park, Calicut on 25<sup>th</sup> September, 2019 in association with the Regional Science Centre and Planetarium, Calicut, Hartitha Kerala Mission and Kerala Scrap Merchants Association, Calicut. A Rally was also organized from Eranhipalam Junction, Calicut to the Sarovaram Bio-Park during this programme. Banners and Placards were also displayed by the volunteers mentioning the importance of waste management, plastic free environment and better sanitation practices. The District Collector, Kozhikode inaugurated the Sharamdan, Director, DASD and Project Coordinator, Haritha Mission gave speech on the importance of the programme.

A cleaning drive was undertaken in the office premises on 2<sup>nd</sup> October, 2019 (Gandhi Jayanthi Day). Banners about the programme were displayed in the office. Trees planting was undertaken in the office premises. Weeding out of files were also done on that day as a part of the cleaning drive.



Fig. 6. Dr.Homey Cheriyan, Director addressing the staff during the pledge



Fig. 7. Banner displaying Swachhta Hi Sewa Campaign





Fig. 8 & 9. Planting trees in the office during the period



## Fig. 10 to 13. Photos of Rally and cleaning drive at Saravoram Bio-Park, Calicut





### 8. SADBHAVANA DIWAS

"Sadbhavana Diwas" was observed on 20<sup>th</sup> August, 2019 on the birth anniversary of former Prime Minister Late Rajiv Gandhi. All staff were gathered and took Sadbhavana Diwas pledge on that day.



Fig. 14. Staff taking the pledge

### 9. RASHTRIYA EKTA DIWAS (NATIONAL UNITY DAY)

Rashtriya Ekta Diwas (National Unity Day) was observed on 31<sup>st</sup> October, 2019 on the birth anniversary of Sardar Vallabhabhai Patel. All staff members took Rashtriya Ekta Diwas Pledge on 31<sup>st</sup> October, 2019.



Fig. 15. Staff taking the pledge

#### **10. INTERNATIONAL YOGA DAY**

4<sup>th</sup> International Yoga Day was celebrated on 21<sup>st</sup> June, 2019 in the Directorate. On the day, all officers and staff performed Yoga under the guidance of Yoga master from **"Friends of Yoga"** Calicut.



Fig. 16. The instructor from Friends of Yoga taking the class





Fig. 17 and 18. Officers and staff participating in the yoga class

#### 11. SWACHHTA PAKHWADA

Swachhata Pakhwada was celebrated in the Directorate from 16<sup>th</sup> to 31<sup>st</sup> December, 2019. Dr. Homey Cheriyan, Director inaugurated the Swachata Pakwada programme. He explained about the importance of cleanliness and programmes proposed to be carried out during the Pakhwada. All staff members of the Direcotrate had taken swachhata pledge.

As part of this programme, Swachhata Pakhwada and Clean India banners were displayed in front of the Directorate as well as in the Website of the Directorate. A joint Rally by the staff of the Directorate and Central Marine Fisheries Research Institute was conducted in the Mananchira Round, Calicut on 30<sup>th</sup> December, 2019 in which placards were displayed to give wide publicity for the importance of cleanliness and to keep the surrounding neat and clean. Besides this, awareness regarding plastic pollution, open defecation, deforestation, water wastage, dust / smoke free air and other anti-environmental practices were also displayed through banners. Around 70-75 staff of both the offices actively participated in the Swachhata Rally. On Kisan Diwas, a cleanliness drive was also organized in the Directorate on 23<sup>rd</sup> December, 2019 at 11.00 AM and all staff of the Directorate participated in the cleanliness drive in the office premises.



Fig. 19. Officers and staff taking the pledge





Fig. 20. Rally held at Mananchira, Calicut



Fig. 21 and 22. Staff taking part in the cleanliness drive in the office premises



## 2. DEVELOPMENT PROGRAMMES

#### **DEVELOPMENT PROGRAMMES**

The Directorate has the national mandate for the development of Arecanut, Spices (other than Cardamom), Betel vine and Aromatic plants. Arecanut, Spices, Betelvine and Aromatic Plants occupy an important position among the horticulture crops because of their huge domestic consumption, sizeable export earnings and substantial employment generation particularly in the rural sector.

#### 1. Mission for Integrated Development of Horticulture (MIDH)

During 2005-06, Government of India launched the National Horticulture Mission (NHM) in the country to promote holistic growth of the horticulture sector through an area based regionally differentiated strategies with an aim to double the production in Horticulture crops, primarily through the improvement in productivity of the crops. The National Horticulture Mission envisaged to cover all aspects of production including scientific cultivation, adoption of high production technology, integrated pest and disease management, integrated nutrient management, organic cultivation, post-harvest management including value addition, storage etc. The mission programmes are fully funded by the Government and different components proposed for implementation financially supported on the scales laid down. The schemes are implemented in all the states and Union Territories in the country except North Eastern and Himalayan States, for which a separate scheme has been sponsored by the Government of India. The objective of the Mission based approach was to give impetus to encourage growth in spices production so as to double the production by 2010. During 2014-15, the Ministry of Agriculture and Farmers Welfare, Government of India has sub-sumed all the development schemes of horticulture (MIDH) for the holistic growth of the entire horticulture sector including spices in the country.

## 1.1 Role of the Directorate of Arecanut and Spices Development (DASD) in the implementation of MIDH programmes

- Responsible for coordinating and monitoring the activities on development of Arecanut, spices and aromatic plants.
- Responsible for organizing national level training programmes, seminars and workshops on spices, medicinal & aromatic plants on regular intervals.
- Directorate supplements the developmental efforts of the State Government by making available the

nucleus planting materials of various high yielding varieties of spices and aromatic plants across the country, through Central Institutes and State Agriculture Universities.

- Directorate is responsible for undertaking accreditation of spice nurseries across the country.
- Directorate disseminates periodically the seasonal crop prospects, area coverage, price trend etc. for the use in the planning process.

#### 1.2 Strategies identified for development of Spices and Aromatic Plants under MIDH

The growing demand for various spices and aromatic plants in food, pharmaceutical and cosmetic industries, both within the country and globally, necessitates streamlining production of these commodities so as to make available enough material for the domestic market as well as for exports. As a result of the national policies on liberalization and globalization and integrated approach in the crop development adopted in the previous plan periods, our export of spices and aromatic plant products, have increased substantially in recent years. Further, the above plant products are generally exported mainly in the whole form collected from various production centres without looking into the varieties. Variety has specific characteristic suited for production of value-added products. Such varieties having specific characteristics, which inter-alia relate to its intrinsic guality, will have to be rapidly multiplied and their cultivation organized for regular production. In order to take full advantage of the above situation and to keep up the momentum of exports, a Mission approach seems inevitable. The National Horticulture Mission is specially focused on increasing production and productivity through adoption of improved technologies, ensuring quality through genetic upgradation of all horticulture crops. Special emphasis is also given on adoption of area-based cluster approach for developing regionally important crops based on their local adaptation. Availability of quality planting materials being the primary requirement, received focused attention through an integrated approach in nucleus planting material production by providing the required infrastructure to various organizations predominantly the ones responsible for the release of these varieties and having sufficient technical support for production and maintenance of purity.

The efforts made by the implementation of NHM/MIDH programmes have reflected in the production statistics of spices. Area and production of spices in the country has increased with average annual growth rate of 3.6% and 6.5% per annum during the period from 2005-06 to 2019-20. Production of spices in the country increased from 3.9 million tonnes to 9.41 million tonnes and area increased from 2.35 million ha to 3.82 million ha during the same period.



## 1.3 Thrust areas identified for development of Arecanut, Spices and Aromatic Plants under MIDH

- \* Achieving higher level of productivity and reducing the cost of production so as to keep the prices at affordable level in the local market and competitive in the international market.
- \* Assuring availability of quality, disease free planting material of HYV of spice crops through planting material production programme implemented in SAUs and ICAR Institutes.
- \* Quality regulation of the private and public sector nurseries is also thrust area of the Directorate, which is ensured through nursery accreditation programme.
- \* Developing the cultivation of export-oriented varieties such as bold and pungent pepper varieties, ginger with low fibre content, turmeric with high curcumin, chillies with bright red colour and low pungency, varieties of spices with high oleoresin and volatile oil content.
- \* Encouraging women in cultivation as well as community processing.
- \* Reducing the foreign exchange outflow taking place on account of import of certain spices and aromatic plants by increasing their production.



### 1.4 Strategies adopted for development of spices

In order to achieve the production targets, to meet the domestic and export demands, accomplishing the quality parameters and product diversification, the following strategies are being adopted:

- \* Promotion of varieties available in the country which have high production potential and better export demand.
- \* Promoting the production of quality planting materials in large scale, adopting the latest technology including tissue culture techniques, microrhizome production, protray raising of seedlings etc. through State Agriculture/Horticulture Departments, Research Institutes, voluntary and private organizations and individuals.
- \* Promoting nursery accreditation programme for regulating the public/private nurseries across the country.
- \* Motivating farmers to follow improved cultivation methods including plant protection measures through transfer of technology programmes.
- \* Collecting statistics on area & production, market arrivals, prices etc. within and outside the country, their compilation and dissemination, conduct studies on cost of production, price spread, domestic demand etc.

### 2. Development Programmes taken up by DASD under MIDH during 2019-20

The activities of the Directorate during the year 2019-20 were

- \* Coordinating and monitoring the activities on the development of arecanut, spices and aromatic plants in the country.
- \* Monitoring of NHM programmes in the mandate crops in various states in the country.
- Implementation of development programmes in the mandated crops through various State
   Agricultural Universities and Central Institutes to supplement the state's efforts in achieving
   the desired results in the production fronts as conceived in the NHM / MIDH.

The development programmes implemented by the Directorate consisted primarily of the production of nucleus planting material of different spices through SAUs and ICAR Institutes and technology dissemination programmes including establishment of frontline demonstration plots, conduct of National Seminar/ Workshops/Farmer's Training programmes. During 2019-20, the Directorate implemented the NHM programmes with an outlay of Rs.11.00 crores for the development of Spices and Aromatic Plants.

|            |   |                       | Cost per<br>unit (Rs. in<br>Lakhs) | Target       |                                | Achievement |                                |
|------------|---|-----------------------|------------------------------------|--------------|--------------------------------|-------------|--------------------------------|
| Si.<br>No. | Programmes  | Unit                  |                                    | Physical     | Financial<br>(Rs. in<br>lakhs) | Physical    | Financial<br>(Rs. in<br>lakhs) |
| Ι          | Production and Distrib                              | ution of Quali        | ty Planting                        | Materials    |                                |             |                                |
| Ι          | Production and Distrib                              | ution of Nucle        | us Planting                        | Materials o  | f Spices                       |             |                                |
| 1          | Black Pepper /<br>Betelvine                         | Nos in lakhs          | 8.0                                | 0 20.57      | 0 164.560                      | 20.320      | 163.026                        |
| 2          | Ginger rhizomes                                     | Qty in tonnes         | 0.3                                | 0 138.75     | 0 41.625                       | 138.750     | 41.625                         |
| 3          | Ginger Protray seed-<br>lings                       | Nos in lakhs          | 1.2                                | 0 2.85       | 5 3.426                        | 2.855       | 3.426                          |
| 4          | Turmeric rhizomes                                   | Qty in tonnes         | 0.3                                | 0 487.50     | 0 146.250                      | 487.500     | 146.250                        |
| 5          | Turmeric protray seed-<br>lings                     | Nos in lakhs          | 1.2                                | 0 4.81       | 0 5.772                        | 4.810       | 5.772                          |
| 6          | Chilli seeds  | Qty in (qtls)         | 0.7                                | 5 32.54      | 0 24.405                       | 32.540      | 24.405                         |
| 7          | Seed spices   | Qty in tonnes         | 0.4                                | 0 105.50     | 0 42.200                       | 105.500     | 42.200                         |
| 8          | Garlic  | Qty in tonnes         | 0.5                                | 0 47.30      | 0 23.650                       | 47.300      | 23.650                         |
| 9          | Tree Spices grafts /<br>seedlings                   |                       |                                    |              |                                |             |                                |
| i.         | Nutmeg grafts<br>(Orthotropic)                      | Nos in lakhs          | 140.0                              | 0 0.07       | 9.800                          | 0.070       | 9.800                          |
| ii.        | Nutmeg grafts<br>(Plagiotropic)                     | Nos in lakhs          | 80.0                               | 0 0.36       | 5 29.200                       | 0.365       | 29.200                         |
| iii        | Tamarind / Kokum<br>grafts                          | Nos in lakhs          | 20.0                               | 0 1.182      | 5 23.650                       | 1.1825      | 23.650                         |
| iv         | Clove /Allspice seed-<br>lings                      | Nos in lakhs          | 20.0                               | 0 0.24       | .0 4.800                       | 0.240       | 4.800                          |
| v          | Cinnamon /Cassia /<br>Curry leaf seedlings          | Nos in lakhs          | 5.0                                | 0 3.39       | 5 16.975                       | 3.395       | 16.975                         |
| 10         | Aromatic Plants                                     | Ha.                   | 0.7                                | 5 43.00      | 0 32.250                       | 43.000      | 32.250                         |
| 11         | Nursery Centre for<br>Spices and Aromatic<br>Plants | Nos                   | 15.0                               | 0 5.00       | 0 75.000                       | 5.00        | 75.00                          |
| 12         | Upgradation of Spice<br>nurseries                   | up to 10<br>lakhs/4ha | up to 1<br>lakhs/4h                | 0 10.00<br>a | 0 25.000                       | 6.00        | 25.00                          |
| 13         | Seed processing and storage infrastructure          | 10 lakh/unit          | 10.0                               | 0 5.00       | 0 50.000                       | 5.00        | 50.00                          |

## Table 1. Major programmes implemented and achievements made during 2019-20 are as follows.

|      | Sub Total   |                 |           |         | 718.563  |         | 717.029  |
|------|---|-----------------|-----------|---------|----------|---------|----------|
| п    | Accreditation of spice nurseries  | LS              |           | 25      | 7.000    | 20.00   | 0.66     |
| III  | Technology Dissemi-<br>nation through Front-<br>line Demonstration  |                 |           |         |          |         |          |
| i.   | Organic Farming<br>Spices   | Nos in Ha.      | 0.60/1.00 | 50.000  | 50.000   | 50.000  | 50.000   |
| ii.  | Maintenance of<br>demonstration plots<br>of pepper established<br>during 2017-18                            | Nos in Ha.      | 0.250     | 10.000  | 2.500    | 10.000  | 2.500    |
| iii. | Maintenance of<br>demonstration plots<br>of pepper established<br>during 2018-19                            | Nos in Ha.      | 0.20      | 13.000  | 2.600    | 13.000  | 2.600    |
| iv.  | Demonstration plots of seed spices  | Nos in Ha.      | 0.40      | 103.000 | 41.200   | 103.000 | 41.200   |
| v    | Demonstration plots of aromatic plants  | Nos in Ha.      | 0.80      | 13.000  | 10.400   | 13.000  | 10.400   |
| vi.  | Multi species cropping<br>in Arecanut Gardens in<br>Karnataka (Nutmeg)                                      | Nos in Ha.      | LS        | 2.000   | 7.440    | 2.000   | 7.440    |
| vii. | Multi species cropping<br>in Arecanut Gardens in<br>Karnataka (Cocoa)                                       | Nos in Ha.      | LS        | 2.000   | 4.000    | 2.000   | 4.000    |
| viii | Multi species cropping<br>in Arecanut Gardens in<br>Assam   | Nos in acre     | LS        | 2.000   | 0.800    | 2.000   | 0.800    |
| ix   | Demonstration of E P N<br>in Arecanut   | Nos in acre     | LS        | 4.000   | 6.440    | 4.000   | 6.440    |
| x    | Demonstration of Are-<br>canut Dwarf Hybrids  | Nos in 0.5 acre | LS        | 2.000   | 4.000    | 2.000   | 4.000    |
| xi   | Participatory Demon-<br>stration Plots of Cinna-<br>mon intercropping in<br>coconut                         | Nos in acre     |           | 5.000   | 3.815    | 5.000   | 3.815    |
| xii  | Technology dissemina-<br>tion through FLD for<br>HDP of grafted Bush<br>pepper under shade<br>net structure | 300 sq. meters  |           | 6.000   | 1.200    | 6.000   | 1.200    |
|      | Sub total   |                 |           |         | 134.3950 |         | 134.3950 |



| IV   | Project based<br>programmes  |              |      |        |          |         |           |
|------|--|--------------|------|--------|----------|---------|-----------|
| a.   | Hi tech prod. system<br>for quality disease free<br>seed rhizomes of Tur-<br>meric and Ginger          |              | LS   |        | 6.000    |         | 6.000     |
| b.   | Participatory mode<br>rehabilitation of black<br>pepper gardens in<br>Kuttiyatoor Panchayath<br>(SAGY) | LS           | LS   |        | 8.290    |         | 8.290     |
| c.   | Varietal Authenticity<br>and Purity Identifica-<br>tion in Black Pepper                                | Nos          | LS   |        | 5.100    |         | 5.100     |
| d.   | Project on establish-<br>ment of seed produc-<br>tion centers in Ginger<br>growing areas               | Nos          | LS   |        | 5.000    |         |           |
|      | Sub Total  |              |      |        | 24.390   |         | 19.390    |
| V    | Transfer of Technolo-<br>gy programmes   |              |      |        |          |         |           |
| a.   | National Level Seminar   | Nos          | 1.00 | 1.00   | 5.000    | 1.000   | 5.000     |
| b.   | State Level Seminar/<br>Workshop   | Nos          | 3.00 | 3.00   | 9.000    | 3.000   | 9.000     |
| с.   | District Level Seminar<br>Workshops  | Nos          | 2.00 | 12.00  | 24.000   | 12.000  | 24.000    |
| d.   | Farmers Training pro-<br>gramme  | Nos          | 0.75 | 110.00 | 82.500   | 109.000 | 81.750    |
|      | Sub Total  |              |      |        | 120.500  |         | 119.750   |
| VI   | Skill Development<br>Schemes   | Nos in lakhs | LS   | 8      | 32.840   | 8.000   | 32.84     |
| VII  | T S G (Monitoring,<br>Evaluation, Mass Me-<br>dia, Publicity etc.)                                     |              |      |        | 8.000    |         |           |
| VIII | Mission Management   |              |      | LS     | 54.312   |         | 44.677    |
|      | GRAND TOTAL  |              |      |        | 1100.000 |         | 1068.7410 |

#### 2.1 Production and Distribution of Quality Planting Materials

The NHM/MIDH programmes on spices implemented in different States such as area expansion, replanting/rejuvenation etc. requires a sizeable quantity of quality planting materials of the respective spices crop. Non-availability of quality planting materials of high yielding varieties is identified as a major constraint in achieving the desired productivity of these crops as conceived in the Mission. Quite a good number of varieties of various spices and aromatic crops have been evolved in various research centres. However, for want of basic infrastructure and adequate funds, the required quantum of nucleus planting material is not being generated so that it can be made available for large scale multiplication and distribution to the farmers. In order to improve the situation, as done in the past, the Directorate had taken up the production of nucleus planting material during 2019-20 also with a financial outlay of Rs.717.029 lakhs. This programme was implemented in association with the SAUs and ICAR Institutes in different states of the country. The materials so produced were made available for further multiplication and distribution to the farmers.

#### 2.1.1 Black pepper

Availability of good quality planting material is one of the major constraints in improving the production of black pepper in pepper growing areas. To overcome this situation, Directorate has taken up production of quality planting materials of black pepper by both conventional and advanced propagation technologies in the State Agricultural University (SAU) farms and Indian Council of Agricultural Research (ICAR) farms located in the major production centers of pepper. A total of 20.57 lakhs of planting materials were produced and distributed with a financial utilization of Rs.164.56 lakhs. Rate of assistance given for production of quality nucleus planting materials of pepper was Rs. 8/cutting. Kerala, Karnataka and Tamil Nadu are the major states producing black pepper in the country. Different Universities/Institutes in Kerala, Karnataka, Tamil Nadu, Andhra Pradesh, West Bengal and Maharashtra implemented this programme for production and distribution of planting materials in the states. The details of Universities/Institutes which undertook this component during the year is placed in the table below.

#### Table 2. Planting material production of black pepper 2019-20 (University-wise).

| S.<br>No. | Institute                                 | Quantity Produced and<br>distributed<br>(in lakhs) | Financial utilisation<br>(Rs.in lakhs) |
|-----------|---|--|--|
| 1         | Assam Agri University, Assam              | 0.250  | 2.000                                  |
| 2         | Bidhan Chandra Krishi Vishwavidyalaya, WB | 0.500  | 4.000                                  |

| 3  | Central Island Agricultural Research Institute,<br>Port Blair             | 0.250  | 2.000   |
|----|---|--------|---------|
| 4  | College of Horticulture and Forestry, CAU<br>Pasighat,                    | 0.050  | 0.400   |
| 5  | Dr. Balasaheb Sawant Konkan Krishi Vidya<br>Peeth, Dapoli, Maharashtra    | 2.000  | 16.000  |
| 6  | Dr. Punjabrao Deshmukh Krishi Vidyapeeth,<br>Akola, Maharashtra           | 0.400  | 3.200   |
| 7  | ICAR-Central Coastal Argicultural Research<br>Institute, Goa              | 0.250  | 2.000   |
| 8  | ICAR-Indian Institute of Spiecs Research,<br>Kozhikode, Kerala            | 1.250  | 10.000  |
| 9  | Kerala Agriculture University, Kerala                                     | 7.500  | 60.000  |
| 10 | Nagaland Central University, Nagaland                                     | 0.050  | 0.400   |
| 11 | Navsari Agricultural University, Gujarat                                  | 0.020  | 0.160   |
| 12 | Odisha University of Agriculture & Technolo-<br>gy, Odisha                | 0.200  | 1.600   |
| 13 | Sri Konda Laxman Telangana State Horticul-<br>tural University, Telangana | 0.050  | 0.400   |
| 14 | Tamil Nadu Agricultural Univesity, Tamil<br>Nadu                          | 3.000  | 24.000  |
| 15 | University of Agri. and Horticulture Sciences,<br>Shimoga, Karnataka      | 2.000  | 16.000  |
| 16 | University of Agricultural Sciences, Banga-<br>lore, Karnataka            | 0.400  | 3.200   |
| 17 | University of Agricultural Sciences, Dharwad,<br>Karnataka                | 0.400  | 3.200   |
| 18 | University of Horticultural Sciences, Bagalkot,<br>Karnataka              | 1.000  | 8.000   |
| 19 | Uttar Banga Agricultural Univesity, Pundibari,<br>WB                      | 0.500  | 4.000   |
| 20 | Directorate of Arecanut and Spices Develop-<br>ment, Kozhikode, Kerala    | 0.500  | 4.000   |
|    | Total   | 20.570 | 164.560 |

## 2.1.2. Ginger

The Directorate produced and distributed 138.75 tonnes of nucleus seed rhizomes of high yielding varieties of ginger through various SAUs and ICAR Institutes located all over the country. Assistance was provided at the rate of Rs. 0.30 lakh/tonne of ginger rhizomes. An amount of Rs.41.625 lakhs was incurred for the programme. The Institute-wise production details of ginger seed rhizomes are detailed below.

 Table 3. Planting material production of ginger 2019-20 (University-wise)

| S.<br>No. | Institute  | Quantity<br>Produced and<br>distributed<br>(in tonnes) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|--|---|
| 1         | Assam Agrculture University, Assam   | 10.000   | 3.000                                     |
| 2         | Banda Agricultural University, UP  | 10.000   | 3.000                                     |
| 3         | Bidhan Chandra Krishi Vishwavidyalaya, WB  | 2.000  | 0.600                                     |
| 4         | Birsa Agricultural University, Jharkhand   | 5.000  | 1.500                                     |
| 5         | Central Island Agricultural Research Institute, Port Blair                         | 5.000  | 1.500                                     |
| 6         | College of Horticulture and Forestry, CAU, Pa-<br>sighat,Arunachal Pradesh         | 5.000  | 1.500                                     |
| 7         | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli,<br>Maharashtra             | 6.000  | 1.800                                     |
| 8         | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharash-<br>tra                  | 10.000   | 3.000                                     |
| 9         | Dr. Y S Parmar University of Horticulture and Forestry, Solan,<br>Himachal Pradesh | 2.000  | 0.600                                     |
| 10        | Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh                         | 18.000   | 5.400                                     |
| 11        | ICAR-Indian Institute of Spiecs Research, Kozhikode, Kerala                        | 4.000  | 1.200                                     |
| 12        | Kerala Agricultural University, Kerala   | 8.750  | 2.625                                     |
| 13        | Vasantrao Naik Marathwada krishi Vidyapeeth, Parbhani,<br>Maharashtra              | 5.000  | 1.500                                     |
| 14        | Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra                               | 10.000   | 3.000                                     |
| 15        | Odisha University of Agriculture & Technology, Odisha                              | 7.000  | 2.100                                     |
| 16        | Sri Konda Laxman Telangana State Horticultural University,<br>Telangana            | 5.000  | 1.500                                     |
| 17        | Tamil Nadu Agricultural Univesity, Tamil Nadu                                      | 1.000  | 0.300                                     |
| 18        | University of Agricultural Sciences, Bangalore, Karnataka                          | 1.000  | 0.300                                     |
| 19        | University of Agricultural Sciences, Dharwad, Karnataka                            | 12.000   | 3.600                                     |
| 20        | University of Horticultural Sciences, Bagalkot, Karnataka                          | 5.000  | 1.500                                     |
| 21        | Uttar Banga Agricultural Univesity, Pundibari, West Bengal                         | 7.000  | 2.100                                     |
|           | Total  | 138.750  | 41.625                                    |

#### 2.1.3. Ginger protray seedlings

State Agri. Universities/ICAR Institutes working on ginger and turmeric have standardized protocol for raising low cost ginger seedlings using single bud rhizomes in protrays, which can be transplanted to main field within 30-40 days. DASD has been promoting this technique and started providing assistance to implementing agencies since 2019-20, to produce protray seedlings @ 1.20 Rs. /seedling. During this year, 2.855 Lakhs ginger protray seedlings were produced and distributed under this programme, utilizing a financial assistance of Rs.3.246 lakhs.

| S.<br>No. | Institute  | Quantity<br>Produced and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|---|---|
| 1         | College of Horticulture and Forestry, CAU, Pasighat                  | 1.000   | 1.200                                     |
| 2         | Kerala Agri University, Kerala                                       | 0.355   | 0.426                                     |
| 3         | Sri Konda Laxman Telangana State Horticultural University, Telangana | 0.500   | 0.600                                     |
| 4         | University of Horticultural Sciences, Bagalkot, Karnataka            | 1.000   | 1.200                                     |
|           | Total  | 2.855   | 3.426                                     |

#### Table 4. Ginger protray seedlings produced in 2019-20 (University-wise)

#### 2.1.4. Turmeric

Turmeric seed production programme was mainly implemented through the SAUs located in the major turmeric producing states. Financial assistance was given @ Rs.25,000/- tonnes of turmeric seed rhizomes produced. By the implementation of the programme, 487.50 tonnes of turmeric seed rhizomes were produced and distributed and Rs.146.25 lakhs has been utilized for the same. The Institute-wise production details of turmeric seed rhizomes are given below.

 Table 5. Planting material production of turmeric 2019-20 (University-wise).

| S.<br>No. | Institute   | Quantity<br>Produced and<br>distributed<br>(in tonnes) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|---|--|---|
| 1         | Anand Agricultural University, Gujarat                                    | 5.000  | 1.500                                     |
| 2         | Assam Agri University, Assam  | 10.000   | 3.000                                     |
| 3         | Banda Agricultural University, UP   | 10.000   | 3.000                                     |
| 4         | Bidhan Chandra Krishi Vishwavidyalaya, WB                                 | 30.000   | 9.000                                     |
| 5         | Birsa Agricultural University, Jharkhand                                  | 10.000   | 3.000                                     |
| 6         | Chaudhary Charan Singh Haryana Agricultural University, Hisar,<br>Haryana | 3.000  | 0.900                                     |
| 7         | Central Island Agricultural Research Institute, Port Blair                | 2.000  | 0.600                                     |
| 8         | College of Horticulture and Forestry, CAU, Pasighat                       | 5.000  | 1.500                                     |

| 9  | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli, Maha-<br>rashtra             | 10.000  | 3.000   |
|----|--|---------|---------|
| 10 | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra                         | 50.000  | 15.000  |
| 11 | Dr. Y S Parmar University of Horticulture and Forestry, Solan, Him-<br>achal Pradesh | 2.000   | 0.600   |
| 12 | Dr. Y S R Horticultural University, Andhra Pradesh                                   | 40.000  | 12.000  |
| 13 | ICAR-Central Coastal Agricultural Research Institute, Goa                            | 6.000   | 1.800   |
| 14 | Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh                           | 25.000  | 7.500   |
| 15 | ICAR-Indian Institute of Spiecs Research, Kozhikode, Kerala                          | 6.000   | 1.800   |
| 16 | Kerala Agricultural University, Kerala   | 10.000  | 3.000   |
| 17 | Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Maha-<br>rashtra              | 10.000  | 3.000   |
| 18 | Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra                                 | 15.000  | 4.500   |
| 19 | Narendra Dev University of Agricultural and Technology, Faizabad,<br>Uttar Pradesh   | 6.000   | 1.800   |
| 20 | Nagaland Central University, Nagaland  | 5.000   | 1.500   |
| 21 | Navsari Agriculture University, Gujarat  | 25.000  | 7.500   |
| 22 | Odisha University of Agriculture & Technology, Odisha                                | 20.000  | 6.000   |
| 23 | Punjab Agricultural University, Punjab   | 35.000  | 10.500  |
| 24 | Rajendra Agricultural University, Dholi, Bihar                                       | 50.000  | 15.000  |
| 25 | Sri Konda Laxman Telangana State Horticultural University, Telan-<br>gana            | 16.000  | 4.800   |
| 26 | Tamil Nadu Agricultural Univesity, Tamil Nadu  | 30.000  | 9.000   |
| 27 | University of Agricultural Sciences, Bangalore, Karnataka                            | 4.000   | 1.200   |
| 28 | University of Agricultural Sciences, Dharwad, Karnataka                              | 7.500   | 2.250   |
| 29 | University of Horticultural Sciences, Bagalkot, Karnataka                            | 12.000  | 3.600   |
| 30 | Uttar Banga Agricultural Univesity, Pundibari, WB                                    | 28.000  | 8.400   |
|    | Total  | 487.500 | 146.250 |

### 2.1.5. Turmeric protray seedlings

State Agricultural Universities/ICAR Institutes working on ginger and turmeric have standardized protocol for raising low cost seedlings using single bud rhizomes in protrays, which can be transplanted to main field within 30-40 days. DASD has been promoting this technique and started providing assistance to implementing agencies since 2019-20, to produce protray seedlings @ 1.20 Rs./seedlings. Under this programme, 4.81 Lakhs turmeric protray seedlings were produced and distributed, utilizing a financial assistance of Rs.5.772 lakhs during this year. Following implementing agencies implemented this programme in 2019-20.

| S.<br>No. | Institute   | Quantity<br>Produced and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|---|---|---|
| 1         | College of Horticulture and Forestry, CAU, Pasighat                     | 1.000   | 1.200                                     |
| 2         | ICAR-Central Coastal Argicultural Research Institute, Goa               | 0.100   | 0.120                                     |
| 3         | Kerala Agricultural University, Kerala                                  | 0.210   | 0.252                                     |
| 4         | Sri Konda Laxman Telangana State Horticultural University,<br>Telangana | 2.000   | 2.400                                     |
| 5         | University of Horticultural Sciences, Bagalkot, Karnataka               | 1.500   | 1.800                                     |
|           | Total   | 4.81  | 5.772                                     |

### Table 6. Turmeric protray seedlings produced in 2019-20 (University-wise)

#### 2.1.6. Chilli

Chilli is the largest produced spice in the country and it is estimated that about 30 tonnes of chilli seeds are required annually to meet the demand. The Directorate had taken up a programme on production of nucleus seeds of chillies through the SAUs located in the major chilli producing centres. During the year 2019-20, a quantity of 32.54 quintals of nucleus seeds of chillies were produced and distributed to State Department farms for further multiplication and distribution among farmers. Assistance to the tune of Rs. 75,000/quintal was provided to the implementing agencies for this programme. A total of Rs. 24.405 lakhs was incurred for this purpose during the year.

| Table 7. The | planting <b>i</b> | material <b>j</b> | production of | f chilli seeds | during 2019-20 |
|--------------|-------------------|-------------------|---------------|----------------|----------------|
|--------------|-------------------|-------------------|---------------|----------------|----------------|

| S.<br>No. | Institute   | Quantity<br>Produced and<br>distributed<br>(in quintals) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|---|--|---|
| 1         | Anand Agricultural University, Gujarat                                      | 1.500  | 1.125                                     |
| 2         | Birsa Agricultural University, Jharkhand                                    | 0.500  | 0.375                                     |
| 3         | C S Azad University of Agriculture and Technology, Kanpur,<br>Uttar Pradesh | 0.040  | 0.030                                     |
| 4         | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli,<br>Maharashtra      | 2.000  | 1.500                                     |
| 5         | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maha-<br>rashtra           | 1.000  | 0.750                                     |
| 6         | Dr. Y S R Horticultural University, Andhra Pradesh                          | 2.000  | 1.500                                     |
| 7         | Kerala Agricultural University, Kerala                                      | 1.500  | 1.125                                     |
| 8         | Vasantrao Naik Marathwada krishi Vidyapeeth, Parbhani,<br>Maharashtra       | 5.000  | 3.750                                     |
| 9         | Sardar Krushinagar Dantiwada Agricultural University, Jagu-<br>dan, Gujarat | 1.000  | 0.750                                     |

|    | Total   | 32.540 | 24.405 |
|----|---|--------|--------|
| 15 | University of Horticultural Sciences, Bagalkot, Karnataka               | 4.000  | 3.000  |
| 14 | University of Agricultural Sciences, Dharwad, Karnataka                 | 8.000  | 6.000  |
| 13 | University of Agricultural Sciences, Bangalore, Karnataka               | 2.000  | 1.500  |
| 12 | Tamil Nadu Agricultural University, Tamil Nadu                          | 2.000  | 1.500  |
| 11 | Sher-e-Kashmir University of Agri. Sciences and Technology,<br>J & K    | 1.000  | 0.750  |
| 10 | Sri Konda Laxman Telangana State Horticultural University,<br>Telangana | 1.000  | 0.750  |

#### 2.1.7. Seed spices

Seed spices occupy about 50% of area under spices and contributes 20% of total spices production in the country. This group of spices has a prominent place in our national economy because of its large domestic consumption and growing demand for export. Low productivity is one of the serious problems in the production of seed spices. Production of nucleus seeds of high yielding released varieties of seed spices was carried out in major seed spice producing states through the SAUs and ICAR Institutes. It is estimated that around 25,000 tonnes seeds of seed spices are required annually. The Directorate in association with the SAUs situated in the major seed spices production centres, produced 105.50 tonnes of seeds and distributed to State Department farms and private nurseries for further multiplication and distribution among farmers. Assistance provided for this purpose was Rs. 40,000/tonne and Rs. 42.20 lakhs were incurred for this programme.

| S.<br>No. | Institute  | Quantity<br>Produced and<br>distributed<br>(in tonnes) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|--|---|
| 1         | Agriculture University, Jodhpur, Rajasthan   | 10.000   | 4.000                                     |
| 2         | Anand Agricultural University,Gujarat  | 6.000  | 2.400                                     |
| 3         | Bidhan Chandra Krishi Vishwavidyalaya, West Bengal                                 | 1.000  | 0.400                                     |
| 4         | Birsa Agricultural University, Jharkhand   | 1.000  | 0.400                                     |
| 5         | Chaudhary Charan Singh Haryana Agricultural University,<br>Hisar, Haryana          | 10.000   | 4.000                                     |
| 6         | C S Azad University of Agriculture and Technology, Kanpur,<br>Uttar Pradesh        | 1.000  | 0.400                                     |
| 7         | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maha-<br>rashtra                  | 3.000  | 1.200                                     |
| 8         | Dr. Y S Parmar University of Horticulture and Forestry,<br>Solan, Himachal Pradesh | 0.500  | 0.200                                     |

#### Table 8. University-wise details of seed spices seed production programme 2019-20

| 9  | Dr. Y S R Horticultural University, Andhra Pradesh                               | 1.000   | 0.400  |
|----|--|---------|--------|
| 10 | Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh                       | 5.500   | 2.200  |
| 11 | Junagadh Agri University, Gujarat  | 2.000   | 0.800  |
| 12 | Maharana Pratap University of Agri. and Technology, Udai-<br>pur, Rajasthan      | 4.000   | 1.600  |
| 13 | Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani,<br>Maharashtra            | 1.000   | 0.400  |
| 14 | Narendra Dev University of Agriculture and Technology,<br>Faizabad, UP           | 3.000   | 1.200  |
| 15 | ICAR-National Research Centre for Seed Spices, Ajmer,<br>Rajasthan               | 21.000  | 8.400  |
| 16 | Punjab Agricultural University, Punjab   | 1.000   | 0.400  |
| 17 | Rajendra Agricultural University, Dholi, Bihar                                   | 1.000   | 0.400  |
| 18 | Sardar Krushinagar Dantiwada Agri University, Jagudan,<br>Gujarat                | 14.000  | 5.600  |
| 19 | Sardar Vallabh Bhai Patel Univ. of Agri Sciences and Tech-<br>nology, Meerut, UP | 2.000   | 0.800  |
| 20 | Sher-e-Kashmir University of Agri. Sciences and Technology, J & K                | 3.000   | 1.200  |
| 21 | Sri Karan Narendra Agriculture University, Jobner, Rajas-<br>than                | 7.000   | 2.800  |
| 22 | Tamil Nadu Agricultural Univesity, Tamil Nadu                                    | 2.500   | 1.000  |
| 23 | University of Agricultural Sciences, Bangalore, Karnataka                        | 1.000   | 0.400  |
| 24 | University of Agricultural Sciences, Dharwad, Karnataka                          | 4.000   | 1.600  |
|    | Total  | 105.500 | 42.200 |

#### 2.1.8. Garlic

Garlic is an important spice crop grown in an area of 2.97 lakh ha with an estimated production of around 16.01 lakh tonnes. The low productivity when compared to other producing countries is primarily because of the varieties being cultivated in major parts of the country. New varieties released from various research stations have not reached the farmers in the required extent. Directorate of Arecanut and Spices Development had been funding Universities to produce nucleus planting materials during 2019-20 so as to make available enough materials for further multiplication and distribution among the farmers. **Table 9. Nucleus seed production programme of Garlic 2019-20.** 

| S.<br>No. | Institute   | Quantity<br>produced and<br>distributed<br>(in tonnes) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|---|--|---|
| 1         | Chaudhary Charan Singh Haryana Agricultural University,<br>Hisar, Haryana | 11.000   | 5.500                                     |

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| 2  | C S Azad University of Agriculture and Technology, Kanpur,<br>UP                            | 0.300  | 0.150  |
|----|---|--------|--------|
| 3  | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maha-<br>rashtra                           | 2.000  | 1.000  |
| 4  | Dr. Y S Parmar University of Horticulture and Forestry, So-<br>lan, Himachal Pradesh        | 3.000  | 1.500  |
| 5  | Junagadh Agri University, Gujarat   | 3.000  | 1.500  |
| 6  | Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani,<br>Maharashtra                       | 6.000  | 3.000  |
| 7  | Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra  | 5.000  | 2.500  |
| 8  | Narendra Dev University of Agri. and Technology, Faizabad,<br>UP                            | 2.000  | 1.000  |
| 9  | Nagaland Central University, Nagaland   | 2.000  | 1.000  |
| 10 | Navsari Agri University, Gujarat  | 2.000  | 1.000  |
| 11 | Sri Konda Laxman Telangana State Horticultural University,<br>Telangana                     | 2.000  | 1.000  |
| 12 | Sardar Vallabh Bhai Patel Univ. of Agri Sciences and Technol-<br>ogy, Meerut, Uttar Pradesh | 1.000  | 0.500  |
| 13 | Sher-e-Kashmir University of Agri. Sciences and Technology,<br>J & K                        | 2.000  | 1.000  |
| 14 | Tamil Nadu Agricultural University, Tamil Nadu  | 2.000  | 1.000  |
| 15 | University of Agricultural Sciences, Dharwad, Karnataka                                     | 4.000  | 2.000  |
|    | Total   | 47.300 | 23.650 |

### 2.1.9. Tree spices

Tree spices being of perennial nature, quality planting material has a major role to play in the success of its cultivation. Lack of good quality planting materials in tree spices like clove, cinnamon/tejpat, tamarind, nutmeg, allspice, cassia, curry leaf etc. is a major hindrance to its development. The Directorate extended assistance for the production of tree spices grafts/seedlings sourced from selected high yielding trees to SAUs and ICAR Institutes located in southern states and Konkan region where it is popularly grown. Grafts of nutmeg & tamarind and seedlings of clove, cinnamon, curry leaf, allspice, cassia were included in the programme. Approximately Rs.5.253 lakh grafts/ seedlings of various tree spices were produced and distributed with a financial utilization of Rs.84.425 lakhs.


| S.<br>No. | Tree spices grafts /seedlings          | Unit         | Unit cost | Quantity<br>produced<br>and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in<br>lakhs) |
|-----------|--|--------------|-----------|--|--|
| 1.        | Nutmeg grafts (Orthotropic)            | Nos in lakhs | 140.00    | 0.070  | 9.800  |
| 2.        | Nutmeg grafts (Plagiotropic)           | Nos in lakhs | 80.00     | 0.365  | 29.200                                       |
| 3.        | Tamarind / Kokum grafts                | Nos in lakhs | 20.00     | 1.1825   | 23.650                                       |
| 4.        | Clove /Allspice seedlings              | Nos in lakhs | 20.00     | 0.240  | 4.800  |
| 5.        | Cinnamon /Cassia /Curry leaf seedlings | Nos in lakhs | 5.00      | 3.395  | 16.975                                       |
|           | Total                                  |              |           | 5.253  | 84.425                                       |

### Table 10. Details of tree spices planting material production programme

### Table 11. Institute-wise details of planting material production of tree spices

### (a) Nutmeg (Plagiotropic)

| S.<br>No. | Institute  | Quantity pro-<br>duced and distrib-<br>uted<br>(in Lakhs) | Financial utilisa-<br>tion (Rs.in lakhs) |
|-----------|--|---|--|
| 1         | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapo-<br>li, Maharashtra | 0.300   | 24.000                                   |
| 2         | ICAR-Central Coastal Agricultural Research Institute,<br>Goa             | 0.010   | 0.800                                    |
| 3         | Tamil Nadu Agricultural University, Tamil Nadu                           | 0.010   | 0.800                                    |
| 4         | University of Agricultural Sciences, Bangalore, Karnata-<br>ka           | 0.020   | 1.600                                    |
| 5         | University of Agricultural Sciences, Dharwad, Karnataka                  | 0.010   | 0.800                                    |
| 6         | University of Horticultural Sciences, Bagalkot, Karnata-<br>ka           | 0.015   | 1.200                                    |
|           | Total  | 0.365   | 29.200                                   |

### Nutmeg (Orthotropic)

| S.<br>No. | Institute  | Quantity<br>produced and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in lakhs) |  |
|-----------|--|---|---|--|
| 1         | ICAR-Central Coastal Agricultural Research Institute,<br>Goa | 0.005   | 0.700                                     |  |
| 2         | Kerala Agri University, Kerala                               | 0.065   | 9.100                                     |  |
|           | Total  | 0.070   | 9.800                                     |  |

### (b) Tamarind/Kokum grafts

| S.<br>No. | Institute  | Quantity<br>produced and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|---|---|
| 1         | Banda Agricultural University, UP                                      | 0.005   | 0.100                                     |
| 2         | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli,<br>Maharashtra | 0.500   | 10.000                                    |
| 3         | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharash-<br>tra      | 0.150   | 3.000                                     |
| 4         | Dr. Y S R Horticultural University, Andhra Pradesh                     | 0.050   | 1.000                                     |
| 5         | Kerala Agri University, Kerala   | 0.0975  | 1.950                                     |
| 6         | Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani,<br>Maharashtra  | 0.150   | 3.000                                     |
| 7         | Tamil Nadu Agricultural University, Tamil Nadu                         | 0.050   | 1.000                                     |
| 8         | University of Agri. and Horticulture Sciences, Shimoga, Karna-<br>taka | 0.020   | 0.400                                     |
| 9         | University of Agricultural Sciences, Bangalore, Karnataka              | 0.050   | 1.000                                     |
| 10        | University of Agricultural Sciences, Dharwad, Karnataka                | 0.060   | 1.200                                     |
| 11        | University of Horticultural Sciences, Bagalkot, Karnataka              | 0.050   | 1.000                                     |
|           | Total  | 1.183   | 23.650                                    |

### (c) Clove/Allspice Seedlings

| S.<br>No. | Institute  | Quantity<br>produced and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|---|---|
| 1         | Central Island Agricultural Research Institute, Port Blair | 0.040   | 0.800                                     |
| 2         | Kerala Agri University, Kerala                             | 0.040   | 0.800                                     |
| 3         | Tamil Nadu Agricultural University, Tamil Nadu             | 0.010   | 0.200                                     |
| 4         | University of Agricultural Sciences, Bangalore, Karnataka  | 0.050   | 1.000                                     |
| 5         | University of Horticultural Sciences, Bagalkot, Karnataka  | 0.100   | 2.000                                     |
|           | Total  | 0.240   | 4.800                                     |

## (d) Cinnamon/Cassia/Curry leaf

| S.<br>No. | Institute  | Quantity<br>produced and<br>distributed<br>(in Lakhs) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|---|---|
| 1         | Bidhan Chandra Krishi Vishwavidyalaya, WB                  | 0.500   | 2.500                                     |
| 2         | Central Island Agricultural Research Institute, Port Blair | 0.050   | 0.250                                     |

| 3  | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli,<br>Maharashtra  | 0.500 | 2.500  |
|----|---|-------|--------|
| 4  | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharash-<br>tra       | 0.200 | 1.000  |
| 5  | ICAR-Central Coastal Argicultural Research Institute, Goa               | 0.040 | 0.200  |
| 6  | ICAR-Indian Institute of Spices Research, Kozhikode, Kerala             | 0.050 | 0.250  |
| 7  | Kerala Agri University, Kerala  | 0.475 | 2.375  |
| 8  | Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani,<br>Maharashtra   | 0.050 | 0.250  |
| 9  | Odisha University of Agriculture & Technology, Odisha                   | 0.020 | 0.100  |
| 10 | Sri Konda Laxman Telangana State Horticultural University,<br>Telangana | 0.200 | 1.000  |
| 11 | Tamil Nadu Agricultural Univesity, Tamil Nadu                           | 0.010 | 0.050  |
| 12 | University of Agricultural Sciences, Bangalore, Karnataka               | 1.000 | 5.000  |
| 13 | University of Agricultural Sciences, Dharwad, Karnataka                 | 0.200 | 1.000  |
| 14 | University of Horticultural Sciences, Bagalkot, Karnataka               | 0.100 | 0.500  |
|    | Total   | 3.395 | 16.975 |

#### 2.1.10. Aromatic Plants

In order to multiply quality planting materials of selected aromatic plants which are in good demand for the domestic industries and also for the export markets, the Directorate extended financial assistance to 15 Universities/ICAR Institutes spread across the country. A total of 43 hectares were covered under the programme with a financial outlay of Rs. 32.25 lakhs during 2019-20, with an assistance @ Rs.75,000/ha.

#### Table 12. Institute-wise details of planting material production programme in Aromatic Plants

| S.<br>No. | Institute   | Quantity<br>produced and<br>distributed<br>(in ha) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|---|--|---|
| 1         | Anand Agricultural University, Gujarat                                    | 1.000  | 0.750                                     |
| 2         | Banda Agricultural University, Uttar Pradesh                              | 2.000  | 1.500                                     |
| 3         | Bidhan Chandra Krishi Vishwavidyalaya, West Bengal                        | 1.000  | 0.750                                     |
| 4         | Chaudhary Charan Singh Haryana Agricultural University, Hisar,<br>Haryana | 2.000  | 1.500                                     |
| 5         | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli, Maha-<br>rashtra  | 6.000  | 4.500                                     |
| 6         | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra              | 5.000  | 3.750                                     |

| 7  | Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh                         | 4.000  | 3.000  |
|----|--|--------|--------|
| 8  | Kerala Agricultural University, Kerala   | 3.000  | 2.250  |
| 9  | Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra                               | 4.000  | 3.000  |
| 10 | Narendra Dev University of Agriculture and Technology, Faiz-<br>abad, Uttar Pradeh | 2.000  | 1.500  |
| 11 | Punjab Agricultural University, Punjab   | 1.000  | 0.750  |
| 12 | Sri Konda Laxman Telangana State Horticultural University,<br>Telangana            | 2.000  | 1.500  |
| 13 | Tamil Nadu Agricultural University, Tamil Nadu                                     | 4.000  | 3.000  |
| 14 | University of Agricultural Sciences, Bangalore, Karnataka                          | 5.000  | 3.750  |
| 15 | University of Agricultural Sciences, Dharwad, Karnataka                            | 1.000  | 0.750  |
|    | Total  | 43.000 | 32.250 |

**QUALITY PLANTING MATERIAL PRODUCTION PROGRAMME 2019-2020** 



Fig. 1. Rooted Black pepper top shoot cuttings at COH, KAU,Thrissur



Fig. 2. Black pepper cuttings raised at IISR, Kozhikode



Fig. 3. Black pepper cuttings raised at HARS, Pottangi



Fig. 4. Bush Pepper Planting materials multiplied at COH, Dapoli



Fig. 5. Quality planting material production of black pepper at UAHS, Shimoga



Fig. 6. Pepper cuttings raised at HRS, Thadiyankudisai, TNAU



Fig. 7. Betelvine planting material raised at PDKV, Akola



Fig. 8. Betelvine quality planting material production at UAS, Bangalore



Fig. 9.Quality planting materials of Betelvine raised at UAS, Dharwad



Fig. 10. Quality planting Material production of Betelvine at UBKV, West Bengal





Fig. 11. Quality seed material production of Ginger at KVK, Panna, JNKVV



Fig. 12. Ginger seed production at Dr.YSPHU, Solan



Fig. 13. Ginger seed production plot at UAHS, Shimoga



Fig.14.Ginger seed rhizomes harvesting at IGKV, Raipur



Fig. 15. Ginger seed production at IF, KAU, Vellayani



Fig. 16. Quality seed production plot of Ginger at UBKV, West Bengal





Fig. 17. Ginger seed production unit at UAS, Dharwad



Fig. 18. Ginger protray seedlings raisedat Dept. of PC & S, COH, KAU



Fig. 19. Turmeric plot for quality planting material production at UBKV, West Bengal



Fig. 20. Field view of quality seed production plot of Turmeric at ARS, Malagi, UAS, Dharwad



Fig. 21. Turmeric plot damaged by flash flood at Dr. YSRHU, Andra Pradesh



Fig. 22. Turmeric Plot affected by flood at MPKV, Rahuri





Fig. 23.Quality Planting Material production of Turmeric at ARS, Bhavanisagar, TNAU



Fig. 24. Quality seed production of Turmeric at PAU, Ludhiana



Fig. 25.Turmeric quality planting material distribution at AAU, Assam



Fig. 26. Turmeric Rhizome production at MAPRS, AAU, Anand



Fig. 27. Turmeric quality planting material production at UAHS, Shimoga



Fig. 28.Waigaon turmeric planting material distribution at PDKV, Akola





Fig. 29. Protray seedlings of Turmeric distributed at SKLTSHU, Telangana



Fig. 30. Chilli seed production plot at AC&RI,TNAU, Killikulam



Fig. 31. Drying of Chilli for quality seed production at UAS, Bangalore



Fig. 32. Chilli seed production plot visited by Dr. R. V. Vyas, Hon'ble VC at MVRS, AAU, Anand



Fig. 33. Chilli seed production plot at PDKV, Akola



Fig. 34. Quality planting material production of Bydagi Chilli at UAS, Dharwad





Fig. 35. Quality seed production of Chilli at SDAU, Jagudan



Fig. 36. Quality Chilli seed production plot at MPKV, Rahuri



Fig. 37.Coriander seed production at KVK, Dhar



Fig. 38. Coriander seed production plot at HRS, Lam



Fig. 39. Coriander RKD-18 seed production plot at AU, Kota



Fig. 40. Field view of quality seed production of Coriander at SDAU, Jagudan





Fig. 41.Quality planting material production of Cumin at SDAU, Jagudan



Fig. 42. Quality seed spices production at NRCSS, Ajmer



Fig.43.Quality planting material production of Seed spices at ARS, Mandor, Jodhpur



Fig.44. Quality planting material production of Celery at PAU, Ludhiana



Fig. 45. Dill Seed production at CSSRS, AAU, Anand



Fig. 46. Quality seed production of Fennel at SDAU, Jagudan





Fig. 47. Fenugreek seed multiplication plot at Dr. YS-PHU, Solan



Fig. 48. Quality planting material production of Fenugreek at HAU, Hisar



Fig. 49. Field view of quality planting material production of fenugreek at MAU, Parbhani



Fig. 50. Quality seed production of fenugreek variety RMt 305 at AU, Kota



Fig. 51. Quality seed production of fenugreek at SK-NAU, Jobner



Fig. 52. Quality planting material production of Fenugreek at PAU, Ludhiana





Fig. 53. Seed production of fenugreek at SDAU, Jag-udan



Fig. 54. Garlic Quality planting material production at Dr. YSPHU, Solan



Fig. 55. Quality Planting material production of garlic at PDKV, Akola



Fig. 56. Quality planting material production of garlic at HAU, Hisar



Fig. 57. Multiplication of quality seeds of garlic at SK-LTSHU, Telangana



Fig. 58. Nutmeg grafts raised at KAU, Thrissur







Fig. 59. Tamarind grafts produced at YSRHU, Andra Pradesh

Fig. 60. Tamarind graft distribution at PDKV, Akola



Fig. 61. Tamarind seedlings raised at COH, UASD, Haveri



Fig. 62. Mother Garden of Kokum at COH, Dapoli



Fig. 63. Quality planting materials of kokum raised at UASB



Fig. 64. Curry leaf mother block at UASB





Fig. 65. Quality planting material of curry leaf at FSRS Sadhanandhapuram, KAU



Fig. 66. Quality planting material of Curry Leaf at KVK, UAS, Dharwad



Fig. 67. Cinnamon seedlings raised at COH, KAU, Thrissur



Fig. 68. Clove quality seedlings raised at ARS, Anakkayam, KAU



Fig. 69. Quality planting material of Cinnamon produced at RCRS, Bhatye



Fig. 70. Davana quality planting material production plot at TNAU





Fig. 71. Lemon grass field at PDKV, Akola



Fig. 72. Aromatic plants seed production plot at M&APRS, AAU, Anand



Fig. 73. Lemon grass production at MPKV, Rahuri



Fig. 74. Vetiver seed production plot at PDKV, Akola

#### 2.2 Establishment of seed processing and storage infrastructure

This programme is being implemented since 2005-06 under NHM and has contributed significantly in the development of seed processing infrastructure and storage facilities in various SAUs and Central Institutes.

Development of infrastructure facilities for processing and storage of seeds is important for any seed production programme. The Directorate has given financial assistance to various Universities/Institutes for developing facilities for handling, processing and package of Seeds. Assistance was also given for creating infrastructure like drying platforms, cleaning and grading machineries, storage bins, packaging units and other related equipments. 100% assistance was provided for this programme. A total of 5 Universities were covered under the programme with a total financial utilization of Rs.50.00 lakhs. Each University were provided with an assistance of Rs.10 lakhs for establishing a seed processing and storage infrastructure. Following are the Universities/Institutes involved in this programme.

- 1. Agriculture University, Jodhpur, Rajasthan
- 2. Anand Agricultural University, Gujarat
- 3. Maharana Pratap University of Agri. and Technology, Udaipur, Rajasthan
- 4. ICAR-National Research Centre for Seed Spices, Ajmer, Rajasthan
- 5. Rajendra Agricultural University, Dholi, Bihar

#### 2.3 Nursery centre for aromatic plants

In order to supply quality planting materials of selected aromatic plants which are in good demand for the domestic industries and also for the export markets, the Directorate established 5 small nurseries in different SAUs. An amount of Rs. 15.00 lakhs were provided per University for establishing the nursery centre. Total Rs.75.00 lakhs were incurred for this purpose.

#### Following SAUs implemented this programme.

- 1. Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli, Maharashtra
- 2. Sardar Krushinagar Dantiwada Agri University, Jagudan, Gujarat
- 3. Sher-e-Kashmir University of Agri. Sciences and Technology, J & K
- 4. University of Agricultural Sciences, Dharwad, Karnataka
- 5. University of Horticultural Sciences, Bagalkot, Karnataka

#### 2.4 Upgradation/Modernisation of nurseries

Non-availability of quality planting material had been a major bottleneck in improving the production and productivity of spices crop. Govt./Public Sector nurseries could hardly cater to 10-15% of the total requirement of planting material in the spices sector. The rest has to be met through private sector. Poor quality planting material supplied by private nurseries cause great loss to the farmers especially in perennial crops where they realize the truth only after couple of years. Genuinity of the variety and health of the planting material raised are two important factors that determine the quality of planting material. These two factors can be addressed only if there is required infrastructure in the nurseries.

There are a number of genuine nursery men who wish to produce quality planting material but do not have the financial resources to acquire the infrastructure required to do so. In this Scheme, the Directorate attempt to help the nurseries both in public and private sector to build up their infrastructure and develop their capability to produce good quality planting material. The important component required as infrastructure are soil solarization unit, work shed for mixing potting mixture, the mist chambers for root and shoot development, poly houses for giving right environment for growth, hardening sheds, irrigation facility



etc. The most important of all this is the mother block which is the source of the propagule used for planting material.

Based on the applications received from nurseries across the country, following nurseries which are already accredited under DASD nursery accreditation programme were selected for providing assistance for upgradation during 2019-20.

- 1. Model Nursery for Spices, KAU, Vellanikkara
- 2. Pepper Research Station, Panniyur
- 3. College of Agriculture, Padannakkad
- 4. AMPRS, Odakkali
- 5. HRS, Pechiparai, Tamil Nadu
- 6. Garacharma Farm, CIARI Port Blair

DASD officials visited the selected nurseries and evaluated the requirements submitted in the proposals. A total financial assistance of Rs.25 Lakhs were provided to these nurseries as assistance for upgradation.

## Establishment and Upgradation of spice nurseries, storage structures 2019-2020





Fig. 75. Spice nursery Upgradation – HRS, Thadiyankudisai, TNAU

Fig. 76. Garacharma farm Upgradation at CARI, Port Blair





Fig. 77. Nursery Centre - HAU, Hisar



Fig. 78. Seed storage Structure at PDKV, Akola



Fig. 79. Seed storage infrastructure- ARSS, Samdari, Barmer



Fig. 80. Seed storage Structure at PDKV, Akola



Fig. 81. Seed storage structure at YSPHU, Solan



#### 3. Accreditation of spices nurseries

Quality of planting material plays an important role in the successful cultivation and development of spices. The planting material requirement by the spices growers is mainly met by nurseries established under State Department of Horticulture/Agriculture, the SAUs and ICAR Institutes at present. However, these nurseries in public domain provide only 30-40% of the demand for planting material. The major part of the demand is met by the unregulated private nurseries, which lacks modern infrastructure such as green house, mist chamber, efficient nursery tools and gadgets, implements and machinery. Establishment of a network of Spice Nursery to ensure the availability of good quality, disease free, certified planting material of desired high yielding variety will have a tremendous impact on production, productivity and quality of the spices produced. Towards this direction, DASD has been authorized by the Ministry of Agriculture and Farmers Welfare, Govt. of India for accrediting spices nurseries.

Accreditation of Nurseries is an important step to ensure availability of quality planting material to the farmers. As per the MIDH norms, planting materials need to be procured only from accredited nurseries for all government programmes. Under the accreditation programme, DASD grants graded recognition to nurseries based on their infrastructure, production system & quality parameters of planting material and management practices adopted. The assessment is carried out through a special committee formed for this purpose. The programme was initiated in the year 2015-16 and around 70 nurseries have been accredited by DASD till March, 2020.

| S.<br>No. | Nursery Details  | State     | Crop certi-<br>fied | Variety/<br>Cultivar  | Star<br>rating | Production<br>capacity<br>(Nos) /<br>annum |
|-----------|--|-----------|---------------------|---|----------------|--|
| 1         | Zonal Agricultural &<br>Horticultural Research<br>Station, Mudigere              | Karnataka | Black pepper        | Panniyur 1  | Four star      | 2,00,000                                   |
| 2         | V V Nursery, Maladi,<br>Kundapura, Uduppi.                                       | Karnataka | Black pepper        | Panniyur 1  | One star       | 75,000                                     |
| 3         | Hegade Nursery, Kum-<br>ta, Uttara Kannada                                       | Karnataka | Black pepper        | Panniyur 1  | One star       | 2,00,000                                   |
| 4         | Kinattukara Nutmeg<br>Plantation & Nursery<br>Pvt Ltd., Pinnakinadu,<br>Kottayam | Kerala    | Nutmeg              | Kinattukara   | Three<br>Star  | 4,15,000                                   |
| 5         | Indian Cardamom Re-<br>search Institute, Spices<br>Board, Myladumpara,<br>Idukki | Kerala    | Black Pepper        | Panniyur 1 to 8, Kari-<br>munda, Vijay, The-<br>vam, Malabar Excel,<br>Sreekara, Subhakara,<br>Pournami, Shakti &<br>Neelamundi | One star       | 15850                                      |

| Table 13 | - List of | E20 spice | nurseries   | accredited | by DASD | during | 2019-20 |
|----------|-----------|-----------|-------------|------------|---------|--------|---------|
|          |           | 20 Spice  | inui scrics | accicuitcu | by DAJD | uurnig | 2012-20 |

| 6.  | Aromatic & Medicinal<br>Plants Research Station,<br>Odakkali, Asamannoor<br>PO, Ernakulam | Kerala        | Black Pepper | Panniyur 1 – 8,<br>Karimunda, Vijay,<br>Thevam, Malabar<br>Excel, Sreekara, Sub-<br>hakara, Panchami,<br>Pournami, Shakti &<br>Girimunda | Two star      | 22000    |
|-----|---|---------------|--------------|--|---------------|----------|
|     |   |               | Nutmeg       | Viswasree,<br>KAU - Pullan,<br>KAU - Kochukudy,<br>KAU - Mundatha-<br>nam,<br>KAU - Poothara,<br>KAU-Punnathanam                         |               | 2000     |
| 7.  | Horticultural Research<br>Station Yercaud,  | Tamil<br>Nadu | Black Pepper | Panniyur 1<br>Karimunda, Shakthi<br>& Thevam   | Three<br>star | 53,000   |
| 8.  | State Horticulture Farm,<br>Yercaud   | Tamil<br>Nadu | Black Pepper | Panniyur 1   | Three<br>star | 50,000   |
| 9.  | Horticultural Research<br>Station, Thadiyankudissi  | Tamil<br>Nadu | Black Pepper | Panniyur 1 & Karim-<br>unda  | Four Star     | 1,50,000 |
|     |   |               | Cinnamon     | PPI  |               | 25,000   |
| 10. | Horticultural Research  | Tamil         | Black Pepper | Panniyur 1   |               | 1,00,000 |
|     | Station, Pechiparai,<br>Kanyakumari Dt.   |               | Nutmeg       | Vishwashree  | Three         | 2,000    |
|     |   |               | Clove        | Acc. SA3   | star          | 1,000    |
|     |   |               | Cinnamon     | PPI (C 1)1   |               | 2,000    |
| 11. | State Horticulture Farm,<br>Pechiparai, Kanyaku-  | Tamil<br>Nadu | Black Pepper | Panniyur – 1 and<br>Karimunda  | Three<br>star | 1,80,000 |
|     | mari Dt.  |               | Nutmeg       | Viswasree and local varieties  |               | 4,200    |
| 12. | Gagan Nursery farm,<br>Abbalagiri, Shimoga,   | Karnataka     | Black pepper | Panniyur-1, Karim-<br>unda   | One star      | 50,000   |
| 13. | Varashree Farm & Nurs-<br>ery, Shimoga  | Karnataka     | Black pepper | Panniyur-1, Pan-<br>niyur-4  | Three<br>Star | 10,000   |
|     |   |               | Nutmeg       | Local varieties  |               | 800      |
|     |   |               | Cinnamon     | Local varieties  |               | 100      |
|     |   |               | Clove        | Local varieties  |               | 500      |
| 14. | Sasyadri Nursery and<br>Farm, Shimoga   | Karnataka     | Black pepper | Panniyur 1   | Two star      | 2,00,000 |
|     |   |               | Clove        | Local varieties  |               | 10,000   |

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| 15. | Aprameya Nursery,<br>Shimoga  | Karnataka        | Black pepper | Panniyur-1, Karimun-<br>da, Neelamundi               | One star      | 50,000   |
|-----|---|------------------|--------------|--|---------------|----------|
| 16. | Beejuvalli Horticultural<br>Farm, Mudigere,   | Karnataka        | Black pepper | Panniyur 1   | One star      | 1,00,000 |
| 17  | Kalasa Horticultural<br>Farm, Mudigere,   | Karnataka        | Black pepper | Panniyur-1   | One star      | 75,000   |
| 18. | Hi-Tech Pepper Nursery,<br>College of Agriculture,<br>Padanakkad PO, Kasar-<br>god, | Kerala           | Black pepper | Panniyur 1-8, Vijay,<br>Karimunda                    | Three<br>star | 70,000   |
| 19. | Regional Coconut Re-<br>search Station, Bhatye,<br>Dr. B S K KVP, Dapoli,           | Maha-<br>rashtra | Black pepper | Panniyur – 1   | Four star     | 10,000   |
|     |   |                  | Nutmeg       | Konkan Swad,<br>Konkan Sugandha,<br>Konkan Sreemanti |               | 5,500    |
|     |   |                  | Cinnamon     | Konkan Tej, Konkan<br>Tejpatta                       |               | 4,000    |
| 20. | Spice Nursery, Depart-<br>ment of Horticulture,<br>Dr. B S K K V P, Dapoli,         | Maha-<br>rashtra | Black pepper | Panniyur – 1   | Four star     | 1,00,000 |
|     |   |                  | Nutmeg       | Konkan Swad, Konk-<br>an Sugandha                    |               | 75,000   |
|     |   |                  | Cinnamon     | Konkan Tej   |               | 65,000   |
|     |   |                  | Kokum        | Konkan Hatis, Konk-<br>an Amruta                     | 1             | 1,07,000 |

(The procedure for recognition and assessment criteria and details of accreditation are available in the website www.dasd.gov.in)

### DASD Nursery accreditation activities 2019-20



Fig. 82. Accreditation Awareness programme at Shakleshpur, Karnataka





Fig. 83. Accreditation Awareness programme conducted at Siddapur, Karnataka



Fig. 84. DASD team at Kalasa Nursery, Karnataka



Fig. 85. Accreditation team at COH, Dapoli



Fig. 86. Accreditation team at Nutmeg nursery, KAU, Odakkali, Kerala.



Fig. 87. Accreditation team at State Horticulture Farm,Yercaud, Tamil Nadu



Fig. 88. Accreditation team evaluating Varashree Pepper Nursery at Karnataka





Fig. 89. Accreditation team evaluating the pepper nursery at RCRS, Bhatye



Fig. 90. DASD Accreditation team at KAU, Padanakkad

#### 4. Technology Dissemination through Frontline Demonstration

#### 4.1 Demonstration of organic farming in Spices

Organic farming in the spices sector is becoming increasingly important. Its environmental and economic benefits have captured attention in most of the importing countries. Consumers' demand for organically produced food products and society's demand for more sustainable development provide new opportunities for farming and business around the world. In view of the growing demand for the organically produced food items worldwide i.e., around 25% per annum, the national advantage our country has, need to be fully exploited. Latest technologies in organic farming need to be demonstrated through farmer participatory demonstration in a compact area.

Even though there is lot of demand for organic products in the markets, the farming community is yet to be fully convinced of the feasibility of organic farming in various crops. The frontline demonstration plots will serve to demonstrate and convince farmers of the applicability of various technologies developed for organic cultivation in different crops. It will encourage farmers to take up the organic farming thereby increasing the country's share in the organic products. Cluster based approach will help to develop these areas into production hub of spices for export.

The Directorate identified two potential clusters in the country to implement the farmer participatory demonstrations on cluster based organic production.

1. Bilaspur district of Chhattisgarh – To demonstrate enhancement of Tribal livelihood through improved cultivation of organic Turmeric and value addition (proposed by the Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chattisgarh).

2. Wayand District of Kerala - Demonstration of bio-intensive management of black pepper adopting organic cultivation practices for creating targeted production hubs in Wayanad (proposed by ICAR - Indian Institute of Spices Research, Kozhikode).



25 ha area has been identified in both locations for establishing the demo plots and expected to be completed by 2020-21.



Fig. 91. Pepper Organic FLD CIARI at Ferrar gunj, South Andaman



Fig. 92. FLD on organic black pepper cultivation at OUAT, Orissa



Fig. 93. Organic Black pepper FLD at AAU, Assam



Fig. 94. FLD Organic ginger at JNKVV, Jabalpur



Fig. 95. FLD field visit at PDKV, Akola



Fig. 96. FLD on Chilli at CAU, Pasighat





Fig. 97. FLD on organic chilli at RSKKVP, Khandwa



Fig. 98. Front Line Demonstration on organic chilli at ARS, Kovilpatti,TNAU



FFig. 99. FLD on Organic farming in Chilli at Pasighat, Arunachal Pradesh

#### 4.2 Demonstration plots for seed spices

Seed spices comprise the single largest group of spices with over 17 items coming under it. The important amongst this group are coriander, cumin, fennel, fenugreek, celery, ajowan seed, dill seed, aniseed etc. India is the largest producer of seed spices with a production of 11.75 lakh tonnes of seed spices annually from an estimated area of about 16.53 lakh ha. This group has a prominent place in our agricultural economy because of its large domestic consumption and growing demand for export. Being annual crops, these are grown extensively in rotation with food crops and also as inter/mixed crops under rainfed/irrigated conditions. Seed spices are mainly cultivated in the states of Rajasthan and Gujarat with a sizeable area in the states of Madhya Pradesh, Haryana, Punjab, Uttar Pradesh, Andhra Pradesh and Bihar. However, the productivity of these crops is much less compared to the potential yield of varieties released by various research stations. This is primarily because of the non-adoption of technologies evolved in these crops. The Directorate



established 103 demonstration plots in the major production centres of the seed spices for dissemination of technological information among the farming community. The financial assistance for one unit of the demonstration plot was Rs. 0.40 lakh/hectare. An amount of Rs.41.20 lakhs was utilized for this programme. A cluster-based demonstration on export-oriented pesticide free cumin production was implemented through NRCSS, Ajmer under the component, as detailed below.

#### Frontline demonstration on Pesticide free cumin production

The insect pests and diseases complex on the seed spice crops causes maximum damage at field level, which account for up to 100 per cent losses at field level in case of severe attack. Among sucking pests, aphids and thrips and in case of diseases wilt /root rot complex, blight and powdery mildew cause maximum losses at field level. Seed spices are high value low volume crops and are exported to the extent of 15% of total production of the country. Pesticide residue is one of serious non-tariff barrier in export of this commodity to other countries. There is an increasing demand for alternative to broad spectrum chemical pesticides. The development of resistance by some insect pests and diseases, increased awareness of adverse effect on non-target organism and environmental contamination has encouraged interest and investment in biological and other selective pest control agents. To create awareness on the ecofriendly management of cumin and to develop a pesticide free export production hub for the crop, the Directorate established a large scale demonstration of Good Agricultural Practices (GAP) in cumin in association with ICAR-NRCSS, Ajmer, Rajasthan .

The locations selected for the demonstrations were cumin productions hubs of Nagaur & Barmer districts of Rajsthan. The beneficiaries were selected in two clusters (25 ha. each through cluster approach) in the cumin growing areas. The main activities conducted under the demonstration programme are listed below:

- 1. Baseline Survey The present status of cumin cultivation including input application was studied and pre evaluation of cumin sample for pestiside residue were done.
- Awareness Training Awareness trainings were conducted in the selected districts to apprise the farming community about the indiscriminate use of pesticides and health hazards and educated the farmers about the concept of Good Agricultural Practices.
- Establishment of Demo plots on GAP- The programme was lunched at two locations at farmer's fields at Gudamalani in Barmer and Mundwa in Nagaur districts. Each location 25 fields of 1.0 ha was selected for the study to demonstrate pesticide free cumin production following Good Agricultural Practices.
- 4. Distribution of inputs Quality seed material of GC4 variety, biocontrol agents, INM materials etc. were distributed free of cost to the farmers for demonstration plots.
- Agroclinics and visits Regular and need based visit/ conduct of agro-clinics were conducted by the NRCSS Scientist to diagnose the issues at field level and suggested solutions as per



need. Trainings were also given at crop maturity stages for scientific harvesting and storage of cumin.

6. Buyer Seller interface – Exporters were invited to the demo field to verify the farmers practices to produce pesticide free cumin.

#### **Results of the programme:**

- \* The programme has created awareness among the farmers on eco-friendly management of cumin crop.
- The yields obtained were on par with the conventional intensive farming practices followed by the farmers. 40 tonnes of pesticide residue free export quality cumin was obtained from the project area.

| S.<br>No. | Institute  | No. of Plots<br>(in ha) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|-------------------------|---|
| 1         | Agriculture University, Jodhpur, Rajasthan   | 8.000                   | 3.200                                     |
| 2         | Anand Agricultural University , Gujarat  | 3.000                   | 1.200                                     |
| 3         | Bidhan Chandra Krishi Vishwavidyalaya, West Bengal                                 | 1.000                   | 0.400                                     |
| 4         | C S Azad University of Agriculture and Technology, Kanpur,<br>Uttar Pradesh        | 2.000                   | 0.800                                     |
| 5         | Dr. Punjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharash-<br>tra                  | 2.000                   | 0.800                                     |
| 6         | Dr. Y S Parmar University of Horticulture and Forestry, Solan,<br>Himachal Pradesh | 1.000                   | 0.400                                     |
| 7         | Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattisgarh                         | 1.000                   | 0.400                                     |
| 8         | Junagadh Agri University, Gujarat  | 2.000                   | 0.800                                     |
| 9         | Maharana Pratap University of Agri. and Technology, Udaipur,<br>Rajasthan          | 7.000                   | 2.800                                     |
| 10        | Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani, Ma-<br>harashtra            | 2.000                   | 0.800                                     |
| 11        | Narendra Dev University of Agri and Technology, Faizabad,<br>Uttar Pradesh         | 1.000                   | 0.400                                     |
| 12        | ICAR-National Research Centre for Seed Spices, Ajmer, Rajas-<br>than               | 58.000                  | 23.200                                    |
| 13        | Rajmata Vijayaraje Scindia Krishi Vishwavidyalaya, Gwalior                         | 2.000                   | 0.800                                     |

#### Table 14. Institute-wise details on FLDs established for seed spices

| 14 | Sher-e-Kashmir University of Agri. Sciences and Technology, J<br>& K | 1.000  | 0.400   |
|----|--|--------|---------|
| 15 | Sri Karan Narendra Agriculture University, Jobner, Rajasthan         | 7.000  | 2.800   |
| 16 | Tamil Nadu Agricultural University, Tamil Nadu                       | 1.000  | 0.400   |
| 17 | University of Agricultural Sciences, Dharwad, Karnataka              | 2.000  | 0.800   |
| 18 | Uttar Banga Agricultural Univesity, Pundibari, WB                    | 2.000  | 0.800   |
|    | Total  | 103.00 | 41.2000 |

#### 4.3 Demonstration plots for Aromatic Plants

India with 16 different agroclimatic zones, is one of the top 12 mega bio-diversity centres of the world with two hot spots located in the Eastern Himalayas and Western Ghats containing 3500 and 1600 endemic species of higher plants, respectively. The Indian biodiversity is immensely rich in medicinal and aromatic plants occurring in diverse ecosystems.

Dissemination of information regarding cultivation of the above crops, among the farming community is very essential. This Directorate established 13 demonstration plots in the various locations spread over the country in the crops of priority in the respective areas. Assistance of Rs.0.80 lakhs was given for establishing a demonstration plot of one hectare. An amount of Rs.10.40 lakhs was utilized for this purpose.

#### Table 15. Institute-wise details of demonstration plots for aromatic crops

| S.<br>No. | Institute  | No. of plots<br>(in ha) | Financial<br>utilisation<br>(Rs.in lakhs) |
|-----------|--|-------------------------|---|
| 1         | Assam Agricultural University, Assam   | 1.000                   | 0.800                                     |
| 2         | Banda Agricultural University, Uttar Pradesh                                 | 1.000                   | 0.800                                     |
| 3         | Dr. Balasaheb Sawant Konkan Krishi Vidya Peeth, Dapoli,<br>Maharashtra       | 1.000                   | 0.800                                     |
| 4         | Directorate of Medicinal and Aromatic Plants Research,<br>Anand, Gujarat     | 3.000                   | 2.400                                     |
| 5         | Indira Gandhi Krishi Vishwavidyalaya, Raipur, Chhattis-<br>garh              | 2.000                   | 1.600                                     |
| 6         | Mahatma Phule Krishi Vidyapeeth, Rahuri, Maharashtra                         | 1.000                   | 0.800                                     |
| 7         | Narendra Dev University of Agri and Technology, Faiz-<br>abad, Uttar Pradesh | 1.000                   | 0.800                                     |
| 8         | Odisha University of Agriculture & Technology, Odisha                        | 1.000                   | 0.800                                     |
| 9         | Sri Konda Laxman Telangana State Horticultural Universi-<br>ty, Telangana    | 1.000                   | 0.800                                     |
| 10        | Tamil Nadu Agricultural University, Tamil Nadu                               | 1.000                   | 0.800                                     |
|           | Total  | 13.0000                 | 10.4000                                   |



Fig. 100. FLD on Cumin at JAU, Junagadh



Fig. 101. FLD on Coriander established by CSAUAT, UP



Fig. 102. FLD on Organic Dill Seed Cultivation at AAU, Gujarat



Fig. 103. Organic FLD on Fenugreek at YSPHU, Solan



Fig. 104. FLD pilot programme inauguration at NRCSS, Ajmer



Fig. 105. FLD on Pesticide free Cumin production - Input distribution at NRCSS, Ajmer





Fig. 106. FLD on Pesticide free Cumin production-Field visit – NRCSS, Ajmer



Fig. 107. FLD on Pesticide free Cumin production-Input training – NRCSS, Ajmer



Fig. 108. FLD on aromatic crop - IGKV, Raipur



Fig. 109. FLD on Asparagus in farmers field by DMAPR, Gujarat



Fig. 110. FLD on lemongrass at sea affected area DMAPR, Gujarat



Fig. 111. FLD on Palmrosa - DMAPR, Gujarat



#### 4.4 Multi species cropping in Arecanut Gardens

Arecanut (*Areca catechu L.*) is one of the important commercial crops grown in the parts of Kerala, Karnataka, Assam and West Bengal. The long pre-bearing period, low returns during the initial bearing period, violent fluctuation in market prices, unexpected loss due to pests and diseases, especially yellow leaf disease are some of the problems associated with the cultivation of Arecanut. Introduction of multi species cropping in Arecanut gardens aimed at increasing the net returns from unit area helps the farmers to withstand the fluctuating prices of Arecanut. Multiple cropping has tremendous potential to generate employment for improving quality of rural life. Multiple cropping, not only provides additional income from inter/mixed crop and employment, it can also act as a social security against instability prices of main crop. Therefore, establishing demonstration plots in few farmers' gardens will encourage many others to follow arecanut based cropping system for the improvement of their livelihood. This Directorate had established a total of 22 demonstration plots of one hectare each in Arecanut growing areas of Kerala, Karnataka and Assam during 2007-08, 2012-13, 2016-17, 2017-18, 2018-19 and 2019-20 which were highly successful in disseminating the information to the farmers.

Following Demo plots were established / maintained during 2019-20 under this programme :

• Two demo plots established in 2018-19 at Kamrup district of Assam in association with CPCRI-RRS, Kahikuchi with Cocoa, Black Pepper and Banana as intercrops.

• Two demo plots on Arecanut based cropping system with Nutmeg + Black Pepper + Banana intercrops were laid out at farmers field in Dakshin Kannada district of Karnataka.

Four Demonstration plots on Arecanut based cropping system with Arecanut + Cocoa + Black Pepper
 + Banana were established at farmers field in Dakshin Kannada district of Karnataka.

The field survey conducted by the CPCRI, Kasargod in two districts of Karnataka (Dakshina Kannada and Udupi) showed that about 73% of farmers have adopted multi cropping systems in arecanut. This is a clear indication that farmers are accepting this technology.

### 4.5 Demonstration of use of Entomo Pathogenic Nematode (EPN) in root grub management of Arecanut

White grub is a key pest of Arecanut and its intercrops in sandy loam soils of Karnataka and Kerala. It damages the seedlings and adult palms by feeding on roots, boring the bole and collar region. Presently the grubs are managed with application of high dose of pesticide frequently which is deleterious to ecosystem. EPNs are identified to be effective and environmental friendly alternative to manage white grubs by CPCRI, Kasaragod. To popularize ecofriendly integrated pest management (IPM) of white grub using EPNs, DASD had established 4 acres of demonstration plots in farmer's fields in arecanut growing areas of Karnataka during 2015-16, which was widely accepted and many farmers of the area adopted this technology for managing rootgrubs in the plantation. The imposed IPM includes two time application of native EPN isolate of CPCRI



*Steinernema carpocapsae* to root zone @ 1.5 billion infective juveniles (IJs) per hectare in combination with imidacloprid 17.8 SL @ 0.25 ml/litre of water, neem cake 2 kg/palm and providing proper drainage system in gardens resulted in 91% root grub populations in three year of treatments, significantly higher than that untreated gardens (without IPM practices). The EPN demonstration has exhibited significant increase in arecanut yield than untreated gardens in root grub alone infested gardens and yellow leaf disease (YLD) + root grub infested gardens in Dakshina Kannada and Chikmagalur districts of Karnataka.

In 2018-19 similar demo plots were established in the Arecanut farmers field in Karnataka. A survey on incidence of root grub and other pests in arecanut based cropping system was conducted in these areas and technical guidance were provided to the beneficiaries. Orientation trainings were given to the farmers of selected gardens on EPN technology for the integrated management of root grub. Farmers were supplied with critical inputs viz., neem cake and EPN bio-control agents for management of root grub in the demonstration plots. Drainage facility and intercultural operations were undertaken in the selected demonstration plots. During the 2nd year 2019-20, mass multiplication of EPN host insect and infective juveniles were done and treatments were imposed for the management of root grub in the selected will be completed by 2020-21.

#### 4.6. Demonstration of Arecanut Dwarf Hybrids

Arecanut tall varieties even though possess high yield potential, are frequently prone to wind damage and sun-scorching and also become difficult to manage. The tall nature of the palm hinders various operations like spraying and harvesting which are quite labour intensive and cumbersome. Dwarf hybrids with high yield potential will directly benefit the growers by way of enhanced returns and reduced cost of various cultural operations like harvesting, spraying and also without causing much damages to palms due to sun-scorching and heavy wind and gives mechanical support to stem. The Directorate established demonstrations on arecanut dwarf hybrids (HYV released from CPCRI, VYTLAH1 & VYTLAH 2) in farmer's fields (2 units of 0.5 acre each) during 2019-20 in association with CPCRI, Kasargod to promote its advantages among progressive farmers. The spacing followed for planting was 9ft. x 9ft. between palms. The programme will be completed in 2021-22.

### 4.7 Technology dissemination through FLD for HDP of grafted bush pepper under shade net structure

Black pepper is an important high value spice crop suitable for cultivation in Goa and its adjoining regions. To address the issue of foot rot disease Colubrinum grafted bush pepper were found effective in the area. Moreover, HDP of bush pepper assures higher productivity levels per unit area with the adoption of high-tech irrigation technology under shade net structures. This technology is suitable for small scale hold-ings to earn higher economic returns per unit area. To promote this potential technology among farmers in the area, five FLDs (two each in North Goa and South Goa Districts) on farmers' fields and one FLD unit in the Institute's Farm at Old Goa, were established by DASD in association with ICAR-Central Coastal Agricultural Research Institute, Old Goa during 2018-19. Shade net structures with 50% green shade net with 300 Sq.m.

area (20 m X 15 m) accommodating 1000 bush pepper grafts (at 50 cm x 40 cm spacing in paired row with 60 cm) was established for demonstration. The results obtained in the first two years are promising. In the demo plots, the bush pepper grafts started yielding 200-250 gm. dry pepper corns per plant within one year and the grafts were not affected by wilt symptoms.

#### 4.8 Participatory Demonstration Plots of Cinnamon intercropping in Coconut

Coconut (*Cocos nucifera L.*) is a perennial palm popularly referred as "Kalpavriksha" or "Tree of Heaven". The innumerable benefit it provides to millions of people has made it nature's gift to the mankind. Coconut is mostly a crop of small farmers in India, the average size of a holding being 0.22 ha. More than 90% of the five million coconut holdings in the country are less than one ha in size. Due to the problems like long pre-bearing period, occurrence of pests and diseases and fluctuating market prices apart from the small size of holdings, the crop has failed to generate sufficient income to sustain even the small families. Diversifying the cropping system including more crops per unit area may be necessary to sustain the small and marginal coconut farm families.

Growing spices under coconut in a farming system leads to economic buffering of the farmer against the risk of mono cropping. Many spices, when grown under coconut complement each other and form compatible combinations and such combinations, if appropriately exploited, can substantially increase the income from a unit area of land through synergism than the coconut or spices grown as a mono-crop. The filtered light received underneath the palm favors the growth of crops like black pepper, vanilla, clove, nutmeg, cinnamon and allspice. Herbal spices like long pepper also requires filtered light similar to that of other annual spices like ginger and turmeric.

Among the above spice crops, potential of commercial cultivation of Cinnamon is least explored by the farmers in Kerala. In modern times, cinnamon is used to flavour a variety of foods, from confections to curries; in Europe and USA it is especially popular in bakery goods. Cinnamon is a stimulant, astringent and carminative, used as an antidote for diarrhoea and stomach upsets. Rampant substitution of cassia for cinnamon has left little demand for the original spice. Consumption of cassia in high amounts is injurious to health since it contains a toxic component by name coumarin. Coumarin is banned as a food additive in many countries since mid-20th century because it is moderately toxic to liver and kidney.

The average production of cinnamon in India is 80 to 100 tonnes per annum. This is miniscule compared to the annual demand of 12,000 tonnes. To meet this growing demand as well as for re-exporting cinnamon after value addition, India imports about 10,000 tonnes of cassia and 200 tonnes of cinnamon a year. In 2016-17, about 1100 tonnes of cinnamon was imported to India according to Spices Board. If the possibility of commercial cultivation of Cinnamon is demonstrated, farmers will be encouraged to take up the crop in future. Cinnamon tree could be grown successfully as intercrop in the ideal conditions prevailing in the coconut plantations. This method is practiced successfully in Sri Lanka, major cinnamon producing country. To demonstrate this technology, DASD has initiated demonstration of high density intercropping of cinnamon in coconut plantations in association with CPCRI, Kasargod during 2018-19. The demo plots were established in

selected coconut plantations of Pollachi (Tamilnadu), Bhatkal (Karnataka) Kasargod (Kerala) through participatory approach. Assistance to maintain these demo plots will be continued in 2020-21.



Fig. 112.Multi species cropping system in arecanut garden at Kahikuchi, Assam



Fig. 113. EPN based ecofriendly mgt of white grub in Arecanut at CPCRI, Kerala



Fig. 114. Cinnamon intercropped with Coconut at CPCRI, Kasargod



Fig. 115. Visit of Director, DASD to bush pepper FLD unit at ICAR-CCARI, Goa



Fig. 116. Demonstration plot on HDP of bush pepper established at farmers field by CCARI, Goa



#### 5. Innovative Programmes

The Directorate introduced some innovative programmes on Hi-tech production system for quality disease free seed rhizomes of Ginger and Turmeric and participatory mode rehabilitation of black pepper. A brief of these programmes are given below.

#### 5.1 Hi-tech production system for quality disease free seed rhizomes of Ginger and Turmeric.

Generally, turmeric and ginger are propagated by rhizomes with a low proliferation rate, and the reproducing part (the rhizome) is also the economically used part of turmeric and ginger, which restricts the availability of seed materials required for cultivation. The major production constraint in turmeric and ginger is the presence of certain soil born diseases which negatively affect the quality and quantity of rhizomes. Among the diseases, rhizome rot and bacterial wilt are the most serious ones which causes heavy losses in yield. Since the crop improvement programmes in turmeric is constrained due to low seed set, modern technologies like clonal selection, mutation breeding, induction of polyploidy and biotechnological tools are used for the improvement of these crops. In turmeric and ginger, propagation by *in vitro* induced microrhizomes, produced independent of seasonal variations, is an ideal method both for the production of pathogen free planting material and for the conservation and exchange of germplasm.

The National Consultative Meeting on Planting Material Production of Ginger and Turmeric organized by DASD under the Chairmanship of Horticulture Commissioner had recommended for establishment of a production system for ginger and turmeric that could ensure freedom from disease and maintain the purity in the planting material produced for distribution to farmers. The Meeting recommended to resort to microrhizome production followed by multiplication of rhizome in soil less medium in protected structure before it is multiplied in field for distribution among farmers. Based on the recommendations of the meeting, Kerala Agricultural University and Indian Institute of Spices Research has submitted a proposal for high tech production system for quality seed production in ginger with the following objectives.

O To produce high-quality disease-free Ginger and Turmeric micro rhizome through tissue culture

• Seed multiplication through high tech production system with single bud derived plants from microrhizomes

The advantages of in vitro microrhizomes production of turmeric and ginger can be summarized as

- \* Microrhizomes production can be done *in vitro* during any season
- \* Using microrhizomes has commercial potential for micropropagation
- \* Microrhizomes can be used as pathogen free seed rhizomes specially in regions with high disease incidence
- \* Microrhizomes can be stored easily, transported and can be used in germplasm conservation.
In order to produce disease free seed rhizomes of ginger and turmeric, micro rhizome production of ginger and turmeric varieties were resorted and inoculated different varieties of ginger and turmeric in to MS medium supplemented with growth hormones. The rhizomes of ginger and turmeric were germinated in sterile sand. The sprouting buds from rhizomes served as initial explants. Multiple shoots were induced through adventitious bud regeneration. The *in vitro* developed shoots of ginger and turmeric were subcultured at regular intervals.

#### Methodology adopted :

- \* For the collection of explants, sufficient quantities of disease free seed rhizomes of pure varieties of ginger and turmeric was collected.
- \* Plant the rhizome bits in green house under protected conditions with 4- 5 inches of sand on top and periodically (once in 20 days ) spray/ drench copper oxychloride at 0.3% to minimize the contamination.
- \* Select the newly sprouting buds and use it as a source of explants for the culture.
- \* Sprouted rhizome buds, washed well under tap water, treated with copper oxychloride and Tween 20 for 30 minutes and washed again.
- \* The external skin and remnant scale leaves were removed from the rhizome with a knife.
- \* Sprouted rhizome buds along with bits of rhizome were cut, removed and treated with 0.1% Mercuric chloride for 3 minutes and washed with sterile distilled water.
- \* These explants were transferred to the aseptic environment of laminar air flow chamber, again treated with 0.1% HgCl, for another 3 minutes and washed thoroughly with sterile distilled water.
- \* These rhizome bits with viable buds were inoculated into culture initiation medium.

#### In vitro multiplication

- \* After 30 days, established cultures were used for further multiplication.
- Cultures were inoculated in multiplication media with composition of MS + BA (3 mg/ L) + NAA (3 mg/ L) + 30 g sucrose.
- \* Cultures were incubated at a temperature of 25°C.
- \* After 30-40 days, these cultures were subcultured.
- \* Further it was subcultured 3-4 times at an interval of 30-40 days.

#### **Microrhizome induction**

Explants were taken from 3 months old in vitro multiplying contamination free cultures.

- \* Roots and top part of the stem were trimmed off and explants of about 2 cm were used.
- \* These explants were inoculated in micro rhizome induction medium.
- \* MS medium supplemented with BA (3 mg/L) + NAA (1 mg/L) and 9% sucrose were used.
- \* A photoperiod of 16 hrs. light and 8 hrs. darkness were provided.
- \* Microrhizome development was noticed after 80-90 days of culture initiation and reached maturity in 120 days.

#### Field transfer of micro rhizomes through pro trays

- \* Harvest the matured micro rhizomes
- \* Roots and top part of the shoots were trimmed off
- \* The rhizomes were transferred to pro trays filled with potting mixture (coir pith + cow dung + vermi compost at 1:1:1 ratio)
- \* These were allowed to grow for 30-35 days under green house conditions and then shifted to bags which produced healthy plants

#### **Varieties multiplied**

- \* Microrhizomes of Athira, Karthika and Aswathy Ginger varieties were produced in KAU
- \* IISR has produced microrhizomes of IISR Mahima, IISR Varada (Ginger varieties), IISR Pratibha, Sona, Varna and Kanthi (Turmeric varieties)

#### 5.2 Participatory mode rehabilitation of black pepper gardens in Kuttiattoor Panchayath

The Directorate had initiated a black pepper rehabilitation programme inKuttiattoor Panchayath (identified under SAGY in Kannur constituency) for a period of 3 years from 2017-18 to 2019-20. It is one of the important potential pepper growing areas in the district with 1427 pepper farmers having more than 212 ha under pepper cultivation at present. The success of the pepper rehabilitation programme in Cheruthazham Panchayath has instigated for proposing a similar programme in Kuttiattoor Panchayath. Similar to the situation in Cheruthazham Panchayath, here too poor soil health, improper management practices with changes in climatic factors leading to the incidence of biotic and abiotic stress and predominance of senile and uneconomic vines are the primary reason for decline in pepper productivity. The rehabilitation programme is implemented in association with KVK, Kannur of Kerala Agricultural University.

Initially, Participatory Rural Appraisal (PRA) was conducted involving all stakeholders and first-hand information on the basic issues in black pepper production in the area was documented. Pepper samithies were formed for planning, implementation and monitoring of the project in the Panchayath and trainings were given to the samithi for capacity building. Twenty-five numbers of farmers plots were identified for

demonstration of soil reclamation activities and inputs were distributed to these farmers. Ten decentralised nurseries with a production capacity of 10,000 cuttings/year/nursery following RMP and serpentine method of multiplication and two mothervine progeny garden with RMP method were established in the Panchayath.

In 2018-19, Standard Operating Protocol (SOP) was developed to benefit the farmers of Kuttiyattoor to address all sorts of issues of Black pepper in the Panchayat. An increase in area under pepper from 212 ha. to 500 ha is proposed under the programme. The pepper farmers would almost double from the present 1,427 nos. to 2,500 farmers. The productivity level would rise from the present 525 gm. per standard to 1,000 gm. dry pepper per standard. The Panchayath will be self-sufficient with its own planting material and would not require introduction from outside. Farmers Field Schools (FFS) at different stages of development of pepper would give the farmers a clear understanding of the critical stage of pepper for different operations.

Improvement in the litre weight of the pepper produce in the area from 500 to 600 gm, is expected in 3 years which is sought after by the exporters. The pepper production from this area would increase from the present level of 100 tonnes to 300 to 400 tonnes. The impact of the technological solutions offered in the production and productivity of black pepper in the area will be documented on completion of the project.

#### 5.3 Varietal Authenticity and Purity Identification in Black pepper

Black pepper (*Piper nigrum L*), is an important spice and medicinal plant known since time immemorial. The authenticity of cultivars is a topic of great economic importance especially when the crop is lucrative, cultivation is expanding, quality principles are genotype dependent, and there is growing interest among farmers for quality high yielding planting material. Clonal selection played the most significant role in developing several high yielding varieties in black pepper. The selection was mainly applied on land races collected from different growing areas of the country. Identification of cultivars has been traditionally carried out by morphological and agronomic traits.

In black pepper, variety and cultivar identification is one of the most important aspects in production systems. The large number of varieties or landraces has made it difficult to identify and characterize varieties solely on the basis of morphological characters because they are non-stable and originate due to environmental and climatic conditions, and therefore phenotypic plasticity is an outcome of adaptation. Molecular marker techniques based on DNA profiling provide novel approaches for cultivar identification. They offer advantages for comparison over morphological and biochemical markers, with respect to resolving power, cost effectiveness, testing at any stages of development, rapidity, environment independent expression and produce an array of polymorphism.

The introduction of Polymerase Chain Reaction and the subsequent development of DNA fingerprinting methods have opened up new avenues in finger printing varieties/cultivars. Molecular markers are powerful tools in aiding genetic characterization, conservation and improvement in crops. RAPD (Random Amplified Polymorphic DNA) and ISSPR (Inter Simple Sequence Polymorphism) are the most commonly used marker strategies and ISSPR is found to be more robust and reliable even in case of closely related individuals. The

development of SCAR markers by directly sequencing RAPD and ISSPR products will generate markers useful for cultivar identification and mapping. The SSR and SNP marker identification will be helpful in authentication of black pepper varieties.

The present planting material production programmes under MIDH and other government funded programmes are multiplying released high yielding varieties and distributes to farmers. Many private nurseries are also engaged in planting material production. In the absence of reliable varietal authentification methods, often spurious seed materials are passed off as that of established variety so as to meet the seed demand. The area expansion and productivity increase in black pepper can be directly linked to spread of improved high yielding varieties. Therefore, genuineness of planting material plays a vital role in production and productivity improvement. The major obstruction in this value chain is, routing of planting materials from unregulated private nurseries which lack mother block and infrastructure to ensure genuineness of the variety. In the nursery accreditation programme, due importance is given to genetic purity of varieties so that reliability of the variety is assured. The accreditation programme of Government of India could also be strengthened if marker assisted varietal authentication technology is effectively utilised .

DASD in association with Indian Institute of Spices Research, Kozhikode implemented a two-year programme from 2018-19 to develop a set of molecular markers for cultivar identification in black pepper. The main objective was to develop a fool proof varietal authentication method using morphological, chemical and molecular markers for black pepper in two years. As per the approved programme, 20 Black pepper varieties/ cultivars were collected and DNA isolation work was done using the standard procedure. Quantification of the isolated DNA was completed using agarose gel analysis and spectrophotometric analysis techniques.

#### Results

• Twenty varieties of black pepper viz., IISR-Girimunda, IISR-Malabar Excel, IISR-Pournami, PLD-2, IISR-Shakthi, IISR-Subhakara, IISR-Sreekara, IISR-Thevam, Arka Coorg Excel, Panniyur-1, Panniyur-2, Panniyur-3, Panniyur-4, Panniyur-5, Panniyur-6, Panniyur-7, Panniyur-8, Panniyur-9, Panniyur-10 and Vijay were profiled using DNA based markers (ISSR/SSR/RAPD) and varieties were distinguished based on the presence/ absence of unique bands. The primers and unique band size used to identify 7 black pepper varieties ( IISR Thevam, IISR Sreekara, IISR Malabar Excel, IISR Pournami, Panniyur 5, Panniyur 6 and Panniyur 7) have been identified.

- Blind testing of the varieties from germplasm was done thrice to confirm the results.
- Development of SCAR marker based on unique bands for varietal identification of IISR Thevam is in progress.
- SSR fingerprinting of all the 20 varieties is in progress, using genomic SSR primers.
- The results are presented in the table below:

| S.<br>No. | Variety Name          | Primer Name | Primer sequence   | Annealing<br>temperature<br>(°c) | Unique band size                          |
|-----------|-----------------------|-------------|-------------------|----------------------------------|---|
| 1         | IISR-Thevam           | (AAG)5CC    | AAGAAGAAGAAGAAGCC | 45.5                             | Presence of 1000<br>bp band               |
| 2         | Sreekara              | (AAG) 5CC   | AAGAAGAAGAAGAAGCC | 45.5                             | Absence of 1000<br>bpand 1100 bp<br>bands |
| 3         | Pournami              | ISSR-02     | AGTGAGTGAGTG      | 47                               | Presence of<br>unique 500 bp<br>band      |
| 4         | Panniyur-5            | ISSR-12     | CACCACCACGC       | 46.5                             | Presence of<br>unique 480 bp<br>band      |
| 5         | IISR-Malabar<br>Excel | UBC-859     | TGTGTGTGTGTGTGRG  | 43.7                             | Presence of<br>unique 650 bp<br>band      |
| 6         | Panniyur-6            | ISSR-02     | AGTGAGTGAGTG      | 47                               | Absence of 550<br>bp band                 |
| 7         | Panniyur-7            | ISSR-02     | AGTGAGTGAGTG      | 47                               | Absence of 550<br>bp and 1200 bp<br>bands |





Fig. 117. Hitech microrhizome production at IISR, Kozhikode

Fig. 118. Awareness programme at Pepper rejuvenation Programme at Kuttiyattoor, Kannur





Fig. 119. Pepper cuttings raised at Kuttiyattoor, Kannur

#### 6. Skill Development Training

Pradhan Mantri Kaushal Vikas Yojana (PMKVY) is the flagship outcome based skill training scheme of the Ministry of Skill Development & Entrepreneurship (MSDE). The scheme offers meaningful, industry relevant, skill based training to enable youth to get wages or self-employment leading to increase earnings and/ or improved working conditions such as getting formal certifications for informal skills.

During 2019-20, the Directorate initiated conduct of skill development trainings under MIDH programmes in selected job roles through KVKs, SAUs/ICAR Institutes affiliated to Agriculture Skill Council of India (ASCI). More than 10 Institutes with sufficient infrastructure and facilities were newly affiliated as per the ASCI norms, and a trainers training (ToT) for the nominated trainers were conducted at different locations. The qualified trainers were given ASCI Trainer Certificate.

The affiliated centres have conducted 200 hrs. skill training successfully on different job roles like Gardener, Vermicompost producer, Medicinal plants grower, spice cultivator etc. during 2019-20. The beneficiaries identified for these trainings were rural unemployed youth. The trainees were certified on different job roles under this programme. They were encouraged to take up their own enterprise related to the skillset achieved and thus attained improved income and livelihood.



Fig. 120. Skill Development Training at IGKV, Raipur



Fig. 121. Skill Development training on Gardener at BCKV, West Bengal





Fig. 122. Skill development training programme on Vermicompost production at IGKV, Raipur



Fig. 123. Skill Training programme at SKUAST on Greenhouse operator



Fig. 124. Skill training on Vermicompost production at SKUAST, J&K

#### 7. Transfer of Technology Programmes



Fig. 125. Participants attending Skill training programme on vermicompost production at UBKV, West Bengal

The Directorate organizes transfer of technology programmes like Seminar and Workshops at national level, state level and district level to disseminate the latest improved technologies evolved in the various research stations of SAUs and ICAR Institutes among the extension workers of the State Departments and progressive farming community. The Directorate also conducts farmers training programme in the major production centres of spices, arecanut and aromatic plants to update the farmers on latest improved technologies available in the cultivation of these crops. Details of the various seminars/workshops and training programmes organized at various centres are detailed as follows.

#### 7.1. National Seminar

#### National Seminar on Spices: Emerging Trends in Production, Processing and Marketing

The Directorate of Arecanut and Spices Development (DASD) and Central Coastal Agricultural Re-

search Institute (ICAR-CCARI), Goa had jointly organized a national seminar on ' Spices: Emerging Trends in production, Processing and Marketing' on 21-22 January, 2020 at ICAR-CCARI, Old Goa. The two days' Seminar had four technical sessions, besides Inaugural and Plenary sessions. Delegates participated in the event comprised of students, Research Scholars, Researchers, Scientists, Heads of the Universities, Directors, Officials from line Departments, Officials from DASD & Spices Board, Co-operative Organizations, NGOs, Industrial Entrepreneurs, Financial Institutions, Spice farmers, etc., representing different states viz. Goa, Maharashtra, Karnataka, Kerala, Telengana, Andhra Pradesh, Tamil Nadu, Assam, Rajasthan, Gujarat, Delhi, Haryana and Jammu & Kashmir.

**Inaugural Session:** Dr. E. B. Chakurkar, Director, ICAR-CCARI, Goa welcomed the dignitaries on the dais, the delegates and all the participants. Lighting of traditional lamp by the Chief Guest and other Dignitaries on the dais marked inauguration of the National Seminar and this was followed by felicitation of the Chief Guest, Dr. S. D. Sawant, Vice Chancellor, Dr. BSKKV, Dapoli and the Special Guest, Dr. J. C. Katyal, Ex-DDG (Education), ICAR, New Delhi, by Dr. E. B. Chakurkar, Director, ICAR-CCARI, Goa.

Dr. Homey Cheriyan, Director, DASD, Kozhikode, delivered the introductory remarks and emphasised the need to develop strategies for spice production in Konkan belt.

Shri. Madhav Kelkar, Director, Directorate of Agriculture, Government of Goa in his address expressed that organic cultivation of spices is an important step taken towards doubling the farmers' income.

Dr. K. Nirmal Babu, Director, ICAR-IISR, Kozhikode reiterated that spices are low volume- high value crops owing to their antimicrobial, nutraceutical and other special quality characters and therefore, spices need to be valued for their intrinsic factors.

Dr. Gopal Lal, Director, ICAR-NRC for Seed Spices, Ajmer stressed upon the need to adopt the Good Agricultural Practices in seed spices and the need to strengthen the value addition, processing and marketing industry.

Dr. J.C. Katyal, Ex-DDG (Education), ICAR, New Delhi mentioned that more focus and promotion are needed on nutraceutical themes of spices.

Dr. S.D. Sawant, Vice Chancellor, Dr. BSKKV, Dapoli said that a lot of extension work is needed for commercial cultivation of spices with improved technologies. Promising technologies like "Bush pepper production" need to be promoted on a large scale for enhancing the income.

The following six progressive Spice farmers were felicitated on the occasion for adopting the improved scientific production practices for spice crops and inspiring other farmers about the new technologies in the surrounding villages.

- 1. Shri Uday Bhate, Narva, Bicholim Taluka, Goa
- 2. Shri Kamalkant Tendulkar, Torla, Nirankal, Ponda Taluka, Goa.

Shri Dipak Naik, Aroshi, Sawntwadi Taluka, Sindhudurg Disttrict, Maharashtra

- 4. Shri Balkrishna Ganapati Gadgil, Palkarwadi, Vetore, Sindhudurg District, Maharashtra.
- 5. Shri K.T. Francis, Kaithakulathu House, Maruthonkara, Kozhikode District, Kerala.
- 6. Shri Saviour, V., Vazhapally House, Kalanode, Kozhikode District, Kerala

Dr. A.R.Desai, Principal Scientist and Organising Secretary of the Seminar proposed the formal vote of thanks in the inaugural session.

#### Technical Sessions held in the seminar.

Technical Session 1: Agro Techniques for Sustainable Spices Production

Technical Session 2: Post Harvest Management and Prospects for Value Addition

Technical Session 3: Marketing Issues and Trading Prospects

Technical Session 4: Spices Stakeholders' Conclave

The following Resource Persons as Lead Speakers delivered lead talks on the respective topics in the relevant sessions in two days.

| SI.<br>No. | Resource Persons / Lead Speakers  | Topic of Lead Talk  |
|------------|---|---|
| 1          | B.N.S. Murthy, Horticulture Commissioner,<br>Govt. of India                           | National Scenario on Spices Production (Presented in Absentia)        |
| 2          | Dr. Nirmal Babu, Director, ICAR-IISR  | Spice technologies to boost Indian footprint in global spice scenario |
| 3          | Dr. Gopal Lal, Director, NRC (Seed Spices), Ajmer                                     | Sustainable production technologies for seed spices                   |
| 4          | Dr. Homey Cheriyan, Director, DASD,   | Quality planting material production in spices                        |
| 5          | Dr. Mini Raj, Professor, KAU, Thrissur  | Tree spices: Potential for spice economy.                             |
| 6          | Dr. P. Subramanian, Principal Scientist , CPCRI,<br>Kasargod                          | Spices-Natural companions in coconut-based cropping system.           |
| 7          | Dr. Ravi Bhat, Principal Scientist , CPCRI,<br>Kasargod                               | Spices in Arecanut based cropping system:                             |
| 8          | Dr. P. M. Haldankar, Director of Research,<br>Dr. BSKKV, Dapoli                       | "Kokum-Production and processing prospects"                           |
| 9          | Dr. K. N. Pushpakumari, Asst. Vice President, AVT<br>Natural Products Limited, Kerala | "Spicy secrets behind scents"   |
| 10         | Dr. A. B. Rema Shree, Director (Research),<br>Spices Board                            | "Codex Regulation: Status of Codex standards for spices"              |

| 11 | Dr. G.K. Vidyasagar, Dy. Director, Marketing,<br>Spice Board | "Global food safety challenges-reorienting spices production and marketing strategies."           |
|----|--|---|
| 12 | Mr. Philip Kuruvilla,  | "National Sustainable Spice Program (NSSP)<br>– a collaborative transformation".                  |
| 13 | Dr. Nazeer Ahmed, Vice Chancellor, SKUAT,<br>Srinagar        | "Production prospects of Saffron and Kala Zeera".   |
| 14 | Dr .T E Sheeja, Principal Scientist , ICAR-IISR              | "Technology Commercialization perspectives<br>for Spice Stake holder and Nurturing Startups<br>". |

The following broad recommendations emerging out of the deliberations of the National Seminar were presented by Dr. A. R. Desai, Organizing Secretary of the Seminar during the Plenary Session.

#### **Broad Recommendations:**

1. The most echoing perception, in all the sessions of the National Seminar, was revolving around food safety and the practices to minimize the health hazard residues in the entire chain of spice production, handling, processing and marketing. Accordingly, Good Agricultural Practices (GAPs) need to be revisited without compromising the productivity levels, rather enhancing the productivity levels with refined GAPs.

2. Considering the Indian spice perspectives involving all the spices stakeholders, it is envisaged that in spite of the research advances in propagation techniques adopted for production of quality spice seeds and planting material, still there appears to be a short supply of the novel and special/location specific varieties of spice crops to meet the demand by the spice growers. Therefore, strategies and the efforts for production of quality planting material of the above need to be continued with renewed support and national level action plan. This should result in helping not only the expanding area under spice crops but also the productivity levels rapidly for doubling the spice farmers' income.

3. The status quo of production technology advances in spices reveals that a great deal of efforts are still due to quantify their efficacy in terms of economic returns in farmers fields and thereby enhancing net income of farmers eventually leading to doubling/manifold increase in their income, so that sustainability in all respects prevails at large among all the spices stakeholders.

4. Spices and spice products being a great source of foreign exchange earnings, the export trade norms are highly stringent and are to be strictly adhered to maintain a leadership scenario in the international market in order to derive the utmost sustainable economic benefits. In view of this, there is an urgent need to create an awareness among all the spices stakeholders, right from farmers to the exporters, about the sensitivity of the fragile demand in the international market for Indian spices and spice products to have continued sustainable foreign exchange earnings in years to come through reoriented action plans / new strategic policies such as cluster approach involving different levels of farmers, corporates, public sectors, developmental agencies, private entrepreneurs, financial institutes and the like.

Dr. Pramod Sawant, the Hon'ble Chief Minister, Government of Goa graced the occasion as Chief Guest of the Plenary Session. He appreciated the contemplation of the DASD, Kozhikode, Government of India, for selecting the Goa State as the venue for the National Seminar on Spices. While emphasizing the importance and need for promoting spice crops in Goa and adjoining Konkan region, The Chief Minister hoped that the research information deliberated during the various Sessions of the two days' Seminar and the recommendations emerging out would be duly considered by appropriate authorities for meticulous implementation and their execution at state and national level so that action plan would give renewed opportunities to the spice farmers in the Konkan Region and other states in the country at large, for enhancing farmers' income and livelihood security in the years to come.

Dr. M.Thangam, Principal Scientist and Secretary, Association of Coastal Agricultural Research, CCARI, Goa, proposed the vote of thanks. He thanked all the delegates and sponsors for their wholehearted participation and support in the conduct of this National Seminar for the cause of the spice farmers, stake holders in particular and Indian Spice industry in general.



Fig. 126. Inauguration of the Seminar by Lighting of the Traditional Lamp by the Chief Guest Dr. S. D.Sawant, Hon'ble Vice Chancellor at Dr. BSKKV, Dapoli, Maharashtra



Fig. 127. Delegates attending the Technical Session



Fig. 128. Shri Uday Bhate Narva, Bicholim, Goa, receiving the Progressive Spice Farmer Award



Fig. 129. Dr. A. R. Desai presenting general recommendations emerged out of the National Seminar





Fig. 130. Dr. Pramod Sawant, Chief Minister, Goa addressing the gathering during closing ceremony

#### 7.2. State Level Seminar

1. State level workshop on "Current trends in production, processing and marketing of spices in Assam"

A two-day State Level Workshop on "Current Trends in Production, Processing and Marketing of Spices in Assam" under Mission for Integrated Development of Horticulture (MIDH) was organized by the Department of Horticulture, Assam Agricultural University, Jorhat and sponsored by the Directorate of Arecanut and Spices Development (DASD), Calicut, Kerala during August, 21-22, 2019.

The workshop on spices production, processing and marketing with reference to Assam focused on streamlining and settingup of provisions for development of this sector along with deliberation of resource person and discussion among the participants.

Addressing the inaugural session as the Chief Guest, Dr. Ashok Bhattacharyya, Hon'ble Vice Chancellor (i/c), Assam Agricultural University, Jorhat, expressed that growing of spices is an age old practice in homestead gardens of Assamese farmers; however, introduction of new and improved technology may increase the farmers' income, which should be our aim.

Shri Babulal Meena, Assistant Director, Directorate of Arecanut and Spices Development (DASD), Calicut & Guest of Honour, emphasized on the importance of improved technologies for doubling the farmers' income and highlighted the schemes of Government of India for the farmers that are supported by Directorate of Arecanut and Spices Development.

Dr. P.K. Pathak, Director, Directorate of Extension Education, AAU opined for proper skill up-gradation of the farmers' suitability in the spice sector.

Dr. (Mrs) Madhumita C. Talukdar, Professor and Head, in her welcome address, highlighted the potential of the sector in the region.

Mr. Sanjib Sharma, Scientist and PI (MIDH), AAU read out the status report of the MIDH project, AAU Centre.

Mr. Soumitra Goswami, Assistant Professor, Department of Horticulture offered the vote of thanks on behalf

of organizing committee.

| S.<br>No. | Technical sessions                      | Resource persons   |
|-----------|---|--|
| 1         | Introduction to spice growing in Assam  | Mr. Vishwa Bhushan Joshi, Field Officer, Spices Board Field Office, Shillong.  |
| 2         | Production technology of Spice crops    | Dr. Luchan Saikia, Professor, Department of Horticulture, AAU,<br>Jorhat.<br>Dr. Mrinal Saikia, Associate Director of Research (Agri), AAU,<br>Jorhat. |
| 3         | Processing and value-addition of Spices | Dr. Ananta Saikia, Professor, Department of Horticulture, AAU, Jorhat.   |
| 4         | Marketing of Spices                     | Mr. Arup Jyoti Borgohain, Agri. Business Head, Amalgamated Plantations Ltd., Teok, Jorhat.   |

The four publications on related topics were released during the inaugural programme.

#### Recommendations of the session on Introduction to spice growing in Assam

- \* Diversification of horticulture towards high value low volume spices
- \* Intercropping of spices in the existing homestead, Arecanut, Tea and Coffee gardens
- \* Production of spices in organic mode
- \* Development of mother blocks and make availability of quality planting materials
- \* Increasing the area of Black Pepper and Long Pepper
- \* Formation of Farmers Producer Society/Company
- \* Quality assurance in spice production
- \* Seeing the potentiality of the region in aromatic industry, the MAP sector to be promoted to a greater height.

#### **Recommendations of the session on production technology of Spice crops:**

- \* Organic cultivation of spice crops to be promoted considering national and international demand
- \* Need-based zone specific agro-technologies to be developed.
- \* High density innovative production model to be designed to fetch the small and marginal farmer's needs
- \* Agro-forestry based model to be developed for spice production

#### Recommendations of the session on processing and valueaddition of Spices:

Primary processing in spices to be popularised among farmers

- \* Cluster processing units along with storage facilities to be developed in district levels
- \* Quality assurance and value addition of spices to be promoted.
- \* Blending of spices with other prized food and beverages

#### Recommendations of the session on marketing of Spices:

- \* Organized marketing system to be developed connecting all spice growing farmers of the region.
- \* e-auction centres for spices may be developed
- \* Block level information centres may be promoted

A farmer-scientist interaction was also conducted as a part of the workshop, in which two successful spice growers Mr. Kumar Limbu and Mr. Nirmal Haloi shared their success story amongst the trainees.

Recommendations of the farmer scientist interactive session:

- \* Organization of large-scale exhibition and Kisan Melas
- \* Exposure visit of the resource persons and the spices growers
- \* Large scale technology demonstration in the farmers fields
- \* Large scale demonstration on processing, grading, packaging and quality management in spices.

During the Plenary Session, Mr.Bhabesh Deka presented the report and recommendations made during the session. Certificates of participation were distributed among the farmers from different parts of the state during the session.

The two day seminar ended successfully. There was active participation from the farmers and they had fruitful deliberations with resource persons.

#### 2. State Level Seminar on Spices held at Dr. PDKV, Akola

Department of Vegetable Sciences, Faculty of Horticulture Dr.PDKV, Akola organized two days State Level Seminar for Farmers on 25-26 February, 2020. The State Level Seminar was inaugurated by Dr.Vilas M. Bhale, Hon'ble Vice Chancellor, Dr. PDKV, Akola. In his address he signified the importance of spices crops in Indian economy, also stated that Dr.PDKV has developed the technologies for production of export quality spices in Vidharbha region.

In the beginning Dr.P.K.Nagre, Dean, faculty of Horticulture and Nodal Officer of the Project illustrated about purpose of seminar and achievements of MIDH project in last ten years. Dr.Vilas K. Kharche, Director of Research, Dr. Dilip M. Mankar, Director of Extension Education, Dr.Yayati Tayade, Associate Dean, PGI and Dr. Arvind M. Sonkamble, Head, Department of Vegetable Sciences were prominently present on dais.

| Session                  | Name of Speaker      | Торіс   |
|--------------------------|----------------------|---|
| Production Technology    | Dr .P.K.Nagre        | Present scenario and Scope for Spices Crop Culti-<br>vation in Maharashta |
|                          | Dr. V. S. Kale       | Advance production technique in turmeric, gin-<br>ger and chilli          |
|                          | Dr. Varsha Tapre     | Advance production technology for Aromatic plants and Betel vine          |
|                          | Dr. S. M Ghawade     | Advance production technique in Seed Spices                               |
| Marketing of Spice Crops | Shri.Manoj Gaydhane  | Marketing of turmeric and organic certification for turmeric              |
|                          | Dr. S.S. Nagpure     | Marketing of Seed Spices  |
|                          | Shri Mangesh Kukade  | Marketing of processed Spices   |
| Post Harvest Technology  | Dr. Sanjay Bhoyar    | Advance processing for turmeric and ginger                                |
|                          | Dr.Amit Deshmukh     | Post harvest technology for Aromatic plants                               |
|                          | Shri Mangesh Kukade  | Processing of chilli  |
|                          | Shri. Sanjay Thakare | Farming experience about turmeric   |
| Plant Protection         | Dr. G.K. Giri        | Diseases management in Spices Crops                                       |
|                          | Shri.R.S.Munghte     | Pest Management in Spices Crops   |

In the seminar, lectures were delivered by expert faculty from various departments of University, professionals engaged in spices cultivation and marketing. The farmers were imparted with advances in production of spices and aromatic crops, their disease and pest management, value addition and marketing of produce. The seminar was followed by exhibition cum competition under various categories and farmers, producer companies, women SHG's, entrepreneurs were awarded with prizes. About 220 farmer participants from Vidarbha, Marathwada and Western Maharashtra attended the seminar among which presence of young entrepreneurs and female farmers, women SHG's was remarkable. During the various sessions participants interacted with speakers.

Closing ceremony was held on 26<sup>th</sup> February, 2020 which was chaired by Dr. P.G. Ingole, Dean, Faculty of Agriculture. He congratulated organizers and faculty of Horticulture for successful organization of seminar. The programme was anchored by Dr. Vijay S. Kale, Professor and Organizing Secretary of seminar and vote of thanks was expressed by Dr. Abhay P. Wagh, Professor of Horticulture.

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### 7.3 District Level Seminar

| S.<br>No. | Organising In-<br>stitute, Date &<br>Venue  | Seminar<br>Topic  | Seminar Details   |
|-----------|---|---|---|
| 1         | National<br>Research Centre<br>on Seed Spices,<br>Ajmer.<br>29 <sup>th</sup> February and<br>1 <sup>st</sup> March, 2020 at<br>KVK (CAZRI), Bhuj,<br>Gujarat. | Improved<br>cultivation of<br>seed spices<br>to enhance<br>the income of<br>farmers | ICAR-NRCSS, Ajmer organized two days District Level Seminar<br>entitled "Improved cultivation of seed spices to enhance the in-<br>come of farmers on 29 <sup>th</sup> February and 1 <sup>st</sup> March, 2020 at KVK<br>(CAZRI), Bhuj, Gujarat. The seminar was inaugurated by Chief<br>Guest of the function, Dr. A. K.Singh, DDG (HS), ICAR, New Del-<br>hi. Dr. Gopal Lal, Director, NRCSS, Ajmer welcomed the Chief<br>Guest and other dignitaries on the dais and all the participants.<br>The Chief Guest of the function, Dr. A. K. Singh motivated the<br>farmers to adopt scientific technologies for crop production,<br>value addition, grading, packaging and self-marketing for high<br>returns. During this Seminar lectures on quality production,<br>plant protection, post-harvest management, value addition and<br>marketing aspects were delivered to the farmer participants by<br>expert in respective fields. The programme was concluded with<br>open discussion with farmers to resolve their day to day farming<br>problems related to seed spices and other horticultural crops.<br>This District Seminar was participated by 175 farmers of Bhuj<br>District. |
| 2         | Agricultural University, Jodhpur,<br>Rajasthan. 19-20<br>February, 2020<br>at Agricultural<br>Research Station,<br>Mandor, AU,<br>Jodhpur                     | Recent<br>Production<br>Technologies<br>of Seed Spices<br>in Western<br>Rajasthan   | Two days District level seminar on Recent Production Technolo-<br>gies of Seed Spices in Western Rajasthan was organized at Agri-<br>cultural Research Station, Mandor. Resource persons from the<br>Univesity delivered lectures on the Best management practices<br>in seed spices, Diseases of spice crops and their management,<br>Soil testing and nutrient management in cultivation of seed spic-<br>es, Importance of organic farming in spice crops. Methods for<br>nominal pesticide residue, Major insect pest and their manage-<br>ment and Post-harvest management and value addition were<br>also described in the seminar. In this two-day seminar, 124 dele-<br>gates comprising scientists, subject matter specialists, technical<br>staff of University, officials from agriculture department of state<br>governments and farmers were participated.   |
| 3         | Kerala<br>Agricultural<br>University,<br>Thrissur.<br>4 <sup>th</sup> March, 2020 at<br>Peravoor, Kannur  | Black Pepper<br>Farmers Meet  | A district level Black Pepper Farmers Meet and Planting material distribution was conducted at Robins Hostel Auditorium, Peravoor, Kannur on 4 <sup>th</sup> March,2020 under the initiative of Pepper Research Station, Panniyur. More than 150 farmers and officials participated in the farmers meet. Dr. Neema, V.P., Head, PRS Panniyur made an introductory class on importance of Black pepper varieties released by KAU, IISR and promising local varieties, Smt. Airina,K. delivered a session on Black pepper cultivation and nursery management and Dr. Yamini Varma,C.K detailed on Plant protection measures in black pepper. Sri.Lakshmanan, Manager, Bio input centre, Peravoor delivered a class on Bio inputs and their importance. Inputs like Trichoderma, Neem oil Garlic Soaps and rooted cuttings of Black pepper were distributed to the participants. Leaflets prepared on pest and diseases of Black pepper were also given to the farmers. The farmers requested for supply of Panniyur varieties directly from the Pepper Research Station, Panniyur to ensure genuine planting material.  |

### 7.4 Farmers Training Programme

| S.<br>No. | Institute  | Training topic   | Date & Venue  | Training details  |
|-----------|--|--|---|---|
| 1         | Indian<br>Institute<br>of Spices<br>Research,<br>Calicut | Spice based<br>cropping systems<br>for enhancing<br>farm incomes   | 28 <sup>th</sup> November,<br>2020 at IISR,<br>Calicut                        | Good agricultural practices for plant health,<br>Polyhouse for spices: Issues and challenges<br>and spice based Intercropping systems for<br>enhancing farm income were dealt in the pro-<br>gramme.  |
|           |  | Scientific and<br>technological<br>interventions for<br>improving<br>production and<br>quality of Ginger<br>and Turmeric | 11 <sup>th</sup> March,2020<br>at ICAR- CTRI,<br>Research<br>Station, Hunsur  | Improved varieties of ginger and turmeric,<br>Scientific cultivation of ginger and turmeric,<br>Pest and disease management in ginger and<br>turmeric were discussed in the programme.<br>More than 85 farmers attended the training<br>programme. The farmers were provided with<br>a training kit consisting of ginger and tur-<br>meric cultivation folder, package of practic-<br>es (Ginger and Turmeric in Kannada), Ginger<br>special (Micronutrient mixture) half kg to each<br>farmer, monthly operation schedule for black<br>pepper. |
| 2         | Junagadh<br>Agri.<br>University,<br>Junagadh,<br>Gujarat | Production, value<br>addition,<br>marketing and<br>export of seed<br>spices crops  | 21st January,<br>2020 at K.V.K.,<br>J.A.U., Morbi.                            | Scientific cultivation and importance of val-<br>ue addition of spices crops, importance of<br>seed spices crops,Economics and marketing,<br>harvesting, grading, processing and value<br>addition of seed spices crops were discussed<br>in the programme.One Training Manual in<br>vernacular language on "Production,value<br>addition, marketing and export of seed spic-<br>es crops" was released on this occasion.Total<br>107 progressive farmers participated in the<br>programme.   |
| 3         | Agricultural<br>University,<br>Jodhpur,<br>Mandor        | Spices crops   | 5 <sup>th</sup> March,2020<br>at Village Bendo<br>ka bera (Osian,<br>Jodhpur) | Weed management, Improved crop produc-<br>tion technology, Seed production, Insect<br>pests and their management in seed spices<br>were discussed in the training. Total 105 pro-<br>gressive farmers were participated in the pro-<br>gramme.  |
|           |  | Spices crops   | 13 <sup>th</sup> March,<br>2020 at<br>Badgaon,<br>Merta City                  | Importance of soil testing and soil health<br>card and Integrated Nutrient management<br>in spices crop, improved agricultural prac-<br>tices in seed spices. Quality improvement in<br>spice crops and Integrated Plant protection<br>measures in seed spices were dealt in the pro-<br>grmme. Total 127 progressive farmers partic-<br>ipated in the programme.   |
| 4         | Maharna<br>Pratap<br>University of<br>Agri. &Tech.,      | Improved Tech-<br>niques of Spice<br>Crops   | 24 <sup>th</sup> February,<br>2020 at KVK,<br>Dungarpur                       | Mandate of MIDH programme and present-<br>ed the Seed Production Techniques for ma-<br>jor spice crops, improved cultivation of spice<br>crops, post harvestmanagement of seed spic   |

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|   | Udaipur,<br>Rajasthan   |   |   | es, role of agriculture weather advisory sys-<br>tem in the cultivation of seed spices were dis-<br>cussed in the programme. About 50 farmers<br>attended the training.   |
|---|---|---|---|---|
|   |   | Improved<br>Production<br>Technology of<br>Spice Crops                                  | 25 <sup>th</sup> February,<br>2020 at KVK,<br>Bhilwara  | Importance and scope of seed spices in south-<br>ern Rajasthan, important cultivation tips for<br>seed spice crops, Post harvest management<br>of seed spices, integrated nutrient manage-<br>ment in seed spices, disease and integrated<br>insect pest management in seed spices were<br>dealt in the programme. About 52 farmers<br>participated in the training programme.  |
|   |   | Post harvest<br>management in<br>Seed Spices  | 7 <sup>th</sup> March,2020<br>at KVK,<br>Chittorgarh  | Importance of seed spices, mandate of MIDH<br>programme, seed production of important<br>seed spices, integrated plant protection mea-<br>sures for seed spices and Post harvest man-<br>agement and value addition in seed spices<br>were presented by experts in the programme.<br>About 86 farmers participated in the training.   |
| 5 | Navsari<br>Agril.<br>University,<br>Navsari,<br>Gujarat                 | Off-Campus seed<br>production<br>training<br>programme on<br>turmeric & black<br>pepper | 17 <sup>th</sup> December,<br>2019 at<br>Dokpatal,<br>Taluk - Ahva,<br>District- Dang                             | Off-campus training was organized at Dokpa-<br>tal village, Taluk-Ahva, Dstricti-Dangto edu-<br>cate the tribal farmers of Dang district on var-<br>ious aspects of seed production techniques,<br>crop management, pest and diseases man-<br>agement, seed quality, post-harvest handling,<br>storage etc. of turmeric and black pepper. In-<br>formation kits were also provided to the farm-<br>ers. Total beneficiaries were 102.   |
| 6 | Central Agril.<br>University,<br>Pasighat                               | Boosting Farmer's<br>Income through<br>Spices Cultiva-<br>tion in Arunachal<br>Pradesh  | 5 <sup>th</sup> &6 <sup>th</sup> Feruary,<br>2020 at CHF,<br>CAU, Pasighat,<br>East Siang, A.P.                   | Scope and importance of spices cultivation<br>in Arunachal Pradesh, Improved production<br>technology of Ginger, Turmeric and Blcak<br>pepper,Nutrient management of important<br>spices, Marketing of important spices, Gin-<br>ger and Turmeric cultivation in Agroforestry<br>based farming system, Package of practices<br>of Large Cardamom, Disease management<br>of important spices,Organic package of prac-<br>tices of Ginger and Turmeric and Curing and<br>value addition of important spices were dealt<br>in the programme. Over 78 farmers from the<br>area took part in the programme |
| 7 | Dte. of<br>Medicinal<br>and<br>Aromatic<br>Plants<br>Research,<br>Anand | Scientific<br>Cultivation of<br>Seed Spices,<br>Medicinal and<br>Aromatic Crops         | 19 <sup>th</sup> Feb, 2020<br>Regional<br>CottonResearch<br>Station (RCRS),<br>AAU, Viramgam<br>District, Gujarat | Cultivation practices of seed spices, integrat-<br>ed nutrient management in seed spices, cul-<br>tivation practices of regional crops, Medicinal<br>use of seed spices and Use of Bio fertilizers<br>were dealt in the programme.  |
|   | Gujarat   | Cultivation<br>Practices of Spices<br>and Condiments                                    | 3 <sup>rd</sup> March,2020<br>at Krishi Vigyan<br>Kendra, AAU,<br>Arnei District.                                 | Information on different varieties of spices<br>crops, Agriculture scheme related with spices<br>crop, Scientific cultivation practices of spices<br>crops, Processing techniques in spices crops,  |

|   |   |   | Gujarat  | Irrigation management in spices crops, Fer-<br>tilizer management in spices crops were dis-<br>cussed in the programme. Over 120 farmers<br>from the area took part in the programme.  |
|---|---|---|--|--|
| 8 | Anand Agril.<br>University,<br>Anand,<br>Gujarat        | Cultivation<br>Practices of Spices<br>and Condiments'                           | 3 <sup>rd</sup> February,<br>2020 at Krishi<br>Vigyan Kendra,<br>AAU, Arnej  | One day training programme on cultiva-<br>tion practices of spices and condiments was<br>conducted at KVK, AAU, Arnej on 3-03-2020.<br>About 120 farmers were participated.  |
|   |   | Scientific<br>Cultivation of Seed<br>Spices, Medicinal<br>and Aromatic<br>Crops | 19 <sup>th</sup> Febru-<br>ary, 2020 at<br>Viramgam,<br>Dhandhuka and<br>Mandal taluk  | One day training programme on Scientific Cul-<br>tivation of Seed Spices, Medicinal and Aromat-<br>ic Crops was conducted at Viramgam, Dhand-<br>huka and Mandal taluk on 19 <sup>th</sup> February,2020.<br>About 152 farmers were participated.  |
| 9 | Bidhan<br>Chandra<br>Krishi Viswa<br>Vidyalaya,<br>W.B. | Spices &Aromatic<br>Plants  | 27 <sup>th</sup> &28 <sup>th</sup><br>January,2020<br>at Ramkrishina<br>Sevadal<br>Ashram,<br>Seminar Hall,<br>District -<br>Bankura | MIDH scheme for Spices, Medicinal and Aro-<br>matic Crops for rural livelihood, Black Pepper<br>multiplication, Cultivation of Ginger, Turmeric<br>and Curry leaf,Growing ofSeed spices, turmer-<br>ic,chilli and Capsicum in dry tract of Bengal,<br>Different Govt.schemes for spices and medic-<br>inal crops were discussed in the programme.  |
|   |   | Spices & Aromatic<br>Plants   | 5 <sup>th</sup> &6 <sup>th</sup><br>February,2020<br>at Murshidabad,<br>KVK  | Scope of Spices in West Bengal Murshidabad<br>a potential area for seed spices, chilli and tur-<br>meric, Black Pepper multiplication and Capsi-<br>cum and ginger growing, Ginger and Turmer-<br>ic under fruit-based cropping system, Pest<br>Management in Spices and aromatic crops,<br>Scope of Spices in India, Production manage-<br>ment of Chilli, Modern techniques for Ginger,<br>Turmeric multiplication, Field level problems<br>and solution on spices were dealt in the pro-<br>gramme. |
|   |   | Spices & Aromatic<br>Plants   | 10 <sup>th</sup> February,<br>2020 at College<br>of Agriculture,<br>BCKV, District-<br>Burdwan                                       | Significance of MIDH scheme for spices and<br>aromatic crops, Black Pepper multiplication,<br>Indegeneous spices and medicinal crops,<br>Spices for rural lively hood and growing Gin-<br>ger and Turmeric,,Curry leaf, Onion and Seed<br>Spices were discussed in the programme.  |
|   |   | Spices & Aromatic<br>Plants   | 6 <sup>th</sup> March,2020<br>at Kalna SDO,<br>District- Purba-<br>Burdwan   | Scope of Spices in India, Improved onion Gar-<br>lic Production technology, Modern techniques<br>for Ginger multiplication, Spices, Medicinal<br>and Aromatic Crops, Improved Production<br>technology and Pest Management in Spices<br>and aromatic crops and Spices in Integrated<br>farming system were dealt in the programme.   |
|   |   | Spices & Aromatic<br>Plants   | 8 <sup>th</sup> March,2020<br>at Sundarbon<br>District   | Economics & Scope of Spices in West Ben-<br>gal, Agronomic Management of Seed Spices<br>crops, Black Pepper multiplication,Growing<br>Ginger and Turmeric under fruit-based crop-<br>ping system and Success stories of spices   |

|    |                     |  |  | cultivation in the Block were discussed in the programme.  |
|----|---------------------|--|--|--|
|    |                     | Spices & Aromatic<br>Plants  | 15 <sup>th</sup> March,2020<br>at Hooghly Dis-<br>trict  | Economics & Scope of Spices in WB, Improved<br>onion Garlic Production technology,Agro-<br>nomic Management of Capsicum, Chilli, Gin-<br>ger, Turmeric, Seed Spices, Medicinal and Aro-<br>matic crops,Govt schemes on agriculture with<br>emphasis on spices,Success stories of spices<br>cultivation in the Block and Motivational lec-<br>ture on spices extension were delivered by<br>experts in the programme.   |
| 10 | CPCRI,<br>Kasaragod | Recent advances<br>in Pest and dis-<br>ease management<br>and multi species<br>cropping system<br>in arecanut            | 24 <sup>th</sup> September,<br>2019 at ICAR -<br>CPCRI Regional<br>station Kidu,<br>Dakshina Kan-<br>nada                              | Multispecies cropping system and Nutrient<br>management in arecanut, Improved varieties<br>and hybrids in arecanut, Integrated disease<br>management in arecanut, Integrated pest<br>management in arecanut were discussed in<br>the programme. Scientist - Farmers Interface/<br>Quiz & essay competition were also conduct-<br>ed as a part of the training. More than 150<br>farmers were participated in the training.   |
|    |                     | Recent advances<br>in Pest and dis-<br>ease management<br>and multi species<br>cropping system<br>in arecanut'           | September<br>25 <sup>th</sup> , 2019 at<br>Vittal village of<br>Dakshina Kan-<br>nada district of<br>Karnataka                         | Multispecies cropping system and Nutrient<br>management in arecanut, Improved varieties<br>and hybrids in arecanut, Integrated disease<br>management in arecanut, Integrated pest<br>management in arecanut were discussed in<br>the programme. Scientist - Farmers Interface/<br>Quiz & essay competition were also conducted<br>as a part of the training. More than 200 farm-<br>ers, development officials, elected members,<br>private input supplier agency, college stu-<br>dents etc. had participated in the programme. |
|    |                     | Recent advances<br>in Pest and dis-<br>ease management<br>and multi species<br>cropping system<br>in arecanut            | September<br>26 <sup>th</sup> , 2019 at<br>Belthangady<br>village of Udupi<br>district of Kar-<br>nataka                               | Multispecies cropping system and Nutrient<br>management in arecanut, Improved varieties<br>and hybrids in arecanut, Integrated disease<br>management in arecanut, Integrated pest<br>management in arecanut were discussed in<br>the programme. Scientist - Farmers Interface/<br>Quiz & essay competition were also conduct-<br>ed as a part of the training. More than 150<br>farmers, development officials, elected mem-<br>bers, private input supplier agency, college<br>students etc. had participated in the training.  |
|    |                     | Arecanut Based<br>Multispecies<br>Cropping System<br>and Integrated<br>Pests and Diseas-<br>es Management in<br>Arecanut | 25 <sup>th</sup> February,<br>2020 at Grama<br>Panchayat Hall,<br>Pambetthady,<br>Sullia Tk., Dak-<br>shina Kannada<br>Dt., Karnataka. | Various topic related to Varieties/ hybrids<br>in arecanut based cropping system, Quali-<br>ty planting material production in arecanut<br>based cropping system, Production technolo-<br>gies of arecanut based cropping system, Inte-<br>grated Pests Management in arecanut based<br>cropping system, Integrated Diseases Man-<br>agement in arecanut based cropping system,<br>Cost of cultivation in arecanut based cropping<br>system. Demonstration of Bordeaux mixture   |

|    |   |   |  | preparation and Transfer of technology pro-<br>grammes in arecanut based cropping system<br>were discussed in the programme. More than<br>120 participants attended the programme.   |
|----|---|---|--|--|
|    |   | Arecanut Varieties,<br>Arecanut Based<br>Multispecies<br>Cropping System<br>and Integrated<br>Pests and Diseas-<br>es Management in<br>Arecanut     | 5 <sup>th</sup> March,<br>2020 at Grama<br>Panchayat Hall,<br>Harihara-Pal-<br>lathadka, Sullia<br>Tk., Dakshina<br>Kannada Dt.,<br>Karnataka. | Lectures, demonstrations and discussions on<br>various topics related to arecanut varieties,<br>arecanut based cropping system and inte-<br>grated pests and diseases management were<br>arranged which helped the farmers to know<br>the scope, importance and advantages of the<br>arecanut varieties, arecanut based cropping<br>system and integrated pests and diseases<br>management in arecanut to increase the prof-<br>it. Exhibits related to varieties/hybrids, qual-<br>ity planting materials production, agronomic<br>practices, arecanut based cropping system,<br>integrated pests and diseases management<br>etc. were displayed for giving first-hand in-<br>formation to the participants. More than 160<br>participants attended the programme and<br>got benefitted. Arecanut planting materials<br>were distributed to participants. |
|    |   | Arecanut Varieties,<br>Arecanut Based<br>Multispecies Crop-<br>ping System and<br>Integrated Pests<br>and Diseases Man-<br>agement in Areca-<br>nut | 9 <sup>th</sup> March, 2020<br>at Belthangady,<br>Dakshina Kan-<br>nada Dt., Karna-<br>taka  | Various topics related to arecanut varieties,<br>arecanut based cropping system and inte-<br>grated pests and diseases management were<br>arranged which helped the farmers to know<br>the scope, importance and advantages of<br>the arecanut varieties, arecanut based crop-<br>ping system and integrated pests and diseas-<br>es management in arecanut to increase the<br>profit. More than 150 participants attended<br>the programme and got benefitted. Arecanut<br>planting materials were distributed to partic-<br>ipants.  |
| 11 | National<br>Research<br>Centre on<br>Seed Spices,<br>Ajmer. | Improved produc-<br>tion and protec-<br>tion technologies<br>of Seed Spices"  | 7th February,<br>2020 at Na-<br>tional Research<br>Centre on Seed<br>Spices, Ajmer.  | The programme was inaugurated by Director,<br>ICAR-NRCSS, Ajmer. He briefed farmers about<br>present status and future perspective of seed<br>spices. The participants were imparted knowl-<br>edge on high yielding varieties in seed spices,<br>improved production technology of seed spic-<br>es, integrated pest and disease management<br>and intercropping of seed spices with fruits<br>and vegetables for higher income. 93 farmers<br>of different villages of Ajmer District had par-<br>ticipated in the Training programme .  |
|    |   | Improved cultiva-<br>tion of Seed Spices  | 26 <sup>th</sup> February,<br>2020 at Katrath-<br>al village of<br>Sikar District  | The training progamme was inaugurated by<br>Director, ICAR-NRCSS, Ajmer. He delivered a<br>talk on production, productivity and medic-<br>inal values of seed spices and post-harvest<br>management and value addition in seed spic-<br>es. Expert team of Scientists of NRCSS, Ajmer<br>interacted with farmers regarding alarming<br>issues of seed spices viz. pests and  |

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|    |  |                                       |   | diseases management, crop production, va-<br>rietal wealth and pesticides residues issues<br>in seed spices. One progressive farmer also<br>shared his views about organic production of<br>seed spices. 96 farmers of different villages of<br>Sikar District had participated in the training<br>programme.  |
|----|--|---------------------------------------|---|--|
| 12 | Sardar<br>Krushi nagar<br>Dantiwada<br>Agri Univer-<br>sity, Gujarat                               | Seed spices crops                     | 6 <sup>th</sup> January,<br>2020 at Ravipu-<br>ra kampa,<br>Taluk Va-<br>dali,District SK | Production scenario of seed spices, export<br>potential and tips for profitable production,<br>Production technology of seed spices with<br>special reference to no or low cost technolo-<br>gy,Crop production and protection technol-<br>ogies of seed spices under organic farming<br>condition Integrated Post Management in   |
|    |  | Seed spices crops                     | 21 <sup>st</sup> January,<br>2020 at Kum-<br>bhasan<br>Taluk Palanpur<br>District         | seed spices, Integrated Trest Management in<br>seed spices, Integrated Disease Management<br>in seed spices, Processing, post harvest and<br>Value addition in seed spices, Improved variet-<br>ies and seed production technologies in seed<br>spices with special reference to seed village  |
|    |  | Seed spices crops                     | 1st February,<br>2020 at Ganesh-<br>pura<br>Taluk.  | concept and Export barriers and quality stan-<br>dards in seed spices were discussed in the<br>programme. Around 170 farmers took part<br>in the training programme including female<br>participants.  |
|    |  | Seed spices crops                     | 6 <sup>th</sup> March, 2020<br>at Pratapgad<br>Kampa,<br>Taluk Vijay-<br>nagar            |  |
| 13 | Sardar<br>Valllabhbhai<br>Patel Univer-<br>sity of Ag-<br>riculture &<br>Technology,<br>Meerut, UP | Spices crops                          | 3 <sup>rd</sup> March, 2020<br>at KVK, Nagina,<br>Bijnore                                 | Production Technology of Seed Spices, Ginger,<br>Turmeric, Production technology of Organ-<br>ic Production of Spices and Plant Protection<br>Measures, Processing and value addition of<br>Spices, Improved varieties of Spices and Qual-<br>ity Seed Production of Spices were dealt with<br>the programme. About 80 farmers attended<br>the programme.                                    |
|    |  | Spices crops                          | 6 <sup>th</sup> March,2020<br>at KVK, Shamli  | Production technology of Coriander, Fenu-<br>greek and Garlic, Plant Protection measures<br>on spices crops, Production Technology of<br>Ginger and Turmeric and Organic Production<br>of Spices, Impact of Spices Production in Ag-<br>riculture Sector, Production of Quality Seed<br>Production of Spices were discussed in the<br>programme. About 80 farmers attended the<br>programme. |
| 14 | SKN Agricul-<br>ture Univer-<br>sity, Jobner,<br>Rajasthan   | Scientific cultiva-<br>tion of spices | 24 <sup>th</sup> Febru-<br>ary, 2020 at<br>KVK, Kumhar,<br>Bharatpur                      | Integrated insect and pest management in<br>Fennel and Coriander, Production technology<br>of Fennel and coriander, Integrated disease<br>management in Fennel and Coriander were<br>dealt with the programme.   |

|    |    |   | Scientific cultiva-<br>tion of spices   | 28 <sup>th</sup> February,<br>2020 at KVK,<br>Navgaon Alwar   | Importance and scope of Spices, INM in<br>Methi, Scientific cultivation of Methi, IPM in<br>Methi, Scientific tips to boost Methi produc-<br>tion, Weed Management in Methi, were dis-<br>cussed in the training.  |
|----|----|---|---|---|--|
|    |    |   | Scientific cultiva-<br>tion of spices   | 1 <sup>st</sup> November,<br>2019 at AT-<br>MQIC, SKNAU,<br>Jobner                                  | mportance and scope of Spices, INM in Methi,<br>Scientific cultivation of Methi, IPM in Methi,<br>Scientific tips to boost Methi production,<br>Weed Management in Methi, were discussed<br>in the training.   |
|    |    |   | Production tech-<br>nology of seed<br>spices  | 5 <sup>th</sup> February,<br>2020 at Pachar,<br>Jobner  | Integrated nutrient management in seed<br>spices crop, Scientific cultivation of fennel, In-<br>tegrated Disease and Pest Management, Im-<br>portance of organic manures in quality seed<br>spices production and Weed Management in<br>Methi were dealt in the training.  |
|    | 15 | Kerala<br>Agricultural<br>University,<br>Thrissur               | Product diversi-<br>fication and Agri<br>business start<br>ups from Spices &<br>Aromatics | 20 <sup>th</sup> February,<br>2020, at Sem-<br>inar Hall, AM-<br>PRS, Odakkali                      | The topics covered during the training pro-<br>gramme were Agri-business Startups and<br>Incubator Activities of Kerala Agricultural Uni-<br>versity, Value addition in major spice crops,<br>Value addition in major aromatics (vetiver<br>and lemongrass), Expectations from farmers<br>and Sales Opportunities and Perfumery based<br>products. Around 150 farmers took part in<br>the programme.   |
|    |    |   | Spices cultivation:<br>A scientific ap-<br>proach   | 27 <sup>th</sup> Novem-<br>ber,2019 at<br>Panchayath<br>Conference<br>Hall, Vellinezhy,<br>Palakkad | Scientific Ginger cultivation, Latest technol-<br>ogies in pepper cultivation, Disease man-<br>agement in Spice crops and Method demon-<br>stration on pepper grafting & layering were<br>discussed in the programme. Around 96 farm-<br>ers took part in the programme  |
| 16 | 16 | Uttar Banga<br>Krishi Viswa<br>Vidyalaya,<br>Pundibari,<br>W.B. | Spices crops  | 6 <sup>th</sup> & 7 <sup>th</sup> Feb-<br>ruary, 2020<br>at Kharibari,<br>Darjeeling                | The topics covered during the trainiing pro-<br>gramme were Scientific Package of Practices<br>for Ginger and Turmeric production, Impor-<br>tance, Package of Practices and economics<br>of Seed spices, Scientific Package of practic-<br>es and problems in Arecanut production and<br>processing, Management of disease-pest of<br>ginger and pepper, turmeric, seed spices and<br>tree spices. Around 75 farmers took part in<br>the programme.   |
|    |    |   | Spices crops  | 6 <sup>th</sup> March,<br>2020 at UBKV,<br>Pundibari  | Doubling farmers income through spices<br>cultivation, Problem and Prospect of Spice<br>Cultivation in Cooch Behar district, Organic<br>production technology in Spices. Improved<br>production Technology of black pepper, tur-<br>meric and ginger, Growing spices in multi-sto-<br>reyed cropping system and Disease manage-<br>ment of chilli, onion, seed spices, ginger,<br>turmeric and black pepper were discussed in<br>the programme. Around 87 farmers took part<br>in the programme. |



|    |   | Spices crops                                    | 04 <sup>th</sup> , 5 <sup>th</sup> and 7 <sup>th</sup><br>March, 2020<br>at Manichak,<br>Malda | The topic covered during the programme<br>were Turmeric rhizome production and its<br>post harvest opportunity production, Oppor-<br>tunities for Seed spices and black pepper cul-<br>tivation in Malda district, Pest management<br>of spice crops, Different cultural practices of<br>rhizomatous spice crops and Improved pro-<br>duction and post harvest technology of black<br>pepper and ginger. Around 50 farmers took<br>part in the programme. |
|----|---|---|--|---|
| 17 | Assam Agri-<br>cultural Uni-<br>versity, Jor-<br>hat, Assam | Advanced Technol-<br>ogies in Horticul-<br>ture | 22 <sup>nd</sup> July, 2019<br>at Bezgaon,<br>Jorhat   | The topics covered were Spice cultivation for<br>doubling farmers income, Plant protection<br>measures to be taken for spice crops and<br>Importance of post harvest techniques for in-<br>creasing shelf life of horticultural crops, Pro-<br>duction of quality planting material for horti-<br>cultural crops. Around 46 farmers took part in<br>the programme.  |
|    |   | Horticulture Pro-<br>duction Technol-<br>ogy    | 27 <sup>th</sup> January,<br>2020 at Nak-<br>achari, Jorhat                                    | The topics covered were Spice cultivation for<br>doubling farmers income, Plant protection<br>measures to be taken for spice crops and<br>Importance of post harvest techniques for in-<br>creasing shelf life of horticultural crops, Pro-<br>duction of quality planting material for horti-<br>cultural crops. Around 90 farmers took part<br>in the programme.  |
|    |   | Production of<br>Quality Planting<br>material   | 7 <sup>th</sup> February,<br>2020 at AAU,<br>Jorhat  | The topics covered were Spice cultivation for<br>doubling farmers income, Production of qual-<br>ity planting material for horticultural crops,<br>Plant protection measures to be taken for<br>spice crops and Importance of Fruits crop<br>in increasing farmers income. 95 famers with<br>a majority being women/tribal farmers took<br>part in the programme.   |
| 18 | Dr. B S KKVP,<br>Dapoli,<br>Maharashtra                     | Production tech-<br>nology of spices            | 12 <sup>th</sup> March,<br>2020 at<br>KVK, Lanja   | Lectures on Production technology of plant-<br>ing material of spices in Konkan region of<br>Maharashtra, Doubling farmers income, Pro-<br>duction technology of Bush pepper and other<br>spices, and Pest management in spice crops<br>were delivered during the training. Over 205<br>farmers took part in the training programme<br>with a majority being female participants.   |
|    |   | Production tech-<br>nology of spices            | 28 <sup>th</sup> February,<br>2020 at<br>College of Horti-<br>culture, Mulde                   | Topics covered during the training were Pro-<br>duction technology of planting material of<br>spices in Konkan region of Maharashtra, Pro-<br>duction technology of spices and tis process-<br>ing especially Nutmeg, Cinammon and Kokum<br>and Pest management in spices. Over 112<br>farmers took part in the training programme<br>with a majority being female participants.  |



| 19 | CCS, HAU,<br>Hissar  | Training pro-<br>gramme on spices                    | 19 <sup>th</sup> February,<br>2020 at<br>HAU Main cam-<br>pus   | Lectures on relevant topics were delivered by<br>different scientists regarding package of prac-<br>tices and usefulness of these crops during<br>various programmes. Details of Extension ac-<br>tivities on spices crop conducted during the<br>year to create awareness among the farmers<br>regarding cultivation of spices crop for diver-<br>sification in agriculture was discussed during<br>the training. Over 75 farmers including wom-<br>en took part in the programme.             |
|----|--|--|---|---|
|    |  | Training pro-<br>gramme on spices                    | 26 <sup>th</sup> February,<br>2020 at<br>HAU Main cam-<br>pus   | Lectures on relevant topics were delivered by<br>different scientists regarding package of prac-<br>tices and usefulness of these crops during<br>various programmes. Details of Extension ac-<br>tivities on spices crop conducted during the<br>year to create awareness among the farmers<br>regarding cultivation of spices crop for diver-<br>sification in agriculture was discussed during<br>the training. over 75 farmers including wom-<br>en took part in the programme.             |
| 20 | Dr. Y S R<br>Horticulture<br>University,<br>Hyderabad,<br>AP                         | Scientific and<br>organic cultivation<br>of Turmeric | 12 <sup>th</sup> November,<br>2019 at<br>Horticultural<br>Research Sta-<br>tion, Ananthara<br>jupeta                          | The topics covered during the training pro-<br>gramme were production technology, post<br>harvest management, seed treatment, ferti-<br>gation, INM and IPDM practices in Turmeric.<br>Scientists of Dr. YSR Horticultural University<br>were the resource persons. Over 100 farmers<br>from the area took part in the programme.   |
| 21 | Odisha Uni-<br>versity for<br>Agriculture<br>and Technol-<br>ogy, Bhu-<br>banesh war | Aromatic Plant<br>Cultivation                        | 13 <sup>th</sup> February,<br>2020 at<br>Krushi Sad-<br>hana Kendra,<br>KARRTABYA,<br>Bandakutra,<br>Junagarh, Kala-<br>handi | Lectures on Scope, importance and commer-<br>cial cultivation of Aromatic plants in Kalahan-<br>di, Details of Government schemes, subsidy,<br>credit facilities and marketing of aromatic<br>plants, Constraints, strategies for promotion<br>and processing of Aromatic plants and quality<br>maintenance of Aromatic oil were delivered<br>during the training. Around 90 farmers took<br>part in the programme.   |
|    |  | Organic Ginger<br>Cultivation                        | 11 <sup>th</sup> February,<br>2020 at<br>RRTS, Semili-<br>guda  | The topics covered during the training pro-<br>gramme were drip irrigation in Ginger, Mar-<br>keting support needs for enhancing produc-<br>tion of Ginger and turmeric, Land preparation,<br>planting method and multiplication of bio<br>agents and their use in Ginger and Turmeric,<br>Ginger varieties suitable for EGHL zone and<br>their characteristics and disease/pest man-<br>agement in Ginger. Around 75 farmers from<br>the ST category took part in the training pro-<br>gramme. |



| 22 | University of<br>Horticulture<br>Sciences,<br>Bagalkot,<br>Karnataka         | Recent advances<br>in production<br>technology and<br>marketing of chilli<br>and garlic          | 29 <sup>th</sup> July, 2019<br>at RHREC,<br>Dharwad   | The topics covered during the programme<br>were Importance of chilli & garlic in modern<br>agriculture, Management of new improved-<br>varieties in chilli & garlic, modern cultivation<br>practices in chilli, cultivation practices in gar-<br>lic, IDM in chilli and garlic, IPM in chilli and<br>garlic, post harvest management technolo-<br>gies in chilli and garlic, seed production & cer-<br>tification in chilli and marketing and export of<br>chilli & garlic. Over 75 farmers participated in<br>the training programme.  |
|----|--|--|---|---|
|    |  | Recent Trends in<br>production and<br>marketing of Spic-<br>es and Aromatic<br>crops             | 14 <sup>th</sup> February,<br>2020 at College<br>of Horticulture,<br>Bidar  | Senior scientists from the University handled<br>the technical sessions in which the topics cov-<br>ered were Cultivation practices of aromatic<br>crops, Production technology of ginger, In-<br>tegrated pest management in ginger and<br>turmeric, Integrated disease management in<br>ginger and turmeric and Future Prospects of<br>aromatic crops and marketing. Over 75 farm-<br>ers took part in the programme.   |
|    |  | Trends in Produc-<br>tion and Post-Har-<br>vest technologies<br>of Turmeric and<br>Garlic        | 25 <sup>th</sup> February,<br>2020 at Horti-<br>culture Exten-<br>sion Education<br>Unit, Arabhavi,<br>KRCCH,<br>Arabhavi | Scientists from the University delivered lec-<br>tures on Improved varieties of Turmeric, Ad-<br>vanced Production Technologies in Turmeric,<br>Integrated nutrient management in Turmeric<br>and Garlic, Production of Turmeric seedlings<br>through Single bud technology, Improved va-<br>rieties and advanced Production technologies<br>in Garlic, Integrated disease-management<br>in Turmeric and Garlic and Marketing and<br>Export opportunities in Turmeric and Garlic.<br>Over 100 farmers from Belagavi, Bagalkot<br>and Vijaypura district were participated in the<br>training programme. |
| 23 | Indira<br>Gandhi<br>Krishi<br>Vishwa<br>Vidylaya,<br>Raipur,<br>Chhattisgarh | Production tech-<br>nology, processing<br>and value addition<br>of spices and<br>Aromatic crops  | 20 <sup>th</sup> and 21 <sup>st</sup> No-<br>vember, 2019 at<br>CoE, MAPs<br>& NTFP, IGKV,<br>Raipur                      | The topics covered were Overview of Spices<br>and Aromatic crops in the state, Production<br>Technology of Lemongrass, Citronella, Tur-<br>meric, Ginger, Post harvest techniqueand<br>processing of Ginger and Turmeric, Process-<br>ing and value-added products of Aromat-<br>ic plants, Pest and disease management in<br>spice crops. Field visit to herbal garden was<br>also conducted. Around 90 farmers including<br>women farmers took part in the programme.   |
|    |  | Production<br>technology,<br>processing and<br>value addition of<br>spices and<br>Aromatic crops | 19 <sup>th</sup> and 20 <sup>th</sup><br>December,<br>2019 at Krishi<br>Vigyan Kendra,<br>Kanker                          | This programme was conducted in a Tribal<br>area. The topics covered were Overview of<br>spices and Aromatic crops in the state,Pro-<br>duction technology of Lemongrass, Citronel-<br>la, Turmeric, Ginger, Post harvest technique<br>and processing of Ginger and Turmeric, Pro-<br>cessing and value added products of Aromatic<br>plants, Pest and disease management in spice<br>crops. Visit to seed production fields of Tur-<br>meric and spices was also conducted.  |

|    |   |   |  | Around 90 farmers including women farmers took part in the programme.  |
|----|---|---|--|--|
| 24 | Rajmata<br>Vijayaraje<br>Scindia<br>Krishi Viswa<br>Vidyalaya,<br>Gwalior, MP | Organic Seed Pro-<br>duction and use<br>of bio pesticide in<br>Ginger   | 25 <sup>th</sup> June and<br>17 <sup>th</sup> Aug, 2019<br>at KVK, Dhar  | The programme was conducted exclusive-<br>ly for women and tribal farmers in the area.<br>Organic Seed Production and use of bio pes-<br>ticide in Ginger was dealt in detail during the<br>training. Around 75 participants took part in<br>the programme.  |
|    |   | Production Tech-<br>noloty of Chilli  | 22 <sup>nd</sup> June, 2019<br>at Khargone   | Lectures on Field preparation, soil sampling,<br>seed treatment, nutrient management and<br>pest management of chilli were delivered by<br>experts. The programme was conducted ex-<br>clusively for women and tribal farmers in the<br>area. Around 50 participants took part in the<br>programme.  |
|    |   | Organic produc-<br>tion, cultivation<br>practices and<br>integrated nutri-<br>ent management<br>in Chilli       | 15 <sup>th</sup> October, 4 <sup>th</sup><br>November and<br>20 <sup>th</sup> November,<br>2019 at KVK,<br>Neemuch | Scientists from the University dealt with Or-<br>ganic production, cultivation practices and in-<br>tegrated nutrient management in Chilli during<br>the training programme.The programme was<br>conducted exclusively for women and tribal<br>farmers in the area. Around 75 participants<br>took part in the programme.  |
| 25 | Mahatma<br>Phule Krishi<br>Vishwa<br>Vidyalaya,<br>Rahuri,<br>Maharashtra     | Cultivation of<br>Medicinal and<br>Aromatic Plants,<br>Garlic, Chilli, Tur-<br>meric and Ginger                 | 20 <sup>th</sup> February,<br>2020 at MPKV,<br>Rahuri  | The experts from the University took classes<br>on Geranium cultivation and distillation pro-<br>cess, prospects and future scope, Cultivation<br>of Turmeric and Ginger with current pros-<br>pects, Post harvest processing and its utility.<br>Over 110 farmers from the area took part in<br>the programme.  |
|    |   | Cultivation of<br>Medicinal and Ar-<br>omatic Plants and<br>the opportunities<br>in Aromatic and<br>Spice crops | 29 <sup>th</sup> February,<br>2020 at Chan-<br>gatpuri, Au-<br>rangabd   | Resource persons delivered lectures on Culti-<br>vation practices of Aromatic plants, medicinal<br>plants and its uses, Facilities provided by the<br>Government to farmers by Ayush and Scope<br>of entrepreneurship development. Over 100<br>farmers took part in the programme.   |
| 26 | University of<br>Agriculture<br>Sciences,<br>Bangalore                        | Training pro-<br>gramme on Spices<br>and Aromatic<br>plants   | 6 <sup>th</sup> March,<br>2020 at Krishi<br>Vigyan Kendra,<br>Ramanagar,<br>Karnataka                              | The topics covered during the training pro-<br>gramme were cultivation of spices crops<br>(Nutmeg, Cinnamon, Turmeic and Ginger),<br>Cultivation of Aromatic and medicinal plants<br>(Rosemary, Patchouli, Mucuna, Ocimum, Co-<br>leus, Aloevera and Ashwagandha), Value ad-<br>dition to spices and aromatic produce, Impor-<br>tance of bio fertilisers in organic cultivation of<br>spices and aromatic plants. 75 famers with a<br>majority being women took part in the pro-<br>gramme. |
|    |   | Training pro-<br>gramme on Spices<br>and Aromatic<br>plants   | 13 <sup>th</sup> March,2020<br>at Krishi Vigyan<br>Kendra, Hdona,<br>Bengaluru                                     | The topics covered during the training pro-<br>gramme were cultivation of spices crops (Nut-<br>meg, Cinnamon, Turmeic and Ginger), Culti-<br>vation of Aromatic and medicinal plants  |



|    |  |   |  | (Rosemary, Patchouli, Mucuna, Ocimum, Co-<br>leus, Aloevera and Ashwagandha), Value ad-<br>dition to spices and aromatic produce and<br>Importance of bio fertilisers in organic cultiva-<br>tion of spices and aromatic plants. 75 famers<br>with a majority being women took part in the<br>programme.  |
|----|--|---|--|---|
| 27 | Tamil Nadu<br>Agriculture<br>University,<br>Tamil Nadu | Production<br>technology of<br>Black Pepper               | 4 <sup>th</sup> March, 2020<br>at Theni                      | Scientists of the University delivered<br>lectures on Prospects of Black pepper<br>cultivation in coffee plantation of Tamil Nadu,<br>Developmental activities of State Department<br>of Horticulture on Black pepper and other hill<br>crops production, Production technology,<br>processing and disease and pest management<br>in Black pepper. Over 100 farmers took part<br>in the programme.  |
|    |  | Recent trends<br>in Turmeric<br>cultivation               | 18 <sup>th</sup> March,<br>2020 at<br>Bhavanisagar,<br>Erode | The topics covered in the programme were<br>Scope and importance of turmeric cultivation,<br>Turmeric varieties suitable for Tamil Nadu<br>condition, Recent advances in propagation<br>and planting of turmeric, Nutrient<br>management techniques in turmeric, Weed<br>management and Cropping systems in<br>turmeric, Recent advances in harvesting<br>and post harvest techniques in turmeric and<br>Rhizome treatment and rhizome storage<br>techniques in turmeric. Over 100 farmers<br>took part in the programme. |
|    |  | Production<br>technology of<br>Chilli                     | 6 <sup>th</sup> February,<br>2020 at<br>Thirunelveli         | The topics covered during the training were<br>Status of Chilli cultivation in Thoothukudi<br>and Thirunelveli, Advances in organic chilli<br>cultivation in Tamil Nadu, Present status and<br>future prospects and Production technology<br>of chilli cultivation. Field visits were also<br>conducted during the programme. Over 100<br>farmers took part in the programme.   |
| 28 | Dr. PDKV,<br>Akola                                     | Production<br>technology for<br>turmeric and<br>ginger    | 3 <sup>rd</sup> March, 2020<br>at Akola                      | The scientists of the University delivered<br>lectures on Scope, advance technology,<br>mechanization and disease & pest<br>management in Turmeric and Ginger crops.<br>Over 75 farmers took part in the programme.   |
|    |  | Production<br>technology for<br>Chilli and Seed<br>spices | 5 <sup>th</sup> March, 2020<br>at Akola                      | Lectures on Scope, advance technology,<br>mechanization and disease & pest<br>management in Chilli and seed spices were<br>delivered during the training. Over 75 farmers<br>took part in the programme.  |



Fig. 131. Inauguration of state level seminar on spices held at Assam Agri. Unversity



Fig. 132.State level Seminar on spices held at Dr. PDKV, Akola



Fig. 133. Certificate distribution to participants at District Level Seminar held at KVK, Bhuj organised by ICAR- NRCSS



Fig. 134. District level Black pepper farmers meet and training organised by KAU at PRS, Panniyur



Fig. 135. Participants at district level seminar organised by AU, Jodhpur



Fig. 136.Training on Organic spice production organised at KVK, Dhar





Fig. 137.Training programme organised at AMPRS, Odakkali, KAU on aromatic crops



Fig. 138. Training on production technology, processing and value addition of Spices and Aromatic Crops at IGKV, Raipur



Fig. 139.Farmers training on cultivation of spice crops organised at RARS, Pattambi, KAU



Fig. 140.Distribution of quality planting material during training organised by UBKV at Kharibari



Fig. 141. Training programme on quality Seed production held at NAU, Navasari



Fig. 142. Training programme on spices cultivation organised at SVBPUAT, Meerut





Fig. 143.Training on cultivation of medicinal and aromatic plants held at DMAPR, Gujarat



Fig. 144.Farmers Training Programme held at KVK, Arnej, Anand, AU



Fig. 145.Farmers training programme on "Aromatic plant cultivation" organised by OUAT, Odisha



Fig. 146. Field visit of participants during training organised at BCKV, West Bengal



Fig. 147.Training on production technology of spice crops organised by Assam Agriiculture University



Fig. 148. FT on adopted seed village organised by SKNAU, Jobner





Fig. 149. FT on cultivation of seed spices organised at Junagadh AU



Fig. 150.Training organised by CIARI, Nicobar Islands at Kakana Village



Fig. 151. Training programme organised at HAU, Hisar



Fig. 152. Participants at FT programme held at BUAT, Banda



Fig. 153. Participants at training on production and post harvest handling of spices held at CARI



Fig. 154. Training programme on seed spices organised by AU, Mandor





Fig. 155. FT programme organised at PAU, Ludhiana



Fig. 156.Training on post harvest management of seed spices organised at MPUAT, Udaipur



Fig. 157.Training on production technologies in spices held at KVK, Sirsi



Fig. 158.Training manual published by Junagah AU



Fig. 159. Women SHGs getting training on soap making at IGKV, Raipur



#### 8. Monitoring

The Directorate is responsible for coordinating and monitoring the activities on the development of Arecanut, Spices and aromatic plants under Mission for Integrated Development of Horticulture (MIDH) in the country. MIDH programmes were monitored through periodical review meeting, field visits, discussions with the officers concerned.

#### 8.1 Review Meeting of MIDH programmes being implemented by DASD

The thirteenth Annual Review meeting of the MIDH programmes implemented through the Directorate of Arecanut and Spices Development, was held on 11-12 June, 2019 at the OUAT, Bhubaneswar, Odisha. There were around 70 participants representing 45 agencies implementing DASD programmes.

The inaugural session began at 10.00 AM after registration of the delegates. Dr. Sashikala Beura, OUAT, Bhubaneswar welcomed the participants. Dr. Homey Cheriyan, Director, DASD conveyed the objectives of the Review Meeting in his introductory address. He briefed the audience about the changes in perception to be brought in the implementation of MIDH programmes and informed that outcome based programmes will be promoted from this financial year onwards. Prof. S.C. Dash, Vice Chancellor in charge, of OUAT presided over the inaugural function. Dr. B.N.S. Murthy, Horticulture Commissioner, Govt. of India was the Chief Guest and inaugurated the review meeting. In the inaugural address, he saluted the people for overcoming and withstanding the extremely severe cyclonic storm that hit Odisha. He highlighted the importance of spices in Indian economy, importance of traceability and nursery accreditation in spices and assured DASD support to take spices production to next level. Dr. Gopal Lal, Director, NRCSS made a special address. Dr. E.V.D Sastry and Dr. S.J. Ankegowda also addressed the gathering. Dr. S.C. Swain, PI, OUAT proposed vote of thanks.

After a break for tea, the technical sessions began at 12.00 Noon. The Review Team consisted of Dr. B.N.S. Murthy, Horticulture Commissioner, Dr. Homey Cheriyan, Director, DASD, Dr. Femina, Deputy Director, DASD and Shri. Babulal Meena, Deputy Director, DASD. Principal Investigators/ Representatives of the 45 SAUs / ICAR Institutes implementing DASD-MIDH programmes made detailed powerpoint presentation and briefed component wise achievements made under the scheme during 2018-19. The review team critically evaluated the performance of each University and appreciated the good work done by them. Suggestions for improvement and possible solutions for issues raised by them were also made by the review team.

As per directions of Horticulture Commissioner, during the last review meeting, it was decided to give a "Best Performer Award" for the best performed University in implementation of MIDH programmes of the Directorate during the year 2018-19. This was done based on a criteria given below:

1. Agencies undertaking programmes with an outlay of minimum Rs.30.00 lakhs are only considered.

- 2. Expenditure during the year 2018-19 and unspent balance as on 01/04/2019.
- 3. Percentage of funds allotted/utilized for the component "production of quality planting material of spices".
- 4. Performance of the agencies during the last five years.
- 5. Timely submission of APR, UC/AUC for the concerned years.

After giving due weightage to the criteria, a committee headed by Deputy Director, DASD recommended Tamil Nadu Agriculture University, Coimbatore as the best Performer of the year 2018-19. Director,

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DASD approved the same and the award was presented to Dr. P. Jansirani, Principal Investigator of TNAU.

### Director, DASD in his closing address mentioned the following points:

1. The fund earmarked for the implementing agencies is as per present availability of funds with DASD. Additional programmes/funds if required, the implementing agencies may submit fresh proposals to the Directorate by 31st July, 2019 on the existing guidelines of the AAP 2019-20, which was circulated earlier.

2. Regarding USB of Seminar/Workshop/Farmer's training programme - The balance funds may be utilized for some purpose connected with the event. The balance funds of seminars/FT must be refunded, if not utilized fully. Any funds being refunded to the Government of India under NHM has to be in the name of Director, DASD, Calicut. Detailed report on the programme alongwith soft copy of photographs (in JPEG format) must be sent to the Directorate.

3. The venue and dates of the TOT programmes should be intimated to DASD well in advance. The impact of such trainings to farmers must be studied, recorded and sent to DASD.

4. PFMS – Hence forth funds under the MIDH scheme will be transferred to the implementing agencies through NEFT. All implementing agencies are requested to register themselves in the PFMS portal and send the unique code of the agency to DASD immediately.

5. The implementing agencies may ensure that funds of the immediate previous year are only lying unspent with them. Funds of the previous years may be utilized completely, as revalidation of funds left unspent for more than 2 years is not permitted. Revalidated funds of the previous year are to be utilized only for the already approved components and these funds are to be utilised first, before the current year's funds are used.

6. The agencies may consider creating a revolving fund from sale of planting material / record on money collected by sale of planting material and submit a separate proposal for implementation of MIDH programmes.

7. MIDH/NHM logo to be placed at all places where funds under NHM are utilized, such as infrastructure, fields, nursery, seminar, farmer's training etc.

8. All nurseries established under NHM funds from the Directorate should be accredited by DASD. Private /public spice nurseries in contact with the University may be encouraged to take up nursery accreditation.

9. Submission of Audited Utilisation Certificates are mandatory. Therefore, all agencies may ensure timely submission of the same.

10. The varieties used in multiplication should be declared at the time of proposal itself. Details of planting material distributed is to be intimated to DASD. The reports on planting material production should show the variety of the crop produced. Only those varieties which are released in last 10 years are to be multiplied under the programme.

11. Details of the planting material produced at each centre to be uploaded on the DASD website.

12. Articles, success stories in connection with the conduct of the FLDs, innovative projects, infrastructure

development, skill trainings, Seminars etc.to be submitted to the Directorate for publication in Journal.

13. Impact of skill development programme, to be intimated to DASD in form of success stories.

14. Refund of funds to DASD - Funds liable to be refunded to DASD may be done only after approval/directions of DASD.

Dr. Femina, Deputy Director, DASD delivered the formal Vote of Thanks. She thanked the Horticulture Commissioner, the VC, all other officials of OUAT, all participants of the Review Meeting and each and every one who contributed to make the function a success.



Fig. 160. Inaugural function of the 14th DASD-MIDH annual review meeting



Fig. 161. Release of publications during the inaugural session



Fig. 162. Vote of thanks proposed by PI, MIDH
# **3. STATISTICS**



The exhaustive, reliable and timely statistics have been identified as the foremost requirement for evolving the development strategies in agriculture sector. Since the correct information on area and production of export oriented commodities like spices is necessary for planning development programmes as well as strategy for export, a more reliable and scientific data base of spices is very essential. With this objective, the Ministry of Agriculture & Farmers Welfare has rightly put collection, compilation and dissemination of statistics of spices and arecanut as one of the mandates of the Directorate of Arecanut and Spices Development has been authorized as the nodal agency for the collection and compilation of area and production of spices and arecanut.

The main activities related to compilation of statistics are:

- v Collection and compilation of area and production of various spices and arecanut from different States.
- v Generate all India estimates for area and production of various spices and arecanut.
- v Collection and compilation of data related to export, import, cost of production, price trend of the commodities concerned.
- v Dissemination of the generated data to the development agencies, traders, exporters, scientists, researchers etc.
- v Review of production and price situation of the crops entrusted to the Directorate.

#### **1. Area and Production Statistics**

The Directorate collects the area and production estimates from the reporting agencies (State Agricultural Statistics Authority-SASA) like State Department of Economics and Statistics / Horticulture / Agriculture and office of the Commissioner of Land Records. The collected data are being compiled for estimating the all India figures for spices as a whole and for individual spices. Similarly, the Directorate compiles Statewise area and production statistics of arecanut. These estimates are being provided to Horticulture Statistics Division of the Ministry of Agriculture & Farmers Welfare, Government of India periodically for releasing the estimates on area and production of horticultural crops including spices at national level.

#### **1.1 Spices**

As per the estimates for 2019-20, production of spices in the country is 101.37 lakh tonnes from an area of 42.91 lakh ha, which registered an increase of 9 % in production and 7.17% in area when compared to 2018-19. Among the various spices ginger, turmeric, coriander, cumin, ajwain, celery, cinnamon, nutmeg and tamarind registered increase in production and other spices registered a decrease in production. All India estimates of area, production and productivity of spices for the years 2018-19 and 2019-20 are given below.

#### Table 1. Crop-wise estimates on area and production of spices

(Area: '000 ha, Production: '000 tonnes, Yield: kg/ha)

| Crops             | 2018-19  |            | 2019-20      |          |            |              |
|-------------------|----------|------------|--------------|----------|------------|--------------|
|                   | Area     | Production | Productivity | Area     | Production | Productivity |
| Black Pepper      | 244.209  | 136.794    | 560          | 259.072  | 104.086    | 402          |
| Ginger (Fresh)    | 167.389  | 1851.088   | 11059        | 178.146  | 1867.742   | 10484        |
| Red Chillies      | 706.709  | 1515.557   | 2145         | 625.924  | 1835.098   | 2932         |
| Turmeric (Dry)    | 261.922  | 957.127    | 3654         | 295.850  | 1153.126   | 3898         |
| Garlic            | 353.496  | 2918.948   | 8257         | 352.468  | 2924.724   | 8298         |
| Cardamom          | 83.336   | 22.065     | 265          | 85.415   | 20.904     | 245          |
| Coriander         | 469.986  | 599.478    | 1276         | 529.361  | 701.090    | 1324         |
| Cumin             | 1027.940 | 700.647    | 682          | 1276.283 | 912.041    | 715          |
| Fennel            | 90.460   | 157.479    | 1741         | 82.731   | 139.762    | 1689         |
| Fenugreek         | 119.783  | 183.912    | 1535         | 126.294  | 182.170    | 1442         |
| Ajwan             | 35.886   | 19.618     | 547          | 41.134   | 28.973     | 704          |
| Dill/Poppy/Celery | 29.656   | 29.032     | 979          | 32.798   | 34.566     | 1054         |
| Cinnamon/Tejpat   | 2.990    | 7.434      | 2486         | 3.021    | 7.561      | 2503         |
| Nutmeg            | 23.703   | 15.353     | 648          | 24.078   | 15.688     | 652          |
| Clove             | 2.154    | 1.226      | 569          | 2.015    | 1.162      | 577          |
| Tamarind          | 45.210   | 147.821    | 3270         | 44.467   | 164.720    | 3704         |
| Vanilla           | 0.125    | 0.067      | 538          | 0.091    | 0.060      | 659          |
| Mint (Mentha)*    | 334.887  | 36.655     | 109          | 328.143  | 44.023     | 134          |
| Saffron           | 3.658    | 0.004      | 1            | 3.523    | 0.004      | 1            |
| Total             | 4003.500 | 9300.306   | 2323         | 4290.813 | 10137.498  | 2363         |

#### \*Mint production in terms of mentha oil

Country-wise area and production of spices are being collected from International organizations like Food and Agriculture Organization (FAO), Rome and International Pepper Community (IPC), Jakarta.

Pepper production in the world was estimated 6.81 lakh tonnes from an estimated area of 6.03 lakh ha in 2019 against a production of 5.40 lakh tonnes from 4.80 lakh ha during 2018. This sharp increase in production of pepper is mainly attributed to India. In India, the Karnataka Government has adopted a new methodology for crop area estimation based on GPS enabled mobile app from 2018-19 onwards. Due to this new methodology, both area and production of black pepper in Karnataka have been revised to 1,45,379 ha and 94,142 tonnes respectively in 2018-19, against 41381 ha of area and 27174 tonnes of production reported in 2017-18. Vietnam is the largest pepper producing country with a production of 2.8 lakh tonnes from 1.15 lakh ha.

| Country             | 2018      |                        |                         | 2019      |                        |                         |
|---------------------|-----------|------------------------|-------------------------|-----------|------------------------|-------------------------|
|                     | Area (ha) | Production<br>(tonnes) | Productivity<br>(kg/ha) | Area (ha) | Production<br>(tonnes) | Productivity<br>(kg/ha) |
| Brazil              | 30503     | 72000                  | 2360                    | 31000     | 80000                  | 2581                    |
| India               | 139487    | 71488                  | 513                     | 244560    | 137360                 | 562                     |
| Indonesia           | 117500    | 70000                  | 596                     | 118200    | 78000                  | 660                     |
| Malaysia            | 17437     | 31073                  | 1782                    | 17477     | 24000                  | 1373                    |
| Sri Lanka           | 40241     | 20135                  | 500                     | 41000     | 19360                  | 472                     |
| Vietnam             | 100011    | 205000                 | 2050                    | 115000    | 280000                 | 2435                    |
| China               | 20000     | 35000                  | 1750                    | 21000     | 32000                  | 1524                    |
| Madagascar          | 4000      | 4000                   | 1000                    | 4000      | 4000                   | 1000                    |
| Thailand            | 500       | 5000                   | 10000                   | 614       | 5000                   | 8143                    |
| Cambodia            | 7471      | 20551                  | 2751                    | 7471      | 16586                  | 2220                    |
| Ecuador &<br>Others | 2800      | 6000                   | 2143                    | 2800      | 5000                   | 1786                    |
| Total               | 479950    | 540247                 | 1126                    | 603122    | 681306                 | 1130                    |

#### Table 2. Country wise area, production and yield per hectare of pepper during 2018 and 2019

Source: India- DASD, Other countries- IPC

#### 1.2 Arecanut

Arecanut production in the country was 11.47 lakh tonnes from an estimated area of 7.18 lakh ha in 2018-19. As per the estimates for 2019-20, area under Arecanut have increased to 7.46 lakh ha and production has increased to 13.81 lakh tonnes. Karnataka, Kerala, Assam, Meghalaya, Mizoram, West Bengal etc. are the major arecanut growing states in the country. All India estimates of area, production and productivity of arecanut in India during 2018-19 and 2019-20 are given in Table 3.

#### Table 3. State-wise area, production and productivity of Arecanut

(Area: '000 ha, Production: '000 tonnes, Yield: kg/ha)

| State       | 2018-19 |         | 2019-20 |         |          |       |
|-------------|---------|---------|---------|---------|----------|-------|
|             | Area    | Prodn.  | Yield   | Area    | Prodn.   | Yield |
| Karnataka   | 476.379 | 850.779 | 1786    | 500.522 | 1081.840 | 2161  |
| Kerala      | 95.739  | 99.925  | 1044    | 96.921  | 92.755   | 957   |
| Assam       | 81.617  | 78.679  | 964     | 82.433  | 79.465   | 964   |
| Meghalaya   | 18.220  | 23.999  | 1317    | 17.670  | 24.902   | 1409  |
| West Bengal | 11.775  | 23.056  | 1958    | 11.890  | 23.857   | 2006  |
| Tamil Nadu  | 6.869   | 10.941  | 1593    | 6.627   | 12.521   | 1889  |
| Tripura     | 6.731   | 23.020  | 3420    | 7.167   | 24.511   | 3420  |
| Mizoram     | 12.140  | 10.470  | 862     | 13.000  | 10.840   | 834   |

| Andaman<br>&Nicobar | 4.076   | 12.389   | 3040 | 4.336   | 10.589   | 2442 |
|---------------------|---------|----------|------|---------|----------|------|
| Maharashtra         | 1.827   | 3.973    | 2175 | 2.666   | 5.000    | 1875 |
| Goa                 | 1.836   | 3.296    | 1795 | 1.971   | 3.704    | 1879 |
| Andhra<br>Pradesh   | 0.976   | 5.317    | 5448 | 1.096   | 10.418   | 9505 |
| Nagaland            | 0.194   | 1.170    | 6029 | 0.216   | 1.197    | 5540 |
| Pondicherry         | 0.052   | 0.078    | 1500 | 0.052   | 0.078    | 1500 |
| All India           | 718.431 | 1147.092 | 1597 | 746.567 | 1381.677 | 1851 |

Country-wise area and production of arecanut were collected from Food and Agriculture Organization, Rome. The latest available data are of 2018. World production of arecanut in 2018 was estimated as 14.29 lakh tonnes from an area of 10.30 lakh ha against 14.15 lakh tonnes from 9.71 lakh ha reported in 2017. India accounts for 49% of area and 59% of production of arecanut in the world.

#### Table 4. Country-wise area and production of Arecanut

| Country                         | 2017      |                   |               | 2018      |                   |               |
|---------------------------------|-----------|-------------------|---------------|-----------|-------------------|---------------|
|                                 | Area (Ha) | Prod.<br>(tonnes) | Yield (kg/ha) | Area (Ha) | Prod.<br>(tonnes) | Yield (kg/ha) |
| India                           | 482236    | 782554            | 1623          | 505236    | 881645            | 1745          |
| Indonesia                       | 141287    | 135854            | 962           | 154565    | 128745            | 833           |
| China,<br>Taiwan<br>Province of | 41802     | 102165            | 2444          | 41500     | 102918            | 2480          |
| Myanmar                         | 55603     | 130098            | 2340          | 55615     | 132086            | 2375          |
| Bangladesh                      | 222570    | 214000            | 961           | 228371    | 137043            | 600           |
| Sri Lanka                       | 18722     | 46333             | 2475          | 17877     | 54691             | 3059          |
| Thailand                        | 23381     | 39549             | 1692          | 23856     | 40390             | 1693          |
| Nepal                           | 3918      | 14390             | 3673          | 3946      | 13905             | 3524          |
| Bhutan                          | 8615      | 8931              | 1037          | 9066      | 9399              | 1037          |
| Malaysia                        | 94        | 328               | 3489          | 95        | 323               | 3400          |
| Kenya                           |           | 113               |               |           | 113               |               |
| Maldives                        | 3         | 3                 | 1000          | 3         | 3                 | 1000          |
| Total                           | 970995    | 1414764           | 1457          | 1029894   | 1428616           | 1387          |

Source: FAO

#### 2. Export and Import Data

#### **Spices**

The data on export of spices (item-wise and country-wise) were collected from the Spices Board, India, which is the nodal agency for the export promotion of spices in the country. Import data were also collected from Spices Board.



Despite the COVID-19 Pandemic, Indian Spices Export has sustained its upward trend in 2019-20 and has crossed 3 billion US \$ for the first time in the history of Spices export. The export of Spices during 2019-20 was 11.83 lakh tonnes valued at Rs.21515.40 Crores (US \$ 3.033 billion) against 11.00 lakh tonnes valued at Rs.19505.81 crores (US \$ 2.805 billion) during 2018-19. The export has shown an increase of 10% in rupee value and 8% in quantity compared to last year. Chilli continued to propel the growth story as India's largest exported spice, accounting for Rs. 4.84 lakh tonnes valued at Rs. 6221.70 crores. Export of pepper, ginger, chilli, turmeric, coriander, cumin, curry powder/paste, fenugreek, oil and oleoresins, mint products registered a significant increase during this year. Export of garlic, fennel, nutmeg & mace decreased during the year 2019-20.

| Spices                       | 2018-19           |                         | 2019              | 9-20                    |
|------------------------------|-------------------|-------------------------|-------------------|-------------------------|
|                              | Quantity (tonnes) | Value<br>(Rs. in lakhs) | Quantity (tonnes) | Value<br>(Rs. in lakhs) |
| Pepper                       | 13,540            | 56,868                  | 16,250            | 55,187                  |
| Cardamom (Small)             | 2,850             | 35,625                  | 2,090             | 42,630                  |
| Cardamom (Large)             | 860               | 6,106                   | 1,100             | 6,758                   |
| Chilli                       | 4,68,500          | 5,41,118                | 4,84,000          | 6,22,170                |
| Ginger                       | 18,150            | 19,602                  | 50,410            | 44,905                  |
| Turmeric                     | 1,33,600          | 1,41,616                | 1,36,000          | 1,21,640                |
| Coriander                    | 48,900            | 35,208                  | 50,250            | 41,110                  |
| Cumin                        | 1,80,300          | 2,88,480                | 2,10,000          | 3,22,500                |
| Celery                       | 6,100             | 6,649                   | 6,510             | 7,176                   |
| Fennel                       | 26,250            | 24,413                  | 23,800            | 22,888                  |
| Fenugreek                    | 27,150            | 13,847                  | 27,660            | 16,383                  |
| Other seeds (1)              | 29,740            | 18,736                  | 32,700            | 19,257                  |
| Garlic                       | 29,500            | 17,110                  | 23,350            | 17,232                  |
| Nutmeg & Mace                | 3,300             | 15,015                  | 2,955             | 13,631                  |
| Other spices (2)             | 43,300            | 61,486                  | 41,050            | 66,303                  |
| Curry powder/Paste           | 33,850            | 74,470                  | 38,200            | 83,410                  |
| Mint Products (3)            | 21,610            | 3,74,934                | 22,725            | 3,83,835                |
| Spice Oils and<br>Oleoresins | 12,750            | 2,19,300                | 13,950            | 2,64,525                |
| Total                        | 11,00,250         | 19,50,581               | 11,83,000         | 21,51,540               |
| Million US \$                |                   | 2,805.50                |                   | 3,033.44                |

#### Table 5. Estimated export of Spices during 2018-19 and 2019-20

(1) Include Ajwan seed, Dill seed, Poppy seed, Aniseed, Mustard etc.

(2) Include Asafoetida, Cinnamon, Cassia, Cambodge, Saffron, Spices (NES) etc.

(3) Include menthol, menthol crystals & mint oils.

During the year 2019-20, import of spices in the country registered an increase of 16% in terms of quantity and 22% in terms of value. In 2019-20, India imported 2,40,890 tonnes of various spices and spice products valued at 860 million US \$ against the import of 2,07,300 tonnes valued at

724 million US \$ in 2018-19. In 2019-20, Ginger is the major item in the import contributing 17% of the total spices imported followed by Cassia (12.4%), Turmeric (11.8%), other spices (11.3%), Clove (11.28%),pepper (10.9%) etc. Item-wise import of spices during the year 2018-19 and 2019-20 are given below.

| Spices                    | 2018-19           |                         | 2019-20           |                         |
|---------------------------|-------------------|-------------------------|-------------------|-------------------------|
|                           | Quantity (tonnes) | Value<br>(Rs. in lakhs) | Quantity (tonnes) | Value<br>(Rs. in lakhs) |
| Pepper (1)                | 24950             | 77991                   | 26230             | 58153                   |
| Cardamom (Small)          | 479               | 4136                    | 470               | 5688                    |
| Cardamom (Large)          | 3343              | 17599                   | 6300              | 32046                   |
| Chilli/Paprika            | 1230              | 1961                    | 1280              | 2120                    |
| Ginger Fresh/Dry          | 30085             | 16154                   | 41100             | 24261                   |
| Turmeric                  | 30578             | 29947                   | 28580             | 24579                   |
| Coriander                 | 13230             | 5609                    | 12000             | 8027                    |
| Cumin black/white         | 950               | 1831                    | 2615              | 4419                    |
| Mustard Seed              | 30                | 48                      | 10                | 10                      |
| Poppy seed                | 18450             | 31788                   | 19940             | 44177                   |
| Garlic                    | 445               | 719                     | 2750              | 953                     |
| Clove                     | 16940             | 82139                   | 27190             | 112867                  |
| Nutmeg                    | 1195              | 4551                    | 1645              | 5545                    |
| Mace                      | 1890              | 15817                   | 1910              | 21137                   |
| Cassia                    | 28180             | 42133                   | 30000             | 57288                   |
| Star anise                | 5825              | 12019                   | 6600              | 24758                   |
| Other spices (2)          | 26090             | 107447                  | 27290             | 119860                  |
| Oils & Oleoresins<br>(3)  | 3410              | 51314                   | 4980              | 64289                   |
| Total                     | 207300            | 503206                  | 240890            | 610177                  |
| Value in Million<br>US \$ |                   | 724.18                  |                   | 860.00                  |

#### Table 6. Import of Spices in India during 2018-19 and 2019-20

(1) Include white pepper, light pepper & black pepper

(2) Include Aniseed, Asafoetida, Cinnamon, Pepper long, Cambodge, Herbal spices and Spices NES

(3) Include Spice Oils & Oleoresins and Mint products

#### 2.2 Arecanut

Arecanut is a commodity, which has a very limited export potential. The bulk of the arecanut production is consumed within the country. However, a small quantity of arecanut is exported mainly meant for the Indian settlers abroad. Arecanut is mainly exported in the form of whole, split, ground and other arecanuts. Majority of the export is in the form of whole arecanut. During 2019-20, export of arecanut has increased and India exported 2640 tonnes of arecanut valued at Rs. 69.87

crores against an export of 2162 tonnes valued at Rs. 62.55 crores in 2018-19. Sri Lanka, Maldives, UAE, USA etc. are the major export destinations of Indian arecanut.

#### Table 7. Country-wise export of Arecanut from India

| Country                  | 2018              | 3-19                    | 2019-20              |                         |
|--------------------------|-------------------|-------------------------|----------------------|-------------------------|
|                          | Quantity (tonnes) | Value<br>(Rs. In lakhs) | Quantity<br>(tonnes) | Value<br>(Rs. In lakhs) |
| Maldives                 | 910.86            | 2,717.68                | 756.11               | 2,269.04                |
| Sri Lanka                | 114.85            | 317.89                  | 1,010.00             | 2,265.78                |
| UAE                      | 478.05            | 1,208.27                | 189.93               | 600.42                  |
| USA                      | 192.80            | 595.82                  | 114.29               | 507.84                  |
| South Africa             | 28.44             | 149.93                  | 52.22                | 246.27                  |
| UK                       | 103.05            | 346.84                  | 71.82                | 245.78                  |
| Nepal                    | 125.62            | 328.18                  | 125.86               | 226.20                  |
| Australia                | 15.07             | 71.16                   | 32.14                | 99.00                   |
| Canada                   | 26.88             | 83.68                   | 29.75                | 81.43                   |
| Mauritius                | 18.05             | 52.69                   | 16.88                | 55.14                   |
| Congo D. Rep.            | 14.72             | 26.99                   | 13.96                | 53.8                    |
| Myanmar                  |                   |                         | 36.00                | 37.63                   |
| Bhutan                   | 2.00              | 10.57                   | 8.13                 | 36.22                   |
| Saudi Arabia             | 3.52              | 2.80                    | 16.51                | 33.35                   |
| New Zealand              | 5.74              | 20.73                   | 4.91                 | 23.5                    |
| Germany                  | 1.45              | 8.29                    | 4.55                 | 19.65                   |
| Trinidad                 | 8.44              | 24.38                   | 7.06                 | 19.38                   |
| Singapore                | 2.66              | 4.45                    | 9.48                 | 17.46                   |
| Uganda                   | 0.53              | 2.83                    | 6.60                 | 16.52                   |
| Pakistan                 | 5.33              | 13.31                   | 4.72                 | 14.31                   |
| Fiji                     | 3.70              | 7.90                    | 14.63                | 14.18                   |
| Mozambique               | 12.31             | 11.45                   | 4.93                 | 13.64                   |
| Kenya                    | 27.71             | 29.49                   | 4.75                 | 12.31                   |
| Netherland               | 2.66              | 13.08                   | 3.14                 | 11.84                   |
| Bangladesh               | 1.00              | 3.43                    | 80.00                | 10.59                   |
| Total (Including others) | 2162.18           | 6254.93                 | 2639.92              | 6987.39                 |

#### Table 8. Product-wise export of arecanut from India

| Product          | 2018-19           |                         | 2019-20           |                         |  |
|------------------|-------------------|-------------------------|-------------------|-------------------------|--|
|                  | Quantity (tonnes) | Value<br>(Rs. in lakhs) | Quantity (tonnes) | Value<br>(Rs. in lakhs) |  |
| Arecanut, whole  | 1220.73           | 3704.79                 | 982.54            | 3008.86                 |  |
| Arecanut, split  | 462.80            | 1174.61                 | 227.82            | 601.87                  |  |
| Arecanut, ground | 0.80              | 2.02                    | 0.21              | 0.91                    |  |

| Other arecanuts | 477.80  | 1373.50 | 1429.35 | 3375.75 |
|-----------------|---------|---------|---------|---------|
| Total           | 2162.18 | 6254.92 | 2639.92 | 697.39  |

In 2019-20, India imported 16761 tonnes of arecanut valued at Rs. 342.56 crores against an import of 18,152 tonnes valued at Rs. 427.64 crores in 2018-19. Usually arecanut is imported in the form of whole, split, ground and other arecanuts. Sri Lanka and Indonesia are the two major sources of arecanut import in the country. Country-wise import of Arecanut in the country during the last two years are given below:

#### Table 9. Country-wise import of Arecanut in India

| Country     | 2018-19           |                         | 2019-20           |                         |  |
|-------------|-------------------|-------------------------|-------------------|-------------------------|--|
|             | Quantity (tonnes) | Value<br>(Rs. in lakhs) | Quantity (tonnes) | Value<br>(Rs. in lakhs) |  |
| Sri Lanka   | 10993             | 29059                   | 9,555             | 25,572                  |  |
| Indonesia   | 7124              | 13637                   | 7,107             | 8,535                   |  |
| Vietnam     | 32                | 57                      | 98                | 145                     |  |
| Afghanistan | 3                 | 9                       |                   |                         |  |
| Australia   | 0                 | 2                       |                   |                         |  |
| Canada      |                   |                         | 1                 | 5                       |  |
| Total       | 18152             | 42764                   | 16761             | 34256                   |  |

#### Table 10. Product-wise import of Arecanut in India

| Product          | 2018-19           |                         | 2019-20           |                         |
|------------------|-------------------|-------------------------|-------------------|-------------------------|
|                  | Quantity (tonnes) | Value<br>(Rs. in lakhs) | Quantity (tonnes) | Value<br>(Rs. in lakhs) |
| Arecanut, whole  | 921               | 2012                    | 991               | 2435                    |
| Arecanut, split  | 3383              | 3746                    | 3593              | 3962                    |
| Arecanut, ground |                   |                         | 321               | 921                     |
| Other arecanuts  | 13849             | 37005                   | 11856             | 26939                   |
| Total            | 18152             | 42764                   | 16761             | 34256                   |

#### **3. Price statistics**

Price behavior of agricultural commodities is an area of major concern for policy makers. Prices of most of the spices commodities like pepper, ginger, turmeric, garlic, cumin, chillies etc. are highly volatile. Price instability affects both producers and consumers and has macroeconomic implications as well. Bearing this in mind, the Directorate has rightly put one of its mandates as collection, compilation and dissemination of price data of spices and arecanut. Weekend wholesale price data of various spice commodities and arecanut are collected from domestic markets across the country. Agricultural Produce Marketing Committees, Regional Offices of the Department of Economics and Statistics, State Dept. of Marketing, Spices Board etc.are the major sources of price data. Arrivals and sales were also obtained from marketing centres. Monthly average of the weekend-prices of major spices and arecanut recorded in the important markets in the country during the last two years are tabulated below.

## Table 11. Monthly average prices of various major spices and arecanut

(Price Rs./quintal)

| Month     | Pepper Garbled<br>(Cochin) |         | Ginger Dry<br>(Cochin) |         | Chillies<br>(Virudhunagar) |         |
|-----------|----------------------------|---------|------------------------|---------|----------------------------|---------|
|           | 2018-19                    | 2019-20 | 2018-19                | 2019-20 | 2018-19                    | 2019-20 |
| April     | 38754                      | 35287   | 13500                  | 26500   | 7750                       | 7833    |
| May       | 38450                      | 36657   | 13833                  | 26500   | 7875                       | 8675    |
| June      | 37754                      | 36650   | 15500                  | 26500   | 8800                       | 9266    |
| July      | 35246                      | 35511   | 15500                  | 26500   | 8375                       | 10312   |
| August    | 37952                      | 35472   | 15500                  | 26500   | 8150                       | 10981   |
| September | 40073                      | 34665   | 15500                  | 26500   | 8000                       | 12706   |
| October   | 39345                      | 33164   | 17250                  | 26500   | 8000                       | 12068   |
| November  | 39436                      | 33907   |                        | 26500   | 8000                       | 12775   |
| December  | 38696                      | 35400   | 20500                  | 27500   | 8250                       | 14168   |
| January   | 37138                      | 34314   | 20500                  | 27500   | 7375                       | 15007   |
| February  | 36358                      | 33337   | 28500                  | 27500   | 7125                       | 12750   |
| March     | 34652                      | 11750   | 26750                  | 4500    | 7550                       | 8625    |
| Mean      | 37821                      | 34942   | 18439                  | 26773   | 7938                       | 11504   |

Table 11.Contd....

## (Price Rs./quintal)

| Month                             | Turm<br>(Cher | neric<br>nnai) | Garlic<br>(Chennai) |         | Coriander<br>(Chennai) |         |
|-----------------------------------|---------------|----------------|---------------------|---------|------------------------|---------|
|                                   | 2018-19       | 2019-20        | 2018-19             | 2019-20 | 2018-19                | 2019-20 |
| April                             | 12000         | 11750          | 2250                | 4875    | 6450                   | 8575    |
| May                               | 12375         | 11750          | 2250                | 5500    | 6400                   | 8840    |
| June                              | 12280         | 11750          | 1950                | 6112    | 6280                   | 9000    |
| July                              | 12000         | 11750          | 3000                | 5875    | 6350                   | 9000    |
| August                            | 12000         | 11750          | 3900                | 6700    | 6850                   | 8850    |
| September                         | 12000         | 11750          | 4000                | 11437   | 6825                   | 8750    |
| October                           | 12000         | 11750          | 4500                | 16500   | 6875                   | 8687    |
| November                          | 11900         | 11700          | 3950                | 16500   | 7860                   | 9000    |
| December                          | 11750         | 11750          | 2875                | 16500   | 7875                   | 8750    |
| January                           | 11750         | 11750          | 3687                | 15900   | 7500                   | 8850    |
| February                          | 11750         | 11750          | 4362                | 13875   | 7625                   | 8750    |
| March                             | 11750         | 11750          | 3900                | 4500    | 8000                   | 8625    |
| Mean                              | 11963         | 11745          | 3385                | 10893   | 7074                   | 8823    |
| Table 11. Contd (Price Rs/quintal |               |                | )                   |         |                        |         |

| Month | Cumin<br>(Chennai) |         | Fennel<br>(Chennai) |         | Fenugreek<br>(Chennai) |         |  |
|-------|--------------------|---------|---------------------|---------|------------------------|---------|--|
|       | 2018-19            | 2019-20 | 2018-19             | 2019-20 | 2018-19                | 2019-20 |  |
| April | 16675              | 16950   | 10067               | 11400   | 4583                   | 6337    |  |
| May   | 16550              | 18090   | 10050               | 11450   | 4850                   | 6670    |  |
| June  | 17230              | 18250   | 10280               | 11487   | 4890                   | 6550    |  |

| July      | 19375 | 18087 | 10950 | 9950 | 4887 | 6550 |
|-----------|-------|-------|-------|------|------|------|
| August    | 20240 | 17720 | 10910 | 9550 | 5070 | 6430 |
| September | 19737 | 16837 | 10837 | 9287 | 4912 | 6250 |
| October   | 20500 | 16500 | 10850 | 9050 | 4875 | 6350 |
| November  | 20870 | 16680 | 11340 | 9120 | 5280 | 6540 |
| December  | 20700 | 17150 | 10925 | 9075 | 5400 | 6462 |
| January   | 18700 | 17540 | 10400 | 9000 | 5400 | 6090 |
| February  | 18137 | 15275 | 10250 | 8750 | 5375 | 5700 |
| March     | 17880 | 14900 | 10350 | 8750 | 5280 | 5500 |
| Mean      | 18883 | 16998 | 10601 | 9739 | 5067 | 6286 |

Table 11.Contd....

(Price Rs./quintal)

| Month     | Tamarind Ajwan<br>(Chennai) (Chennai) |         | Ajwan<br>(Chennai) |         | Ma<br>(Coc | ice<br>hin) |
|-----------|---------------------------------------|---------|--------------------|---------|------------|-------------|
|           | 2018-19                               | 2019-20 | 2018-19            | 2019-20 | 2018-19    | 2019-20     |
| April     | 15450                                 | 12250   | 10583              | 13500   | 44300      | 60000       |
| Мау       | 14500                                 | 12150   | 10500              | 13500   | 38900      | 77700       |
| June      | 14900                                 | 11750   | 10650              | 13500   | 30000      | 71700       |
| July      | 14750                                 | 11750   | 11250              | 13250   | 46800      | 93700       |
| August    | 14500                                 | 11850   | 10950              | 13250   | 60000      | 82800       |
| September | 15125                                 | 12250   | 10500              | 13250   | 55800      | 70000       |
| October   | 16000                                 | 12187   | 10500              | 13250   | 55000      | 86800       |
| November  | 15300                                 | 12000   | 10710              | 13750   | 67700      | 90900       |
| December  | 14562                                 | 12000   | 14875              | 14000   | 70000      | 80000       |
| January   | 14750                                 | 12500   | 14500              | 14000   | 88200      | 112800      |
| February  | 13875                                 | 12950   | 14625              | 12000   | 90000      | 130000      |
| March     | 29800                                 | 13100   | 14500              | 12500   | 72900      | 130000      |
| Mean      | 16126                                 | 12228   | 12012              | 13313   | 60000      | 90500       |

Table 11.Contd....

(Price Rs./quintal)

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| Month     | Clove<br>(Cochin) |         | Nutmeg without shell<br>(Cochin) |         | Arecanut-Dry<br>(Kozhikode) |         |
|-----------|-------------------|---------|----------------------------------|---------|-----------------------------|---------|
|           | 2018-19           | 2019-20 | 2018-19                          | 2019-20 | 2018-19                     | 2019-20 |
| April     | 68391             | 62000   | 34043                            | 41000   | 20000                       | 21500   |
| Мау       | 69440             | 69538   | 31365                            | 39673   | 19625                       | 21475   |
| June      | 72056             | 68587   | 30000                            | 33591   | 20300                       | 21350   |
| July      | 74880             | 66519   | 34520                            | 39444   | 19575                       | 20825   |
| August    | 73706             | 61660   | 40062                            | 39200   | 20034                       | 21125   |
| September | 72295             | 61026   | 41325                            | 37000   | 23063                       | 21750   |

| October  | 72354 | 59250 | 41000 | 35272 | 22875 | 22750 |
|----------|-------|-------|-------|-------|-------|-------|
| November | 72763 | 57630 | 43800 | 37195 | 23760 | 20800 |
| December | 73333 | 55977 | 42175 | 36704 | 23500 | 21500 |
| January  | 72136 | 55220 | 45590 | 41520 | 24066 | 24000 |
| February | 69318 | 55586 | 42263 | 41000 | 22625 | 25125 |
| March    | 63062 | 26500 | 41381 | 41000 | 21500 | 25000 |
| Mean     | 71145 | 58291 | 38960 | 38550 | 21744 | 22267 |

#### 4. Quick survey to assess the crop prospects of black pepper

Since advance information about the production in the ensuing harvesting season is of considerable importance from the trade point of view as well as for formulation of future development programmes, DASD conducted a quick survey in the major pepper growing tracts of Kerala, Karnataka and Tamil Nadu to estimate the expected production of black pepper in the country during 2019-20. The field visits in pepper plantations were conducted during the months of October and November, 2019. The information was collected through personal interview of the farmers, based on a pre-designed interview schedule, in the major pepper growing districts of these States. The field was then visited to see if the information corroborates with the actual stand of the crop. The sample size was fixed in proportion to the area under cultivation in each district. The pepper gardens were selected from the list of pepper cultivators available at respective Krishi Bhavans in Kerala and office of Assistant Director of Horticulture (ADH) in Karnataka and Tamil Nadu. Krishi Bhavans under Department of Agriculture have helped in data collection in Kerala and Horticulture Dept. have helped in data collection in Karnataka and Tamil Nadu. As per the survey, the production of pepper in Karnataka registered a marginal decline and that in Kerala and Tamil Nadu registered an increase compared to the previous year.



Fig. 1. View of pepper garden in Idukki



Fig. 2. Survey team interview the farmer during the Pepper survey in Kannur





Fig. 3. Pepper survey in Sakleshpura, Karnataka



Fig. 4. View of pepper plantation from Kolli Hills



Fig. 5. Disease affected pepper plant in Idukki District

#### 5. Garlic Survey in Madhya Pradesh

In view of some discrepancies noticed in the estimates of area, production and productivity of Garlic in Madhya Pradesh, DASD had conducted a quick sample survey in Dhar and Ujjain Districts of Madhya Pradesh to assess the reliability of productivity reported by M.P. Horticulture Department during the month of May, 2019. The survey, conducted through focus group discussions, indicated that the productivity estimates are reliable.

Further, the Review Committee Meeting held on 23<sup>rd</sup> August, 2019 at Krishi Bhavan, New Delhi under the Chairmanship of Shri. Rakesh Kumar Kamra, Additional Director General, DAC&FW, Ministry of Agriculture & Farmers Welfare, Govt of India to finalize the third advance estimates of horticulture crops for 2018-19 has suggested to verify the yield estimates of garlic in M.P. by conducting crop cutting experiments during the harvesting period of the crop season 2019-20.



As recommended by the Review Committee, the Directorate in association with M.P.Horticulture Department conducted a sample survey among the garlic farmers in the Ujjain Division, which contributes around 62% of the total garlic production in M.P. From Ujjain Division, the top three garlic producing districts viz. Ujjain, Ratlam and Neemuch were selected for the study. From each district two villages with maximum area under garlic were selected. From each village, five farmers were selected from the list of garlic farmers available at the District Horticulture Office. Total 30 farmers and 31 plots were selected from these three districts. The information were collected from the farmers through an interview schedule. The major information collected are area under garlic, variety, yield, method of planting, fertilizer details, irrigation details, weight loss after sun drying etc. Crop cutting experiments were also done in these 31 garlic fields to estimate the average yield of garlic. One square meter plot was selected from each farmers' fields and the entire garlic plants in the plot were harvested by hand pulling. The bulbs were cut from the plants and measured the weight using an electronic balance. No. of plants and weight of the bulbs (yield) per plot were recorded. The per plot yield were converted into per hectare yield. Mean yields for the Villages, Districts and Division were estimated using weighted average method by giving weights to area. Data on market arrivals of garlic in major markets in Ujjain Division were also collected to compare the arrivals with the production estimates.

To check the reliability of the garlic area estimated by Horticulture Department, area estimated by Commissionerate of Land Records and Settlement, Madhya Pradesh, area recorded under the scheme "Chief Ministers Krishak Samrudhi –CMKS" (*Bhavanthar* Payment) were collected from respective offices and these estimates were compared. The report of the survey is under preparation.



Fig. 6. Shri Rajesh, Adviser (Hort. Stat) & Shri Babulal Meena, Deputy Director visiting the garlic field during the survey



Fig. 7. Conducting crop cutting experiment in garlic field



Fig. 8. Measuring the weight of the harvested garlic using electronic balance



Fig. 9. Harvested garlic preparing for weighing



Fig. 10. Harvesting of garlic from the sample plot

#### 6. Meeting on estimates of area and production of black pepper in Karnataka.

The Directorate organized a meeting at Directorate of Economics and Statistics (DES), Bangalore, Karnataka to discuss the estimates of area and production of black pepper in Karnataka based on a complete enumeration using a GPS enabled mobile app methodology on 28<sup>th</sup>February, 2020. The meeting was chaired by the Director, DES, Bangalore and Shri. Shakeel Ahmed, Joint Director of Horticulture and Crop Survey Technical Officer, Government of Karnataka briefed the detailed methodology based on a GPS enabled mobile app adopted for estimation of area of different crops in the state. DASD presented the implication of the estimates based on this new methodology in the pepper and arecanut statistics in the country.





Fig. 11. Dr. Homey Cheriyan, Director, DASD addressing the meeting at DES, Bangalore



Fig. 12. View of the meeting at DES, Bangalore

# 4. PUBLICITY



An important aspect of the scientific process is the broadcasting of new results and innovations through publications of Journals so that the information is disseminated to the larger community.

Transfer of Technology plays a vital role as catalyst for further development which is one of the main mandate of the Directorate. With a view of achieving our target to make the agriculture production system in the country more robust through effective publicity, the Directorate brough out several publications on mandatory crops in English, Hindi and Malayalam and have also participated in various exhibitions during the year.

#### 1. **Publications**

#### 1.1 Indian Journal of Arecanut, Spices and Medicinal Plants

The Directorate publishes a quarterly journal the "Indian Journal of Arecanut, Spices and Medicinal Plants", which has wide circulation among farmers, extension workers, scientists, exporters, industrialists and other stakeholders etc. The journal contains popular articles by eminent scientists on scientific cultivation, processing and marketing aspects of Arecanut, Spices and Medicinal & Aromatic Plants, thereby providing information on latest technology in the field of Agriculture, Quarterly market reviews, price statistics, area and production statistics, forecast on farm operations etc. are also featured regularly in the Journal. Annual subscription for this Journal is Rs.200/-.



Fig. 1. Cover pages of published Journals



#### **Participation in Exhibitions**

Participation in exhibitions and fairs is an important programme of the Directorate for promotion of cultivation of various spices and dissemination of advanced technologies in crop production all over the country. The Directorate had put up stalls exhibiting banners and display boards depicting various activities of the Directorate and descriptions about various spices. During such exhibitions live spices, dry spices, oleoresins, leaflets, journals and other publications are also displayed especially for the farming community. The Diectorate participated in 4 National/State level exhibitions during the period under report as given below :

1. Malayala Manorama organized a one day seminar cum exhibition at North Malabar Chamber Hall, Kannur, Kerala on 17th May, 2019.



Fig. 2. Stall at Malayala Manorama exhibition at Kannur



2. VAIGA-2020: In order to ensure better income to the farmers by utilizing the scope of value addition and to attract new entrepreneurs, the Department of Agriculture Development and Farmers Welfare, Government of Kerala organized VAIGA-2020 during 4-8 January, 2020 at Thekkinkad Maithanam in Thirissur district, Kerala. The theme of VAIGA-2020 is "Sustainable growth through agripreneurship". Experts, farmers, scientists etc. from within the country and abroad attended the programme.



Fig. 3. Stall at VAIGA held at Thrissur



Fig. 4. Shri K. Krishnan Kutty, Hon'ble Minister for Water Resources, Kerala visiting the stall

3. Calicut Flower Show – 2020 during9-19 January, 2020 at Marine Ground, Beach Road, Calicut organized by the Calicut Agri Horticultural Society, Calicut. The main purpose of the show was to educate and impart practical knowledge to the public, farmers and interested growers on various aspects of scientific agriculture, horticulture and floriculture, spices and allied subjects like scientific cultivation, processing and marketing of products.



Fig. 5. Stall at Calicut Flower Show

4. 3rd Malabar Innovation Festival during February 28, 29 and March 1, 2020 organized by the Regional Science Centre & Planetarium, Calicut. The aim of the event was to bring together forward-thinking creators, makers, inventors, entrepreneurs and emerging leaders in start-up innovation from this part of our country, who are embracing change, blazing new trails, and moving our country forward. The festival also be a platform to showcase novel and general people who are expected to turn up in large numbers.



Fig. 6. Stall at Planetarium, Calicut



# 5. OFFICIAL LANGUAGE

# राजभाषा कार्यान्वयन

भारत सरकार की राजभाषा नीती को प्रभावपूर्ण ढंग से कार्यान्वयन करने में सुपारी और मसाला विकास निदेशालय सदा सक्रिय है। निदेशालय के 80 प्रतिशत से अधिक कर्मचारी हिंदी में कार्यसाधक ज्ञान प्राप्त कर लिए हैं। इसके अनुसार निदेशालय राजभाषा नियम 10 के उप नियम (4) के अंर्तगत भारत सरकार के राजपत्र में अधिसूचित किया गया है।

## राजभाषा कार्यान्वयन समिति

राजभाषा से संबंधित नियमों का अनुपालन सुनिश्चित करने एवं कार्यान्वयन में तेज़ी लाने के उद्देश्य से निदेशालय में राजभाषा क्कार्यान्वयन समिति गठित की गई है। हर अनुभाग के अध्यक्ष इसमें सदस्य है।

| डॉ. होमी चेरियान       | निदेशक              | अध्यक्ष              |
|------------------------|---------------------|----------------------|
| डॉ. फेमिना             | उप निदेशक           | सदस्य                |
| श्री. बाबुलाल मीणा     | उप निदेशक           | हिंदी संपर्क अधिकारी |
| श्री. सी. सनमुख सुंदरम | अधीक्षक             | सदस्य                |
| श्रीमती. सी.वी. दिव्या | वरिष्ठ तकनीकी सहायक | सदस्य                |
| श्री. के. मनोज कुमार   | सोंख्यकीय अन्वेषक   | सदस्य                |
| श्री. के.वी. राजेश     | अवर श्रेणी लिपिक    | सदस्य                |
| डॉ. पी.एन. ज्योति      | कनिष्ठ अनुवादक      | सदस्य-सचिव           |

राजभाषा के प्रगामी प्रयोग को उत्तरोत्तर बढ़ाने के लिए इस समिति की बैठकें हर तिमाही में आयोजित की जाती है। हिंदी के प्रयोग को बढ़ावा देने के लिए प्रत्येक अनुभाग के सदस्यों को नियमों के अनुसार निधारित लक्ष्य पाने का सुझाव दिया जाता है। बैठक का कार्यवृत्त मंत्रालय के हिंदी अनुभाग, बागवानी प्रभाग, राजभाषा विभाग के क्षेत्रीय कार्यान्वयन कार्यालय और नगर राजभाषा कार्यान्वयन समिति को नियमित रूप से भेज दिया जाता है।

## राजभाषा नियम 1976 के धारा का अनुपालन 3(3) का अनुपालन

निदेशालय में राजभाषा नियम 1976 के धारा 3(3) का शत प्रतिशत अनुपालन किया जाता है। कार्यालय ओदश, परिपत्र, कार्यालय ज्ञापन आदि द्विभाषी रूप में जारी किए जाते हैं। कार्यालय में पूर्णत: हिंदी-अंग्रेजी द्विभाषी मोहरों का प्रयोग किया जाता है। अधिकारियों और अनुभागों के नाम पट्ट, सूचना बोर्ड, कार्यालय वाहन, बैनर आदि द्विभाषी रूप में है। रजिस्टरों और सेवा पंजियों में प्रविष्टियों हिंदी में की जाती है। निदेशालय का नाम बोर्ड मलयालम-हिंदी-अंग्रेज़ी त्रीभाषी रूप में है।

#### आज का शब्द

कर्मचारियों के बीच हिंदी में प्रयुक्त शब्द एवं वाक्यांशों का परिचय देने के उद्देश्य से व्हाइट बोर्ड पर हर दिन अंग्रेज़ी के समानार्थक एक हिंदी शब्द / वाक्यांश लिखा जाता है। हिंदी पखवाड़ा के दौरान इन शब्दों एवं वाक्यांशों के आधार पर प्रतियोगिता चलाकर विजेताओं को पुरस्कार दिया जाता है।



## हिंदी दिवस / पखवाड़ा

कार्यालय में हिंदी के प्रयोग के लिए अनुकूल वातावरण बनाने के उद्देश्य से हर वर्ष निदेशालय में हिंदी दिवस / पखवाड़ा आयोजित किया जाता है। इस वर्ष 16 सितंबर, 2019 को हिंदी पखवाड़ा का शुभारंभ किया। डॉ. होमी चेरियान, निदेशक ने दीप जलाकर पखवाड़ा का उद्धाटन किया। उन्होंने सभी स्टाफ सदस्यों को राजभाषा नियमों और समय-समय पर जारी निर्देशों का अनुपालन सुनिश्चित करने का अनुरोध किया। डॉ. फेमिना, उप निदेशक ने स्वागत भाषण दिया और पत्राचार में हिंदी या द्विभाषी रूप में पत्र भेजने का अनुरोध किया। श्री. बाबुलाल मिणा, उप निदेशक ने हर अनुभाग में हिंदी के प्रयोग बढ़ाने का अनुरोध किया। डॉ. पी.एन. ज्योति, कनिष्ठ अनुवादक ने हिंदी से संबंधित संवैधानिक प्रावधानों और नियमों का विवरण दिया और कार्यालय में सरल हिंदी के प्रयोग करके पत्राचार एवं टिप्पण को बढ़ाने का अनुरोध किया। कर्मचारियों के राजभाषा संबंधी ज्ञान बढ़ाने एवं अपने दायित्व के बारे में जागरूक बनाने के उद्देश्य से राजभाषा अधिनियम, आठवीं अनुसूचि में सम्मिलित भाषाऐं, जाँच बिंदुऐं, नेमी कार्यालय टिप्पणियों आदि का संकलन द्विभाषी रूप में तैयार करके वितरण किया गया।

हिंदी दिवस के अवसर पर कर्मचारियों को हिंदी के प्रयोग में उपयोगी विभिन्न प्रकाशनों का परिचय देने के लिए संदर्भ ग्रंथों, हिंदी में तैयार किए गए पोस्टरों और अन्य प्रदर्शन सामग्रियों, निर्देशालय द्वारा प्रकाशित हिंदी पत्रकें, कार्यालय में उपलब्ध हिंदी पत्रिकाएँ, पुस्तकें, समाचार पत्र आदि शामिल करते हुए राजभाषा प्रदर्शनी तैयार किया गया। आठवीं अनुसूची में सम्मिलित 22 भाषाओं को भारत की पृष्ठभूमि में सजाकर रंगीन पोस्टर और मसाले फसलों एवं औषधीय पौधों से संबंधित नई सूचना सामग्रियाँ भी प्रदर्शनी में शामिल की गई।

कर्मचारियों को हिंदी के प्रयोग के लिए प्रेरणा एवं प्रोत्साहन देने के उद्देश्य से पखवाड़े के दौरान हिंदी में विभिन्न प्रतियोगिताएँ आयोजित की गई। निबंध लेखन, टिप्पण-आलेखन, टंकण, तकनीकी शब्दावली, हस्तलिपि, अंताक्षरी, हिंदी पढ़न आदि प्रतियोगिताएँ चलाई गई। राजभाषा से संबंधित प्रश्नों को शामिल करते हुए हिंदी में प्रश्नोत्तरी कार्यक्रम चलाया गया।

हिंदी पखवाड़ा का समापन समारोह डॉ. होमी चेरियान, निदेशक की अध्यक्षता में संपन्न हुआ। उन्होंने अपने अध्यक्षीय भाषण में हर अनुभाग में अधिकाधिक पत्राचार हिंदी में करके निर्धारित लक्ष्य प्राप्त करने का अनुरोध किया। इस अवसर पर उन्होंने हिंदी प्रतियोगिताओं के विजेताओं को पुरस्कार वितरण किया।



डॉ. फेमिना, उप निदेशक, भाषण देती हुई

डॉ. होमी चेरियान, निदेशक हिंदी पखवाड़ा का उद्धाटन करते हुए







श्री. बाबुलाल मीणा, उप निदेशक भाषण देते हुए



श्री. एन. मधु, अनुसंधान अधिकारी, भाषण देते हुए



डॉ. होमी चेरियान, निदेशक मुख्य भाषण देते हुए





पुरस्कार वितरण





हिंदी कार्यशाला का प्रेक्षकगण



समापन समारोह का प्रेक्षकगण

## हिंदी कार्यशाला

कर्मचारियों को हिंदी के प्रयोग में प्रशिक्षण देने के उद्देश्य से 19-9-2019 को एक-दिवसीय हिंदी कार्यशाला आयोजित किया गया। इसमें कालिकट हिंदी शिक्षण योजना के प्राद्यापक श्रीमती प्रवीणा ने टिप्पण-आलेखन के विषय पर क्लास चलाया और अभ्यास कराया।

कार्यालय में हिंदी के प्रयोग बढ़ाने के लिए कर्मचारियों को प्रशिक्षण देने के उद्देश्य से दिनांक 11 दिसंबर, 2019 को एक दिवसीय हिंदी कार्यशाला संपन्न हुआ। इस कार्यशाला भारतीय कृषि अनुसंधान परिषद्-भारतीय मसाले फसल अनुसंधान संस्थान और इस निदेशालय के द्वारा संयुक्त रूप से आयोजित किया गया। कार्यशाला का उद्घाटन भाकृअप-भारतीय मसाले फसल अनुसंधान संस्थान के निदेशक डॉ. के. निर्मल बाबु की अध्यक्षता में संपन्न हुआ। कार्यशाला के पहले सत्र में श्री. रामचन्द्रन, उप निदेशक ने हिंदी व्याकरण और इसके प्रयोग करते समय सामान्यतः आने वाली त्रुटियों के विषय पर क्लास चलाया। फाइल टिप्पण हिंदी में लिखने का अभ्यास कराया और कर्मचारियों के संदेहों को दूर करने के लिए चर्चा हुई।

दूसरे सत्र में कर्मचारी भविष्य निधि कार्यालय के हिंदी अधिकारी श्री. अरविंदाक्षन ने कंप्यूटर पर हिंदी में काम करने के विषय पर क्लास चलाया। हिंदी टंकन के विभिन्न प्रणालियों और कुंजीपटल का परिचय कराते हुए कर्मचारियों को अभ्यास कराया। कुल मिलाकर 30 कर्मचारियों इस कार्यशाला में भाग लिए।





श्री. रामचन्द्रन, उप निदेशक (राजभाषा), आयकर विभाग क्लास चलाते हुए।



डॉ. के. निर्मल बाबु, निदेशक, भारतीय मसाले फसल अनुसंधान संस्थान कार्यशाला का उद्घाटन करते हुए।



श्री. अरविंदाक्षन, वरिष्ठ अनुवाद अधिकारी, भविष्य निधि कार्यालय, क्लास चलाते हए।



कार्यशाला का प्रेक्षकगण

### नगर राजभाषा कार्यान्वयन समिति की सदस्यता

कालिकट नकर राजभाषा कार्यान्वयन समिति के तत्वावधान में आयोजित प्रत्येक कार्यक्रम में निदेशालय सक्रिय रूप से भाग ले रहा है। इसकी हर अर्धवार्षिक बैठकों में निदेशक और हिंदी अनुवादक नियमित रूप से भाग ले रहे हैं। समिति द्वारा आयोजित संयुक्त हिंदी पखवाड़ा के कार्यक्रमों में हिंदी अनुवादक भाग लिया।

## हिंदी प्रकाशन

निदेशालय द्वारा प्रकाशित *इंडियन जर्नल ऑफ अरीकनट, स्पाइसेस एण्ड मेडिसिनल प्लान्ट्स नामक* त्रैमासिक पत्रिका में विभिन्न मसाला फसलों पर आधारित वैज्ञानिक लेख, कृषि क्रियाएँ, मसालों के बाज़ार मूल्य की समीक्षा आदि नियमित रूप से हिंदी में प्रकाशित किए जाते है।

#### प्रोत्साहन योजना

कार्यालयीन काम मूल रूप से हिंदी में करने के लिए कर्मचारियों को प्रेरणा देने के लिए राजभाषा विभाग द्वारा लागू किए गए नकद पुरस्कार योजना और हिंदी में टंकण करने के लिए प्रोत्साहन भत्ता योजना का कार्यान्वयन निदेशालय में किया गया है। दोनों योजनाओं में कर्मचारियों सक्रिय रूप से भाग ले रहे हैं।

## पुस्तकों की खरीद

कार्यालय में संदर्भ के लिए हिंदी में विभिन्न विषयों पर पुस्तकें खरीदी जाती है। इसके अलावा निदेशालय में हिंदी दैनिक समाचार पत्र नवभारत टाइम्स तथा हिंदी पत्रिकाएँ जैसे कृषि समीक्षा, उन्नत कृषि, नारियल पत्रिका, कैरली, रोशनी, मसालों का महक आदि भी उपलब्ध है।





# सुपारी और मसाले विकास निदेशालय

कृषि एवं किसान कल्याण विभाग कृषि सहकारिता एवं किसान कल्याण विभाग भारत सरकार, कालीकट- 673005, केरल

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