PROCEEDINGS OF THE XV WORKSHOP OF THE ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES

18-21 November, 1999
held at
Calicut, Kerala

ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES
CALICUT, KERALA

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Director & Project Coordinator

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Technical Information Officer

15th May 2000

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INTRODUCTION

The XV National Workshop of the All India Coordinated Research Project on Spices (AICRPS) was held under the auspices of Indian Institute of Spices Research, Calicut. Though Calicut is the headquarters for the IISR, the premier Research Institute for Spices in India, and the headquarters for the AICRPS, it is the first time that the Workshop is organised at Calicut. It was a unique opportunity for the Spices workers all over India to come down to Calicut to see the spices state of the Indian continent, and to interact with all the Scientists of IISR.

Dr K.N.S. Nair, Vice Chancellor, Kerala Agricultural University was the Chief Guest. In his inaugural address he stressed the urgent need for monitoring the impact of ecological changes as a result of pepper and cardamom cultivation in the Western Ghats of Kerala and the importance of developing sustainable production technology that is eco-friendly. Dr Nair said that the drastic changes which had taken place in the environment in which pepper and cardamom are traditionally grown, might have an adverse effect on the volume of the production. From coastal areas pepper cultivation had shifted to Western Ghat hills and because of depletion of forest cover the area available for cardamom cultivation is shrinking. He highlighted that the impact of changes due to long term cultivation had to be studied as it may have influence on the ecology of the area, and on the productivity and sustainability of the crop. The Vice Chancellor stressed the need to bring about fast changes and the age old concept of gradual change should be replaced by one of 'leap frogging' in the areas of crop production and productivity if we want to keep pace with the increasing need of the nation. Dr. R N Pal, Director General (PC) presided over the inaugural function and delivered the presidential address. He briefly traced the history of spices research and highlighted the significance of AICRPS in spices research scenario of our country.

While welcoming the delegates, Dr K V Peter, Director, IISR said that agricultural Scientists had every reason to be proud of their research achievements in spices, as there has been remarkable achievements in production and productivity. He also felt that Scientists have effectively managed the crisis caused by Phytophthora disease in black pepper.

Dr P N Ravindran, Project Coordinator presented the report wherein he highlighted the significant achievements and the progress made by 20 AICRPS research centres during the past two years, in the areas of varietal improvement, crop management, crop production and crop protection. He informed the house that the programmes of AICRPS during the past years facilitated the identification of 10 new varieties for release in addition to the production technologies perfected for adoption.

A distinct feature of the Calicut Workshop has been the separate pre-workshop concurrent group meetings of three groups viz., Genetic Resources and Crop Improvement, Crop Production and Crop Protection held on 18th November 1999. The meeting critically reviewed and formulated the research programmes of AICRPS. New programmes were formulated based on the discussion between panel members, resource persons and Scientists. About 150 delegates including spices scientists working in 20 AICRPS Research Centres and 8 Voluntary Centres under 15 SAUs besides experts from Spices Board, IISR, CPCRI, KAU, DASMP, NBPGR and various other SAUs, Spice Industry, farmers representatives from Agro-Input Agencies, Principal Investigators of Adhoc Schemes, Director of Agriculture and officials from ICAR headquarters attended the four-day deliberations.

ACKNOWLEDGEMENTS

The Project Coordinator on behalf of the ICAR and IISR place on record his grateful acknowledgements to the following Organisations who supported the XV Workshop.

1. The State Bank of India, Calicut
2. M/s Biocontrol Research Laboratories, Bangalore
3. M/s Bits-Tact, Calicut
4. M/s United Phosphorus Limited, Cochin
5. The Institute for Micronutrient Technology, Poona
6. M/s Southern Phosphate & Minerals, Cochin
7. The All India Spices Exporters Forum, Cochin
8. M/s Novartis India Limited, Coimbatore
9. M/s Rallis India Limited, Bangalore
10. M/s Indo American Hybrid Seeds Pvt Ltd, Bangalore
11. M/s Synthite Industrial Chemicals Ltd, Ernakulam
12. M/s Parry Agro Industried Ltd, Coimbatore
13. M/s Indian Pepper and Spice Trade Association, Cochin

The Project Coordinator is also extremely grateful to the Director and all the Scientists of IISR, whose untiring efforts made the present Workshop a grand success. The Chairman & Co-Chairman of the various technical sessions, Rapporteurs as well as the Members of the various committees deserve special thanks. He is also thankful to all the panel members and experts who helped in the formulation of the research projects. He is indebted to the staff of the PC's Cell who have put in long hours of extra work to make this Workshop a great success.

XV WORKSHOP OF AICRP ON SPICES
18-21 November 1999

PROGRAMME

Venue : ASMA TOWER, Mavoor Road, Calicut

18 Nov. 1999 Pre-Workshop Meet.

0800 – 0930	:	Registration
0930 – 1000	:	Briefing by Project Coordinator
1000 – 1015	:	Tea
1015 – 1730	:	Group Meetings (Concurrent Sessions)
1330 – 1430	:	Lunch
1430 – 1630	:	Group Meetings (continued)

Group I :: Genetic Resources & Crop Improvement

Panel members : Dr. K V Peter
Dr. T Thangaraj

Rapporteurs : Dr. J Rema
Dr. R R Nair

Resource persons:
Dr. K J Madhusoodanan
Dr. M R Sudharsan
Dr. Hemant Hegde
Mr. B Krishnamurthy
Mr. P A Mathew
Dr. B Sasikumar
Dr. T John Zachariah

Group II :: Crop Production

Panel members : Dr. A K Sadanandan
Dr. S N Potty
Dr. K Sivaraman

Rapporteurs : Dr.(Mrs) C K Thankamani
Dr. V Srinivasan

Resource persons :
Dr. V S Korikanthimath
Dr. (Mrs.) C.K. Thankamani
Dr. V. Srinivasan
Dr. V Krishnakumar
Dr. E V Nybe
Dr. J Thomas

Group III :: Crop Protection

Panel members : Dr Y R Sarma
Dr. Sukumaravarma
Dr. K V Ramana

Rapporteurs :
Dr S S Veena
Dr A Kumar

Resource persons :
Dr. S Devasahayam
Dr. M Anandaraj
Dr. M N Venugopal
Mr. Santhosh J. Eapen
Dr. D Gopakumar
Dr. K P Mammootty

19 November 1999

9.00 – 11.30 Inaugural Session

Welcome address : Prof. Dr. K V Peter
Director, IISR, Calicut

Felicitation : Dr. S Edison
Director, CTCRI, Trivandrum

Report on AICRPS : Dr. P N Ravindran
Project.Coordinator

Release of publications: AICRPS Annual Report 1998-99
Bibliography on Spices Research at IISR, Calicut
Release of Spices Vision – ISS News Letter

Presentation of Sugandha Bharathi Award :

Remarks by Dr J S Pruthi, recipient of the award

Presidential address: Dr. R N Pal, ADG (PC)

Inauguration and
Inaugural address : Dr. KNS Nair
Vice Chancellor, KAU

Vote of thanks : Dr. M Anandaraj
Convenor, Programme Committee

1130 – 1145 : Tea

1145 – 1340 Session I :: Genetic Resources

Chairman	:	Dr. KUK Namboodiri
Co-Chairmen	:	Dr. K.C. Velayudhan
		Dr. P N Ravindran
Rapporteurs	:	Mr. B Krishnamurthy
		Mr. K V Saji

20 November 1999

9.00 – 16.00 Session II :: Crop Improvement

Chairman	:	Dr. K V Peter
Co-Chairman	:	Dr. T Thangaraj
Rapporteurs	:	Dr. P A Mathew
		Dr .J Rema

16.30 – 19.45 Session III :: Crop Production

Chairman	:	Dr. S N Potty
Co-Chairman	:	Dr. K Sivaraman
Rapporteurs	:	Dr. zzzz(Mrs.) C K Thankamani
		Dr. Sreenivasan

21 November 1999

09.00 – 13.10 Session IV :: Crop Protection

Chairman	:	Dr. Y R Sarma
Rapporteurs	:	Dr. (Ms) N K Leela
		Dr. A Kumar

14.15 – 18.30 Session V :: Release of Varieties and Recommendations for Extension Agencies

Chairman	:	Dr S Edison
Co-Chairmen	:	Dr. K V Peter
		Dr. P N Ravindran
Rapporteurs	:	Mr. R R Nair
		Dr. K S Krishnamurthy

19.10 – 19.30 Session VI :: ICAR Adhoc Schemes

Chairman	:	Dr. K V Peter
Co-Chairman	:	Dr. P N Ravindran
Rapporteurs	:	Mr. S Hamza
		Ms. Minoo Divakaran

19.35 – 20.25 Session VII :: Plenary Session

Chairman	:	Dr R N Pal
Co-Chairmen	:	Dr K V Peter
		Dr P N Ravindran
Rapporteurs	:	Dr T J Zachariah
		Mr Santhosh J Eapen

Presentation of Report : Technical Session II to VII

Remarks by Chairman & Co-Chairman

Vote of thanks : Dr. M Anandaraj

PROJECT COORDINATOR'S REPORT

The All India Coordinated Research Project on Spices (AICRPS) is the largest spices research network in the country, comprising of 20 coordinating and eight voluntary centres based at 15 Agricultural Universities in 13 agroclimatic zones. As per the recommendations of the QRT 1998, ICRI RC (Spices Board), Gangtok is also identified as a Voluntary Centre since September 1999 to work on Large Cardamom in place of ICAR RC, Gangtok. AICRPS now works on 12 spices – black pepper, cardamom, large cardamom, ginger, turmeric, clove, nutmeg, cinnamon, coriander, cumin, fennel and fenugreek. There are 85 projects manned by 53 Scientists, supported by 32 Technical / Auxiliary staff. The annual budget is Rs.120 lakhs, shared by ICAR and SAUs in 75:25 basis. The research achievements for the year 1998-99 are presented in this report.

The AICRPS centres strengthened the genetic resources base by adding 139 accessions of black pepper, 88 of ginger, 173 of turmeric, 62 of tree spices, 24 of coriander, 166 of cumin, 238 of fennel and 212 of fenugreek.

From germplasm evaluation, Panniyur centre short-listed three accessions of pepper (yield 5.0, 5.8 & 7.7 kg/vine); Solan three lines of ginger (yield 7.5 to 7.7 kg/3m2) and four lines of turmeric (yield 8.1 to 8.3 kg/3m2); Pottangi five lines of ginger (yield 7.2 to 7.8 kg/3m2); three lines of turmeric (14.0 to 15.0 kg/3m2) and two lines of *Curcuma aromatica* ,(9.5 and 11.5 kg/3m2); Jagtial four long duration turmeric (8.2 to 9.0 kg/3m2), five medium duration (7.3 to 12.5 kg/3m2) and three short duration (11.5 to 13.0 kg/3m2); and Jobner centre three lines of coriander. Apart from these a few disease/pest tolerant accessions have been identified in cardamom, ginger, turmeric, coriander, cumin, fennel and fenugreek.

Thirteen coordinated trials are in progress in various centres, and based on the CVTs the following lines have been short-listed :

Ginger	:	Pottangi – 2 lines (10.1 & 11.6 kg/3m2)
		Pundibari – 1 (12.1 kg/3m2);
		Raigarh – 1 (17.4 kg/3m2);
Turmeric	:	Pottangi – 1 (12.7 kg/3m2)
		Raigarh – 1 (33.8 t/ha);
Coriander	:	Jobner – 1 (885 kg/ha);
Cumin	:	Jobner – 1 (237 kg/ha)
Fennel	:	Jagudan – 1 (2720 kg/ha)
Fenugreek	:	Jobner – 2 (2116 & 2321 kg/ha)

Based on quality analysis, two high curcumin turmeric lines have been identified (6.3% curcumin) and also three accessions for dry recovery (20.3 to 26.6%). In ginger, five accessions having 2.0 to 2.8% oil and four lines having 8.3 to 8.7% oleoresin have been identified. At Hisar, three coriander accessions having above 0.4% oil have been identified.

Seven new varieties in seed spices, three in coriander, one each in cumin and fennel and two in fenugreek are being proposed for recommendation by the XV AICRPS Workshop for release. Proposals have been received from various centres for starting CVT in pepper (six entries), coriander (seven entries), cumin (six entries), fennel (three entries) and fenugreek (three entries) and these were discussed in the group meeting yesterday and programmes were formulated.

In the area of crop production, Mudigere centre came up with the new fertilizer dose of 75:75:150 kg NPK/ha for cardamom (mean yield 684 kg/ha); Raigarh centre found that

150:125:125 kg/NPK/ha is required for high yield in turmeric in that area; Jobner centre found that sowing cumin during 15 October reduced cumin wilt; while in coriander, November 4 sowing gave the best yield. Under Coimbatore condition sowing at 15 x 10 cm spacing in October was best in coriander. For clove and nutmeg drip irrigation of 8 l/day/tree and fertilizer dose of 400:350:1200 NPK + 100 kg FYM + 50gm each of Azospirillum and Phosphobacteria per tree is found ideal.

For managing *Phytophthora* disease in Sirsi area, Potassium phosphonate @ 0.3% as spray (3 l/vine) and drench (5 l/vine) twice was effective. At Panniyur centre, application of 1 kg neem cake + 3 g ai of Phorate, 1% Bordeaux mixture as premonsoon spray and 0.2% Akomin spray as post-monsoon was good for containing the disease. In cardamom, thrips infestation caused an yield loss of 15.3 kg/ha (for a yield of 250 kg/ha) in addition to reduction in oil content and market price. In ginger, at Solan seed rhizome treatment with Dithane M-45 (0.25%) + Bavistin (0.1%) along with soil application of Thimet 10g (12 kg/ha) minimized rhizome rot disease. *Trichoderma harzianum* was found effective in checking the disease in pepper and ginger. *Taphrina* leaf blotch control in turmeric could be achieved with 1% Bordeaux mixture spray (Pundibari) and by 200 ppm Ridomil spray (Raigarh). Stem gall of coriander is reported to be very severe in Bihar. In Coimbatore, coriander wilt could be controlled by seed treatment with Trichoderma + Thiophenate methyl foliar spray. In cumin and fenugreek *Trichoderma* + fungicide + neem cake were helpful in controlling wilt disease.

All AICRPS centres took up actively the planting material production. The centres produced and distributed 213246 cuttings of black pepper, 5278 cardamom clones and 13 kg seeds, 16.3 quintals of ginger, 15 tonnes of turmeric and 41.1 tonnes of seed spices during 1997-99.

For the first time the ICAR adhoc projects on spices are also being presented in the Workshop, and the progress reports of these projects are included in the Annual Report.

The research programmes of AICRPS are being critically reviewed for formulating need based and action based research project for meeting the future targets and challenges in spices production and productivity in the emerging decade.

Presidential Address by Dr. R N Pal, Assistant Director General (Plantation Crops), Indian Council of Agricultural Research, New Delhi

I am extremely happy to be here in this 'City of Spices'. It is indeed a matter of great pleasure and privilege for me to have the honour to address this distinguished gathering. We are indeed lucky that the Honorable Vice Chancellor of Kerala Agricultural University, Dr. K.N.S. Nair, has kindly agreed to inaugurate this National Group Meeting. I am happy to note that many Spices Scientists and R&D personnel from industries have assembled here and would participate in the deliberations. We are also privileged because Directors of Development Departments, resource persons from SAUs and ICRI, officers from Spices Board, Managerial representatives from various Horticultural input agencies, Spice Industry, Spices Planters, etc. are also attending this function.

I am also particularly happy that IISR, Calicut is organising this function. I am thankful to the Vice Chancellor, KAU for agreeing to inaugurate this All India Coordinated Research Workshop at Calicut. Also relevant is the fact that the present spices workshop is being held in Kerala, the state that has made a lasting impression on production and trading of spices from ancient times. It is near this historic city, Kappad, about 20km north of Calicut, where Vasco da Gama landed in 1498 May 20, in search of spices. That was indeed the singular event that changed the history of our country. That was the moment when India emerged from the middle age to the modern age, and with that the country had eventually slipped into foreign hands and into foreign domination, that lasted till August 1947. It was the lure of spices that attracted the foreigners to this land.

Indian spices with their intrinsic qualities that are distinctly superior, flavours the food in over 130 countries. The aroma, flavour and taste of Indian spices make the food palatable and enjoyable to all the people on the earth. Let this saga of Indian Spices continue ad infinitum.

It has been estimated that we produce annually spice worth around Rs.13000 crores in the country. We have been dominating the world trade by contributing almost 35% of its volume but only 13% in terms of value over the years. In the past years the country has witnessed sizable increase year after year in the spice export and during 1998-99, India exported spices, including oils and oleoresins, worth Rs.1650 crores. This was due to the combined effort of Indian farmers, traders, merchants and exporters. The domestic consumption of spices is also quite high and the exportable surplus is just about 10%. In this whole spices production scenario of our country, the AICRPS has played a very significant role in increasing both production and productivity of spices. The productivity of spices has increased significantly during the past two decades, but still very much less compared to the productivity of other producing countries.

In a competitive global market the production cost is intimately linked to productivity, and unless and until we achieve high productivity we will not be able to compete with other countries. So enhancement of productivity and production potential needs a multipronged approach integrating high yielding varieties, appropriate production technology and constraint alleviation. The AICRPS can contribute much in these areas.

AICRP on Spices

The establishment of AICRPS as a separate project by ICAR is a milestone in the spices research system in the country. The AICRPS is the mechanism in holding a nation wide cooperative and inter disciplinary research network, linking ICAR system with SAU's, to focus attention on spices research. This AICRPS is the largest research network on spices operating in our country providing technology base for national level planning and management of spices research. This provides the much needed coordinating mechanism between ICAR, IISR and SAU's and other research and development organisations. AICRPS works in partnership with the SAU's and other organisation to undertake research on spices. The coordinating centres are based in 15 SAU's located in 15 states of India right from

Panniyur and Pampadumpara in Kerala to Solan in Himachal Pradesh. The headquarters of the project is at IISR, Calicut and the research programme are monitored and coordinated by the PC (Spices). This project is bestowed with the mandate to conduct and coordinate research on 12 spice crops. The project has a total staff strength of 85 consisting of 53 scientist and 32 other position. The IX plan out lay of AICRPS is 526.68 Lakhs shared by 75:25 ratio basis by ICAR and SAU's.

The AICRPS conducts biennial workshop which is the forum for presentation / discussion and finalization of research programme and review and evaluation of the progress of research under each project as well as for formulation of package of practices including recommendation of varieties. So far 14 workshops were conducted.

About 120 delegates are attending this XV AICRPS workshop from various parts of the country from almost 15 states. During these 4 days deliberations the research results emanating from 85 projects on 12 spices will be discussed in depth and the results analysed and debated. This workshop will also formulate technical programmes for the next two years. It is expected that several proposals for recommendation of varieties for release will be discussed, and technologies developed from the various centres will be debated upon for possible adoption.

This project has 85 research programmes operating at various centres covering the respective mandate crops. The research programmes of the centres are integrated in a manner to meet both the regional as well as National research needs in the major spices. Production system and productivity also vary among regions and technologies emerging from AICRPS have improved the production system at the regional level and the production and productivity of spices at the national level as well.

The AICRPS has made substantial contribution to spices research and development during the last three decades since its inception. A number of proven technologies have already been transferred to farmers, and these technologies are making good impact. Considerable head way has been made in crop improvement mainly in the development of high yielding varieties/hybrids (more than 65) specially suitable to different agroclimatic regions of the country, input technologies, standardization of agrotechnologies for plant protection and in distribution of elite seed/planting material of high yielding varieties in spices.

As we enter into the 21st Century, all Scientists and Organisations associated with Spices Research should struggle hard to find solutions to these problems. In this process always keep in mind that in this competitive world the consumer is the master, and ask yourselves whether your research is sufficiently fine tuned to meet the needs of the consumers, of the markets?

I understand that all Scientists working on Spices in our State Universities and ICAR institutes and many R&D organisations are here. You have already spent a day in formulating the technical programmes for the next two years. I am sure you must have taken into consideration the points I mentioned earlier.

As a research manager, I look forward seeing the results - concrete results in terms of productivity enhancement and widening of the knowledge base of the farming community. I am sure you will have elaborate discussion during the next three days of this Workshop and come out with very meaningful programmes and recommendations, that will take this project to the 21st Century. I look forward to see your performance and wish you well in your endeavour.

I take this opportunity to thank the Vice Chancellor of Kerala Agricultural University for agreeing to come here to inaugurate this Workshop amidst his pressing responsibilities and pre-occupations.

Before I close, I extend a warm welcome to you all. I am sure this distinguished gathering will solve the crucial issues and evolve strategies to boost yield and export of spices and spice products.

I wish you all success.

JAI HIND

Inaugural address by Dr. K N Shyamasundaran Nair, Vice Chancellor, Kerala Agricultural University, Trichur

It gives me immense pleasure to be amongst the distinguished Scientists and Spices Workers, in this historic city of Calicut, in connection with the XV Workshop of AICRPS organised by the Indian Council of Agricultural Research and Indian Institute of Spices Research. This coastal town in North Kerala has been engraved in the annals of the history of spices and that of our great country. It was near Calicut, at Kappad, some 20 km away from this city, the great navigator Vasco-de-Gama landed almost 500 years ago (in 1498 May 20) lured by spices. This event has changed the course of history of the Indian sub-continent, that led to colonialism and the subsequent events that are part of history. From time immemorial the west coast of Indian Peninsula, known as the Malabar coast, was famous for spices export and held trade relations with the West. The Cochin ginger, Aleppey green cardamom, Aleppey turmeric, Tellicherry black pepper were all synonyms with the highest quality of spices. It is accepted that the Western Ghats are the home of both the King and Queen of spices, namely the black pepper and cardamom. India being the land of spices does occupy a prominent place both in production and export of spices. We produce about 27 lakh tonnes of spices annually and the domestic consumption is about 90%, leaving hardly about 10% for export. During 1998-99, the export earnings was Rs.1650 crores in foreign exchange, by the export of about 2.10 lakh tonnes. The exports are directed to over 130 countries in the world, although the important among them are US, UK, Japan, China, Canada, Saudi Arabia, Italy, Russia and several countries in Africa, Australia and South America. On a global scale India shares 35% of spices traded, though only 13% in terms of value. The quality of Indian spices, especially their intrinsic quality is rated as the best by discerning consumers around the globe, and people look forward to "Indian Spices" to add taste and flavour to their foods.

Spices occupy a prominent place in the day to day recipe of all our homes. Among them chillies, black pepper, cardamom (both small and large), ginger, turmeric, cumin, coriander, fennel, fenugreek, clove, nutmeg, cinnamon are all important. Some less important spices like ajowan, dill, saffron, celery, vanilla, etc. are also to be accounted for our effort on research and development. There is an urgent need for monitoring the impact of ecological changes as a result of pepper and cardamom cultivation in the Western Ghats of Kerala and the importance of developing sustainable production technology that is ecofriendly. From coastal areas pepper cultivation had shifted to foot hills and because of depletion forest cover the space available for cardamom cultivation is shrinking. The impact of these changes had to be studied since it would have an effect on the volume of production of these spices in which Kerala was the leader. Scientist should also bring out fast changes in the need areas of crop production and productivity. In a world that is fast changing the concept of slow change should be replaced by one of "leap frogging", if we want to keep pace with the rest of the world.

The Indian Institute of Spices Research, with headquarters at Calicut, caters to the needs of the basic and applied research on all the spices, of course, not so much on the seed spices. The fullfledged laboratories and experimental farms, together with Krishi Vigyan Kendra are doing excellent service to the farming community, provide training to professionals in the extension departments of various State Governments, Directorate of Spices Development and the Spices Board. The Kerala Agricultural University is also playing a vital role in the spices research and development scenario of our country. The Pepper Research Station, Panniyur has released the first ever pepper hybrid and the various research stations under KAU are involved in many developmental activities related to spices. The Plantation Crops and Spices Department of the KAU has given substantial contribution for spices research, including in the area of spices biotechnology.

Similarly, the All India Coordinated Research Project on Spices, which was started with four centres under the IV Plan, slowly grew to an organization with 20 centres as on today and these centres are located in 15 states in the country under the administration of 15 State Agricultural Universities, including 2 centres under KAU. The mandatory crops of this coordinated project include almost all major spices, both the plantation spices and seed spices groups. I understand that with 53 scientists under the coordinated network, this project has done yeomen service in enhancing of spices productivity in collaboration with Indian Institute of Spices Research. The most significant achievement of these organisations has been the release of 60 high yielding varieties of spices, which led to increased productivity of spices per unit area.

The Govt. of Kerala is also taking all necessary steps to promote spices production in the State. The districts of Wynad and Idukki have been declared as spice districts and special schemes have been formulated for these districts. The Government has initiated the Pepper Technology Mission to improve pepper cultivation with an aim of evolving sustainable production technology. There is a component of *15.39* crores for research and IISR is deeply associated with this too. The Planning Board of the Kerala Government has formulated perspective plans for spices development of the state for the next decade. I am sure with the assistance of ICAR and AICRPS, spices production and productivity can achieve the much needed quantum jump. In a world that is fast changing, the concept of slow change should be replaced by one of 'leapfrogging' especially in the areas of crop production and productivity if we want to keep abreast with the rest of the world. This calls for dedicated, committed hard work on the part of R&D agencies and personnel. There is no substitute for hard work – only that can save our country. Unfortunately, commitment, hard work, devotion to duty are all in short supply now.

Ladies and Gentlemen, let us take a solemn decision to step into the next Century with greater commitment, greater resolve, to make our country great.

I thank the organisers for inviting me to be a part of this great occasion to inaugurate this last AICRPS Workshop of the Century. With these words, I inaugurate this Workshop. I wish you all the best.

JAI HIND

GROUP MEETING FOR FINALISATION OF TECHNICAL PROGRAMME

18th November 1999

Pre - Workshop Meet - Concurrent Sessions

Group I : **Genetic Resources & Crop Improvement**
Group II : **Crop Production**
Group III : **Crop Protection**

Major guidelines
1. Projects should be taken up in more than one centre
2. Projects which are in progress for more than three years should be closed.
3. Single centre projects should be closed or merged with other projects.

Group I Genetic Resources & Crop Improvement

Panel members : Dr. K V Peter, Director, IISR, Calicut
Dr. T Thangaraj, Professor, TNAU, Coimbatore

Rapporteurs : Dr. J Rema
Dr. R R Nair

Resource persons:

Dr. K J Madhusoodanan (ICRI, Myladumpara)
Dr. M R Sudharsan (ICRI, Sakleshpur)
Dr. Hemant Hegde (UAS, Dharwar)
Mr. B Krishnamurthy (IISR, Calicut)
Mr. P A Mathew (IISR, Peruvannamuzhi)
Dr. B Sasikumar (IISR, Calicut)
Dr. T John Zachariah (IISR, Calicut)

General Suggestions

- Paprika may be included in the AICRPS, subject to the decision of ICAR.
- Priority should be given for hybridization programmes in black pepper and cardamom.
- Coordinated multilocational approach should be strictly followed in all projects.
- The released varieties should be properly popularised.
- The facilities available at NBPGR, should be utilized for collection and characterization of germplasm
- The germplasm collected at all centres should be registered at NBPGR and get IC numbers to avoid duplication.
- Utilization of the collected germplasm should be given more emphasis.
- *In situ* conservation may be given importance in case of certain species specific to certain locality.
- All Centres should send one set of germplasm to IISR for conservation in the national conservatories.

GENETICS RESOURCES

BLACK PEPPER

PEP/CI/1.1 : **Germplasm collection, characterisation, evaluation & conservation**

Decisions taken

Panniyur

1. Programme will continue.
2. An action plan on collection should be prepared and submitted to coordinator.
3. A database on collected variability should be developed.
4. Passport data on collections should be prepared and communicated to coordinator.

Sirsi

1. Programme will continue.
2. Collection and evaluation of elite lines of Karimalligesara should be initiated
3. Collection from Uttara Kannada area will be completed within next two years.

Chintapalli

1. Programme will continue.
2. Collection from Chintapalli taluk to be completed, in the coming year

Yercaud

1. Programme will continue.
2. Collections from Upper Kothayar, Mahendragiri, Kolli hills and Gudallur will be completed within next two years.
3. Collection of local cultivars from Thadiyankudisai and Pechiparai area to be completed.

Dapoli

1. Programme will continue.
2. Collection and maintenance of wild types available in the locality, should be completed.

Ambalavayal

1. Ambalavayal centre will be a voluntary centre for collection, conservation and evaluation of black pepper germplasm.

CARDAMOM

CAR/CI/1.1 : **Germplasm collection, characterization, evaluation and conservation**

Decisions taken

Mudigere

1. Programme will continue.
2. Passport data on collections will be submitted to coordinator at the earliest.
3. Collection of elite lines will be initiated.

Pampadumpara

1. Programme will continue.
2. Drought tolerant lines will be collected after a detailed survey during the years having severe drought.
3. Major estates may be screened for locating superior clumps

GINGER

GIN/CI/1.1 : **Germplasm collection, characterization, evaluation and conservation**

Decisions taken

Pottangi

1. Programme will continue.
2. Collections from Phulbari district and Koraput district will be completed within next two years.
3. Passport data will be submitted to coordinator at the earliest.

Pundibari

1. Programme will continue.
2. Survey work will be continued in Garubathan and Kalimpong area of Darjeeling districts.
3. Maintenance and characterization will be continued.
4. Initial evaluation of newly collected germplasm will be done in next two years.

Dholi

1. Programme will continue.
2. Survey and collection from Northern Bihar will be done on a priority.

Raigarh, Solan & Kumarganj

1. Programmes will continue.
2. Collection of local germplasm will be completed.

TURMERIC

TUR/CI/1.1 : **Germplasm collection, characterization, evaluation and conservation**

Decisions taken

Pottangi

1. Programme will continue.
2. Characterization of Turmeric germplasm will be given priority.
3. Passport data will be made available to the coordinator at the earliest.

Pundibari

1. Programme will continue.
2. Survey work will be continued in turmeric growing areas of Jalpaiguri, Darjeeling and Malda.
3. Maintenance and characterization of germplasm will be taken up.
4. Initial evaluation of newly collected germplasm will be continued during the next two years.

Coimbatore

1. Programme will continue.
2. Characterization and documentation of existing germplasm will be completed within two years.

Raigarh, Solan, Jagtial, Dholi & Kumargànj

Programmes will continue.

TREE SPICES

TSP/CI/1.1 : **Germplasm collection, characterization, evaluation and conservation of clove, nutmeg & cinnamon**

Decisions taken

Yercaud

1. Programme will continue.
2. Maintenance of clove germplasm will be given emphasis.
3. Collection of variants of allspice from Courtalum region will be taken up.

Dapoli

1. Programme will continue.
2. Collection of nutmeg elite lines from Konkan/Goa, and Sindhudurg areas.

Thadiyankudisai

No reports were forthcoming from this Centre. Dr. Thangaraj has agreed to look into this and solve the problems.

Pechiparai

Programme will continue on voluntary basis.

CORIANDER

COR/CI/1.1 : **Germplasm collection, description, characterization, evaluation & conservation**

Decisions taken

Jobner

1. Programme will continue.
2. Survey work will be temporarily suspended.
3. Volatile oil estimation will be completed in 100 accessions.
4. Documentation will be completed for 100 accessions.

Jagudan

1. Programme will continue.
2. Maintenance of existing germplasm.
3. Characterization and documentation will be done on priority.

Coimbatore

1. Programme will continue.
2. Quality analysis (oil content) of the existing accessions will be completed within two years.
3. Documentation and characterization of 50 accessions will be completed.

Hisar

1. Programme will continue.
2. The existing germplasm will be maintained, evaluated and documented as per the uniform and standard crop descriptors.
3. New collections will be made from Narnual and its surrounding areas in Mohindergarh district and the same will be evaluated and maintained.
4. Screening of new collections against stem gall and powdery mildew diseases will be done.

Dholi

1. Programme will continue.
2. Characterization and documentation of existing collections will be given priority during next two years.

Raigarh, Guntur, Kumarganj

Programmes will continue.

CUMIN

CUM/CI/1.1 : **Germplasm collection, characterization, evaluation and conservation**

Decisions taken

Jobner

1. Programme will continue.
2. Germplasm collection from Nagerer, Jalore, Sanchor and Bhinmal areas for high yielding types.

Jagudan

Programme will continue.

FENNEL

FNL/CI/1.1 : **Germplasm collection, characterization, evaluation and conservation**

Decisions taken

Jobner

1. Programme will continue.
2. Volatile oil estimation in 100 accessions.
3. Documentation of 100 accessions will be completed. The passport data sheets will be prepared and sent to NBPGR for giving IC Nos.

Hisar

1. Programme will continue.
2. The existing germplasm of fennel will be evaluated for volatile oil content with the help of Jobner centre.
3. A full documentation of the material will be carried out based on the standard descriptor and passport data sheets will be prepared and sent to NBPGR for giving IC Nos.

Dholi & Jagudan

Programme will continue.

FENUGREEK

FGR/CI/1.1 : **Germplasm collection, characterization, evaluation & conservation**

Jobner
1. Programme will continue.
2. Germplasm collections from Chittor and surrounding areas for high yielding and disease resistant types.

Jagudan
1. Programme will continue.
2. Maintenance of existing collections.

Coimbatore
1. Programme will continue.
2. Characterization and documentation of 50 accessions will be completed. Passport data sheets will be sent to NBPGR for IC Nos.

Hisar
1. Programme will continue.
2. Characterization and documentation of existing germplasm will be given emphasis.
3. Passport data will be passed on to project coordinator, at the earliest.

Dholi
1. Programme will continue.
2. Maintenance of the existing collections and documentation will be given importance.

Kumarganj & Guntur
Programme will continue.

CROP IMPROVEMENT

BLACK PEPPER

PEP/CI/2 **Hybridization trial**
PEP/CI/3 **Coordinated Varietal trial (CVT)**

Decisions taken

Panniyur
1. Inter-varietal hybridization will be continued. Forty cross combinations will be done
2. 1987 series III will be closed and report will be submitted.

Sirsi
1. Trials will continue based on the deliberations in technical session on crop improvement.

Chintapalli
1. Trial will be continued.
2. Pathologist of IISR will be deputed to advise on disease management.

Pampadumpara, Yercaud & Ambalavayal (Voluntary centres)
1. Trials will be continued.

CARDAMOM

CAR/CI/2 **Hybridization and selection**
CAR/CI/3 **Coordinated Varietal trial (CVT)**
CAR/CI/4 **Varietal / Evaluation trial**

Decisions taken

Mudigere

1. All the on-going trials will be continued.

Pampadumpara

1. Trial will be continued for one more year.
2. Pooled analysis of data will be conducted and report will be submitted to Coordinator.

Sakleshpur

All the trials will be continued.

Myladumpara

Trials will be continued based on the decision in technical sessions.

GINGER

GIN/CI/2 **Coordinated varietal trial (CVT)**
GIN/CI/3 **Varietal / Evaluation trial**
GIN/CI/4 **Quality evaluation trial**

Decisions taken

Pottangi

1. CYT-1996 will be concluded with this year's data. The new CVT will be started next year.

Chintapalli

Trial will be continued this year also.

Pundibari

1. Present CVT will be concluded, and a new CVT will be taken up next year.

Solan

1. Trial will be continued based on the decisions in technical sessions. A new CVT will be taken up in the next season.

Raigarh

Trial will be continued based on the decisions in technical sessions.

TURMERIC

TUR/CI/2 **Coordinated varietal trial (CVT)**
TUR/CI/3 **Varietal / evaluation trial**
TUR/CI/4 **Quality evaluation trial**

Decisions taken

Pottangi

1. Necessary help for curcumin analysis will be provided by IISR.
2. A composite sample as per specific recommendation should be sent to at least three centres for analysis.

Dholi

CVT 1996 will be concluded. A new CVT will be taken up next season.

Chintapalli

CVT 1996 will be concluded.

Pundibari

1. CVT 1996 will be concluded.
2. CYT 1996 will be continued.
3. A new CVT will be started next year.

Jagtial

Trial will be continued.
A new CVT will be taken up next year

Kumarganj

CVT 1996 will be concluded.
A new CVT will be taken up next year.

Coimbatore

1. Curcumin of 157 accessions will be analysed within next two years.
2. Trial on impact of environment on quality of turmeric will be continued.

TREE SPICES

TSP/CI/2 **Coordinated varietal trial (CVT)**

Decisions taken

Yercaud

1. Trials will be continued. In view of the many constraints efforts will be made to shift the work to Pechiparai.
   (Voluntary centre)

Pechiparai

1. Trials will be continued as per the decision in the technical session.

Thadiyankudissai

1. Trials will be continued as per the decision in the technical session. The Professor & Head of Plantation Crops (TNAU) has taken the responsibility

to see that the centre takes up the work and give periodical reports.

Ambalavayal

Trials will be continued.

CORIANDER

COR/CI/2 **Coordinated varietal trial (CVT)**
COR/CI/3 **Varietal / evaluation trial**
COR/CI/4 **Quality evaluation trial**

Decisions taken

Jobner

1. CVT 1996 will be concluded. New CVT will be started next season. Jobner will be the centre for coriander and fenugreek research.

Jagudan

1. CVT 1996 will be concluded. Coriander work will be discontinued and this centre will concentrate on cumin and fennel.

Coimbatore

1. CVT 1996 will be concluded.
2. CYT will be concluded.
3. New trials will be taken up next season.

Dholi

CVT 1996 will be concluded based on the decision of technical session.

Hisar

1. Trials will be concluded as per the decision in the technical session, and new CVT will be taken up next season.

Kumarganj & Guntur

1. Trial will be continued as per the decision in the technical session.

CUMIN

CUM/CI/2 **Hybridization trial**
CUM/CI/3 **Coordinated varietal trial (CVT)**
CUM/CI/4 **Quality evaluation trial**

Decisions taken

Jagudan

1. CVT 1994 will be concluded. New CVT will be taken up next season.

Jobner

1. CVT-III 1996 will be continued, and new CVT will be taken up next season.

FENNEL

FNL/CI/2 **Hybridization trial**
FNL/CI/3 **Coordinated varietal trial (CVT)**
FNL/CI/4 **Quality evaluation trial**

Jobner
1. Trials will be continued as per the decision in technical sessions, and a new CVT will be taken up next year.

Jagudan
1. Trials will be continued as per the decision in technical sessions. A new CVT will be taken up next year.

FENUGREEK

FGK/CI/2 **Hybridization trial**
FGK/CI/3 **Coordinated varietal trial (CVT)**
FGK/CI/4 **Varietal / evaluation trial**

Decisions taken

Coimbatore
1. CVT-1995 will be closed.
2. CYT-CI/4.1 will be closed.
3. The work on fenugreek will be discontinued by Coimbatore centre.

Jagudan
1. Hybridization will continue. A new CVT will be planned for next year.

Jobner
1. CVT IV-1999 will be initiated.

Hisar & Guntur
1. Trials will be continued as per the decision during the technical session.

Kumarganj
1. New CVT on fenugreek will be started.

Group II Crop Production

Panel members : Dr. A K Sadanandan (PC, AICRPS (Retd.))
Dr. S N Potty (Director of Research, ICRI, Myladumpara)
Dr. K Sivaraman (Director, DASMP, Calicut)

Rapporteurs : Dr.(Mrs) C K Thankamani
Dr. V Srinivasan

Resource persons :

Dr. E V Nybe (KAU, Trichur)
Dr. J Thomas (KAU, Odakkali)
Dr. V S Korikanthimath (IISR, Appangala)
Dr. (Mrs.) C.K. Thankamani
Dr. V Srinivasan (IISR, Calicut)
Dr. V Krishnakumar (ICRI, Myladumpara)

Proceedings of Group Meeting

Group Discussion of Session II on crop production were conducted by the panel members, Dr S N Potty, Dr A K Sadanandan & Dr K Sivaraman and resource persons. Dr Potty emphasised the need for developing technologies for sustainable production of residue free, clean spices. Dr K Sivaraman stressed the need for clearcut sound recommendations to the farmers by the research organisations. The need for basic data base creation on large scale organic farming was also stressed by the resource persons.

BLACK PEPPER

PEP/CM/1.1 **Irrigation trial**

Decisions taken The experiment can be continued for two more years even though it is a single location trial, because it was laid out with a specific objective for the location selected. Observation on soil moisture content has to be monitored.

The present trial at Panniyur will be continued. The Yercaud centre expressed its willingness to take up the trial at farmers plot, provided financial assistance for meeting the transport / fuel expenditure are met.

CARDAMOM

CAR/CM/1.1 **Nutrient management trial**

Decisions taken The experiment is in 5th year at Mudigere & 3rd year in Pampadumpara. The yield data and the trend of response are same in both the locations. With the yield data for current season, pooled analysis can be made and final report can be submitted. The experiment shall be concluded at Mudigere, and Pampadumpara will continue the experiment.

Results of Mudigere station was inconsistent and trial in Pampadumpara was vitiated by drought in 1997-98. This experiment at both centres can be discontinued.

Experiments on micronutrients are in progress at two locations by ICRI. The same experiment can be modified taking into consideration the micronutrient status of Cardamom growing soils at Mudigere & Pampadumpara, and can be started in these centres as new trials. ICRI will give the technical programme for the new trial.

CAR/CM/1.3 **Trial on integrated nutrient management**

Decisions taken The experiment at Mudigere centre can be continued. At Pampadumpara due to technical reasons the experiment has not been laid out so far. The experiment with the same set of treatments as that in Mudigere can be laid out at Pampadumpara, with an additional treatment to compensate for potassium (as wood ash).

TURMERIC

TUR/CM/1 **Nutrient management trial**

Decisions taken Both the experiments at Kumarganj & Raigarh can be concluded af-

ter the harvest of the current season's crop. The pooled analysis of data & final report can be submitted.

TREE SPICES

TSP/CM/1.1 **Propagation/multiplication trial**

Decisions taken The experiment at Yercaud centre can be concluded.

TSP/CM/2.1 **Irrigation trial**

Decisions taken Since the crop is of a perennial nature and the plants are at pre bearing stage (6 years), the experiments can be continued even though this is a single location trial. Scientists at Yercaud expressed the difficulty in getting sufficient water source for irrigation and requested for additional funds to strengthen water source.

TSP/CM/3.1 **Nutrient management trial**

Decisions taken Four years pooled yield data are available . The experiment can be concluded and final report may be submitted.

TSP/CM/4.1 **Physiological studies**

Decisions taken Since the fruit drop is not a major concern in Dapoli region, the survey need not be repeated, and experiment can be concluded.

CORIANDER

COR/CM/1.1 **Nutrient management trial**

Decisions taken The experiment can be concluded after this season's harvest. Yield data shall be analysed and final report can be submitted

COR/CM/1.2 **Response of coriander to micronutrients**

The experiment at Jobner centre can be continued.

Same experiment shall be initiated at Kumarganj centre also with similar set of treatments

CUMIN

CUM/CM/1.1 **Nutrient management trial**

CUM/CM/2.1 **Irrigation trial**

Decisions taken None of the projects presented under this head are of AICRPS sponsored projects. All are state projects/trials. However the result were noted. In future such state projects need not be presented in AICRPS workshop.

FENNEL

FNL/CM/1.1 **Irrigation trial**

FNL/CM/3.1 **Nutrient management trial**

Decisions taken None of the projects presented under this head are of AICRP- Spices

sponsored projects. All are state projects/trials.

FENUGREEK

FGK/CM/1.1 **Spacing/sowing trial**

Decisions taken Study was conducted for two seasons and hence can be concluded.

FGK/CM2.1 **Nutrient management trial**

Decisions taken The experiment can be concluded after recording the current season's data. After pooled data analysis final report can be submitted.

FGK/CM/2.2 **Response of fertility levels and spacing on growth and yield of fenugreek**

FGK/CM/2.3 **Response of fertilizer on yield of fenugreek**

These are not under *AICRPS trials. However, trials can be concluded* after the current season's harvest.

NEW PROGRAMMES:

As per the guidelines issued, the technical programmes for the new projects were discussed in detail. House felt the absolute necessity of experiments on location specific biofertilizer strains and practicability in designing and laying out trials with commercially available brands of biofertilizers was questioned. After considerable debate the theme areas on which new programmes are to be initiated are finalised as :

A) to screen the efficacy of biofertilizers viz., *Azospirillum / Azatobactor* and P-Solubilizers on spices

B) organic farming in spices

A-Biofertilizer studies
Efficacy of biofertilizer studies using Azospirillum

Black pepper

Centres identified : Panniyur, Sirsi, Thadiyankudisai, Yercaud & Ambalavayal (as voluntary centre)

Biofertilizer selected : N – fixer as *Azospirillum* and Phosphate solubilizers

Treatments

T1 – Inorganic N (100%) + *Azospirillum* (50 g) + 5 kg FYM
T2 – Inorganic N (75%) + *Azospirillum* (50 g) + 5 kg FYM
T3 – Inorganic N (50%) + *Azospirillum* (50 g) + 5 kg FYM
T4 – FYM (5 kg) + *Azospirillum* (50 g)
T5 – FYM (5 kg) alone
T6 – FYM (10 kg) + *Azospirillum* (50 g)
T7 – FYM (10 kg) alone
(* P & K are common as Rock phosphate and MOP)

Application in two splits, one in May – June and other in August – September. Six vines / treatment with four replications.

The location specific biofertlizer isolates can be supplied by the respective State Agricultural Universities.

Efficiacy of Biofertilizer studies using P. Solubilizers

Similar treatments with levels of P (as rock phosphate) with P solubilizers will be taken up at all centres identified. The requirement over the organic source (FYM) can be supplemented through inorganic source.

Cardamom

Similar programmes on N – fixers and P solubilisers with the same set of treatments will be initiated at the centres identified:

Centers identified : *Mudigere, Pampadumpara* and *Myladumpara* (ICRI). The details are:

Treatments

T1 – Inorganic N (100%) + *Azospirillum* (50 g) + 5 kg FYM
T2 – Inorganic N (75%) + *Azospirillum* (50 g) + 5 kg FYM
T3 – Inorganic N (50%) + *Azospirillum* (50 g) + 5 kg FYM
T4 – FYM (5 kg) + *Azospirillum* (50 g)
T5 – FYM (5 kg) alone
T6 – FYM (10 kg) + *Azospirillum* (50 g)
T7 – FYM (10 kg) alone
(* P & K are common as Rock phosphate and MOP)
No. of replications :– Four
Plot size : Six clumps / treatment

Turmeric

Similar programme on N_2 fixer with *Azospirillum* @ 5 kg/ha will be started with the same set of treatments as identified for Black pepper

Centres identified : Coimbatore, Kumarganj, Raigarh and Pottangi, Ambalavayal (voluntary centre)

Treatments

T1 – Inorganic N (100%) + *Azospirillum* + 5 (t/ha) FYM
T2 – Inorganic N (75%) + *Azospirillum* + 5 (t/ha) FYM
T3 – Inorganic N (50%) + *Azospirillum* + 5 (t/ha) FYM
T4 – FYM (5 *t/ha*) + *Azospirillum*
T5 – FYM (5 *t/ha*) alone
T6 – FYM (10 *t/ha*) + *Azospirillum*
T7 – FYM (10 *t/ha*) alone
(* P & K are common as Rock phosphate and MOP)
* *Azospirillum* @5 kg */ha*
No. of replications : Four
Plot size : 3 x 1M beds
Spaling : 40 plant / bed

Ginger

Centres identified Ambalavayal, Pottangi & Solan

Treatments

T1 – Inorganic N (100%) + *Azospirillum* + 5 (t/th) FYM
T2 – Inorganic N (75%) + *Azospirillum* + 5 (t/th) FYM
T3 – Inorganic N (50%) + *Azospirillum* + 5 (t/th) FYM
T4 – FYM (5 *t/ha*) + *Azospirillum*
T5 – FYM (5 *t/ha*) alone
T6 – FYM (10 *t/ha*) + *Azospirillum*
T7 – FYM (10 t/th) alone
(* P & K are common as Rock phosphate and MOP)
* *Azospirillum @5 kg /ha*
No of replications 4
plot size 3 x 1M bed

Coriander

Centres identified Jobner, Coimbatore, Kumarganj

Treatments

T1 – Inorganic N (100%) + *Azospirillum* + 5 *t/ha* FYM
T2 – Inorganic N (75%) + *Azospirillum* + 5 *t/ha* FYM
T3 – Inorganic N (50%) + *Azospirillum* + 5 *t/ha* FYM
T4 – FYM (5 *t/ha*) + *Azospirillum*
T5 – FYM (5 *t/ha*) alone
T6 – FYM (10 *t/ha*) + *Azospirillum* (50 g)
T7 – FYM (10 *t/ha*) alone
(* P & K are common as Rock phosphate and MOP)
* *Azospirillum @1 5 kg/ha seed treatment*

Cumin

Centres identified Jagudan, Kumarganj and Jobner

Treatments

T1 – Inorganic N (100%) + *Azospirillum* + 5 *t/ha* FYM
T2 – Inorganic N (75%) + *Azospirillum* + 5 *t/ha* FYM
T3 – Inorganic N (50%) + *Azospirillum* + 5 *t/ha* FYM
T4 – FYM (5 *t/ha*) + *Azospirillum*
T5 – FYM (5 *t/ha*) alone
T6 – FYM (10 *t/ha*) + *Azospirillum*
T7 – FYM (10 *t/ha*) alone
(* P & K are common as Rock phosphate and MOP)
* *Azospirillum @1 5* kg/*ha* as seed treatment

Fennel

Centres identified : Jagudan, Kumarganj and Jobner

Treatments

T1 – Inorganic N (100%) + *Azospirillum* + 5 *t/ha* FYM
T2 – Inorganic N (75%) + *Azospirillum* + 5 *t/ha* FYM
T3 – Inorganic N (50%) + *Azospirillum* + 5 *t/ha* FYM
T4 – FYM (5*t/ha)* + *Azospirillum*
T5 – FYM (5 *t/ha)* alone
T6 – FYM (10 *t/ha)* + *Azospirillum* (50 g)
T7 – FYM (10 *t/ha*) alone
(* P & K are common as Rock phosphate and MOP)
(Azospirillum @ 1.5* kg*/ha as seed treatment)*

Fenugreek

Centres identified : Jobner, Jagudan, Coimbatore and Guntur

Treatments

T1 – Inorganic N (100%) + *Azospirillum* (50 g) + 5 t/ha FYM
T2 – Inorganic N (75%) + *Azospirillum* (50 g) + 5 t/ha FYM
T3 – Inorganic N (50%) + *Azospirillum* (50 g) + 5 t/ha FYM
T4 – FYM (5 *t/ha*) + *Azospirillum* (50 g)
T5 – FYM (5 *t/ha*) alone
T6 – FYM (10 *t/ha*) + *Azospirillum*
T7 – FYM (10 kg) alone
(* P & K are common as Rock phosphate and MOP)

(In all seed spices : FYM levels will be 5 t/ha & 10 t/ha
Azospirillum : *1.5 kg/ha as seed treatment*

B. ORGANIC FARMING

Comparison will be made between organically grown and conventionally grown spices –only in Black pepper, Ginger & Turmeric

Black Pepper : Centres : Panniyur, Sirsi, Tdiyankuduasai, Yercud, & Ambalavayal (as vol. Centre)

The nutrient sources of organic origin are through FYM/Vermi compost /neem cake/ biofertilizers + Rock phosphate and wood ash. The cultural and crop protection practices are to be finalised after discussion with resource persons from crop protection group.

Similar trials will be taken up in Ginger and Turmeric

Ginger : Pottangi, Solan, Dholi, Raigarh

Turmeric : Pottangi, Bhavanisagar, Raigarh

No. of beds : 50 each of organic farming and conventional methods.

The standardised package of practices on organic farming in Pepper, Ginger and Turmeric are available with ICRI and it will be provided to the AICRP centres.

Group III Crop Protection

Panel Members	:	Dr Y R Sarma (Principal Scientist, IISR, Calicut) Dr. Sukumaravarma (Professor, KAU, Trichur) Dr. K V Ramana (Principal Scientist, IISR, Calicut)
Rapporteurs	:	Dr S S Veena Dr A Kumar
Resource persons	:	Dr. S Devasahayam (IISR, Calicut) Dr. M Anandaraj (IISR, Calicut) Dr. M N Venugopal (IISR, Appangala) Mr. Santhosh J. Eapen (IISR, Calicut) Dr. D Gopakumar (ICRI, Myladumpara) Dr. K P Mammootty (KAU, Panniyur)

BLACK PEPPER

PEP/CP/1 **Disease management trial**

PEP/CP/1.1 ***Phytophthora* foot rot disease management in black pepper**

Decisions taken
1. Final report of the project will be submitted to Project Coordinator
2. Large scale field trials will be laid out based on the results obtained during previous experiments.

PEP/CP/1.2 **Biological control of *Phytophthora* foot rot of black pepper – nursery trial**

Decisions taken Pathologist did not represented from Chintapalli centre /No report presented

PEP/CP/1.3 **Studies on the control of nursery disease of black pepper including biocontrol**

Decisions taken
1. Present experiments will be concluded.
2. New set of experiments will be laid out after obtaining relevant information from Pathologist.

PEP/CP/1.4 **Control of *Phytophthora* disease of black pepper in farmers' field – observational trial**

Decisions taken Population of nematodes in pepper soil will be estimated, if a Nematologist is identified.

PEP/CP/1.5 ***Phytophthora* foot rot incidence in black pepper under different density in an arecanut garden**

Decisions taken
1. All plots will be superimposed with package of practices for foot rot management.
2. The programme identified for Sirsi will be followed by Panniyur centre also.

PEP/CP/2 **Pest Management trial**

PEP/CP/2.1 **Control of scale insects in black pepper**

Decisions taken

Pampadumpara : Experiments will be conducted during January-March.

PEP/CP/2.2 **Survey for the incidence of insect pests in black pepper at high altitudes**

Decisions taken *Pampadumpara*

1. Survey for insect pests of black pepper will be conducted during appropriate season
2. Dr. Gopakumar, Mr. S Devasahayam and Mr. Joseph Rajkumar will meet and finalise the future programmes.
3. Crop loss assessment for pollu disease (anthracnose) and detailed etiology of anthracnose will be worked out.

CARDAMOM

CAR/CP/1 **Pest management in cardamom**

CAR/CP/1.1 **Evaluation of plant based insecticides for the control of thrips and borer in cardamom**

Decisions taken *Mudigere :*

1. Complete data on the project may be obtained and submitted to PC.
2. Project may be concluded.

CAR/CP/1.2 **Estimation of quantitative and qualitative loss due to thrips damage in cardamom**

The Entomologist will provide the complete data on quantitative loss to PC. Qualitative analysis has to be done with the help of biochemist at IISR.

CAR/CP/1.3 **Bioecology of natural enemies of major pests of cardamom**

Experiment will be taken up at Pampadumpara also.

New programmes :

1. Programmes on root grub will be taken up at Pampadumpara and Mudigere
2. Survey, crop loss and etiology of anthracnose will be taken up at Mudigere and Pampadumpara and at RARS, Ambalavayal, Wynad as a voluntary centre.
3. All the centres viz., Panniyur, Sirsi & Mudigere will have a common programme for foot rot management with major emphasis on biocontrol agents.

General recommendations :

For monitoring the projects, the help of Scientists from KAU and IISR may be sought.

Coordinator may take steps with University to get one Entomologist posted at Mudigere.

GINGER

GIN/CP/1 **Disease management trial**

GIN/CP/1.1 **Studies on control of rhizome rot of ginger**

Decisions taken *Solan :*

1. Dr. Dohroo will submit the detailed report on rhizome rot management in March.

2. Based on the results obtained, large scale field trials will be conducted along with biocontrol agents in 6 major districts in 1ha/location
3. Financial assistance provided either by ICAR/ University to Solan centre to conduct trials at farmers' field.

Pundibari :

1. Etiology of rhizome rot disease will be established before going for management programmes
2. The help of IISR, Calicut may be sought to study the etiology of rhizome rot of ginger. The concerned scientist can visit IISR with samples during December

Dholi :

1. Project may be concluded and the final report may be submitted to PC.
2. New trials involving biocontrol agents and test results of previous experiments may be initiated.

Raigarh

1. The technical help of IISR, Calicut may be sought to study the etiology of rhizome rot of ginger. The concerned scientist may visit IISR with samples during December
2. Based on etiology, common programmes will be identified for all the four centres.

GIN/CP/1.2 **Biocontrol studies on rhizome rot of ginger**

Programme has been identified for all the 4 centres.

TURMERIC

TUR/CP/1 **Disease management trial**

TUR/CP/1.1 **Survey and identification of disease causing organisms in turmeric and screening of turmeric germplasm against diseases**

Decisions taken

Dholi

1. This centre should provide the methodology adopted for screening germplasm for diseases of turmeric to PC.
2. Released varieties from IISR, Calicut will be provided to Dholi centre.
3. Final report on disease survey will be submitted to PC.

Jagtial :

1. Etiology of rhizome rot of turmeric need to be looked into at Nizamabad (Jagtial), Guntur and Cuddapa areas.
2. Management trials for rhizome rot of turmeric will be taken up in Guntur and Jagtial. These centres may seek the technical help of APAU.

3. Nematologist and Pathologist from IISR, Calicut may make a trip to Jagtial to assess the status of *Pratylenchus* and rhizome rot. The assessment report may be submitted to PC.
4. The final report on the result of germplasm screening for disease resistance may be submitted to PC.

Coimbatore :

None represented.

TUR/CP/1.2 **Chemical control of *Taphrina* leaf spot disease of turmeric may continue**

Decisions taken

Dholi & Pundibari:

1. The present experiments will be concluded at both the centres and the report may be submitted to PC.
2. The centres may formulate new set of experiments.

TUR/CP/1.3 **Effect of seed treatment on leaf blotch of turmeric / effect of fungicides on leaf spot disease**

Decisions taken

Raigarh:

1. The project report (final report) may be submitted to PC.
2. The experimental treatments may be finalised/ earmarked for Dholi and Raigarh area.
3. Raigarh centre may give priority to rhizome rot of ginger.

TUR/CP/1.4 **Investigations on the causal organism of rhizome rot of turmeric and screening of biocontrol agents for the management**

Decisions taken

Jagtial :

1. The present experiments may be concluded.
2. Based on the results of the experiments, new experiments can be formulated.
3. Etiology of turmeric rhizome rot may be resolved with the help of Scientists at IISR, Calicut.

CORIANDER

COR/CP/1 **Disease management trial**

COR/CP/1.1 **Survey to identify the disease incidence, collection and identification of causal organism**

Decisions taken

Dholi, Jagudan, Jobner

1. The available germplasm will be evaluated for stemgall resistance at Dholi.
2. Complete information on reaction of all the germplasm types to disease be compiled and submitted to PC by Jobner and Jagudan centres.
3. Available germplasm at Dholi and Jagudan will be screened.
4. Detailed survey may be conducted for disease incidence by Jagudan.
5. Exotic lines of coriander may be included in the screening programme at Jagudan.

COR/CP/1.2 **Studies on wilt and powdery mildew management in coriander. Biocontrol of wilt in coriander.**

Decisions taken

Coimbatore :

PC may take note of non-participation of Coimbatore centre. The non-participation may be reported to Director of Research, TNAU, Coimba tore.

COR/CP/1.3 **Studies on stemgall disease management of coriander by different fungicides**

Decisions taken

Dholi :

1. Research programmes for seed spices should be finalized before June so that the programmes can start in the current season.
2. Experimental details may be submitted to PC.

CUMIN

CUMIN/CP/1 **Disease management trial**

CUM/CP/1.1 **Blight disease control by manipulation of agronomic practices**

Decisions taken

Jagudan

The pooled data for the last 3 years can be submitted to PC.

CUM/CP/1.2 **Epidemiological study of *Alternaria* blight of cumin**

Decisions taken

Jagudan and Jobner:

1. All available germplasm will be evaluated for blight and wilt. The short listed germplasm may be included in the disease management programmes.

Jobner:

1. Data on disease incidence, dates of sowing and yield may be submitted to PC. Based on the results future programmes will be formulated.
2. Ajmer area may be used for evaluation of date of sowing.

Jagudan :

1. Data on disease incidence (blight), dates of sowing and yield may be submitted to PC. based on the results future programme will be formulated.

CUM/CP/2 **Pest management trial**

CUM/CP/2.1 **Integrated management of pests and disease of cumin**

Decisions taken

Jobner:

1. Pooled data for the past four years will be submitted to PC by June.

Jagudan:

1. Data on blight incidence will be submitted to PC.
2. The root rot nematode resistant lines of cumin should be evaluated for wilt disease too.
3. The tolerant lines should be included in the management programmes.

Coimbatore:

None represented.

New projects to be initiated in 2000

1. Black pepper

PEP/CP/1.1 **Phytophora footrot Diseases management in black papper**

a) Foot rot management

Treatments : The following treatments involving fungicides and biocontrol agents were suggested in the coming years.

1. Metalaxyl (300 ppm) or Metalaxyl gold
2. Potasium phosphonate (3ml/L. and 5L./ vine) (Spry and drench) and the quantity of fungicide will depend on the canopy size.
3. Biocontrol agents (*Trichoderma* sp.) 50 g of inoculum + 1kg of Neem Cake
4. Combination of biocontrol agent and fungicides.
5. Neem cake application - One kg / vine
6. Untreated check.

Plot size : Minimum of 20 vines per treatment in an existing plantation and at two locations.

Duration : 5 years

1. Biocontrol agent should be formulated at the particular institute or University rather than using commercial products. The population of *Trichoderma* of the original content is 10 to, 50gm to the produce would be sufficient per vine.

b) Anthracnose

1. Crop loss due to anthracnose at the time of spiking should be studied.
2. Spike and leaf damage due to anthracnose should be studied.

c) Biological Control

Trichoderma based biocontrol technology be made available to government agencies.

d) Planting materials

Planting materials of spices should be certified to ensure supply of disease free planting material to farmers.

PEP/CP/2.1 **Control of scale insects in black pepper.**

Centre identified : Pampadumpara

Treatments

1. Dimethoate – 0.05%
2. Malathion – 0.075%
3. Phosphamidon - 0. 05%
4. Rakshak – 0.5%
5. Control

Replications - Four

Pretreatment incidence of scales from cm^2 leaf in 3 bits and from 2.5 cm long twigs, to be recorded.
Two sprays at 21 days interval during January-March (at the onset of infestations after harvest of berries). Observations to be recorded 21 days after each spray

The experiment may be conducted during two seasons.

PEP/CP/2.2 **Survey for the incidence of pests of black pepper at high altitudes**

Centre identified : Pampadumpara

Technical programme

1. Survey may be conducted in Idukki area during June-August and January-March, for a period of two years.

2. Ginger

Decisions

1. Commercially available biological control agents should not be used for experimentation as it can lead to lot of inconsistencies and controversies.
2. Field monitoring should be performed during the crop season up to harvest to ensure for selection of healthy seed rhizomes for planting purpose.
3. Storage experiments should be carried out at Solan and northern plains for optimising storage conditions.
4. Field experiment should be carried out with the following treatments
   a) Metalaxyl mancozeb (200-300ppm) seed treatment
   b) Biocontrol as seed treatment
   c) Biocontrol as soil applications and seed application
   d) Metalaxyl as seed treatment and soil application of biocontrol
   e) Untreated check.

3. Turmeric

1 Varieties may be given common seed treatment and foliar spray with carbendazim and mancozeb respectively (or a combination product)

1. The following field experiments should be carried out with atleast two promising varieties.
   a) Mancozeb 0.2%
   b) Carbendazim 0.2%
   c) Mancozeb + Carbendazim 0.2%
   d) Biocontrol agents
   e) Mancozeb as seed treatment and biocontrol agents as soil application
   f) Carbendazim as seed treatment and biocontrol agents as soil application
   g) Untreated check.

4. Seed Spices

1. All existing programmes may continue and new programmes have to be finalized during 2000 AD, Rabi season.

5. Cardamom

1. No Change in the programmes

CAR/CP/1.3 **Bioecology of natural enemies of major pests of cardamom**

Centres identified Mudigere, Pampadumpara

1. Collection, identification and documentation of natural enemies
2. Studies on predatory/parasitic/pathogenic activities of natural enemies.

CAR/CP/1.4 **Management of root grubs of cardamom**

Centres identified Mudigere, Pampadumpara

Treatments

1. Chlorpyriphos – 0.05%
2. Chlorpyriphos – 0.075%
3. Phorate 10G – 40g/plant
4. Phorate 10G – 60g/plant
5. Imidacloprid (Confidor) – 0.50 ml/L
6. Imidacloprid – 0.75 ml/L
7. Control –

   Replications – Three

Time of application

April- May-September - October

PROCEEDINGS OF XV AICRPS WORKSHOP

Technical Session I Genetic Resources

Chairman : Dr. K U K Nampoothiri, Co-Chairman : Dr. K. C. Velayudhan

Rapporteurs : Mr. B Krishnamurthy
Mr. K V Saji

1. No of papers presented : 9
2. Name(s) of centres where work was done : Panniyur, Sirsi, Chintapalli, Yercaud, Dapoli, Mudigere, Pampadumpara, Solan, Pottangi, Pundibari, Kumarganj, Dholi, Raigarh, Jagtial, Coimbatore, Pechiparai, Thadiyankudisai, Dapoli, Jobner, Jagudan, Guntur, Hisar
3. Non-performing centres, if any : No participation from Guntur. No reports and no participation from Thadiyankudisai, and Pechiparai (voluntary centres)
4. Brief description of the work done and salient results reported (cropwise) : The Coordinating centres presented their reports of different spices crops.

5. Recommendations / decisions (crop wise)

General observations :

Black pepper

1. Preparation of passport data and sending the same to the Project Coordinator (Spices) have to be carried out.
2. Distinct genetic entities are to be registered with NBPGR, New Delhi.
3. A set of wild Piper collections from all centres may be sent to IISR for conservation.
4. Voucher specimens are to be collected and herbaria deposited, one copy to be sent to IISR
5. At Sirsi, variability in Karimalligessara has to be collected.
6. Chinthapalli centre has to complete the collections in Eastern Ghats in two years, one set of collection is to be sent to IISR
7. Intensive surveying has to be carried out at Shevroys, Lower Pulneys, Kanyakumari, Upper Kodayar, Gudalur and Kolli hills by Yercaud centre in two years.
8. One centre may be identified as a lead centre for quality analysis and facilities provided. Standardisation of evaluation criteria has to be done.

Cardamom

1. Drought tolerant types and elite types must be collected after an intensive surveying by Mudigere centre. Fifty accessions can be described using IPGRI proforma.
2. "Kanni elam" – a low elevation, drought tolerant line has to be collected by Pampadumpara centre.

3. Young Scientists could be deputed to NBPGR for training on germplasm collection. Help from NATP could be obtained for TA.
4. Survey of plantation should be carried out for collection of drought tolerant lines and super clumps by Mudigere & Pampadumpara centres.

Ginger

Solan : The Solan centre has to complete documentation and characterisation of germplasm in the next two years. Passport data has to be collected and send to NBPGR through PC. Surveying of Northern Uttar Pradesh and some parts of Himachal Pradesh must be done.

Pottangi : Pottangi centre has to survey unexploited, inaccessible tribal blocks of Koraput and Phulbani districts of Orissa and collect land races of ginger. Characterisation of germplasm has to be done in two years.

Dholi : Vaishali, Muzaffarpur and Samastipur districts must be surveyed and local ginger cultivars must be collected.

Kumarganj : Cultivars from Kumarganj and adjoining district must be collected and germplasm collections must be maintained at least in cement tubs.

Pundibari : Surveying of Northern districts in West Bengal has to be done and variability available must be collected. Emphasis for collection for salad ginger types must be given from North East areas.

Raigarh : Collection from tribal area in Baster (MP) has to be carried out in the next two years.

Turmeric

Solan : Surveying of northern Uttar Pradesh and some parts of Himachal Pradesh must be carried out ; passport data must be collected; documentation and characterization must be carried out in two years.

Pottangi : Passport data must be prepared and supplied to NBPGR through PC for getting IC Nos.

Kumarganj : Jalpaiguri, Darjeling, Maharajganj, Deoria must be surveyed and collections made.

Dholi : Vaishali, Muzaffurpur and Samastipur districts must be surveyed and local cultivars collected.

Pundibari : Collection from Jalpaiguri, Darjeling and Malde has to be done within two years; characterization must be carried out in two years.

Jagtial : Collection for perennial and special type from Adilabad district has to be done ; fifty accessions must be characterized further ; quality characterization also has to be done.

Coimbatore : Local collection from Thalavadi (high elevation types) must be carried out besides documentation and characterization.

Tree Spices

Yercaud : The tree spices genetic resources work could be shifted to Pechiparai centre. Wild nutmeg types may be collected and conserved.

Dapoli : The existing trials will be carried out under crop improvement ; Tree spices genetic resources work will be discontinued.

Coriander

Jobner : Locating the unexplored areas and collecting the variability are to be done. Documentation and characterization have to be completed. Quality analysis based on volatile oil estimation has to be done. This is a lead centre for coriander and fenugreek work. Ad-

ditional facility for quality analysis has to be given.

Jagudan : Work on coriander will be discontinued. Facility for storage of germplasm at Jagudan and Jobner has to be given. This will be presented before QRT.

Coimbatore : Collection of leafy types will be done. Characterization and documentation must be carried out. Quality analysis will be done.

Hisar : Collection from Naurnal district will be completed in two years. RCr 41 will be collected from Jobner. Characterization and documentation will be carried out. Germplasm will be screened for stem gall disease tolerance.

Dholi : Collection from Vaishali, Muzaffarpur and Samastipur will be carried out in the next two years.

Kumarganj : Surveying in Barabanthi, Baharaich, Kanpur and Sultanpur has to be carried out.

Raigarh : Chatis Ghat area will be surveyed.

Cumin

Jobner : Collection from neighboring districts must be completed. EC collection should be documented and registered at NBPGR.

Jagudan : Collection from Saurashtra region has to be done. Evaluation and documentation are to be carried out.

Fennel

Jobner : Quality evaluation and documentation are to be carried out.

Jagudan : Quality evaluation based on volatile oil content and documentation are to be carried out.

Hisar : Quality evaluation for volatile oil, documentation and characterization are to be carried out.

Dholi : Collection will be carried out along with other spices.

Fenugreek

Jobner : Chitur, Begu, Numbahera, Railmagre areas to be explored and variability collected.

Jagudan & Coimbatore : Documentation and characterization of germplasm

Hisar : Documentation of the existing germplasm will be carried out; possibility of quality analysis has to be explored.

Dholi : Collection from Vaishali, Muzaffarpur and Samastipur will be done; documentation has to be carried out.

Kumarganj : Collection from Kumarganj, Barabank, Baharaich, Allahabad, Mirzapur, Janpur, Varanasi, Sultanpur, Gorakpur, Deoria and Maharajganj will be carried out and will be documented.

6. Programmes proposed for the next year : The ongoing programme for 2000-2001 will continue as per the decisions of the Group Meeting.

7. General decisions :

Voucher specimen should be prepared at the time of collection. Passport data has to be prepared and sent to Coordinator. Distinct entities are to be registered with NBPGR, New Delhi after getting the IC number.

The collection work can be completed after intensive survey within two years. Documentation and characterization are to be carried out wherever necessary.

Scientist can be deputed to NBPGR, New Delhi for training on germplasm collection.

The tree spices research at Yercaud can be discontinued, and the work can be shifted to Pechiparai, through a work arrangement by the TNAU.

Additional facility for storage of germplasm must be made available at Jagudan & Jobner and quality analysis facility also to be created at Jagudan as this centre is now identified as the lead centre for cumin and fennel work in the country. This will be projected to the next QRT.

One centre (such as Panniyur) may be identified as a lead centre for quality analysis for black pepper. Alternatively the strengthening of the facility at IISR Calicut may be thought of to take up the AICRPS work also.

There was a suggestion to remove Thadiyankudisai as a voluntary centre. However, Dr. Thangaraj, Professor of Plantation Crops and Spices has taken up the responsibility of getting the work done at the Thadiyankudisai centre including timely reporting.

Technical Session II Crop Improvement

Chairman : Prof. K V Peter, Co-Chairman : Dr. T Thangaraj

Rapporteurs : Mr. P A Mathew

Dr. J Rema

1) No. of papers presented : No. of projects 43

No. of presentation 73

2) Non-performing centres if any : Nil

3) Brief description of the work done &

salient achievements reported : The centres presented the reports

4) Recommendations/decisions (crop wise)

Black Pepper

A new CVT on black pepper would be started in 2000 June at four centres namely Panniyur, Sirsi, Pampadumpara and Ambalavayal with 13 treatments and three replications with six standards/plot and two cuttings/standard. The treatments include five lines from Panniyur namely PRS-17, 21, 22, Cul.5308 and 5489 and six lines from IISR, Calicut namely, HP-34, 105, 813, 1411, Coll-1041 and Karimunda OP with Panniyur I as the check. It was also decided that the materials included in the trial should not be distributed to any one including farmers under any circumstances.

Cardamom

A new CVT on cardamom would be taken up in four centres namely, Myladumpara,

Sakleshpur, Pampadumpara and Mudigere with 14 treatments and three replications and with a population of 18 plants/plot which will include local check and control. Entries from Myladumpara would be MCC 13, 18, 200 and 347, from Pampadumpara PS 44 and S1, Mudigere would be CL 692 and &730, Sakleshpur SKP 165 and 170 and two katte tolerant and one rhizome rof tolerant lines from IISR.

Ginger

A new CVT on ginger would be undertaken in five centres namely, Pottangi, Chintapalli, Solan, Pundibari and Raigarh with six entries namely, two entries from IISR, (35 and 117) and two entries from Pottangi, (V1C-8 and V1S1-2) with local check and control.

Turmeric

A new CVT on turmeric would also be undertaken in seven centres namely, Pottangi, Pundibari, Jagtial, Dholi, Coimbatore, Kumarganj and Raigarh with 15 entries; two from Pundibari (TCP-1), six from Pottangi (PTS 55, Tu.No.1, PTS-11, 15, 52 & 59), two from Jagtial (JTS-6 & 313), and (TC P-2) one from Dholi (RH-5) four from IISR (ACC. 593 & 675, 584 & 585).

General Decisions

1. In cardamom uniform varieties and package of practices should be adopted in the experiments at Myladumpara and Pampadumpara as both the stations are located in nearby places.
2. Local checks along with the latest released varieties should be included in all varietal trials in future. In all varietal testing programmes, it is expected that the yield levels should be far above the state/national averages. In case of trials with very low yields due to various reasons, it is decided that such data need not be published. Quality parameters are also to be included in all evaluation trails.
3. For all future varietal trials in cardamom, Green Gold or farmers' varieties should be included as a control, adopting the recommended package of practices.
4. Since, 70-90% of the black pepper plants in the CVT at Chintapalli are affected by virus the Project Coordinator would visit the centre, discuss with the scientists and decide whether to continue the trial or not.
5. All the coordinating centres may send the turmeric accessions Acc.360 and 361 to IISR, Calicut for quality analysis.

Programme proposed for the next year

The on going programme for 1999-2000 will continue and the new programmes identified in the group meeting

Technical Session III Crop Production

Chairman : Dr. S N Potty, Co-Chairman : Dr. K Sivaraman

Rapporteurs : Dr. (Mrs.) C K Thankamani
Dr. V Srinivasan

1. No. of papers presented	:	No. of projects - 13 No. of Presentations – 17
2. Name(s) of centres where work was done:		Panniyur, Sirsi, Yercaud, Dapoli, Mudigere, Pampadumpara, Coimbatore, Pechiparai, Thadiyankudisai, Dapoli, Jobner
3. Non-performing centres, if any	:	No person attended from Pechiparai. No running projects at Kumarganj and Jagudan
4. Brief description of the work done and salient results reported (cropwise)	:	The Centres presented the reports
5. Recommendations / decisions (cropwise) :		

Black Pepper

PEP/CM/1.1 **Irrigation-cum-fertilizer requirements of black pepper and arecanut in the mixed cropping system**

The experiment can be continued for two more years at Sirsi.

Observation on oil moisture content has to be taken.

PEP/CM/1.2 **Trial on drip irrigation in black pepper**

The present trial at Panniyur will be continued. No extra fund to Yercaud centre is possible (as it showed willingness to take up trial), and so no need for the same to continue at Yercaud.

Cardamom

CAR/CM/1.1 **Effect of fertilizer on the yield of cardamom**

The experiment is in fifth year at Mudigere and third year in Pampadumpara. The yield data and the trend of response are same in both the locations. The experiment shall be concluded at Mudigere and of Pampadumpara will continue for two more years.

CAR/CM/1.2 **Influence of micronutrients on the yield of cardamom**

Results of Mudigere Station was inconsistent and trial in Pampadumpara was vitiated by drought in 1997-98. This experiment at both centres can be discontinued.

ICRI is conducting experiments on micronutrients at two locations. The same experiment can be modified for Mudigere & Pampadumpara, taking into consideration of the micronutrient status of these soils. ICRI will give the technical programme for the new trial, in these centres.

CAR/CM/1.3 **Trial on integrated nutrient management**

The experiment at Mudigere centre can be continued. At Pampadumpara

due to technical reasons the experiment has not been laid out so far. The experiment with the same set of treatments as in Mudigere, can be laid out at Pampadumpara, with an additional treatments to compensate for potassium (as wood ash), short supplied through organics.

Tree Spices

TSP/CM/1.1 **Vegetative propagation in nutmeg, clove & cinnamon**

Since standardized technologies are available with high success rates, trial can be concluded/discontinued at all the centres.

TSP/CM/2.1 **Drip irrigation in clove and nutmeg**

Location of the experiment will be shifted to Pechiparai which is a potential area for tree spices and experiment will be laid out in established gardens. The facilities developed at Yercaud for this trial can be shifted to Pechiparai.

TSP/CM/3.1 **Biofertilizer trial in tree spices**

Four years pooled yield data are available . The experiment can be concluded and final report submitted.

TSP/CM/4.1 **Studies on fruit drop in nutmeg**

Since the fruit drop is not a major concern in Dapoli region, the survey need not be continued and experiment can be concluded.

Coriander

COR/CM/1.2 **Response of coriander to micronutrients.**

The experiment at Jobner Centre can be continued.

Same experiment shall be initiated at Kumarganj centre also with similar set of treatments.

Fennel

FNL/CM/1 **Response of fennel to micronutrients.**

Trial can be continued for one more year and report can be submitted (not included in the agenda notes).

Fenugreek

FGK/CM/1.1 **Effect of time of sowing and spacing in fenugreek**

Study was conducted for two seasons and hence the experiment can be concluded.

FGK/CM2.1 **Response of fenugreek varieties to row spacing and date of sowing**

The experiment can be concluded after recording the current season's data. After pooled data analysis final report can be submitted. Findings can be recommended to extension agency.

General decisions : The need for reduction in quantity of chemical input usage and experi-

ments on organic farming to create database on large scale in support of the concept was emphasized.

Absolute necessity for experiments on location specific biofertilizer strains on spices productivity was stressed.

The State trials conducted at different centres need not be presented in the AICRPS workshop.

6) Recommendations ready for transfer to extension agency, if any : Nil

7) Programme proposed for the next year

All experiments are to continue

NEW PROGRAMMES:

Biofertilizer studies in spices

BLACK PEPPER

Efficacy of biofertilizer studies in black pepper using *Azospirillum*

Centres Identified : Panniyur, Sirsi, Yercaud, Thadiyankudisai & Ambalavayal (as voluntary centre)

Biofertilizer selected : N – fixer as *Azospirillum* and P solubilizer

Treatments

T1 – Inorganic N (100%) + *Azospirillum* (50 g) + 5 kg FYM
T2 – Inorganic N (75%) + *Azospirillum* (50 g) + 5 kg FYM
T3 – Inorganic N (50%) + *Azospirillum* (50 g) + 5 kg FYM
T4 – FYM (10 kg) + *Azospirillum* (50 g)
T5 – FYM (10 kg) alone
T6 – FYM 5 Kg + *Azosprillum*
T7 - FYM 5Kg alone

(* P & K are common as Rock phosphate and MOP)

Application in two splits one in May – June and other in August – September. Six vines/ treatment with four replications.

The location specific biofertlizer isolates can be supplied by the respective State Agricultural Universities.

Efficacy of biofertilizer studies in black pepper using P solubilizers

Similar treatments with levels of P (as rock Phosphate) with P- solubilizers will be taken up at all centres identified.

Cardamom

Efficacy of biofertilizer studies in cardamom and *Azospirillum* using P solubilizers

Similar programmes on N – fixers and P-solubulisers with the same set of treatments will be initiated in Caldamom.

Centres identified : Mudigere, Pamapdumpara and Myladumpara (ICRI)

Turmeric

Similar programme on N – fixers with *Azospirillum* @ 5 kg/ha will be started with the same set of treatments as identified in Black pepper.

Centres identified : Coimbatore, Kumarganj, Raigarh and Pottangi, Ambalavayal (voluntary centre)

Ginger

Similar programme on N – fixers with *Azospirillum* @ 5 kg/ha will be started with the same set of treatments as identified in Black pepper.

Centres identified : Pottangi, Solan & Ambalavayal

Seed spices

Coriander : Jobner, Coimbatore, Kumarganj

Cumin : Jagudan, Kumarganj and Jobner

Fennel : Jagudan, Kumarganj and Jobner

Fenugreek : Jobner, Jagudan, Coimbatore and Guntur

(FYM levels will be 10 t/ha ; *Azospirillum* @ 1.5 Kg/ha as seed treatment

(The treatmental detils are given in the detailed technical programme presented in the group meeting.)

ORGANIC FARMING IN SPICES

Comparison will be made between organically grown and conventionally grown spices in Black pepper, Ginger & Turmeric

The nutrient sources of organic origin are through FYM/Vermi compost /neem cake/ biofertilizers + Rock phosphate and wood ash. The cultural and crop protection practices are to be finalized after discussion with resource persons from crop protection group.

Similar trials will be taken up in

Black Pepper : Panniyur, Ambalavayal (voluntary centre) and Yercaud (number of vines 200 in each system)

Ginger : Pottangi, Solan, Dholi and Raigarh

Turmeric : Pottangi, Raigarh and Bhavanisagar (as Voluntary centre)

No. of Beds : 50 each of organic farming and conventional methods.

The standardised package of practices on organic farming in Black pepper, Ginger and Turmeric are available with ICRI and it will be provided to the AICRP centres.

Technical Session IV Crop Protection

Chairman : Dr. Y R Sarma
Rapporteurs : Dr. (Mrs) N.K. Leela
Dr. A. K. Kumar

1) No. of papers presented :
2) Non-performing centres, if any : None represented from Coimbatore centre
3) Brief description of the work done and salient results reported (crop wise) : The coordinating centres presented their reports
4) Recommendations/decisions (crop wise) :

BLACK PEPPER

PEP/CP/1 Disease management trial

PEP/CP/1.1 **Phytophthora foot rot disease management in black pepper**

Decisions taken

1. Final report of the project will be submitted to Project coordinator
2. All the centres will have a common programme for foot rot management with major emphasis on biocontrol agents. (Panniyur, Sirsi, Mudigere).
3. Large scale field trials will be laid out based on the results obtained during previous experiments.
4. Nematode population in pepper rhizosphere soil at Sirsi will be monitored if a Nematologist is identified.
5. Survey, crop loss and etiology of anthracnose will be taken up at Mudigere and Pampadumpara and at RARS, Ambalavayal, Wynad as a Voluntary Centre.
6. The treatment comprising "All cultural practices + 1 kg neem cake + 3g ai phorate/vine + Bordeaux mixture spray before monsoon + 0.3% potassium phosphonate spray during dry spell at late July or early August may be recommended for the management of combined *infection* of *Phytophthora* and *Radopholus similis*.

PEP/CP/1.2 **Biological control of Phytophthora foot rot of black pepper - nursery trial**

Decisions taken

1. Strict quality parameters should be adopted for supplying planting material to coordinating centres and farmers.
2. The planting material should be free of diseases and insect pests. The responsibility of supplying disease free seedlings / planting material should be fixed on the concerned plant breeder.

PEP/CP/1.3 **Studies on the control of nursery disease of black pepper including biocontrol**

Decisions taken

1. Present experiments will be concluded.
2. New set of experiments will be laid out after obtaining relevant information from Pathologist.
3. Research personnel should be identified in Pepper Technology Mission project for monitoring the population of *Radopholus similis* in pepper garden of Kerala.

PEP/CP/1.4 **Control of *Phytophthora* disease of black pepper in farmers' field - observational trial**

Decisions taken Population of nematodes in pepper soil will be estimated, if a Nematologist is identified.

PEP/CP/1.5 ***Phytophthora* foot rot incidence in black pepper under different density in an arecanut garden**

Decisions taken

1. All plots will be super imposed with package of practices for foot rot management.
2. The programme identified for Sirsi will be followed by Panniyur centre also.

PEP/CP/2 **Pest Management trial**

PEP/CP/2.1 **Control of scale insects in black pepper**

Decisions taken Pampadumpara : Experiments will be conducted during January-March.

PEP/CP/2.2 **Survey for the incidence of insect pests in black pepper at high altitudes**

Decisions taken : Pampadumpara :

1. Survey for insect pests of black pepper will be conducted during appropriate season
2. Dr. Gopakumar, Mr. S Devasahayam and Mr. Joseph Rajkumar will meet and finalise the future programmes.
3. Crop loss assessment for pollu disease (anthracnose) and detailed etiology of anthracnose will be worked out.
4. Entomologists at IISR, Calicut and Entomologist at KAU should collaborate for insect pest survey particularly mealy bug in high altitude areas of Kerala.
5. Any new pest / diseases, whether or not they are major threat, should be informed to Project Coordinator.
6. An Ad-hoc project may be proposed on scale insect incidence of black pepper. Dr. R N Pal has agreed to support such a project.
7. A new project on root grub management will be taken up at Mudigere and Pampadumpara

CARDAMOM

General recommendations :

For monitoring the projects, the help of Scientists from KAU and IISR may be sought.

Co-ordinator may take steps with University to get one Entomologist posted at Mudigere.

CAR/CP/1 **Pest management in cardamom**

CAR/CP/1.1 **Evaluation of plant based insecticides for the control of thrips and borer in cardamom**

Decisions :

Mudigere

1. Complete data on the project may be obtained and submitted to PC.
2. Project may be concluded.

CAR/CP/1.2 **Estimation of quantitative and qualitative loss due to thrips damage in cardamom**

The Entomologist will provide the complete data on quantitative loss to PC.

Qualitative analysis has to be done with the help of biochemist at IISR.

CAR/CP/1.3 **Bioecology of natural enemies of major pests of cardamom**

Experiment will be taken up at Pampadumpara also.

GINGER

GIN/CP/1 **Disease management trial**

GIN/CP/1.1 **Studies on control of rhizome rot of ginger**

Decisions :

Solan :

1. Dr. Dohroo will submit the detailed report on rhizome rot management on March.

2. Based on the results obtained large scale field trials will be conducted along with biocontrol agents in 6 major districts of Himachal Pradesh
3. Financial assistance provided either by ICAR/ University to Solan centre to conduct trials at farmers' field.
4. Based on the leads obtained from earlier experiments large scale field experiments will be conducted in Himachal Pradesh.
5. An attempt will be made to post a Nematologist at Coordinating Centres to analyse the nematode population of ginger soil. For practical purpose, the sample will be analysed with the help of nematologists at Agricultural Universities.

Pundibari :

1. Etiology of rhizome rot disease will be established before going for management programmes
2. The help of IISR, Calicut may be sought to study precisely the etiology of rhizome rot of ginger. The concerned scientist can visit IISR with samples during December

Dholi :

1. Project may be concluded and the final report may be submitted to PC.
2. New trials involving biocontrol agents and test results of previous experiments may be initiated.
3. The nematologist available with the centre may be utilized for nematode enumeration.

Raigarh

1. The technical help of IISR, Calicut may be sought to study the etiology of rhizome rot of ginger. The concerned scientist may visit IISR with samples during December
2. Based on etiology, common programmes will be identified for all the four centres.

GIN/CP/1.2 **Biocontrol studies on rhizome rot of ginger**

Programmes have been identified for all 4 centres.

1. Disease and pest free seed rhizome of ginger should be used for field trials to avoid eratic results obtained with different treatments.
2. Uniform programmes or treatments should be identified in all Coordinating Centres.

TURMERIC

TUR/CP/1 Disease management trial

TUR/CP/1.1 **Survey and identification of disease causing organisms in turmeric and screening of turmeric germplasm against diseases**

Dholi :

1. This centre should provide the methodology adopted for screening germplasm for diseases of turmeric to PC.
2. Released varieties from IISR, Calicut will be provided to Dholi centre.
3. Final report on disease survey will be submitted to PC.
4. Work on other diseases (apart from *Taphrina* and *Colletetrichum*) will be initiated in the coming season.

Jagtial :

1. Etiology of rhizome rot of turmeric need to be looked into Nizamabad (Jagtial), Guntur and Cuddpa areas.
2. Management trials for rhizome rot of turmeric will be taken up in Guntur and Jagtial. These centres may sought the technical help of APAU.
3. Nematologist and Pathologist from IISR, Calicut make a trip to Jagtial to assess the status of *Pratylenchus* and rhizome rot. The assessment report may be submitted to PC.
4. The final report on the result of germplasm screening for disease resistance may be submitted to PC. Seed material from Jagtial centre will be evaluated in Coimbatore also. The other centres viz., Kumarganj and Dholi will also perform the disease screening for tolerant lines. All these centre may work together for evaluation of germplasm of ginger and turmeric.

Coimbatore :

None represented.

TUR/CP/1.2 **Chemical control of *Taphrina* leaf spot disease of turmeric**

Dholi & Pundibari:

1. The present experiments will be concluded at both the centres and the report may be submitted to PC.
2. The centres may formulate new set of experiments.
3. Use of metalaxyl, and emisan may be avoided in the future experiments.
4. An observational trial may be conducted and yield may be recorded.

Pundibari : No new decision

TUR/CP/1.3 **Effect of seed treatment on leaf blotch of turmeric / effect of fungicides on leaf spot disease**

Raigarh:

1. The project report (final report) may be submitted to PC.
2. The experimental treatments may be finalised/ earmarked for Dholi and Raigarh area.
3. Raigarh centre may give priority to rhizome rot of ginger.

Pundibari : No new decision

TUR/CP/1.4 **Investigations of the causal organism of rhizome rot of turmeric and screening of biocontrol agents for the management**

Jagtial :

1. The present experiments may be concluded.
2. Based on the results of the experiments, new experiments can be formulated.

3. Etiology of turmeric rhizome rot may be resolved with the help of Scientists at IISR, Calicut.
4. Re-establishment of etiology of rhizome rot of turmeric
5. Panel meeting decision stands
6. Encouraging results / findings should be included in the new proposals.

CORIANDER

COR/CP/1 **Disease management trial**

COR/CP/1.1 **Survey to identify the disease incidence, collection and identification of casual organism**

Dholi :

1. The available germplasm will be evaluated for stemgall resistance.
2. Tolerant line developed at Dholi will be evaluated at Kumarganj also.
3. The exotic lines of coriander may be evaluated in India for powdery mildew resistance.
4. Final report may be sent to PC.

Jagudan :

1. Complete information on reaction of all the germplasm types to disease be compiled and submitted to PC by Jobner and Jagudan centres.
2. Available germplasm at Dholi and Jagudan will be screened.
3. Detailed survey may be conducted for disease incidence.
4. Exotic lines of coriander may be included in the screening programme.

COR/CP/1.2 **Studies on wilt and powdery mildew management in coriander. Biocontrol of wilt in coriander.**

Coimbatore :

PC may take note of non-participation of Coimbatore centre. The non-participation may be reported to Director of Research, TNAU, Coimbatore.

The logic behind selecting he aconazole should be communicated to PC.

COR/CP/1.3 Dholi :

1. Research programmes for seed spices should be finalized before June so that the programmes can start in the concurrent reason.
2. Experimental details may be submitted to PC.

CUMIN

CUM/CP/1 **Disease management trial**

CUM/CP/1.1 **Blight disease control by manipulation of agronomic practices**

The pooled data for the last 3 years can be submitted to PC.

Promising lines identified at Jagudan will be evaluated at Jobner.

Jagudan

CUM/CP/1.2 **Epidemiological study of *Alternaria* blight of cumin**

Jogudan and Jobner:

1. All available germplasms will be evaluated for blight and wilt. The short listed germplasm may be included in the disease management programmes.

Jobner:

1. Data on disease incidence, dates of sowing and yield may be submitted to PC. Based on the results future programmes will be formulated.
2. Ajmer area may be used for evaluation of date of sowing.

Jagudan :

1. Data on disease incidence (blight), dates of sowing and yield may be submitted to PC. based on the results future programme will be formulated.

The data on seed spices experiments will be compiled and submitted to PC.(Jobner and Jagudan)

CUM/CP/2 **Pest management trial**

CUM/CP/2.1 **Integrated management of pests and disease of cumin**

Jobner:

1. Pooled data for the past four years will be submitted to PC by June.

Jagudan:

1. Data on blight incidence will be submitted to PC.
2. The root rot nematode resistant lines of Cumin should be evaluated for wilt disease too.
3. The tolerant times should be included in the management programmes.

Coimbatore:

None represented.

FGR/CP/1.1 **The treatment combinations of *Trichoderma* and neem cake may go for recommendation for the management of root rot of fenugreek.**

New Projects to be initiated in 2000

BLACK PEPPER:

PEP/CP/1.1: **Phytophthora foot rot disease management in Black Pepper**

a) Foot rot management

Treatments: The following treatments involving fungicides and biocontrol agents were suggested in the coming years.

1. Metalaxyl or Metalaxyl gold = MZ 68 100 ppm a.i of Metalaxyl (commercial 2.5 g/l)
2. Potassium phosphonate (5ml/l and 5 l/vine spray/drench) and the quantity of fungicide will depend on the canopy size.
3. Biocontrol agents (*Trichoderma harzianum*) 50 g of inoculum (CUF 107 + 1 kg of neem cake
4. Soil application of *T.harzianum* + spray and drench with Ridomil Gold
5. Biocontrol agent -*T.harzianum* + Potassium phosphonate spray and drench
6. Neem cake application -1kg/vine
7. Untreated check

Application : Pre-monsoon treatment. Biocontrol agent should be formulated at the particular Institute or University rather than using commercial products. IISR can supply the requirement @ Rs.75/kg

Centres: Panniyur, Mudigere centres and if possible at Pampadumpara and Ambalavayal

Plot size : Minimum of 20 vines per treatment in an existing plantation and at two locations/centre.

Duration : 5 years

b) Anthracnose

1 Crop loss due to anthracnose at the time of spiking should be studied.

2 Spike and leaf damage due to anthracnose should be studied

c) Biological Control

Trichoderma based biocontrol technology be made available to government agencies.

d) Planting materials

Planting materials of spices should be certified to ensure supply of disease free planting material to farmers.

PEP/CP/1.2: **Management of *Phytophthora* foot rot in Areca-pepper cropping system.**

Centre : Sirsi

Design RBD - Plot size 25 - Replication =3

Treatments :

1. Pepper in 25% population of areca.
2. Pepper in 50% population of areca
3. Pepper in 75% population of areca
4. Pepper in 100% population of areca

All the package of practices will be followed for the management of disease right from the start. Two cuttings will be planted/standard (*Areca palm*)

Observation: (1) Establishment % (2) Growth parameters (3) Death of vines (4) Yield

PEP/CP/1.3: **Biological control of *Phytophthora* foot rot of black pepper - nursery trial**

The following trial can be laid out at Pampadumpara and Ambalavayal.

The experiment can be conducted in polybag size of 15 x 20 cm with planting of three noded cuttings @ 4 no/bag. For each treatment 200 bags can be kept.

Treatments :

T1 Planting IN solarized soil

T2 In non-solarized soil

T3 Solarized soil fortified with *Trichoderma harzianum* @ 1g/kg of soil plus with 100cc of VAM inoculum/1kg of soil.

T4 Non-solarized soil fortified with *Trichoderma harzianum* @ 1g/kg of soil plus with

100ccof VAM inoculum/1kg of soil.

T5 Ridomil spray and drench (1.25 g/l Ridomil MZ 72 WP) + T1

T6 Treatment 5 + Treatment 2

T7 Copper oxychloride drench (0.2%) + Treatment 1

T8 Copper oxychloride drench (0.2%) + Treatment 2

Observations:

Time of germination
Ungerminated cuttings
Death due to infection
Height of the plants and number of leaves
Total biomas - 25 cuttings/treatment

} Observation to be taken in all the bags

PEP/CP/2.1 **Control of scale insects in black pepper**

Centre: Pampadumpara

Replications - Four

Treatments:

Dimethoate - 0.05%

Malathion - 0.075%

Phosphamidon - 0.05%

Rakshak - 0.5%

Control

Pretreatment incidence of scales from 1 cm2 leaf in 3 bits and from 2.5 cm long twigs to be recorded.

Two sprays at 21 days interval during January - March (at the onset of infestations after harvest of berries). Observations to be recorded 21 days after each spray.

The experiment may be conducted during two seasons

PEP/CP/2.2 **Survey for the incidence of pests of black pepper at high altitudes**

Centre identified Pampadumpara

Survey may be conducted in Idukki area during June-August and January-March, for a period of two years.

GINGER

Decisions

1 Commercially available biological control agents should not be used for experimentation as it can lead to lot of inconsistencies and controverises

2 Field monitoring should be performed during the crop season up to harvest to ensure for selection of healthy seed rhizomes for planing purpose

GIN/CP/1.1 **Disease surveillance survey in ginger - etiology of rhizome rot in ginger**

All the centres Pundibari, Dholi etc. survey can be undertaken in major ginger growing areas during July- August and September - October period to record the incidence and severity. For this in each garden 20 clumps at random in a 3x1 m bed can be counted and can be categorized as 1) healthy 2) diseased - leaf spot-rhizome rot-bacterial wilt. For each disease they can give a visual rating as +, mild ++ , medium +++, severe. At least 3 plots can be recorded at each site.

GING/CP/1.2**Biocontrol studies on rhizome rot of ginger**

As a disease management trial the following experiment can be taken up at all ginger centres expect Solan where large scale demonstration are to be conducted.

At Solan, in each site IDM trial will be demonstrated in 1 ha/plot. Disease incidence in sample plots, the population of pathogen and biocontrol agent be recorded. Monitoring of disease incidence for *fusarium oxysporum Trichoderma* and disease pathogen population if any may be recorded.

Treatments:

T1 Seed sown directly - No treatment (Control)

T2 Seed treatment with hot water 510 C for 10 minutes

T3 Seed treatment with Mancozeb (3g/l) for ½ hour

T4 Seed treatment with Biocontrol inoculum 100 g inoculum/5l (107 c f u) of water for ½ hour

T5 Seed treatment with hot water 510 C for minutes + Mancozeb treatment for ½ hour

T6 Seed treatment with hot water at 510 C for 10 minutes + biocontrol inoculum mixed with 1 kg of neem cake in 3x1 bed, at the time of planting.

T7 Soil application of neem cake at the time of sowing and planting the seed

T.harzianum can be supplied by IISR @ Rs.75/kg

Quality of seed = 1 kg/3x1 m bed

RBD - plot size 3x1 bed, 2 beds/treatment, replication 3

Centres : Pundibari, Raigarh, Kumarganj, Solan

Observations

(1) Germination (2)Disease incidence at bimonthly intervals (3)yield

TURMERIC

Decisions

1 Varieties may be given common seed treatment and foliar spray with carbendazim and mancozeb respectively (or a combination product)

2 The following field experiments should be carried out with atleast two promising varieties agent leaf blotch/leaf spot

TUR/CP/1.3 **Management of Leaf blotch & leaf spot in turmeric**

a) Mancozeb - 0.2%

b) Carbendazim - o.2%

c) Mancozeb + Carbendazim - 0.2%

d) Seed and soil treatment as the *Trichoderma* with addition of 1 kg neem cake

e) Mancozeb as seed treatment and biocontrol agent as soil application

f) Carbendazim as seed treatment and biocontrol agents as soil application

g) Untreated check

TUR/CP/1.4 **Rhizome rot of turmeric**

Centre : Jagtial, Guntur, Coimbatore, Dholi, Pundibari, where rhizome rot is observed.

Treatments:

T1 Recommended NPK (control)

T2 Recommended NPK + Farm yard manure

T3 Recommended NPK + *T.viride* + *Pseudomonas flourescence* @ 4g/kg seed as seed treatment

T4 Recommended NPK + *T.viride* + *Pseudomonas flourescence* to be applied to soil @ 12.5 kg/ ha and 25.0 kg/ha as basal and top dressing respectively.

T5 T2+T3

T6 T2+T4

T7 T2+T3+T4

T8 T2 + *Bacillus subtills* (Biostat) @ 1 ml/liter of water. Soak the finger rhizome in *Bacillus* bacterial suspension for 30 minutes and to shade dry before sowing (new treatment). If cultures are available same culture can be used at centre.

SEED SPICES

All existing programmes may continue and new programmes have to be finalized during 2000 AD, Rabi season

Cardamom

All existing programme may continue

CAR/CP/1.3 **Bioecology of natural enemies of major pests of cardamom**

Centres identified : Mudigere, Pampadumpara

1 Collection, identification and documentation of natural enemies

2 Studies on predatory/parasitic/pathogenic activities of natural enemies

CAR/CP/1.4 **Management of root grubs of cardamom**

Centres identified : Mudigere, Pampadumpara

Tratments:

1	Chlorpyriphos	-	0.05%
2	Chlorpyriphos	-	0.075%
3	Phorate 10G	-	40g / plant
4	Phorate 10G	-	60 g / plant
5	Imidacloprid (Confidor)	-	0.50 ml/L
6	Imidacloprid	-	0.75 ml /L
7	Control		
	Replication - Three		
	Time of application	:	April-May-September-October

Cumin

CUM/CP/1.3 **Integrated cumin wilt disease management**

Centre: Jagudan

Plot size : 4 ᵐ x 2.5 meter

Treatments

Soil solarization

Seed treatment with Captan 0.3% + soil application of *T. harzianum*

Seed treatment with Carbendazim 0.1% and soil application of *T. harzianum*

Seed treatment with Thiram 0.3% + soil application of *T.harzianum*

Soil application of neem cake + *T. harzianum*

Soil application of neem cake

Control

Coriander

COR/CP/1.2 **Biocontrol wilt of coriander**

Design RBD

Centres : Jobner, Jagudan, Dholi, Kumarganj, Raigarh

Treatments (Pre sowing seed treatments)

T1 Treatment with Carbendazim%

T2 Treatment with *Trichoderma viride* + soil application

T3 Treatment with *T harzianum* + soil application

T4 Treatment with *Bacillus subtilis* + soil application

T5 Treatment with *Pseudomonas flourescence* + soil application

T6 Seed treatment with soil drenching of carbendazim

T7 Control

The biocontrol agent can be obtained from a single source.

Technical Session V : Release of varieties and recommendations to extension agencies

Chairman : Dr. K.V. Peter, Co- Chairman : Dr. S. Edison

Rapporteurs : Dr. R.R. Nair

: Dr. K.S. Krishnamoorthy

The following proposals were submitted for consideration during the session

Black Pepper

1. P-24 (IISR, Calicut)
2. Panniyur-6 (Panniyur centre)
3. Panniyur-7 (Panniyur centre)

Cardamom

4. RR-1 (IISR, Appangala)

Coriander

5. RCr-684 (Jobner centre)
6. RCr-435 (Jobner centre)
7. RCr-436 (Jobner centre)

Fenugreek

8. Guj. Methi-1 (Jagudan centre)
9. RMt-303 (Jobner centre)

Cumin

10. Guj. Cumin-3 (Jagudan centre)

Fennel

11. RF-101 (Jobner centre)

The Chairman in his opening remarks gave the following general suggestions:

* The variety should give at least 10% more yield than the ruling variety or should have some special characters as resistant/tolerance to biotic/abiotic stresses or should have special quality.
* The varieties released should be sustainable.
* Breeders should be able to supply sufficient seed materials of the released variety.
* There should be uniformity in yield/quality in released varieties.
* The proposals received from the various Centres/Institutes were presented by the concerned Scientist(s) followed by detailed discussion. The outcome of the discussions are summarised below.

Black Pepper

1. P-24, IISR.

Suggestions :

* A table showing severity of *Phytophthora* disease at Sirsi should be included along with the proposal.

* The term 'high level of field tolerance' should be defined and substantiated with data.
* Detailed data should be given year wise regarding the survival of the variety at different locations.
* Origin of the line (pedigree) should be properly described.
* Statistical analysis of the data is essential. CD should be given for a better comparison of varieties included in the trial.
* Comparative weather data of test sites should be included.
* P24 should be included in the coordinated varietal trial, for the next season.
* The proposal along with the above additional information may be discussed critically among Director of Research (KAU), Dr. P N Ravindran and Dr Y R Sarma and a decision taken.

Black Pepper

2. **Panniyur-6,** PRS-Panniyur
3. **Panniyur-7,** PRS-Panniyur

Since the varieties are meant for Kerala state only, the house recommended the variety for presentation before the State Variety Release Committee.

Cardamom

4. **RR-1, IISR,** Appangala

* Since the variety is resistant to rhizome rot, it can be recommended for registration at NBPGR.
* As far as release is concerned this variety will be sent to Karnataka state variety release committee, as the data is available only from one state.
* The variety will be included in CVT for further recommendation of it to other cardamom growing areas.

5. **Coriander RCr-684, Jobner (RAU)**

The variety is recommended for identification.

6. **Cumin GC-3, Jagudan (GAU)**

The variety is recommended for release.

7. **Fenugreek RMT-303, Jagudan (GAU)**

The variety is recommended for identification.

8. **Fenugreek GM-1, Jagudan (GAU)**

This is recommended for state variety release committee, Gujarat.

9. **Coriander RCr-436, Jobner (RAU)**

Recommended for state variety release committee of Rajasthan.

10. **Coriander RCr-435, Jobner (RAU)**

Recommended for state variety release committee of Rajasthan.

11. **Fennel – RM-101, Jobner (RAU)**

Recommended for state variety release committee of Rajasthan.

Recommendation to Extension Agencies

1. To control Phytophthora foot rot, 1kg neem cake per vine, first round pre-monsoon spray with Bordeaux mixture followed by copper oxychloride drenching and second round Akomin spray followed by Akomin drenching post monsoon is recommended for Kerala conditions. Wherever nematode incidence is high, phorate @ 3g. a.i. can be given during September-October. Also, normal phytosanitary measures should be followed.
2. Dr. Lokesh may modify his recommendations as per the suggestions and may be presented at the meeting of the committee on the state package of practice.

Technical Session VI — ICAR Adhoc Schemes

Chairman : Dr. K V Peter, Co-Chairman : Dr. P N Ravindran

Rapporteurs : Mr. S Hamza

Ms. Minoo Divakaran

ICAR is currently funding 15 Adhoc research schemes in spices and out of which six projects are operating at IISR, Calicut.

The Principal Investigators of the following Schemes presented reports.

1. Dr R N Nawale, KKV, Dapoli

   'Improvement of Kokum in Konkan region'

2. Dr N Kumar, TNAU

   'Scheme for intensification of research on vanilla'

3. Dr Luchan Saikia, AAU, Jorhat, Assam

   'Collection, maintenance, evaluation and standardisation of agro-techniques of seed spices germplasm'

4. Dr P A Valsala, KAU, Trichur

   'Hybridization in ginger (Zingiber officinale Rosc.) through in vitro pollination'

   The adhoc projects operating at IISR will be reviewed by Dr R N Pal, ADG during the SRC meeting of IISR.

Technical Session III — Plenary Session

Chairman : Dr. R N Pal, Co-Chairmen : Dr. K V Peter & Dr. P N Ravindran

Rapporteurs : Dr. T J Zachariah
Mr. Santhosh J Eapen

ADG (PC) : Introductory remarks

Presentation of reports : Dr P N Ravindran, PC (Spices)

The Plenary Session was held in the evening of 21st November 1999 under the chairmanship of Dr. R N Pal, Asst. Director General (PC), ICAR. Dr. K V Peter, Director, IISR and Dr. P N Ravindran, Project Coordinator co-chaired the session. The chairman in the introductory remarks complemented the project scientists and its Project Coordinator for the detailed deliberations done during the last four days of Spices Workshop.

The Project Coordinator presented the report on the various decisions of the various technical sessions in brief and the house approved the same.

An important aspect of this Workshop has been the recommendation for release/ identification of the following varieties.

Sl.No.	Crop	Culture No.	Centre	Remarks
1.	Black pepper	Panniyur-6	PRS Panniyur	Proposed for state release
2.		Panniyur-7	PRS Panniyur	Proposed for state release
3.	Cardamom	RR-1	IISR Appangala	Proposed for Karnataka State variety release
4.	Coriander	RCr-684	Jobner	Recommended for identification
5.		RCr-435	Jobner	Recommended for state variety release
6.		RCr-436	Jobner	Recommended for state variety release
7.	Fenugreek	Guj.Methi-1	Jagudan	State variety release committee
8.		RMt-303	Jobner	Recommended for identification
9.	Cumin	Guj.Cum.3	Jagudan	Recommended for identification
10.	Fennel	RF-101	Jobner	State release

In addition to the varieties recommended for release, recommendations on transfer of technology have been made based on the detailed discussions.

Another special activity of this year's Workshop is the pre-workshop meeting held on 19th November 1999. The pre-workshop meeting held under three concurrent sessions.

The discussions also concentrated on modifying the technical programmes and indepth discussions on the ongoing programmes and formulation of new CYT/CVT/MLT and development of suitable/modified technical programmes on integrated disease management.

Then proceedings of the XV Workshop of the AICRPS come to a close at 8.30 PM with the vote of thanks by Dr.M Anandaraj.

LIST OF PARTICIPANTS

A. Indian Council of Agricultural Research, New Delhi

1 Dr R N Pal
Asst. Director General (PC)

2 Dr P N Ravindran
Project Coordinator.

B. Spices Board

3 Dr S N Potty
Director
ICRI, Myladumpara

4 Mr Koshy John
Director (Development)
Spices Board

5 Dr M R Sudharsan
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