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PROCEEDINGS OF
THE NATIONAL MEETING (XII WORKSHOP) OF RESEARCH WORKERS OF ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES

Held at
KERALA AGRICULTURAL UNIVERSITY
Trichur

during
JULY 26-28, 1993

Project Coordinator : Dr. A. K. Sadanandan

भाकृअनुप
ICAR

ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES
NATIONAL RESEARCH CENTRE FOR SPICES
(Indian Council of Agricultural Research)
CALICUT-673 012, KERALA.

1993

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INTRODUCTION

The National Group Meeting (XII Workshop) of the All India Coordinated Research Project on Spices (AICRPS) sponsored by Indian Council of Agricultural Research (ICAR) was hosted by Kerala Agricultural University (KAU), Vellanikkara, Trichur, Kerala during July 26-28, 1993.

The workshop was inaugurated by Shri P P George, Hon'ble Minister for Agriculture, Govt. of Kerala. In his inaugural address the Hon'ble Minister called for the need in augmenting production and productivity of spice crops by adopting modern economically viable and socially acceptable technologies developed by scientific research. The Minister called for concerted effort of Scientists of Indian Council of Agricultural Research (ICAR) and Kerala Agricultural University to find solution to the serious disease problems of pepper, cardamom and ginger affecting crop productivity.

Dr.K.L.Chadha, Deputy Director General (Hort.), ICAR, New Delhi in his presidential address emphasized the need for conservation of genetic resources and called for integrated approach in producing quality spices by scientific research to meet the growing export demand and international market. During VIII Plan, Rs.30 million has been earmarked for AICRPS alone which is 300% more than the allotment made during the previous Plan period.

Dr.A.M.Michael, Vice Chancellor, KAU, highlighted significant contributions made by KAU towards spices production. Dr.M.Aravindakshan, Director of Research, KAU gave welcome speech. The felicitation addresses were delivered by Shri T.Nandakumar, Chairman, Spices Board, Dr.M.K.Nair, Director, Central Plantation Crops Research Institute (ICAR), Kasaragod, Dr.K.V.Peter, Director, National Research Centre for Spices (NRCS), Calicut and Dr.C.C.Abraham, Associate Director, College of Horticulture, KAU. Dr.P.Rethinam, Asst. Director General (Plantation Crops), ICAR, New Delhi gave vote of thanks.

Results of research programmes carried out during the last two years by AICRPS were presented in the seven Technical Sessions and future programmes discussed, finalised and decision taken are presented in this Proceedings.

ACKNOWLEDGEMENTS

I am extremely grateful to Shri P P George, Hon'ble Minister for Agriculture, Govt. of Kerala for having condescended to our request and inaugurated the Workshop. We place on record our gratitude to ICAR especially to Dr.V.L.Chopra, Director General, Dr.K.L.Chadha, Deputy Director General (Hort.), Dr.P.Rethinam, Asst. Director General (Plantation Crops) for sponsoring the XII AICRPS Workshop.

Dr.K.L.Chadha, DDG (Hort.), ICAR was kind enough to be present at the venue for three consecutive days and guide us in the planning and conduct of the Workshop smoothly. I owe my indebtedness to Dr.K.L.Chadha. I also extend my gratitude to Dr.P.Rethinam, ADG (PC) who has been instrumental in getting timely ICAR approval for the Workshop and also his valuable guidance and conduct of the deliberations as General Chairman/Chairman of the various technical sessions. The assistance rendered by Sri T.A.Sriram, Senior Technical Officer at the ICAR level in the conduct of Workshop is also gratefully acknowledged.

I owe my indebtedness to Dr.A.M.Michael, Vice Chancellor, KAU for not only hosting the Workshop but also for delivering the key-note address at the Inaugural Session and hosting a dinner and variety entertainment programmes during the Workshop.

I am grateful to Dr.M.Aravindakshan, Director of Research, KAU for delivering the welcome address and to Shri T.Nandakumar, IAS, Chairman, Spices Board, Cochin, Dr.M.K.Nair, Director, CPCRI, Kasaragod, Dr.K.V.Peter, Director, NRCS, Calicut and Dr.C.C.Abraham, Associate Dean, College of Horticulture, KAU for delivering the felicitation addresses and their suggestions for future strategies in spices research for meeting the export demand and internal requirement.

From the KAU Dr.M.Aravindakshan, Dr.C.C.Abraham, the Associate Directors of Research, Director of Extension, Professors, Associate and Assistant Professors and students extended the help and cooperation, in making all arrangements, for the conduct of the

Workshop, hosting variety entertainments and dinner. I hereby express my deep sense of gratitude to everyone who assisted us.

I am extremely thankful to Dr.K.V.Peter, Director, NRCS for his whole-hearted support, continued encouragements and to the scientific colleagues and staff members of NRCS for all help rendered in the Workshop.

For the conduct of technical sessions, the help rendered by Dr.P.Rethinam, Dr.M.K.Nair, Dr.K.V.Peter, Dr.I.Irulappan, Dr.A.I.Jose, Dr.K.I.Wilson, Dr.C.C.Abraham, Dr.C.K.George, Mr.E.Velappan, Dr.K.Midha, as General Chairman/Chairman/Co-Chairman deserve special thanks. My thanks are also due to scientists of NRCS and AICRPS Centres for the help rendered as rapporteurs at the technical sessions. My gratitude are also due to Directors/Deputy Directors of Department of Agriculture/Horticulture for the various States for their contribution in the technical session on Planting material Production and Distribution.

I am grateful to Chairman, Quinquennial Review Team, Dr.P.C.S.Nair and the Members Dr.K.I.Wilson, Dr.P.C.Sundarababu, Dr.K.R.Maurya and Dr.R.Vikraman Nair for having accepted our invitation and attended Workshop and participated in the discussion.

I thank the media Press, Doordarshan, All India Radio for the publicity and coverage of the programme. I would also like to thank all the input agencies such as VST Industries Ltd., Rallis India Ltd., Hindustan Ciba-Geigy, Sunitron International, AV Thomas & Co., PPCL, Concert Spices and Export, Elron etc. and progressive farmers from different spice growing states for their interaction with the scientists in the technical session. Lastly I would like to record our appreciation to all who toiled hard to make the Workshop a grand success.

A.K.Sadanandan
Project Coordinator

P R O G R A M M E

Venue	:	Kerala Agricultural University Vellanikkara Trichur - 680 654 KERALA
Dates	:	July 26, 27 & 28, 1993

July 26, 1993

0830 - 1000	:	Registration
1000 - 1245	:	Inaugural Session
Venue	:	University Auditorium Kerala Agricultural University, Trichur
Invocation	:	KAU Choir
Welcome address	:	Dr.M.Aravindakshan Director of Research (KAU)
Report of the Project Coordinator	:	Dr.A.K.Sadanandan Project Coordinator (Spices), ICAR
Felicitations	:	Dr.K.V.Peter Director, NRC for Spices, Calicut
		Dr.C.C.Abraham Associate Dean, KAU
		Dr.M.K.Nair Director, CPCRI, Kasaragod
		Mr.T.Nandakumar Chairman, Spices Board
Key-note address	:	Dr. A.M.Michael Vice Chancellor, KAU
Inaugural address	:	Sri P.P.George Hon'ble Minister for Agriculture & Animal Husbandry Government of Kerala
Presidential remarks	:	Dr.K.L.Chadha Deputy Director General (Horticulture), ICAR
Vote of thanks	:	Dr.P.Rethinam Asst.Director General(Plantation Crops), ICAR

National Anthem

1245 - 1400)
1445 - 1830) : Technical Session I :

CROP IMPROVEMENT, PHYSIOLOGY & BIOCHEMISTRY

Chairman : Dr.M.K.Nair, Director, CPCRI
Rapporteurs : Dr.B.Sasikumar, NRCS
: Dr.K.K.Ibrahim, KAU
All the 16 Centres presented reports.

July 27, 1993

0900 - 1230 : Technical Session II : **GENETIC RESOURCES**

Chairman : Dr.K.V.Peter, Director, NRCS
Rapporteurs : Dr.S.L.Dashora, RAJAU, Jobner
Mr.B.Krishnamoorthy, NRCS
All the 16 Centres presented reports.

1230 - 1345)
1430 - 1700) : Technical Session III :

PLANT PATHOLOGY & ENTOMOLOGY

Chairman : Dr.C.C.Abraham,Associate Dean
College of Hort., KAU
Vellanikkara
Co-Chairman: Dr.K.I.Wilson
Pl.Pathologist(Rtd.), KAU
Rapporteurs : Dr.G.N.Dake, NRCS
Mr.M.N.Venugopal, NRCS
All the 16 Centres presented reports.

1700 - 1845 : Technical Session IV :

GROUP DISCUSSION ON PLANTING MATERIAL PRODUCTION AND DISTRIBUTION OF SPICES

General Chairman : Dr.P.Rethinam, ADG(PC)
Chairman : Mr.E.Velappan
Co-Chairman: Mr.Ujgar Singh
Dy.Commissioner (H)
Rapporteurs : Dr.Krishnakumar, ICRI
Dr.K.Sivaraman, NRCS
Directors of Agriculture & Horticulture from major States participated.

1700 - 1800
(parallel Session) : Special Session :

MULTILOCATION CESS FUND (ICAR) PROJECT ON GINGER RHIZOME ROT

Chairman : Dr.K.Midha
Principal Scientist, ICAR
Rapporteurs : Dr.G.N.Dake, NRCS
Mr.M.N.Venugopal, NRCS
Three participating centres attended and presented reports.

July 28, 1993

0915 - 1300 : Technical Session V :

AGRONOMY & SOIL SCIENCE

General Chairman : Dr.P.Rethinam, ADG(PC)
Chairman : Dr.I.Irulappan, Dean, TNAU
Co-Chairman: Dr.A.I.Jose, KAU
Rapporteurs : Dr.K.Sivaraman, NRCS
Dr.C.T.Abraham, KAU
The concerned centres presented their reports.

1300 - 1400)
1445 - 1540) : Technical Session VI : **VARIETY RELEASE**

Chairman : Dr.P.Rethinam
Asst.Director General(PC), ICAR
Co-Chairman: Dr.C.K.George
Executive Director, Spices Board
Rapporteurs : Dr.H.M.Chandrappa
UAS, Mudigere
Dr.A.Manohar Rao
APAU, Jagtial
Three centres presented the proposals

1540 - 1800 : Technical Session VII : **PLENARY SESSION**

Chairman : Dr.P.Rethinam
Asst.Director General(PC), ICAR
Rapporteurs : Dr.A.K.Sadanandan, NRCS

Vote of thanks : Dr.P.Rethinam
Asst. Director General (PC), ICAR
Dr.A.K.Sadanandan, PC (Spices)

National Meeting concludes.

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INAUGURAL SESSION

PROJECT COORDINATOR'S REPORT
All India Coordinated Research Project on Spices

I have immense pleasure to present the XII biennial report of research accomplishments (1991-93) of AICRP (All India Coordinated Research Project) on Spices. The last meeting was held at Trivandrum two years back which was presided over by the Hon'ble Minister for Agriculture of Kerala Shri P P George who inspired us to intensify spices research to regain the past glory of India as the **"land of spices"**.

The Deputy Director General (Horticulture), Dr.K.L.Chadhaji of ICAR (Indian Council of Agricultural Research), New Delhi in his thought-provoking address made at the last National Meet suggested new dimensions in spices research for attaining sustainable production. We are implementing the suggestions in our present research programmes.

The AICRP on Spices was formulated during IV Five Year Plan (1971) as a combined AICRP on Spices and Cashewnut, and the first Workshop was held at CPCRI, Kasaragod in 1971 and research programmes were initiated at four centres in four spice crops (pepper, cardamom, ginger and turmeric). During V Plan, research on seed spices was initiated by adding four more centres. In VI Plan, two new centres were added, one for pepper and the other for ginger and turmeric. During VII Plan, three more centres were added, one for coriander and fenugreek, one for turmeric, and the third for large cardamom in Gangtok. In VIII Plan, two new centres were added, one at Hisar (Haryana) to work on seed spices (Coriander, Cumin, Fennel and Fenugreek) and the other at Dholi (Bihar) to work on Coriander, Fenugreek and Turmeric. Research on tree spices (clove, cinnamon and nutmeg) was also added at Vercaud (TNAU), thus making a total of 16 Research Centres under AICRP based in 11 Agricultural Universities located in 11 States.

Research activities

The AICRP on Spices is vested with a mandate to develop location specific agro-techniques for sustainable spices production. A multipronged approach is envisaged and research projects formulated to step up production and tackle pests and diseases. There are 61 Research projects in progress - 31 in crop improvement (including genetic resources), 11 in crop production, 5 in quality improvement and 14 in crop protection. The crop-wise distribution of projects are- pepper 10, small cardamom 9, large cardamom 3, ginger 7, turmeric 5, tree spices 5, seed spices 22 (coriander 7, cumin 4, fennel 4 and fenugreek 7). The research accomplishments during the last two years are given below.

Genetic Resources

A total of 1552 germplasm accessions including wild types are maintained in 16 centres. Wild pepper germplasm numbering 117 was shifted to Ambalavayal (Kerala). The Yercaud centre added 102 accessions in pepper. In large cardamom, an allied species belonging to genus Amomum was collected from the forests of Gangtok at 6000 MSL. At Pottangi, 186 turmeric accessions including C. longa, C. aromatica and C. amada were added. In seed spices alone the AICRP has a collection of 2611 accessions. Efforts are also underway to import or exchange seed spices germplasm from Mediterranean countries.

Crop Improvement

Thirty eight spice varieties having high yield potential and high oil and oleoresin contents were released. Thirteen more varieties were recommended for release. Sixteen multilocation trials (MLTs) are in progress at various centres in different spice crops (viz., four in pepper, three in cardamom, one each in ginger, turmeric, large cardamom, clove, cinnamon, cumin, coriander, fennel and fenugreek).

In pepper, 34 cultivars were identified as promising out of 1134 hybrid progenies at Panniyur. In pepper, three selections viz., Culture-239 and two Kottanadan selections have been received for consideration of the house and recommendation for release. In small

cardamom, high yielding, high quality selections (P-3 and PC-5) are under pre-release multiplication. A proposal has been received for consideration of this house for recommendation for release a cardamom variety (SKP-14) for Karnataka region. In seed spices, mutation breeding programmes to evolve early flowering and high quality lines with resistance to diseases are giving encouraging results at Jobner and Coimbatore.

Crop Production

Pepper varieties suitable to grow as a mixed crop in coffee gardens at Andhra Pradesh have been identified (Panniyur-1, Kottanadan, Narayakodi and Uddaghere). Irrigation had a profound influence in increasing yield of pepper and IW/CDE ratio of 0.25 was the best. In arecanut-pepper mixed cropping system, application of NPK nutrients at 100 : 40 : 140 g/vine/year was optimum under Sirsi condition (Karnataka). The improved cardamom cv. Mudigere-1 yielded 675 kg/ha in a spacing of 1.8 x 1.8 m with a nutrient dose of 75:75:150 kg NPK/ha/year under Mudigere conditions. Technology for optimising ginger and turmeric yields have been established. A compatible crop combination of ginger and soybean has been recommended for Orissa. Location specific nutrient recommendations could be arrived at in ginger at Pottangi (NPK @ 125 : 100 : 100 kg/ha) and for turmeric, application of NPK at 140:60:180 kg/ha was optimum. Nitrogen requirement for coriander under Hisar condition has been arrived at as 60 kg/ha. For fennel, application of N at 90 kg/ha with 40 kg P_2O_5 applied as basal was found optimum. Application of Neem cake @ 150 kg/ha as basal dose and seed pelleting with Trichoderma viride increased yield and reduced root-knot nematode incidence.

Quality evaluation

Studies on quality evaluation of ginger showed that SG-681 could give maximum ginger oil and oleoresin. The ginger variety Jamaica gave high dry recovery. The ginger selection SG-666 recorded high essential oil (2.5%). High volatile oil content was recorded in two accessions in coriander (JCO.125 and UD-435 - 0.4%).

Crop Protection

The management of Phytophthora capsici causing foot-rot of pepper has been worked out. They are phytosanitation, use of antagonistic organism (Trichoderma harzianum), organic amendments (like neem cake) and the use of Bordeaux mixture (1%) spray and soil drenching with copper oxychloride (0.2%). The nursery diseases of pepper could be effectively checked by spraying with Bordeaux mixture (1%) followed by drenching Difolatan (0.2%). Azhukal and capsule rot of cardamom can be effectively checked by spraying Bordeaux mixture (1%). A package to check cardamom thrips by combining cultural operations with Monocrotophos spray (0.05%) followed by phosalone spray (0.07%) alternatively was effective. Against rhizome-rot of ginger, application of phorate (10 kg/ha) after preparation of beds and seed treatment with a combination of Dithane M-45 and Bavistin (0.1%) reduced rhizome-rot and increased the yield. Trials at Jagtial centre showed that Turmeric cv. Suguna (PCT-13) and Sudarshana (PCT-14) being short duration varieties are ideal for crop rotation, relatively tolerant to rhizome-rot and are gaining popularity among the Andhra farmers. An early maturing coriander accession (CS-287) suitable for rainfed tracts of Tamil Nadu recorded less incidence of wilt and grain mould. Seed pelleting with Trichoderma viride registered the lowest wilt incidence and highest yield of 350 kg/ha under Coimbatore condition. The cumin wilt can be checked by adopting three year crop rotation together with seed treatment using 1:1 mixture of Bavistin and captan at 4g/kg of seed followed by spraying with Mancozeb (0.2%) at 15 days intervals.

The performance of all the coordinating centres are by and large satisfactory. However frequent transfers of scientists and long term vacancies affect the performance of the project. We are looking forward to your active participation in the deliberations in drawing specific recommendations to meet the aspirations of the spice farmers and Industry.

Staff and budget

The permanent staff strength of AICRP on Spices consists of 41 Scientific supported by 21 Technical and 3 Auxiliary making a total of 65 staff. The annual budget was increased from Rs.15.6 lakhs in 1985 to Rs.45.0 lakhs in 1992-93.

Planting material

The Directorate of Cocoa, Arecanut and Spices Development, Calicut under the Union Ministry of Agriculture, has arranged a group discussion on production and distribution of spices planting material at this venue tomorrow. The meeting would be attented by representatives from 25 states and 2 Union Territories. The coordinating centres under the project have the moral responsibility to produce and make available the nucleus planting material for this activity. It will be the endeavour of the SAUs, District Agricultural Farms or District Seed Farms of the States to take up further multiplication for timely distribution of seed-kit to the farmers. During the period under report, the coordinating centre at Panniyur has distributed over 2.2 lakhs of improved varieties of pepper. About three tonnes of seed ginger of cv. Suprabha and Suruchi, eight tonnes of seed rhizome of turmeric varieties were also distributed. The NRCS, Calicut has distributed about 25 tonnes improved varieties of turmeric. Mudigere centre distributed about 25 kg of seed capsules and seedlings of cardamom and in seed spices about 3 tonnes of nucleus seed material were distributed by seed spice centres.

Future thrust areas

* Enrichment of germplasm including introduction of exotic germplasm especially of seed spices from Mediterranean regions
* Developing descriptors for all the spices
* Exploitation of hybrid vigour
* Development of cropping systems
* Studies on location specific nutritional requirement of spices including micro nutrients

* Development of varieties with tolerance to soft-rot and bacterial wilt, low fibre and high oleoresin content in ginger
* Development of dual purpose variety in seed spices
* Evolving black pepper cultivars with multiple resistance to Phytophthora foot-rot, slow decline and pollu beetle
* Development of high yielding varieties of black pepper suitable with high oleoresin, essential oil and piperine.

This National Group Meet was arranged within six months of my assuming charge as Project Coordinator. If there is any lapse, kindly bear with me.

Thank you, Jai Hind.

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KEY-NOTE ADDRESS BY DR.A.M.MICHAEL, VICE CHANCELLOR KERALA AGRICULTURAL UNIVERSITY, TRICHUR

The Hon'ble Minister for Agriculture, Government of Kerala, Mr.P.P.George, Dr.K.L.Chadha, Dy. Director General, Horticulture, ICAR, my esteemed colleagues, Scientists and farmer friends,

I have extreme pleasure to welcome you to this "Garden City of Spices" the Kerala, during the auspicious 'Onam' season. Historically the coming month of August is significant for Keralites and Indians. We await the arrival of 'Mahabali' who brings prosperity and happiness.

India is the "land of spices". In fact, the word "India" is associated with Spices. With this tradition, India was dominating the World Spices Market to a great extent. The world trade in spices in 1992-93 was 4.5 lakh tonnes valued US dollar 1,300 million. India's export during this period was 1.32 lakh tonnes valued US dollar 130.8 million equivalent to Rs.382 crores. Projected world trade in spices in 2001 is estimated to 6.25 lakh tonnes valued US dollar 2,200 million to 3000 million. The projected India's export in 2001 is 2.0 lakh tonnes valued US dollar 515 million. I am intentionally quoting the above figures in the introductory remarks itself to highlight the scope and potential of spices for the India's economy.

Kerala Agricultural University (KAU) is historically linked to the research on Spices for the last two decades. It was the Horticultural Research Station, Ambalavayal, presently the Regional Agricultural Research Station, Ambalavayal, initiated concerted attempts on Spices Research including Vanilla. The Pepper Research Station at Panniyur (Kerala) is internationally known for evolving the first hybrid variety in black pepper. The small cardamom, "Queen of Spices", is originated in the Western Ghats of Kerala. Appropriately the Cardamom Research Station at Pampadumpara initiated intensive research on small cardamom and released variety PV-1 from Myladumpara bears testimony to this effort. In Kerala, it is only at the Regional Research Station, Ambalavayal 'Allspice' is being propagated through seeds and made available to farmers from the Government sector. The Agricultural University has an exclusive

co-ordination group on spices, which deals with production, management and protection. The KAU has two coordinating centres under the AICRP on Spices, operating at the Pepper Research Station, Panniyur and Cardamom Research Station, Pampadumpara.

I am extremely proud to state that scientists of Kerala Agricultural University have also contributed substantially to the Spices Research and Development. Their contributions will be discussed in detail in this present National Group Meeting.

I may bring to the kind notice of the august audience, the Kerala scenario and the needs for concerted effort on Spices Research and Development to catch up with changing global need. Kerala's population is expected to go by 300 lakhs and its requirement of food (cereal) equivalent to about 60 lakh tonnes by 2000 AD. To the Futurologists, agricultural economy of Kerala presents two alternative scenarios. One is all in secular stagnation with the State increasingly dependant on other states for its essential requirements of food and consumer goods and the other is of a mixed and integrated farming system, reinforced by the growing Agriculture Business sector. Spices, mainly pepper, cardamom, ginger, turmeric and tree spices find greater relevance in the second scenario.

Land in Kerala is a scarce resource with almost all cultivable land already brought under the plough. The high pressure of population led to medium farm size of 0.43 ha, too low for sustaining an average family. This demands growing of high value crops and synthesis of values added products for export and internal consumption. A whole farm development project, with emphasise on spices, rather than a single crop, specific approach would be a desirable concept in crop planting in Kerala.

Spices, particularly, pepper cardamom, ginger and turmeric have significant positions in Kerala's Agricultural economy. Almost the entire quantity of pepper and more than 90% of cardamom exported from India are contributed by Kerala alone.

Future projections :

Research on identifying quality spices and synthesis of value added products like piperine, oleoresin and essential oil from pepper should get priority attention in the Research programme. Enrichment of spices germplasm, screening germplasm for tolerance to pathogens and insect pests, evaluation for high quality types in terms of high piperine and oil, screening of varieties for drought and shade tolerance are a few requiring attention.

Eco or organic spices fetch premium price in the international trade. Eco-spices are grown organically without application of fertilizers and without resorting to the use of plant protection chemicals. Bio-fertilizers and bio-agents like predators and parasites, microbes and insects need to be identified.

Step up in spices production and its sustainability need awareness and coordination :

* Coordination and prioritisation of research, development and production are pre-requisites, prior to any effective planning for Kerala. Kerala spices are mainly pepper and cardamom. Spices like chilli, ginger, turmeric, clove, cinnamon and nutmeg are now acclamatised to our soils and need special attention and support.

* Prioritisation in choice of locations for intensive cultivation is another aspect. In Kerala especially the districts of Wynad and Idukki have the largest area under pepper and cardamom. The above districts also provide congenial weather and soil conditions and are conducive for growing other spices like ginger, turmeric and tree spices. Thrust on development and production of these spices may be restricted to these areas. This would reduce considerable dessipation of much valued resources. There can also be pepper villages, ginger villages, tree spices villages and so on in the chosen districts. Appropriately Govt. of Kerala has declared Wynad and Idukki as 'Spices Districts'.

* Special zones for spices for export are again another concept to be pondered to. There are new export promotion zones for industrial goods. Similar spices production zones for different spices, if developed and special attention like single window system with research, development and production integrated, there can be considerable investment possibility for such ventures.

* Intensification of spice cultivation for export. Being essentially an economic activity of high competition and international interference, prestige of the country is at stake many times. There is utmost need to create awareness in people, public men and administrators the need for imparting preferential monitory treatment to spices for export. Spices should receive adequate and due recognition in the agricultural policy as well as the industrial policy of the State Government. Quality consciousness in production, processing and storage need to be infused to farmer's mind.

* Constraints in spices production and productivity are mainly technological economic and weak extension education. The highest pepper yield recorded is 140 kg fresh berries from one vine in an estate at Nilgiris. The gap in productivity is 52 times when national average is compared to performance at Research Station, 102 times when compared with elite farmers and 170 times when compared with the highest yield recorded. Both in cardamom and black pepper, the present technology is sufficient to boost up unit area yield by 8-10 times of the national average.

* Inadequate availability of planting materials, is another important constraint. The Sub-Group on Plantation Crops - planting material production - projected a requirement of 400 lakh cuttings in pepper, 2870 tonnes of seed rhizomes in ginger, 2870 tonnes of seed rhizomes in turmeric, 200 tonnes of chilli seeds, 2.5 lakh seedlings of clove, 1.25 lakh seedlings of nutmeg, 22,500 seedlings of cinnamon and 15 tonnes of seeds of minor spices during the VIII Plan period. Involvement of registered growers, both through cooperative approach and private sector can produce the required planting materials. This would also generate rural employment.

* The success of research results can be best judged in their effective adoption by farmers. This can be possible only through an effective working linkage among the Department of Agriculture, Kerala Agricultural University, Spices Board, Directorate of Cocoa, Arecanut and Spices Development and the National Research Centre for Spices.

I wish this National Meet of Research Workers would ponder over the above ideas and would give forthwith appropriate recommendations. Once again I welcome you to this Land of Spices. I wish the delegates a happy and useful stay.

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INAUGURAL ADDRESS BY SHRI P P GEORGE
HON'BLE MINISTER FOR AGRICULTURE & ANIMAL HUSBANDRY
GOVERNMENT OF KERELA

India has been for ages past the home of Spices and Kerala is known as the spice garden of India. Indian spices are world famous and this resulted in the establishment of trade relations with European, Arab and Western Countries.

The annual production of spices in India is around 23 lakh tonnes from a cultivated area of about 20 lakh hectares. Spices export during 1992-93 broke all previous records and touched an all time high of Rs.385 crores through the export of 1.3 lakh tonnes of spices. This is a remarkable achievement considering the high competition from other countries in the world spices market. The target fixed for this year is Rs.500 crores. It is estimated that the demand for spices and spice products in the world market by 2000 AD would be around 4 and 2 lakh tonnes respectively, and at the current growth rate, India's share to meet this demand would be around 1.5 and 0.75 lakh tonnes of spices and spice products, respectively.

To achieve this research on production, productivity, product diversification and upgrading quality of spices meant for export should be intensified so as to compete in the international market. In this context, the role played byIndian Council of Agricultural Research in the country, particularly in Kerala has to be specially mentioned. The National Research Centre for Spices, an institution under the ICAR located at Calicut is serving as a National Centre for research on all aspects of black pepper, cardamom, ginger, turmeric, clove, cinnamon, nutmeg and allspice. The institution is also a centre of excellence for providing research support in basic areas to other related institutions and agencies. The All India Coordinated Research Project on Spices with its headquarters at Calicut has 14 centres throughout the country and is working in close coordination with State Agricultural Universities.

The research efforts and achievements of Kerala Agricultural University on spices is also remarkable. It serves as a centre for research on spices and allied crops and dessimination of information as well as imparting specialised training to extension personnel of the State Agriculture Department and for production and distribution of elite planting materials to the farming community. The University has its Research Stations on cardamom and black pepper undertaking applied and adaptive research to develop efficient technologies for these crops. Technologies for the control of "azhukal disease in cardamom and Phytophthora foot rot of black pepper and release of new black pepper varieties like Panniyur-II, III and IV are some of the achievements of the Kerala Agricultural University.

The vital role played by Spices Board as well as Spices Export Promotion Council in promoting production and export of spices and spices products in the country has also to be specially mentioned.

I also take this opportunity to place on record the role of State Government in the development of spices in the State. Special emphasis was given for spices development in the 'Agricultural Development Policy' announced recently by the Government. A separate status was given to the Districts of Idukki and Wynad where cardamom, black pepper, tree spices and ginger are grown extensively. The Government proposes to give special attention in implementing spices development programmes in these districts. For increasing the area and production of black pepper, a scheme for planting black pepper vines, in all the available trees suited as standards was implemented in 200 selected panchayats last year. This year it would be extended to 200 more panchayats. A massive rehabilitation scheme to save black pepper cultivation from the devastating fungal disease in major black pepper tracts was also taken up by the Agricultural Department. An area of 9500 hectares of black pepper gardens were rehabilitated last year.

Special emphasis has also been given for production and distribution of black pepper and tree spices like nutmeg and clove. The Government has also come forward to help spices farmers by providing production inputs at subsidised rates and also by purchase of produce from small growers. Apart from these relief measures, a

"Agricultural Price Support Fund" has also been set up for market intervention and implementing support price for agricultural commodities. This will surely raise the confidence of small growers especially for annual spice crops like ginger, turmeric etc. The cost of cultivation could be reduced to a great extent by implementing schemes through group activity especially in crops like black pepper. Along with these activities, special thrust has to be given for post harvest technology and product diversification for competing in the international market.

I feel very happy for giving me an opportunity to meet you all in this Group Meeting and I specially thank the organisers for conducting the same at this crucial juncture.

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PRESIDENTIAL ADDRESS BY DR. K.L. CHADHA
DEPUTY DIRECTOR GENERAL (HORTICULTURE), ICAR

The Hon'ble Minister for Agriculture, Govt. of Kerala Shri P.P.George, Dr.A.M.Michael, Vice Chancellor, Kerala Agricultural University, my esteemed colleagues and Scientists,

It gives me immense pleasure to preside over this important XII National Group Meeting of Spices Workers. The occasion becomes more important that this Group Meeting is inaugurated by the Hon. Minister for Agriculture, Shri P.P. George whose commitment towards development of agriculture especially spices is well known. His presence adds significance to this National Meeting of spices workers organised in Kerala, the 'Spice Garden of India'. The combined All India Coordinated Research Project on Spices and Cashew was started in 1971 during IV Plan. The present AICRP exclusively on spices was initiated in 1986. It operates in 16 centres with a total scientific manpower of 41, spread over 10 states. Eleven state Agricultural Universities participate in the project. Twelve spice crops are studied under 75 experiments, with 35 in Crop improvement, 20 each in Crop Production and Crop Protection aspects. During 1991-92 an amount of Rs.29.5 lakhs was spent for the project. The VIII Plan allocation is Rs.300 lakhs.

Production of spices in India during 1991-92 showed an increase in black pepper (16.37%), cardamom (5.2%), ginger (5.04%), turmeric (0.35%), cumin (11.42%), fennel (1.12%), fenugreek (3.86%), clove (8.7%) and nutmeg (201.89%) over 1990-91. During 91-92, India produced spices worth Rs.5210 crores. The year 92-93 witnessed an increase in export in rupee terms (Rs.383.06 crores) though there was decline in quantity (-6%) and value in dollar terms (-12%). Export increased in value terms for pepper (12%), large cardamom (70%), turmeric (47%), coriander (67%), cumin (100%), fennel (75%), fenugreek (23%), other spices (84%), curry powder (20%) and spice oils and oleoresin (17%) over 91-92 export figures. There was reduction in export of small cardamom, chilli, ginger, celery, other seed spices and garlic. World trade of spices in 92-93 was 4.5 lakh tonnes valued at US $ 1500 million and India's share was 1.23 lakh tonnes (27%) valued US $ 131 million (9%). The export target of spices during 93-94 is 1.5 lakh tonnes valued Rs.500 crores. To achieve

the target, an increase by 22% in export of spices is imperative. Based on the projected growth rate assumed by the International Trade Centre, the world import of spices if likely to touch 6.25 lakh tonnes by 2001 AD. This is expected to be of the value of US $ 2200 to 3000. The report of the Forum for increasing Export of Spices targets 25% of the market in value terms by India. To achieve the above objective, we need to make time-bound programmes for research towards attaining quality improvement, value addition, packaging, market promotion and crisis management. Our failure in export of spices was mainly due to non-competitive pricing and fluctuating and non-reliable supply. Increasing productivity per unit area is the alternative to ensure higher income to our farmers. Our strength to achieve the target of getting 25% of the market in value terms lies in a large number of spices we grow, a substantial breakthrough is needed in production technologies in the 64 different agro-climatic zones spread in the country. The potential of all zones to grow spices and above all effort of well-trained and experienced scientific man power and committed farmers are needed.

India has so far been concentrating on bulk production and distribution of spices. Oils and oleoresins, spice powders and mixed spices in consumer packs have come to stay. New products like dehydrated green pepper, freezed dry green pepper, frozen green pepper, sterilised spices etc. are entering the market. It is possible to target a 30 per cent annual growth rate in oils and oleoresin provided production and research back-up are ensured. High curcumin turmeric, high colour paprika, light pepper, fibre less ginger etc. are a few desirable spice types.

Policy to boost production and export of spices

Investment in spice production under Central Sector Schemes was only Rs.5.74 crores during 91-92 and is now enhanced to Rs.150 crores during 92-97 (VIII Plan). Out of this, Rs.50 crores are earmarked for spices development in Kerala alone. Measures are taken to form spices districts (Idukki and Wynad), small farmers' agro-business consortium, Indian spices logo and brand promotion, market intervention and special subsidies during 93-94. These policy measures and financial commitments would raise the growth rate of 4% in VII Plan to targeted 10% in the VIII Plan.

Research attainments and future programmes

Considerable increase in productivity has been achieved due to research efforts in pepper, ginger, turmeric, cardamom and seed spices. Through the All India Coordinated Research Project on Spices, 5 high-yielding varieties and hybrids in black pepper, 5 in small cardamom, 3 in ginger, 12 in turmeric, 11 in coriander, 3 in cumin, 4 in fennel and 4 in fenugreek are released. The national average yield of pepper is 290 while yield at research station is 2445 kg/ha. In cardamom, the national average yield is 75 kg while yield at research station is 450 kg. In ginger, national average yield is 2421 kg whereas in research station, it is 8250 kg. Yield gaps between national average yield and highest yield recorded is 1.72 in coriander, 5.15 in cumin and 1.92 in fennel. The immediate need is effective transfer of technology from research stations to the farmers' fields. Attempts are also made to identify main production constraints and work out appropriate economic production strategies.

Development of rapid multiplication methods in black pepper, Piper colubrinum, P. nigrum grafts to withstand constraints, bush pepper development, evaluation of segregating progenies of Piper nigrum, synthesis and utility of aneuploids and euploids in P. nigrum, heterosis breeding for ideo-types, utilisation of P. colubrinum to transfer resistance to Phytophthora foot rot and nematodes, standardization of tissue and cell culture techniques in P. nigrum and P. colubrinum, induction of somaclonal variations for disease resistance and their utilisation, evolving drought and shade tolerant lines, and biochemical bases of disease and pest resistance are a few areas of research, demanding immediate attention.

In small cardamom, projects on intercultivar hybridization and selection for evolving high yielding and high quality lines, breeding for disease resistance, propagation studies, breeding for ideotypes, quality analysis etc. are continued. Induction of fertility and seed set through polyploidy and mutations, screening and evaluation of germplasm for pest and disease resistance, induction of somaclonal variations, establishment of cell culture systems and quality analyses are areas of research in ginger. In turmeric, breeding for high yield and high quality and studies on rhizome development are to be pursued.

India imports tree spices, worth Rs.25 crores annually. Need for strengthening research on these spices is therefore felt. Nutmeg and cinnamon are now included in the All India Coordinated Research Project on Spices. These tree spices and the allspice are receiving special attention for vegetative propagation. Evaluation of epicotyl grafts in nutmeg, approach grafts in clove and cuttage in cinnamon are in progress at National Research Centre for Spices at Calicut.

Input requirements of spices for optimum production under intensive cultivation in different cropping systems have to be worked out. Nutritional, water and micro-climate requirements and their interaction, micro nutrient studies etc. of black pepper, small cardamom, ginger, turmeric, nutmeg, clove, cinnamon and allspice need to be determined. Organic and eco-spices fetch better returns. This necessitates emphasis on organic farming and related aspects. Spices farmers in Kerala and Karnataka are small land holders practising a multiple cropping system. Coffee-cardamom, coffee-pepper, coffee-cardamom-pepper, coffee-clove-nutmeg-allspice, coffee-pepper-cardamom-tree spices etc. are a few of the predominant cropping systems. Arecanut and coconut-based spices cropping systems are also commonly followed. Research needs of the above systems are to be met to realise maximum returns per unit of space.

Spices are attacked by an array of insect pests and nematodes, 'Pollu beetle' top shoot borer and coccids in black pepper, shoot and capsule borer and root grubs in cardamom and shoot borer in ginger are a few of the major pests. Nematodes Radopholus similis and Meloidogyne incognita are equally damaging to spices. Evaluation of spices for sources of resistance/tolerance to major pests/nematodes, biological control and use of pheromones in pest control and management of crop combinations and rotations to minimise insect damage are to be pursued.

Phytophthora foot rot, 'pollu' disease, slow decline and stunted disease in black pepper, 'katte', rhizome rot, 'kokke kunt' and Nilgiris necrosis' in small cardamom, rhizome rot, leaf spot (Phyllosticta) and bacterial wilt in ginger continue to be major diseases. Biology and ecology of diseases, extraction and characterisation of plant-based antifungal compounds to manage Phytophthora foot rot of black pepper, development of integrated disease management, studies on flower fall in nutmeg and clove and

management of pests and diseases of seed spices through biological means are areas for concerted research.

Production of breeders/nucleus planting materials, rapid multiplication of elite planting materials, t raining of trainees and farmers in high production technology in black pepper and cardamom etc. are a few of transfer of technology activities to be pursued.

Environment-friendly spice culture

Organic spices fetch premium prices. Use of plant protection chemicals leads to residual toxicity in spice products. Bio control of pests and diseases is another area, where useful information need to be generated.

The National Group Meeting of Workers of the All India Coordinated Research Project on Spices would be deliberating on these vital issues. Time-bound technical programmes need to be formulated and implemented. I wish the deliberations grand success. I look upon the Scientists working in the project for a committed time-bound approach to bring back India to the pride of place it deserves as a global leader in spices.

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Technical Session I	:	**CROP IMPROVEMENT, PHYSIOLOGY & BIOCHEMISTRY**
Chairman	:	Dr.M.K.NAIR
Rapporteurs	:	Dr.B.SASIKUMAR Dr.K.K.IBRAHIM

Technical Session I : CROP IMPROVEMENT, PHYSIOLOGY & BIOCHEMISTRY

1. Number of papers presented : 44

2. Centres where work was done : 14 Centres and 3 participating centres

3. Non-performing centres if any : Nil

4. Brief description of the work done and salient results reported :

Black pepper : Cultures 239, 54 and 331 gave highest yields in the MLT during the last four years at Panniyur. Among the open pollinated (OP) progenies Cul.1558, Cul.5128, Cul.5834 are promising at Panniyur.

Cardamom : High yielding selections in cardamom viz., P-3 and PC-5 are under pre-release multiplication. Other cardamom clones Cl-692, P-20, Cl-683, Cl-802 at Mudigere, APG-7, YC-14, YC-1 at Yercaud, PTS-10, PV-4, PV-12 and PV-3 at Pampadumpara are promising.

Ginger : The V_1E_4-4 a vegetative mutant in ginger is quite promising at Pottangi, Ginger collections viz., SG-674, SG-547 and SG-666 at Pottangi, SG-547 and V_1S_1-2 at Solan are promising.

Turmeric : High yielding turmeric mutant PTS-19 (OUAT) and TC-2 (TNAU) are in the process of pre-release multiplication.

Seed Spices : Promising lines in Coriander, fenugreek, cumin & fennel were identified in MLTs.

RECOMMENDATIONS / DECISIONS

I. BLACK PEPPER

1) The Chintapalli centre will collect planting material from

NRCS, Calicut immediately for MLT gap filling

2) The MLT-IV (1991) will be laid out at all the Centres

3) Promising cultures under MLT should be evaluated in farmers' fields besides being evaluated at the Research Station

4) Experiments already identified under MLTs (1993) should be started at (Chintapalli and Thadiyankudisai). Scientist from Thadiyankudisai requested for the allotment of MLT-IV (1991). (Action : TNAU / NRCS / Panniyur)

5) Thadiyankudisai will be a participating centre

II. CARDAMOM

1) Multilocation trial (MLT-II 1988)
This trial will be initiated at Pampadumpara in 1994

2) Hybridization and selection experiment at Mudigere
Five suckers each of the four superior lines will be given to NRCS by Mudigere for micropropagation (Mudigere)

3) MLT series-III (1991) with Malabar types will be taken up at ICRI and RRS Thadiyankudisai in the current season

4) For MLT series-III (1991) with Mysore types, the planting materials will be supplied to Appangala from Myladumpara (Action: Myladumpara)

III. LARGE CARDAMOM

1) A Group Meeting will be conducted preferably at Gangtok during 1994 to chalk out the detailed technical programme (Directors, NRCS / DCASD)

IV. GINGER

1) In initial evaluation trial of ginger at Solan, the fibre content and dry recovery should be evaluated

2) The conversion data of ginger yield from experiments of Pottangi will be checked (Project Coordinator)

V. TURMERIC

1) Turmeric samples from initial evaluation trial at Pottangi will be sent to Solan for estimating curcumin (Pottangi & Solan)

2) Turmeric dry recovery will also be recorded at Pottangi

3) High curcumin varieties will be tested at Jagtial & Pottangi centres

4) The Solan centre will work only on ginger. No new experiment on turmeric need be taken at Solan (Solan)

5) All centres will send samples to NRCS for quality evaluation

6) There was a request for treating Bhavanisagar as a voluntary centre for Turmeric. The Workshop approved the proposal (Action : ADG PC).

VI. CORIANDER

1) IET and MLT (1989). Samples will be sent to TNAU, Coimbatore for evaluation of varieties for oil content (Action : All Centres)

2) Stability analysis is to be done on the four year data and results to be reported (Action : Guntur)

3) MLT-I (1989) : At all Centres where the MLT is conducted for four years, it will be concluded and a new MLT started. A committee constituted under the chairmanship of Dr.Irulappan, Dean (Hort.), TNAU will finalise the varieties and other details of IET & CYT Experiments in seed spices.

VII. CUMIN

1) The MLT-I (1989) will be continued for one more year and performance evaluated (Jobner & Jagudan)

2) Hisar will cease to be a Centre for research on cumin in view of high disease incidence

3) Inclusion of celery at Hisar will be discussed at the Plenary Session

VIII. FENNEL

1) The MLT-I (1989) will be continued for one more year and performance evaluated (Jobner, Jagudan and Hisar)

IX. FENUGREEK

1) IET be continued for one more year and performance evaluated (Coimbatore)

2) From the four years yield data of MLT-I 1989 at Jobner, yield during the poor season should be deleted and re-analysed to see if any worthwhile information can be derived.

3) At Jagudan, the data on pooled analysis of variance may be re-examined.

4) The MLT at Guntur is to be concluded and final report submitted to PC (Guntur)

5) A Committee constituted under the chairmanship of the Dean of Horticulture, TNAU will finalise the varieties and details of a new MLT.

5. Recommendations ready for transfer to extension agency, if any) Suitable varieties have been proposed for release in Session-VI - Variety Release

6. Programme proposed for next year

a) Ongoing experiments : All the ongoing experiments will continue except the ones which are recommended to be closed

b) New experiments :

I. Coriander

1) Initial Evaluation Trial
First maintain germplasm for two years and then promote cultures for IET. The experiment will be laid out in the following Centres: Jobner, Jagudan, Guntur, Hisar, Dholi, Coimbatore.

No. of entries : 9 lines + control (recently released variety of respective centre as control)

Design : RBD with 3 replications
Plot size : 30 x 10 cm (3 rows/each entry)

Observations :

1) Days to 50% flowering
2) Plant height
3) No. of branches
4) No.of umbels/plant
5) No. of umbelets/umbel
6) No. of seeds/umbel
7) Reaction to pests and diseases
8) Yield/plot/ha
9) Oil content
10) Days to maturity
11) Percentage of splitting
12) Weight of 1000 seeds

2) Comparative Yield Trial :

The experiment will be laid out in the following Centres: Jobner, Jagudan, Guntur, Hisar, Dholi and Coimbatore.
No. of entries : 10 + 1 check = 11
(Each centre will give 2 promising entries from their IET)
Design and Observation : Same as in IET

Entries

1) CC 462
2) CC 964
3) ATP 77
4) ATP 102
5) DH 36
6) DH 38
7) JCO 64
8) JCO 123
9) UD 446
10) UD 447
11) Check

3) CYT for Green (leafy) types

The experiment will be laid out in the following Centres :
Coimbatore, Dholi, Guntur
No. of entries : 12 (11 + 1 local)
Design : RBD
Replication : Three
5 Entries from Jagudan
6 Entries from Jobner

Observations : 1) Plant height at 45 DAS
2) Green yield
3) Nutrient content
4) Productivity (per day) and economics

4) Mutation breeding in Coriander :

The two centres Coimbatore & Jobner will Continue the experiment

II. CUMIN

The following experiment will be laid out at the two Centres : Jobner & Jagudan

1) Germplasm
2) IET - 9+1 (Local check) (Jagudan centre)
3) CYT - Ongoing trial will be continued
(and the design and observations as in the previous case)

III. FENNEL

The experiment will be laid out at all centres : Jobner, Jagudan & Hisar

1) Germplasm : Only Jagudan centre
2) IET : Only Jagudan centre
3) CYT : Jobner & Jagudan will continue the trial (Hisar will continue this experiment for one more year)

IV. FENUGREEK

The experiment will be laid out in the following centres : Jobner, Jagudan, Guntur, Coimbatore, Hisar and Dholi

1) Germplasm : For all centres
2) CYT : No. of entries (8 + 1)
   1) CF 169
   2) CF 390
   3) HM 103
   4) HM 141
   5) J Fenu 145

6) J Fenu 149
7) UM 143
8) UM 144
9) Check

Plot size : 4.0 x 2.4 m
Design : RBD with three replications

3) Mutation breeding : Jobner and Coimbatore

V. CELERY

Hisar & Solan centre will collect germplasm and carry out evaluation

GENERAL DECISIONS :

1) Special items of work identified (not under Co-ordinated Project) are:

   a) Jagudan centre will initiate breeding in Cumin and Fennel
   b) Guntur centre will take breeding work in Coriander (composite of early varieties)
   c) Dholi centre may also work on (Nigella sativa (Black cumin) and Omum (Ajowan)

2) Next group meeting (Scientists) on seed spices will be held at Hisar in 1994 before the harvest of crop.

3) Action taken on the recommendations of the XI Workshop will be discussed while presenting the report of the concerned centres.

FUTURE THRUST

1) The promising cultures of black pepper are to be evaluated for their quality parameters and disease resistance. Only those cultures with high quality parameters (piperine and oleoresins, oil) are to be included in the comparative yield evaluation trials (All pepper centres)

2) Efforts are to be directed to breed varieties for tolerance to

'kette' disease (Mudigere & Sakleshpur)

3) Evaluation of ginger varieties are facing problems in traditional areas, due to soft rot disease, and therefore must be evaluated in non-traditional areas. Ten promising varieties under test at NRCS will be given to Pottangi (NRCS).

4) In view of the large number of high yielding varieties released in turmeric, there is a need to concentrate on developing varieties preferred by importers (high curcumin content) (Action : Turmeric centres)

5) Breeding for resistance should receive top priority in grain spices as even yield evaluation trials are not giving conclusive results due to wilt disease of coriander and blight of cumin (Jobner & Jagudan).

6) Leafy spices (Coriander & fenugreek varieties) will receive increased attention. All the centres can identify the varieties and lay out MLTs to identify the leaf type (Coimbatore & Jobner).

7) Tree spices research will also receive priority.

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Technical Session II	:	**GENETIC RESOURCES**
Chairman	:	Dr.K.V.PETER
Rapporteurs	:	Dr.S.L.DASHORA Mr.B.KRISHNAMOORTHY

Technical Session II : **GENETIC RESOURCES**

1. Number of papers presented : 13

2. Centres where work was done : 15

3. Non-performing centres if any : Nil

4. Brief description of work done and salient results reported :

1) BLACK PEPPER : Panniyur centre has 193 collections, Sirsi 50, Chintapalli 29 and Yercaud 102. The 117 wild pepper germplasm from Panniyur (KAU) has been shifted to RARS Ambalavayal (KAU). Panniyur centre has identified KM-I, KM-111 and Sullia as promising black pepper accessions.

2) CARDAMOM : Mudigere, Pampadumpara and Yercaud have 245, 87 and 35 accessions respectively. Accessions PV-34 and PV-35 are reported to be superior at Pampadumpara. At Mudigere CL-683, CL-692, 83(A) and P-15 were found to be superior in giving maximum suckers/ plant.

3) GINGER : Pottangi has 146 and Solan 152 collections. At Pottangi Rajgarh Local and Sisaguda local were identified as the most promising ones.

4) TURMERIC : Pottangi has 186, Solan 146 and Jagtial 147 entries. At Pottangi out of 139 collections evaluated, Ventimtitta of C. aromatica and CAM-3 among C. amada were found to be most promising.

5) SEED SPICES : In cumin, Jobner has 220 and Jagudan 272 collections, in coriander germplasm, collections of 445, 445. 120, 189 at Jobner, Jagudan, Guntur and Coimbatore respectively are being maintained. A germplasm collection of 84 and 287 in fennel are being maintained at Jobner and Jagudan centres. They have 142 and 183 fenugreek collections, followed by Coimbatore with 104 and Guntur 70 accessions.

In coriander, 3 accessions from Jobner and 12 accessions from Jagudan were identified as promising. Seven accessions in cumin were identified as promising at Jobner. At Jagudan, 4 exotic accessions were identified as resistant to wilt. In fennel 6 accessions were found to be most promising at Jobner. 19 entries were identified in fenugreek as having low incidence of powdery mildew, while 7 showed low incidence of root rot at Jobner including the mutant obtained from Tamil Nadu. At Guntur, Lam Selection-1 recorded best. Acc.258 recorded maximum yield at Coimbatore.

6) TREE SPICES : Elite trees of clove and nutmeg were identified by the Yercaud centre.

RECOMMENDATIONS / DECISIONS

I. BLACK PEPPER

1) A joint team of Scientists from KAU, UAS and NRCS may be formed for collection of pepper wild type. In Kerala (NRCS, KAU), Karnataka (NRCS, UAS), in Tamil Nadu (NRCS & TNAU). If NBPGR is willing to join they may also be included. An alternative centre for cultivated germplasm will be at Panniyur, other centres (other than NRCS) and Panniyur will be concentrated on wild collection. (Action : NRCS, KAU, NBPGR, Project Coordinator).

II. CARDAMOM

1) Breeding for 'Katte' tolerance: Work on 'Katte' disease tolerance with special emphasis on 'Natural Katte Escapes' has to be intensified (Action : Saklespur, Appangala, Mudigere)

III. GINGER

1) At Pottangi, 10-15 promising accessions may be evaluated having low fibre and high oleoresin content. Promising 10 lines from National Research Centre for Spices may be tested there. Pottangi may be a lead centre for ginger germplasm.

IV. TURMERIC

Work on turmeric may be discontinued at Solan.

V. CORIANDER

Oil content may be estimated from germplasm accessions for identifying quality accessions. The Centres will send samples to Coimbatore (Action : concerned Centres).

VI. CUMIN

Four wilt resistant lines identified at Jagudan may be tested at Jobner. The materials will be supplied by Jagudan centre.

VII. FENUGREEK

In fenugreek, Guntur and Coimbatore centres will work on vegetable type of fenugreek.

VIII. TREE SPICES

Discussions may be held with the Tree Spices Breeder at National Research Centre for Spices, Calicut regarding elite trees identification. The Director of Horticulture & Plantation Crops, Govt. of Tamil Nadu will permit the TNAU to collect the required scion and root stock materials from the mother trees available at State Horticulture farm at Kallar-Burliar and Courtallam for vegetative propagation of nutmeg in a large scale (Action : Yercaud).

Future thrust

Wild pepper collections would be strengthened to identify source of resistance to *Phytophthora* foot rot and burrowing nematode (*Radopholus similis*).

Cardamom germplasm would be further enriched by natural *Katte* escapes, *Kokke kundu* (Mudigere, Saklespur, Appangala)

Ginger germplasm would be evaluated for low fibre content, high oleoresin and resistance to soft rot (Solan & Pottangi)

High curcumin lines in turmeric with higher driage would be further collected. (Action : NRCS, Jagtial, Pottangi)

Seed Spices germplasm needs enrichment by introduction from Bulgaria, Morocco etc. (Action : NRCS, NBPGR, PC)

Tree spices need enrichment by exotic introduction (Action : NRCS / NBPGR).

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Technical Session III	:	**PLANT PROTECTION (PATHOLOGY & ENTOMOLOGY)**
Chairman	:	Dr.C.C.ABRAHAM
Co-Chairman	:	Dr.K.I.WILSON
Rapporteurs	:	Dr.M.N.VENUGOPAL Dr.G.N.DAKE

Technical Session III : **PLANT PROTECTION (PATHOLOGY & ENTOMOLOGY)**

1. Number of papers presented : Except ICAR Research Complex, Gangtok all the centres participated and presented their reports

2. Centres where work was done : 9 centres

3. Non-performing centres, if any : Nil

4. Brief description of work done and salient results reported : Scientists from various Coordinating Centres presented the present status and progress of work and were discussed at length

RECOMMENDATIONS / DECISIONS

I. BLACK PEPPER

1) The ongoing experiments on Foot rot and nematode management are to be continued. In the meanwhile it is necessary to review all the present experimental programmes thoroughly to decide upon the future experimental strategy for various centres. In all experiments the cost benefit (C/B) ratios are to be invariably worked out to assess the economic implications of adoption of the various technologies.

2) In foot rot disease management, review of the existing recommendations of pasting collar region of pepper with Bordeaux paste up to 1 metre above ground level is needed. The available data on this may be reviewed and appropriate decision taken (Action FC).

A group meeting of Phytophthora workers is to be convened immediately to review the present disease management strategy and to formulate a new programme to develop low cost disease management technology. (Action : PC / NRCS).

3) Experiments on the bio-control of foot rot using Trichoderma sp. is to be intensified and pursued actively with a view to develop control strategies. (Action : Concerned centres).

4) Approved nomenclature (foot-rot; slow decline etc.) to describe the diseases will have to be used while reporting the result. The technical programme is to be followed uniformly in all the Centres.

5) In fungicide/insecticide evaluation trials, yield data is to be provided wherever needed. The C/B ratios are to be worked out to the extend possible. (Action : Pepper centres).

6) A well knit group management for pepper diseases is to be formed by integrating crop intensive programme in view of various developmental agencies taking up the programme, viz., Directorate of Arecanut, Cocoa and Spices Development / Department of Agriculture/Horticultue, Spices Board and NABARD. (Action : DCASD).

7) Experimentation on Phytophthora foot-rot and nematode management will continue for two more years in all the three coordinating centres.

8) The field trial for the control of 'slow wilt' disease will be concluded after collecting this years data including yield (Action : Panniyur).

9) The studies on the control of nursery diseases may be continued for one more year at Panniyur. Sirsi centre should start the experiment in the coming nursery season (Action : Panniyur / Sirsi).

10) In the pest infestation survey, intensity of the incidence is to be quantified properly by adopting proper grading scales (Action : Mudigere, Pampadumpara).

11) The work on chemical control of insect pest at Pampadumpara is to be undertaken in the ensuing season (Action : Pampadumpara).

II. CARDAMOM

1) There is no progress on the studies on screening of cardamom varieties for resistance to the Katte disease, at Mudigere due to the non-availability of Plant Pathology staff in the centre. The Project Coordinator may take up the matter with the UAS authorities and expedite positioning of staff at the earliest (Action : PC).

2) In few clones (D-163, D-547, D-446 and D-514) sources of resistance to the thrips and the shoot borer have been identified at the Mudigere centre. This work is to be purused actively, and extended to the Pampadumpara centre also. (Action : PC / Pampadumpara).

3) Predatory fauna associated with Scicthrips cardamomi have been identified at Mudigere. Their predatory potential and amenability to large scale rearing are to be studied. Survey for natural enemies of the thrips is to be taken up at Pampadumpara also (Action : Mudigere & Pampadumpara).

III. GINGER

1) At NRCS, it is reported that seed treatment with Metalaxyl Mancozeb combination effectively controlled the soft rot disease. The data so far generated on seed treatment experiments may be examined and suitable recommendations formulated (Action : PC).

2) The technical programme on biological control of rhizome rot of ginger was approved for Solan centre (Action : Solan).

IV. CORIANDER

1) Fungicidal trial on grain mould control has been concluded. The recommendation of applying Carbendazim at 0.1% for the control of diseased is ready for transfer.

2) The experimental procedure for screening coriander varieties against Meloidogyne incognita has to be adopted in the Jobner, Jagudan and Coimbatore centres uniformly. The population loads of juveniles of nematodes for inoculation are to be specified for adoption (Action : PC).

V. CUMIN

1) The results on seed treatment of cumin with carbendazim for control of the cumin wilt are conclusive and proper recommendations are ready for transfer (Action : PC).

2) The three year crop rotation involving cluster bean - cumin-cluster bean - wheat - cluster bean - gram - cluster bean - mustard is found to reduce the incidence of cumin wilt. The data are convincing and the recommendation is ready for transfer.

GENERAL RECOMMENDATION

1) In view of great concern for reducing the pesticide residues in spices and spices products, it is strongly felt that a co-ordinating centre of the AICRP on Pesticide Residues may be established in the NRCS Kozhikode.

2) Infrastructure for pesticide residue assay may be established at least in selected centres. Facilities for microbioassay using Drosophila melanogaster may be developed in centres where Entomology staff positions are available or likely to become available.

3) Sulphur residues in coriander samples above the permissible values have been reported in certain cases. This is most probably be due to fumigation conducted with sulphur dioxide fumes. The pest and microbial spoilage problems in coriander and other spices may be taken up for studies at selected centres. In all these cases the terminal residue hazards may be assessed.

4) The beneficial effects of neem cake application for the management of nematodes and Phytophthora in black pepper are reported from Coordinating centres. More in-depth studies are required on this aspect to evaluate its effect on the burrowing and root knot nematode population and also on the soil population of Phytophthora in relation to beneficial fungi like Trichoderma, Mycorhizae etc.

5) Collaborative programmes on the post-harvest technology with reference to storage pests and diseases may be initiated.

5. Recommendations ready for transfer to extension agency, if any :

Coriander

* Chemical control of grain mould by spraying with carbendazim (0.1%) after 20 days of flowering significantly reduces grain mould of coriander (Coimbatore centre).

Cumin

* Management of cumin wilt
  Seed treatment : In three years trial seed dressing with Bavistin and Carbendazim (0.1%) consistently reduced the wilt incidence (Jobner centre)
* Crop rotation for reducing cumin wilt : In the cumin wilt hot spots areas a 3 years crop rotation of cluster bean, cumin, cluster beans wheat, cluster bean and mustard can be followed to effectively reduce the wilt incidence (Jobner centre).

6. Programme proposed for the next year : Already indicated

7. General remarks : Nil

Future thrust

1) Varieties/cultures identified as tolerant/resistant to pests and diseases should be tested under heavy inoculum pressure of respective organism(s) under congenial weather conditions.

2) Work on biocontrol of pests and diseases needs a great deal of stress and implications.

3) Use of biocontrol for pest and disease management

4) Residue analysis for the pesticides in spices & spice products.

5) Collaborative work on post harvest spoilage of spices and spice products due to insects/mites/diseases.

6) Development of integrated pest and disease management technologies.

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Technical Session IV	:	**GROUP DISCUSSION ON PLANTING MATERIAL PRODUCTION & DISTRIBUTION OF SPICES**
General Chairman	:	Dr.P.RETHINAM
Chairman	:	Mr.E.VELAPPAN
Co-Chairman	:	Mr.UJGAR SINGH
Rapporteurs	:	Dr.K.SIVARAMAN Dr.V.KRISHNAKUMAR

Technical Session IV : **GROUP DISCUSSION ON PLANTING MATERIAL PRODUCTION & DISTRIBUTION OF SPICES**

The Chairman in his introductory remark outlined about the development programmes of Directorate of Cocoa, Arecanut and Spices Development, under Ministry of Agriculture and briefly outlined the three tier system of developmental programmes undertaken by the Directorate. It was emphasized that only high yielding and proven varieties of spices will be utilised for multiplication and distribution.

Mr. Ujgar Singh, Director of Horticulture, Tamil Nadu briefly outlined the requirement of planting materials of the state. It was also agreed that only the varieties of pepper released from NRCS/KAU will be utilised for multiplication.

Mr. Mathew Philip, Joint Director of Agriculture (Spices), Kerala outlined the activities undertaken by the Government of Kerala regarding distribution of planting materials of spices.

Similarly officials from Governments of Andhra Pradesh, Haryana and Madhya Pradesh briefly outlined the problems involved in the mutiplication and distribution of the planting materials of spices in their respective states.

Mr.Sharma of NABARD explained about the various facilities available in the NABARD like loan for developmental programmes, R & D grants and training programmes etc. for the improvement in spices production in our country.

Dr.C.K.George, Executive Director, Spices Board presented the details of various schemes implemented by them for meeting the requirement of planting materials of spice crops such as pepper, cardamom, ginger, vanilla and large cardamom.

The following are the recommendations emanated from the deliberations in the group meeting.

RECOMMENDATIONS / DECISIONS

1) The nucleus planting materials produced at the SAUs and ICAR Institutes should be utilized fully by the Development Departments for further multiplication and distribution. The material produced should be taken delivery by the Development departments without any delay to avoid damage in the nursery/storage.

2) As far as possible, for large scale multiplication, the nucleus material of the improved varieties should be utilized to the maximum extent.

3) The exchange of nucleus planting materials of different varieties should be facilitated among the implementing agencies.

4) Since large number of demonstration plots are being laid out with improved varieties under Central Sector Scheme, development departments should attempt to recover planting materials from such plots for further distribution.

5) In clove, large scale production of seedlings may be continued.

6) In the case of nutmeg, only grafts will be produced under Central Sector Scheme for which sufficient number of scion blocks should be established. Mother trees at Kallar-Burliyar & Courtallam will be utilised for making grafts.

7) Institutional finance available from NABARD may be availed of for setting up of nurseries under private sector, for which nucleus material should be obtained from SAUs and ICAR institutions.

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Special Session	:	MULTILOCATIONAL CESS FUND PROJECT ON RHIZOME ROT OF GINGER
Chairman	:	Dr.K.MIDHA
Rapporteurs	:	Dr.G.N.DAKE Mr.M.N.VENUGOPAL

Special Session : **MULTILOCATIONAL CESS FUND PROJECT ON RHIZOME ROT OF GINGER**

The following represented :

1. Dr.S.K.Midha, Principal Scientist (Plant Protection), Indian Council of Agricultural Research, New Delhi
2. Dr.Y.R.Sarma, Principal Scientist (Plant Pathology) National Research Centre for Spices, Calicut
3. Dr.N.P.Dohroo, Dr.Y.S.Parmar Univ. of Horticulture & Forestry, Solan
4. Dr.P.K.Koshy, Principal Scientist & Acting Joint Director CPCRI Regional Station, Kayamkulam
5. Dr.K.V.Ramana, Senior Scientist NRCS, Calicut
6. Dr.M.N.Venugopal, Senior Scientist NRCS, Appangala
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9. Mr.P.Balakrishnan, Research Associate NRCS, Calicut
10. Mr.N.M.Usman, Research Associate NRCS, Calicut

Dr. Midha in his introductory remarks indicated that the project has come to an end by 30th June 1993 at Solan and the Udaipur centre will be completing 3 years by September 1993. Since the work at Bhubaneswar did not progress on the specified technical programme, that also will cease during November 1993. The reports were presented both by Dr.Sarma and Dr. Dohroo. Dr. Lodha from Udaipur and Dr. C.C.Rath from Bhubaneswar could not attend the meeting. Based on the results obtained at two centres ie., Calicut and Solan, good leads have been obtained specifically on the biological aspect of rhizome rot of ginger. In all the three centres ie, Calicut, Udaipur and Solan, the etiological agents involved in rhizome rot and the nature of infection have been clearly established. However, their interaction with nematodes needs indepth study in future. Although the efficacy of biocontrol agents has been promising in the Institute field trials, there

is an urgent necessity to develop appropriate delivery systems for large scale field evaluation under the farmers' condition. The information is also available about the compatibility of biocontrol agents especially Trichoderma with systematic fungicide Ridomil; thus integrating soil solarisation with a chemical seed treatment as well as biocontrol agents. There is a great prospect to realise the objective of the project on effective integrated disease management. With the cultivars that have been screened for resistance at Calicut as well as Solan, no high degree of resistance has been found. However, healthy seed materials will become an important non-cash input which can be integrated with the above disease management programme. Thus in general, the objectives by an large have been fulfilled except for the large scale demonstration of the efficacy of biocontrol agents. It has been suggested by Dr.Midha that these programmes have to be continued to get meaningful feedback information from Solan and Calicut centres. He also has suggested to bring out a compiled report of all the four centres on the information generated during the three year period of the Project so that the information will be available for future reference.

Pythium aphanidermatum is involved in rhizome rot of ginger in Kerala, Ridomil MZ as a seed treatment has been found effective. Since Trichoderma is compatible with Ridomil an ad hoc recommendation is made for seed treatment with 500 ppm of Ridomil.

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Technical Session V	:	**AGRONOMY & SOIL SCIENCE**
General Chairman	:	Dr.P.RETHINAM
Chairman	:	Dr.I.IRULAPPAN
Co-Chairman	:	Dr.A.I.JOSE
Rapporteurs	:	Dr.K.SIVARAMAN Dr.C.T.ABRAHAM

Technical Session V : AGRONOMY & SOIL SCIENCE

1. No. of papers presented : 11

2. Centres where work was done : 8 Centres

3. Non-performing centres if any : Nil

4. Brief description of work : The progress of work done were presented and discussed

In his opening remarks, the General Chairman observed that the research programmes in Agronomy and Soil Science need re-orientation towards the emerging trends. The Chairman in his introductory remarks emphasized innovative thinking in formulating future research programmes.

RECOMMENDATIONS / DECISIONS

BLACK PEPPER

1) Regarding manuring / fertilizer experiment, leaf and soil analysis is to be done at least once in a year. The Professor and Head, Dept. of Soil Science and Agricultural Chemistry, KAU, Vellanikkara will provide soil and leaf analysis facilities for Panniyur Centre. In future presentation of yield data, the cumulative yield data of the previous years and the data for the reporting year are to be presented. An Adhoc scheme may be prepared for studying soil fertility and nutrient uptake in seed spices (Action : PC).

2) In the irrigation cum fertilizer experiment involving arecanut and pepper at Sirsi centre, incidence of pests, diseases should be recorded.

3) Manurial experiment involving arecanut and pepper at Sirsi centre is to be concluded and the final report send by December 1993 to the Project Coordinator.

CARDAMOM

1) Manurial experiment under artificial shade at Mudigere centre is to be continued for one more year.

2) Completion reports for the experiments conducted on cardamom at HRS, Yercaud are to be sent by December, 1993 to the Project Coordinator.

3) Final report for the manurial trial conducted at Pampadumpara centre is to be sent by December 1993 to the Project Coordinator.

4) The nutrient trial on cardamom at Pampadumpara is to be re-laid with vegetatively propagated material during the current season.

GINGER & TURMERIC

1) The NPK experiment on ginger at Pottangi will be continued for one more year.

2) The soil and plant analysis data are to be presented during the next group meeting (Pottangi and Jagtial).

3) Intercropping trial at Pottangi and Jagtial will be concluded and report sent to Project Coordinator.

4) The crop rotation experiment in turmeric is to continue for one more year at Jagtial.

SEED SPICES

1) The results of all the experiments with full details including data on economics will be presented during seed spices group meeting to be held at Hisar during April 1994.

2) The weed control experimerts conducted on Coriander at Jobner will continue for one more year.

3) The treatments may be modified as unweeded control and the treatments viz., 14, 15 and 16 will be modified as hand weeding once, twice and thrice respectively. Similar modifications may also be made in trial on fennel at Jobner and Hisar.

4) The fertilizer and seed rate trial on fenugreek at Jobner will be concluded and report sent to PC by December 1993.

5) The weed control trial at Jobner will be continued for one more year and details on weed flora (dicots and monocots), weed dry matter, scientific name and population of the weeds are to be recorded.

TREE SPICES

For the trials on drip irrigation and use of bicfertilizers at Yercaud, nutmeg grafts only have to be used.

GENERAL RECOMMENDATIONS

1) Allahabad Agricultural Institute will serve as a Voluntary Centre. The Scientist may also submit an ad hoc scheme on black cumin (Nigella sativa) & Ajowan based on specific problem areas of research.

2) Centre for Water Resources Development and Management (CWRDM), Calicut will serve as Voluntary centre, for studies on water management in spices.

3) Experiments on fertilizer use efficiency and slow release fertilizers are suggested for important spice crops.

4) Organic farming trials on important spices have been suggested under AICRP on Spices

5) Integrated Nutrient Management trials (INM) including bio-fertilizers have been suggested under AICRP on Spices.

6) Cropping system trials involving pepper, tree spices and other crops are suggested under AICRP on Spices.

5. Recommendations ready for transfer to extension agency if any : Technologies developed are mentioned under item No.4

6. Programmes proposed for next year :

a) On-going experiments : Subject to the above decisions the current technical programmes would continue. The Project on Effect of fertilizer application and seed rate on yield of fenugreek has been concluded at Jobner.

b) New experiments

(1) Effect of time of sowing and spacing in fenugreek

Centres : 1) Hisar 2) Dholi
3) Coimbatore

Experimental design : R.B.D.

Replications : 3

Plot size : 4 x 2.4 m

Treatments : a) Date of sowing = 6

i) 5th September 1st Oct.
ii) 20th September 15th Oct.
iii) 5th October 1st Nov.
iv) 20th October 15th Nov.
v) 5th November
vi) 20th November

b) Spacing - 3

i) 15 x 10 cm
ii) 22½ x 10 cm
iii)30 x 10 cm

Observations to be recorded : 1) Plant height 45 days after sowing at flowering and at harvest
2) Days to 50% flowering
3) Number of branches/plant
4) Number of pods/plant
5) Number of seeds/pod
6) Seed yield/plot and/ha
7) Biological yield/ha
8) Harvest index

Variety : Recently released variety of the region

Note : The above dates of sowing have been proposed with respect to the North Western sub-tropical parts of India. Suitable change in the dates may be made in other regions according to the requirement.

(2) Increasing efficiency of fertilizers by use of organics and slow release compounds for black pepper

Objective : To increase the efficiency of applied fertilizers in view of the increase in fertilizer cost.

Centre : Panniyur, Sirsi & Chintapalli

Experiment design : RBD

Replication : 4

Plot size : 9 vines/treatments

Treatments : T_1 - Control

T_2 - NPK fertilizers with organic manure at recommended dose

T_3 - Recommended dose of NPK fertilizers without organic manure

T_4 - Fertilizers @ 1/3 of the recorded dose (Nemin treated urea and organic manure) apply in two splits (June & September)

T_5 - Fertilizers at 1/3 of the recorded dose (Nemin treated urea & organic manure) apply in three splits (June, Aug. & Oct.)

T_6 - Fertilizer at 1/2 of the recorded dose (Nemin treated urea & organic manure) applied in two splits (June & Sept.)

T_7 - Fertilizer at 1/2 of the recorded dost (Nemin treated urea & organic manure) apply in three splits (June, Aug. & Oct.)

Observation to be recorded : Usual morphological and yield data to be collected

Variety : Released variety

Note : Full amount of P for all treatments except control and 10 kg organic manure (FYM)/vine will be applied as basal in the T_2, T_4, T_5, T_6 & T_7 treatments. In T_4, T_5, T_6 & T_7 urea will be treated with 1% Nemin, kept for 24 hrs and applied.

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Technical Session VI	:	**VARIETY RELEASE**
General Chairman	:	Dr.P.RETHINAM
Chairman	:	Dr.C.K.GEORGE
Rapporteurs	:	Dr.H.M.CHANDRAPPA Mr.A.MANOHAR RAO

Technical Session VI : **VARIETY RELEASE**

To discuss the proposals for release of varieties of spices received from different coordinating centres a special technical session was convened. The proforma prescribed by the Central Sub-Committee on crop standards, notification and variety release was followed for presentation.

The data pertaining to the following crops/varieties were presented in the XII Workshop for recommendation for release.

Variety release proposals

Sl. No.	Centre	Crop	Culture No.	Remarks
1.	Panniyur	Pepper	Culture 239	Recommended for Kerala State
2.	ICRI Regional Station Sakleshpur	Cardamom	SKP-14	Recommended for Karnataka State
3.	HAU, Hisar	Coriander	DH-5	Haryana. In A.P.areas where long duration varieties are grown. The duration of the variety is 135 days.
4.	HAU, Hisar	*Fenugreek	HM-57	Haryana

*not recommended for release

a) BLACK PEPPER

1) Culture 239 (Panniyur-5) was proposed by Panniyur Station, KAU, Kerala, and was recommended for release for Kerala State. It is selected from the open pollinated progeny of the local cultivar Perumkodi. Distinguishing morphological

characters are ovate leaf with accuminte tip, shorter internodes. Stipule is faint violet at protandrous nature of flowers. Spike is long, varies from 12cm to 26cm with average green berries of 3.196 kg/vine. Dryage 35.71%, Essential oil 12.33% and piperine content 3.8%. Most distinguishing feature is the Protandrous nature of flowers. Comes up well under monocropping and companion cropping especially with arecanut. Yield potential is 3076 kg/ha @ 1100 vines/ha. Data may be given with regard to litre weight also. It is suitable for growing in all pepper growing tracts of Kerala, and has better ability to survive under drought conditions.

b) CARDAMOM

1) SKP-14 : Proposed by Indian Cardamom Research Institute, Regional Station, Saklespur, Karnataka. Recommended for growing in Karnataka State. It is a Malabar type with long, bold capsules. More than 73% of capsules are above 7.5 mm diameter. Yield recorded is 599 kg/ha under irrigated condition which is 118% more than local check. Under rainfed condition yield is 439 kg/ha (81.4% more than the local check). Data with regard to tolerance to the incidence of thrips may be given.

c) CORIANDER

1) DH-5 : (Hisar Anand). Proposed by Department of vegetable crops, HAU, Haryana. Selected from the indigenous material collected from farmers' field in Karnal district (Haryana). It is a dual purpose, mid-late and high yielding variety with wider adaptability. Average yield under normal conditions ranges from 1400-1600 kg/ha. Data is required on oil content and splitting of the fruits. Recommended for Haryana and A.P. areas where long duration varieties are grown. The duration of the variety is 135 days.

d) FENUGREEK

1) HM-57 : Proposed by Department of Vegetable crops, HAU, Haryana. Selected from the available germplasm collected from Kurukshetra district of Haryana. It is a quick growing dual purpose, and high yielding variety. Average yield under normal conditions ranges from 1600-1800 kg/ha. Not recommended for want of sufficient data.

GENERAL RECOMMENDATIONS

1) 50 vines of each pepper variety 50 clumps of cardamom/ released should be maintained in concerned research station as maximisation plot.

2) A note on Package of practices to be followed for each variety recommended for release may be prepared and annexed with the proposal in future.

3) The small seed samples of varieties proposed for release may be displayed in Workshop in future.

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PLENARY SESSION

Chairman : Dr.P.RETHINAM

Rapporteur : Dr.A.K.SADANANDAN

PLENARY SESSION

The Plenary Session was held on the afternoon of July 28, 1993 under the chairmanship of Dr.P.Rethinam, Asst. Director General (PC). The Chairman in his introductory remarks complimented the project scientists and the coordinator for the exercise done for the last three days under the able guidance of Dr.K.L.Chadha, Deputy Director General (Hort.), ICAR, New Delhi. Further the Chairman also appreciated for having included two Special Sessions one each on "Planting Material Production and Distribution" and other on "Multilocation Cess Fund Project on Rhizome Rot of Ginger" as these two are vital issues in spices production. The house wished that ADG (Plant Protection), ICAR, New Delhi should have participated for an effective discussion on rhizome rot of ginger which is one of the burning problems faced by ginger growers.

The Chairman congratulated the workers for having proposed four new spices varieties one each in pepper, cardamom, coriander and fenugreek for release. Except fenugreek all the three varieties were recommended for release. The Chairman underlined the need to gather scientific information particularly on nutrition management of spices and the need of soil scientists associated with AICRPS programmes. He suggested to prepare an ad-hoc scheme for generating information on nutrition management of spices as there is a 3-4 fold increase in cost of nutrients in the recent past. The house felt that the data generated by each project is to be catalogued properly and the incidence of pests and diseases recorded to get indepth information on the relationship between the treatments and the incidence of pests and diseases.

In order to strengthen the investigation in large cardamom and seed spices in view of the increasing importance of these crops it was proposed to hold separate group meeting one each at Gangtok for large cardamom and other at Hisar to take stock of the problems and formulating detailed technical programmes for seed spices. The Hisar centre offered to hold the meeting at the Haryana Agricultural University, Hisar during April 1994 before the harvest of seed spices crop.

The proceedings of the Technical Sessions in the preceding two and half days and the discussions arrived at along with the recommendations were presented by the respective sessional chairmen/ rapporteurs. Based on the discussion the following decisions and recommendations were emerged.

The technology that were generated for different agro-climatic regions by the investigation of each project, which were recommended for transfer to the farmers, were presented and discussed. The informations in detail are furnished in the report given under each of the technical sessions.

The three spices varieties that were recommended for release are :

Sl. No.	Centre	Crop	Culture No.	Remarks
1.	Panniyur	Pepper	Culture-239	Recommended for Kerala State
2.	ICRI Regional Station, Sakleshpur	Cardamom	SKP-14	Recommended for Karnataka State
3.	HAU, Hisar	Coriander	DH-5	Recommended for Haryana, Andhra Pradesh areas where long duration varieties are grown as duration is 135 days

Based on the discussion the following decisions and recommendations were made:

* The Coordinator shall visit each of the Centres within three months of the conduct of the Workshop for close monitoring of the work.

* Post harvest technology programme may be taken up by AICRPS as the demand for spices in the international market is increasing

* For additional requirement of funds the centres may send detailed request with justification sufficiently in advance.

* The Coordinating Centres will be responsible not only for nucleus seed/seedlings production but also for transfer of technology for adaptive trials.

* A group meeting of Phytophthora workers is to be convened immediatelly to review the present disease management strategy and formulate effective programmes.

* Solan centre will work only on ginger. No new experiment on turmeric need be taken at Solan. The work on turmeric may be discontinued at Solan.

* Hisar and Solan centres will collect Celery germplasm and carry out evaluation, Hisar will cease to be a centre for research on cumin, in view of high disease incidence.

* Dholi centre may also work on black cumin and Ajowan

* Jagudan centre will initiate breeding in cumin and fennel while guntur centre will take breeding work in coriander.

* Guntur and Coimbatore centres will also work on vegetative type of fenugreek.

* Intervarietal hybridisation in pepper at Panniyur may be treated as a University experiment.

* A joint team of scientists from KAU, UAS & NRCS, NBPGR may be formed for collection of pepper wild types.

* All the centres will send samples of turmeric to NRCS for quality evaluation. Seed spices germplasm need enrichment by introduction from Bulgaria, Morocco etc. Tree spices need enrichment by exotic introductions.

* The Workshop approved the proposal of treating Bhavanisagar (TNAU) as a voluntary centre, Allahabad Agricultural University and CWRDM (Calicut) will also serve as voluntary centres.

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D. Spices Board / Indian Cardamom Research Institute

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