Proceedings of XX Workshop of All India Coordinated Research Project on Spices

6-8, June 2009
Horticultural College & Research Institute
Tamil Nadu Agricultural University, Coimbatore

ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES
Indian Institute of Spices Research
(Indian Council of Agricultural Research)
CALICUT-673 012, KERALA

Compiled and edited by

Dr. M. Anandaraj
Project Coordinator (Spices)

Dr. J. Rema
Principal Scientist (Horticulture)

Dr. Johny A.Kallupurackal
Technical Information Officer

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(All India Coordinated Research Project on Spices)

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PROGRAMME
6 June 2009

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1450-1455 hrs	Welcome address Dr. E. Vadivel, Dean, HC & RI, TNAU
1455-1510 hrs	Presentation of AICRPS Report Dr. M. Anandaraj, Project Coordinator, AICRP on Spices
1510-1530 hrs	Address by Chief Guest Dr. H. P. Singh, Dy. Director General (Hort.)
1530-1540 hrs	Presidential address Dr. P. Murugesa Boopathi, Vice Chancellor, TNAU
1540-1550 hrs	Votes of Thanks Dr. K. Rajamani, Prof. & Head, Department of Spices & Plantation Crops, HC & RI, TNAU, Coimbatore

Rapporteurs

Dr. J. Rema, Principal Scientist, IISR Calicut

Dr. V. Srinivasan, Sr. Scientist, IISR Calicut

6 June 2009

0935-0945 hrs		**Welcome Address**
Welcome		**Dr. Vadivel**, Dean (Hort.), TNAU, Coimbatore **Dr. M. Anandaraj**, Project Coordinator, AICRP on Spices, IISR, Calicut
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Chairpersons	:	**Dr. M. M. Anwer**, Director, NRCSS, Ajmer **Dr. T. Thangaraj**, Former Dean (Hort.), TNAU
Rapporteurs		**Dr. (Mrs) N. Shoba**, TNAU, Coimbatore **Dr. K. N. Shiva**, IISR, Calicut
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Chairpersons	:	**Dr. N. Vijayan Nair**, Director, SBI, Coimbatore **Dr. S. Thamburaj**, Former Dean (Hort.), TNAU
Rapporteurs	:	**Dr. K. N. Shiva**, IISR, Calicut
		Dr. K. Giridhar, APHU, Guntur
Presentation of reports		
Black pepper Cardamom Ginger Turmeric Coriander Cumin Fennel Fenugreek Tree spices New research programmes		Dr. V.P. Neema, KAU, Panniyur Dr. Sreekrishna Bhat, RRS, Sakleshpur Dr. D.K. Dash, OUAT, Pottangi Dr. D.K. Dash, OUAT, Pottangi Dr. K. Giridhar, APHU, Guntur Dr. Dhirendra Singh, RAJAU, Jobner Dr. EVD Sastry, RAJAU, Jobner Dr. K. Giridhar, APHU, Guntur Dr. U. B. Pathe, KKV, Dapoli Dr. J. Rema, PC Unit, IISR, Calicut
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		Dr. N. Vijayan Nair, SBI, Coimbatore Dr. V.A. Parthasarathy, IISR, Calicut Dr. M.M. Anwer, NRCSS, Ajmer Dr. S.K. Malhotra, ICAR, New Delhi Dr. Z.A. Abraham, NBPGR Dr. M. Anandaraj, Project coordinator, AICRP on Spices

7 June 2009		
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Fennel Fenugreek Tree spices New research programmes		Dr. E.V.D Sastry, RAJAU, Jobner Dr. K. Giridhar, APHU, Guntur Dr. U. B. Pathe, KKV, Dapoli Dr. J. Rema, PC Unit, IISR, Calicut
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Chairperson	:	**Dr. P. Rethinam,** Former Asst. Director General, Plantation Crops
Rapporteurs	:	**Dr. Senthil Kumar,** IISR, Appangala
	:	**Dr. C. Sarada,** APHU, Guntur
Presentation of reports		
Black pepper Cardamom Coriander		Dr. D. Lakshmanan, TNAU, Yercaud Dr. K. M. Devaraju, UHS, Mudigere Dr. T. P. Mallik, CCS HAU, Hisar
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Ginger Turmeric Cumin Fennel Fenugreek Tree spices New research programmes		Dr.S. P. Singh, RAU, Dholi Mrs. N. Shobha, TNAU, Coimbatore Dr. N. L. Jat, RAJAU, Jobner Dr. S. K. Tehlan, CCS HAU, Hisar Dr. R. P. Saxena, NDUAT, Kumarganj Dr. J. Prem Jousha, TNAU, Pechiparai Dr. J. Rema, PC Unit, IISR, Calicut
SESSION IV	:	**CROP PROTECTION 1830-2100 hrs**
Chairpersons	:	**Dr. K.P. Mamootty,** PRS, Panniyur **Dr. Chandrasekhar,** TNAU, Coimbatore **Dr. S. Devasahayam,** IISR, Calicut
Rapporteurs	:	**Dr. A. I. Bhat,** IISR, Calicut
		Dr. P. Muthulakshmi, TNAU, Coimbatore
Presentation of reports		
Black pepper Cardamom Ginger Turmeric		Dr. M. S. Lokesh, UHS, Sirsi Dr. Dhanapal, K., ICRI, RS, Sakleshpur Dr. N. P. Dohroo, YSPUHF, Solan Dr. S. Bandyopadhyay, UBKV, Pundibari
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8 June 2009		
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Coriander Cumin Tree spices New research programmes		Dr. P. Muthulakshmi, TNAU, Coimbatore Dr. K.D. Patel, SDAU, Jagudan Dr. V. A. Gadre, KKV, Dapoli Dr. J. Rema, PC Unit, IISR, Calicut
SESSION V		**RECOMMENDATION OF VARIETIES & TRANSFER OF TECHNOLOGY 1015-1300 & 1300-1415 hrs**
Chairpersons	:	**Dr. M. Tamilselvan,** Director, DASD, Calicut
		Dr. M. Vijayan Nair, Director, SBI, Coimbatore
Rapporteurs	:	**Dr. K. N. Shiva,** IISR, Calicut
		Dr. K. Kandiannan, IISR, Calicut
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		Coriander 1. Dr. N. Shoba 2. Dr. K. D. Patel 3. Dr. P. Muthulakhsmi 4. Dr. K.S. Sekhawat **Fenugreek** 1. Dr. Dhirendra Singh 2. Dr. N. Shoba
1100-1115 hrs		**Tea/12.10-2.145 Lunch**
1410-1445 hrs		**PLENARY SESSION 1445-1635 hrs**
Welcome	:	**Dr. K. Rajamani,** Prof. & Head Department of Spices & Plantation Crops HC & RI, TNAU
Chairpersons	:	**Dr. P. Rethinam,** Former Asst. Director General, Plantation Crops (ICAR)
Rapporteurs	:	**Dr. V. Srinivasan,** IISR, Calicut
		Dr. A. K. Johny, IISR, Calicut
Presentation of proceedings of Session I-V & Discussion		**Rapporteurs of various sessions** **Session I - Genetic Resources** Dr. K.N. Shiva **Session II -Crop Improvement** Dr. K.N. Shiva **Session III - Crop Production** Dr. Senthil Kumar **Session IV - Crop Protection** Dr. Muthulakshmi **Session V - Recommendation of varieties** Dr. K. Kandiannan
Feed Back from Centers		
Remarks of Chairpersons		
Vote of thanks	:	**Dr. M. Anandaraj,** Project Coordinator, AICRP on Spices

INAUGURAL SESSION

Dr. E. Vadivel, Dean (Horticulture) TNAU, welcomed the dignitaries, delegates and participants.

Dr. M. Anandaraj presented the AICRPS report where the research achievements under various projects for two years were presented. He highlighted the role played by Jobner and Jagudan centers in popularizing seed spices varieties and Pottangi centre for turmeric varieties.

Dr. H.P. Singh, DDG (Hort), in his inaugural address emphasized the need for modifying the research to suit the changing agricultural situation in India as the country is passing through a crucial phase in agriculture due to the climate change, depleting water resources, increasing population and declining land area and shrinking land resource. He emphasized the need for a network mode of research for solving major issues in agriculture. Conservation of germplasm, enhancing germplasm collection, conservation horticulture, developing plant ideotypes in major crops, developing varieties to withstand biotic and abiotic stresses, production and distribution of good quality planting material etc. were some of the areas which need immediate attention. He also said the waste generated through spice cultivation and processing should be properly re-utilized and converted into value added products. He also called for increased quality control in spices products.

Dr. P. Murugesa Bhoopathy, Vice Chancellor, TNAU, in his presidential address emphasized the importance of spices and the research development in the field of spices. He said that the technologies developed should be farmer friendly and should increase the production in spices. He also mentioned that market for processed spices was growing phenomenally and institutions should place more emphasis on research on the value addition. He highlighted the importance of drawing an action plan to increase production in spices.

Dr. M. Anandaraj, Project Coordinator, AICRP on Spices presented a brief report of AICRPS highlighting the achievements made for the last two years (2007-08 & 2008-09) and the varieties and technologies developed by the Coordinating centers.

Dr. K. Rajamani, Prof. & Head, Division of Plantation Crops HC & RI, TNAU proposed vote of thanks.

Project Coordinator's Report

The All India Coordinated Research Project on Spices (AICRPS) with its headquarter at Indian Institute of Spices Research, Calicut, is vested with the mandate to conduct and coordinate research in 12 spice crops. Presently there are 34 centers consisting of 19 regular, 8 Co-opting and 7 Voluntary centers spread over 21 States located in 21 State Agricultural Universities, 3 in ICAR institutes and 3 under Indian Cardamom Research Institute (Spices Board). The XI Plan budget of AICRPS is Rs. 1400 lakhs (ICAR share) and 457.00 lakhs State share. The monitorable targets fixed for XI plan period includes identifying suitable varieties and technologies for cultivation of ginger and turmeric in North East India /non- traditional areas and enhancing seed germination in seed spices. During the last two years, Rs. 231 lakhs (2007-08) and Rs. 250 lakhs (2008-09) have been released to the centres.

About 115 research programmes covering the mandate spice crops are being conducted at various centres.

Action taken on previous recommendations

Based on the recommendations made by Quinquennial review team and IX Workshop action have been taken and new programmes formulated. Some of the prominent actions are follows.

* ICAR- Research Complex Barapani and Mizoram are included in XI plan as co opting centres with financial assistance for undertaking research on ginger and turmeric.
* Augmented Block Design is being followed for evaluation of germplasm if the entries are more than fifty.
* Original name of accession/cultivars are maintained
* All centres are advised to collect germplasm on regular basis
* Centres have been advised to do stability analysis for yield attributing characters while promoting entries from IET to CVT
* Centres were advised to multiply and supply sufficient planting material of the entries for laying out trial. To avoid transplantation shock and minimize desiccation initial planting material of all entries are distributed to participating centres for further multiplication before start of the experiment
* Crop wise decisions have been carried out and will also be further discussed during technical sessions.

Review of work done by various centers

Each centre has been evaluated for performance using three criteria namely filling up of posts, financial discipline and execution of work. Although, it was possible to maintain financial discipline, there were some difficulties in achieving the targets in other areas. Some of the universities have not filled up the vacancies despite several requests. However, the efforts of Universities in evolving appropriate technologies and popularizing the same among farmers has been appreciated by review team and press. The major achievements made in various crops during the last two years are given below.

Black pepper

- Five hundred and eighty five accessions of black pepper germplasm consisting of cultivated, exotic and wild and related species are maintained under different AICRPS centres.
- Characterization of germplasm resulted in identification of high yielding accessions *viz.*, Karimunda-II (5.60 kg green berry/vine and Valiyaramundi (3.45 kg green berry/vine) from Panniyur centre.
- An Accn. PN-57 was identified as high yielder (4 kg dry/vine) from Yercaud centre.
- Among the inter-varietal hybrids developed at Panniyur centre, P-6 x P-5 was found to be promising with a fresh yield of 3.54 kg/vine.
- Integrated nutrient management treatment recorded maximum yield at Panniyur and Sirsi centres when compared to organic and inorganic treatments.
- Spraying potassium phosphonate (0.3%) and application of *Trichoderma harzianum* @ 50 g/vine with 1 kg of neem cake was found to be the best treatment in controlling foot rot disease at Chintapalle, Panniyur and Pampadumpara centres.
- Two sprays of 0.1 % Propiconazole @ 5 l /vine during the last week of June and August for the management of anthracnose disease is recommended from Mudigere centre.

Cardamom

- Three hundred and five germplasm have been maintained by two (Pampadumpara and Mudigere) AICRPS centers.
- Under CVT, entries CL-722, PS-27, MCC-309 and MCC-246 were found promising for dry capsule yield (337.96 kg/ha) at Mudigere centre.
- Based on the yield trial PS-27 and MHC-26 were identified as promising entries from Pampadumpara centre.
- The yield of cardamom treated with inorganic P alone or with P-solubilizer was significantly superior over other treatments.
- Panicle and clump infections due to capsule and rhizome rot disease were found to be minimum in plots treated with *T. harzianum* and consortium of bacteria @ 50 g/plant.
- For the management of shoot fly in newly planted cardamom plantation phorate, imidacloprid, thiamethaxam and neem cake were found superior to other chemical treatments.
- Significant reduction of cardamom root grub was observed in plots treated with combined application of imidacloprid (0.006%) and *Heterorhabditis indica* (100 IJ/grub).

Ginger

- Ginger germplasm of 659 accessions have been maintained under various AICRPS centers.
- The CVT trial at Pottangi showed maximum yield in V_1E_4-5 (29.21 t/ha) followed by V_2E_5-2 (28.29 t/ha) with 32.29% and 28.12% higher yield over national check Suprabha.

- Pottangi centre has identified V_1E_8-2 as a promising high yielding low fibre ginger accession for release.

Turmeric

- One thousand three hundred and twelve turmeric germplasm accessions have been maintained by eight centers under AICRPS.
- Out of the 265 germplasm accessions screened for resistance against leaf spot and leaf blotch diseases at Coimbatore centre, accessions *viz.*, CL-1, 2, 3, 6, 14, 22, 25, 31, 32, 33, 53, 54, 148, 153, 230 were resistant to leaf spot (8 to 10 PDI) and for the leaf blotch, the accessions *viz.*, CL- 8, 9, 139, 153, 160 and 161 were resistant (10 PDI).
- NDH 18 and CL101 were identified as promising varieties and being proposed for release from Kumarganj and Coimbatore centres respectively.
- Pottangi centre has identified PTS-43, as a promising high yielding, high curcumin accession for release.
- Integrated nutrient application recorded highest rhizome yield (24.8 t/ha) followed by inorganic (22.9 t/ha) whereas, organic treatment recorded 21.2 t/ha in the trial on organic farming in turmeric at Jagtial center.

Tree spices

- A total of 38 clove, 119 nutmeg, 39 cinnamon and 10 cassia germplasm have been maintained under three AICRPS centres.
- Characterization of cinnamon germplasm at Pechiparai led to the identification of Sel.65 with a bark yield of 469 g of dried bark/tree and leaf yield of 6.3 kg/tree.

Coriander

- One thousand nine hundred and eleven germplasm of coriander have been conserved at various AICRPS centres for further evaluation and characterization.
- Three entries COR-5 (1913 kg/ha) COR-4 (1825 kg/ha) and COR-2 (1670 kg/ha) were identified as high yielders from Hisar during the year.
- At Kumarganj, COR-9 (19.90 q/ha) and COR-8 (19.37 q/ha) were identified as high yielders. Among the shade nets evaluated, maximum green yield was recorded in 50% shade net (8.17 t/ha) which is significantly superior to all other treatments.
- Among the fifty high yielding genotypes evaluated for drought tolerance at Coimbatore, the genotype CS-127 was found to be promising.
- Seed treatment *with Pseudomonas fluorescens* (IISR-6) at the rate of 10 g/kg of seed followed by foliar application at 10^8 cfu on 60 days after sowing was found to be effective in reducing the powdery mildew intensity in coriander.
- Seed treatment and soil application of rhizobacterial strain FL-18 gave an yield of 1779 kg/ha in coriander followed by the application of *Trichoderma* MTCC- 5179 (1611 kg/ha).

- Spraying wettable sulphur @ 0.2% (1.250 kg/ha) at 60 DAS (ICBR 1:31.66) or seed treatment + soil drenching + spray of tridemorph @ 0.1% (625 ml/ha) at 60 DAS (ICBR 1:6.22) was found effective in controlling powdery mildew from Jagudan centre.

Cumin

- Jobner and Jagudan centres hold 526 accessions of cumin germplasm.
- Out of ten entries in IET tested against wilt, blight and powdery mildew, UC-331 and UC-225 was identified as resistant entries against wilt, blight and powdery mildew at Jobner.
- Soil solarization + soil application of *Trichoderma harzianum* + spraying mancozeb @ 0.25% at 60 DAS and application of vermicompost + soil application of *Trichoderma harzianum* + spraying Mancozeb @ 0.25% at 60 DAS were also effective for controlling the disease.

Fennel

- Six hundred and twenty five accessions are conserved in different centres under AICRPS.
- The volatile oil content in the entries of CVT at Jobner ranged from 1.60% to 2.47%. The maximum volatile oil of 2.47% was observed in FNL-17 followed by 2.27% in FNL-15 and FNL-20.

Fenugreek

- AICRPS centres maintain 978 germplasm accessions of fenugreek.
- Among CVT entries, JF-270 recorded the highest yield of 573 kg/ha, which was on par with Rmt-303 (543 kg/ha) from Coimbatore centre.
- FGK-14 was identified promising from Dholi centre with an yield of 2.2 t/ha.
- Entries J.Fg.-244 and NS-2006-3 were identified as drought tolerant at Jobner.

Varieties Released

The highlight of the XX Workshop is identification of thirteen varieties, one each in black pepper, ginger and cumin; two each in turmeric and fennel; three each in coriander and fenugreek for release.

Following are the varieties identified.

Black pepper - Panniyur-8 from Pepper Research Station, Panniyur (KAU)

Ginger - Subhada from HARS, Pottangi (OUAT)

Turmeric - CL-101 from HC& RI, Coimbatore (TNAU)

Turmeric - Surangi from HARS Pottangi, (OUAT)

Coriander - RCr-728 from SKN College Agriculture, Jobner (RAJAU)

Coriander – APHU Dhania-1 from HRS, Guntur (APHU)

Coriander - DH-206 from Hisar (CCS HAU)

Cumin - RZ-345 from SKN College of Agriculture, Jobner (RAJAU)

Fenugreek - RMt-361 from SKN College of Agriculture, Jobner (RAJAU)

Fenugreek- APHU Methi-1 from HRS, Guntur (APHU)

Fenugreek - HM-219 from Hisar (CCS HAU)

Fennel -UF-205 from SKN College of Agriculture, Jobner (RAJAU)

Fennel -JF-444-1 from Main Spices Research Station, Jagudan (SDAU)

Technologies

Following are the technologies identified for recommendation to farmers.

Black Pepper

1. Management of anthracnose disease in black pepper (Mudigere)
2. Management of mussel scale in black pepper (Mudigere)

Cardamom

1. Influence of biofertilizer *Azospirillum* on growth and yield of cardamom (Pampadumpara & Mudigere)
2. Influence of neem cake on yield and occurrence of insect pests and diseases of cardamom (Pampadumpara)
3. Management of cardamom shoot fly ((Mudigere)

Ginger

1. Integrated management of *Pythium, Fusarium* and *Ralstonia* of ginger (Pundibari)

Turmeric

1. Organic farming in turmeric (Coimbatore)

Coriander

1. Effect of bio-regulators in coriander (Coimbatore)

2. Management of powdery mildew disease in coriander (Coimbatore & Jagudan) and control of powdery mildew in coriander (Jobner)

Fenugreek

1. Effect of bio regulators in fenugreek (Jobner&Coimbatore)

ACTION TAKEN REPORT 2009

Sl. No.	Decision	Action Taken
	General	
1.	In the evaluation of germplasm uniform plot size has to be followed and yield should be reported per plant taking in to consideration a minimum of five plants by all centres; augmented block design should be followed for evaluation of the germplasm is more than fifty. In evaluation of germplasm, besides yield, quality, reaction to biotic and abiotic stresses has to be recorded.	Directions being followed by all centers. A minimum of five plant observation is being recorded. All suggestion made in workshop are implemented.
2.	Uniform accession numbers should be given for the collection held by the centres for all the crops, pedigree of all the accession has to be maintained in all crops by all centers; if the germplasm collected from any other centre /organization, original accessions numbers should be represented.	Center all directed to follow original name of accession/cultivar. Pedigree record being maintained at centre wherever available. Original accession number of culture as given by the donor centres are maintained.
3.	To characterize the germplasm, yield and yield attributes should be reported specified characters.	It has been done accordingly.
4.	Explore the possibility of including ICAR NEH RC, Barapani & Mizoram for conducting research in ginger & turmeric and Sikkim for large cardamom germplasm trial.	These centres were sanctioned as Co-opting centres during XI plan with financial assistance.
5.	Collection of germplasm has to be taken up on regular basis, different mutants generated in the Crop improvement can be considered as germplasm material.	Centres are advised to collect germplasm of mandate crops routinely and intensively.
6.	Minimum number of promising entries should be reported based on the yield performance over the control and all data should be presented with proper statistical analysis.	IET trails are being conducted. Promising lines reported. Proper statistical analysis is done in almost all experiments by all centers and lines shortlisted for further evaluation.

7.	Exotic germplasm entries having good quality and yield attributing characters should be identified for further use in breeding programme.	Most of the centre does not have exotic entries. The centres are advised to procure through NBPGR.
8.	In order to update the variety list in spices all centre are advised to send the proceedings of SVRC.	Copy of the proceedings of SVRC received from Sirsi centre.
9.	All centers are advised to carry out experiments scientifically, data properly analyzed, data on soil tissue analysis etc collected.	Centers are directed to do so.
10.	In order to promote the promising lines of IET to CVT, stability analysis may be carried out by respective centres.	Centres are directed to do stability analysis for on going experiments.
11.	Replication wise data of all the experiments may be sent to PC unit for monitoring the project.	Centres are advised to send replication wise data after recording.
12.	The seed/planting materials of CVT entries should be multiplied in sufficient quantities and distribute to centres in advance to enable them to layout the trial in time.	Planting material of CVT entries are multiplied in sufficient quantities.
	Black pepper	
1.	Recording of yield in black pepper	The RAC of IISR desired to discuss and finalize the method for recording of yield of black pepper in the ensuing XX AICRPS Workshop.
2.	Pundibari centre has to intensify efforts for collecting local germplasm lines.	Directions given to the centre. But response is poor
3.	In CVT of black pepper, the year of planting/replanting of cutting should be indicated.	The centers are advised to do so.
4.	PEP/CI/3.2:CVT-1991 series IV may be concluded and final report is to be submitted by Yercaud & Dapoli Centers.	Final report received.

5.	Organic farming experiments may be continued. For all the experiments data on soil nutrient status and details of treatments should be provided.	The soil nutrient status was analyzed and experiments laid out.
6.	Pathogen involved in the disease may be confirmed while attributing the treatment effectiveness.	Pathogen involvement was ascertained in black pepper by Sirsi and Pampadumpara, centres before attributing the treatment effectiveness.
7.	While collecting yield data, the diseased and dead vines should be accounted.	Taken in to account while comparing yield data in pepper.
8.	Management of *Erythrina* gall wasp in black pepper.	The trial could not be initiated at Pampadumpara since entomologist post is vacant and efforts to fill the post by PC was unsuccessful.
	Cardamom	
1.	Entries CRSP-4 and CRSP 72 are to be evaluated for confirmation of their tolerance to thrips and shoot borer (Pampadumpara).	Could not be confirmed during 2008-09 in the absence of an entomologist/breeder at Pampadumpara.
2.	In CVT, original accession number of cultivar/variety as given by the donor centre should be mentioned and maintained by all the cardamom centres.	Directions followed.
3.	CAR/C/3.4 CVT 2000 Session –IV may be concluded at Pampadumpara, Mudigere and Sakleshpur centres and final report to be submitted after pooled and stability analysis.	The material was supplied accordingly. But the crop stand was not uniform in any of the centers due to desiccation during transport. The experiment is being replanted during 2009 to maintain uniform stand.
4.	The nucleus planting materials should be supplied to other centres and centre concerned can multiply the same for planting in CVT & CVT may be initiated at Mudigere, Pampadumpara and Myladumpara centres.	Done accordingly.
5.	The short listed entries of IET- II, viz. CL-726 and CL – 691 Mudigere and MCC – 346 from Myladumpara may be promoted for CVT.	Planting material of MCC-346 supplied to all centres.
6.	The pooled data on soil nutrient availability, quantity, pest and disease incidence of the concluded experiments to	The final report has been submitted by Mudigere centre.

	be presented by Mudigere centre for finalizing results and recommendations.	
7.	The results of the experiments on *Azospirillum* and *P. solutilizers* may be pooled to bring out effective recommendations with cost benefit ratio by the Mudigere centre. New programmes on water and nutrient use efficiency may be proposed by Mudigere center.	The results are integrated in the recommendations and new trial proposed by Mudigere Centre.
8.	Project CAR/CP16.1 & CAR/CP/6.2 may be concluded and final report will be submitted.	Project concluded.
9.	A new project on mass multiplication of natural enemies will be taken up and field trial will be conducted.	EPN alone is presently being mass multiplied and other natural enemies could alone be conserved at Pampadumpara.
	Ginger	
1.	In trail GIN/CI/2.2: CVT 2000 series V may be conclude and final report to be submitted by Pundibari & Raigarh Centres.	The trial was concluded in 2006-07 and final report has been submitted by Pundibari Center. Raigarh is recommended to submit the final report.
2.	The IET may be discontinued and CVT GIN/CI/2.3, CVT 2006 may be initiated at Chintapalle Centre.	The centre is asked to follow the directions. The centre also suffers from lack of personnel and frequent transfers.
3.	The pooled data of the concluded experiments on micronutrients and biofertilizer along with soil nutrient status may be analyzed and recommendations may be given by all the centres.	The trial concluded the pooled data has to be analyzed first report along with recommendations has to be submitted by centers
4.	Crop production experiment at Kumarganj may be discontinued as the crop is failing continuously.	Done accordingly.
5.	Project on Ginger.GIN/CP/6.4 and GIN/CP/6.5 may be concluded and final report may be submitted.	The projects closed in 2007-08
6.	New project on *Pythium* rot, *Ralstonia* wilt, *Fusarium* yellows management including newer treatments treatments will be formulated.	Trials laid out at Sirsi and Pundibari, but could not be initiated at Pampadumpara.
	Turmeric	
1.	The raw data of the trial, TUR/CI/2.2: CVT 2000 series V may be rechecked and	The trial was closed in 2006-07, raw data checked and final report received in 2006-

	final report may be submitted by Coimbatore, Raigarh, Jagtial and Pundibari centres.	07 from Pundibari and Coimbatore centres. Raigarh and Jagtial centers has not submitted the final report.
2.	TUR/CI/2.3: CVT series VI 2005, pooled analysis may be done after completing third year 2007-08 and final report to be submitted by all centres.	The project has been closed in 2007-08 and pooled analysis done.
3.	The promising turmeric lines having high curcumin content of Coimbatore centre may be confirmed with IISR, Calicut	Data got confirmed at IISR, Calicut
4.	Impact of environment on quality of turmeric (TUR/CI/4.2) may be concluded and final report to be submitted.	The trial has been concluded and final report received.
5.	The promising entries NDH-18, NDH- 19 of Kumarganj centre may be promoted to CVT.	This is being done.
6.	In the trial, GXE interaction on quality of turmeric, the entry Narendra Haldi – 1 of Kumarganj centre may be included.	The trial is being started on 2008-09
7.	The data on concluded experiment on *Azosrpillum* may be pooled analyzed and recommendations may be made.	The trial was concluded, the recommendation made by Coimbatore, Pundibari & Kumarganj centers. Dholi has not submitted the final report.
8.	The optimum dose of micronutrients may be worked out in the experiment using the response functions.	Similar work was done at IISR and based on the leads it has to be done in AICRPS centers.
9.	Screening of rhizome rot resistance must be conducted with pathogen specific for particular locations.	Screening conducted as per recommendations.
10.	Newer projects on foliar disease management including newer options will be formulated.	The new project has been formulated and started in 2008-09.

	Tree spices	
1.	In nutmeg, mace yield and nut yield should be reported separately (Pechiparai).	The center has been advised to do so.
2.	The trials TSP/CI/2.3: CVT 2001 in nutmeg and TSP/CI/2.4: CVT 2001 in cassia may be continued at Dapoli and Yercaud/Pechiparai centres.	Noted for further action.
3.	For better establishment and success rates grafting elite clove lines on clove root stock may be explored at Dapoli centre.	The efficacy of grafts over self pollinated progeny need to be established.
4.	Project T5P/CP/3/may be concluded and final report submitted.	The project was concluded and final report submitted by Dapoli
	Coriander	
1.	The trial COR/CI/2.6 : CVT 2005 may be continued for one more year at all the centres.	Continued for one more year and closed. Final report submitted by Dholi.
2.	The trial COR/CI/2.5: CVT 2004 Production of leafy type coriander during off season may be concluded and a new trial may be proposed	Trial has been concluded. New trial initiated at Coimbatore. Due to high temperature trial was vitiated every year. Therefore new trail is not proposed. The trails concluded at Hissar and new trial under shade has been started. New trial initiated at Guntur center.
3.	The experiment on bioregulators may be concluded and results compiled and analyzed and recommendations may be drawn.	The trial concluded and the recommendations made by Jobner.
4.	The drought tolerant lines identified at different centres may be further tested under stress conditions for confirmation at NRCSS. This programme for identification of drought tolerant lines can be shifted to genetic resources.	The drought tolerant lines identified and sent to NRCSS for further confirmation
5.	Project COR/CP/6.1 may be concluded and final report will be submitted. The promising lines identified against powdery mildew and wilt at Jagudan, Jobner and Kumarganj may be multiplied and distributed to other center for IET.	The pooled data analysis has to be complete after obtaining the 2008-09 results and the final report to be submitted by centers
6.	Benefit: cost ratio of the most effective treatment for powdery mildew/wilt/stem gall management may be worked out	This is being done.

	(Biocontrol agent + chemical) and recommend may be transferred.	
	Cumin	
1.	Cum/CI/3.4 CVT 2005 – Series VI may be continued for two more years at all the centres.	The trial continued in 2008-09
2.	New project on cumin wilt disease management including newer options will be formulated as none of the treatments could control the wilt	Action will be taken up by the Cumin centers
	Fennel	
1.	CVT in fennel (Transplanting) FNL/CI/3.4 CVT the advantage of early transplant may be analyzed including the cost of cultivation after three years of experimentation in all the centres.	This is the 3rd year of the trial and instructions are followed.
2.	The data of the concluded experiment on biofertilizers may be analyzed with cost benefit ratio.	This is being followed.
3.	Appropriate statistical analysis may be followed for identifying efficient genotypes for alkalinity tolerant fennel lines and the same may be tested in field in problematic conditions.	Directions given to centers
	Fenugreek	
1.	The high diosgenin content (1.27%) in the Guntur entry FGK 14 may be confirmed by Coimbatore centre.	The diosgenin content of Guntur entry FGK 14 was rechecked and found to be 0.32%.
2.	The CVT FGK/CI/3.3: CVT 2001 series V may be concluded and final report may be submitted.	The trial concluded. Final report submitted
3.	The trail FGK/CI/4.3: IET may be confirmed and data critically analyzed with NRCSS, Ajmer by Jagudan centre.	This is being followed.
4.	The experiment on biofertilzers may be concluded and the result may be compared with other centre and reports may be submitted with cost: benefit ration.	The biofertiliser experiment was concluded. Report submitted.

TECHNICAL SESSION : I

GENETIC RESOURCES

Chairpersons: Dr. M.M. Anwer
Director, NRCSS,
Ajmer, Rajasthan

Dr.T. Thangaraj
Former Dean (Horticulture)
TNAU, Coimbatore

Rapporteurs: Dr. K.N. Shiva
Sr. Scientist,
IISR, Calicut

Dr. (Mrs) N. Shoba
TNAU, Coimbatore

Recommendations

General

* Descriptor may be fine tuned for characterization of major seed spices (coriander, cumin, fennel and fenugreek) in the ensuing workshop at NRCSS, Ajmer.

* Maintenance and evaluation of seed spices germplasm including layout design may be redefined/fine tuned.

* Consolidated data of old and new collections should be presented to draw a conclusion or to identify the promising line.

* The data pertaining to each crop should be sent well in advance the persons identified for presentation.

* IC/EC numbers may be obtained by each centre for the originally collected material and not for those obtained from other centres.

* While presenting information on germplasm background information and previous years data may be mentioned to get overall pictures.

* MLT evaluation may be taken in consultation with NBPGR, AICRPS and NRCSS, Ajmer.

Black pepper

* IC/EC numbers may be obtained from NBPGR based on original collection number and passport data. Renaming/ renumbering should be avoided.

* Crop curators may be identified at national level and specialists from each centre to fix the responsibilities.

* In order to promote IET, IC Nos. should be obtained from NBPGR by submitting passport data.

* Joint exploration may be taken up in consultation with NBPGR and PC (AICRPS centres).

Cardamom

* New collections along with promising accessions from old collections may be taken up for germplasm evaluation.

* Minimal descriptor should be followed for germplasm evaluation by including quality parameters.

* Back ground information and combined data of 2-3 years may be presented to draw/identify the promising lines for further trials.

Ginger

* Quality parameters should be given importance, apart from yield.

* Some centres (Barapani, Dholi, Kumarganj, Raigarh) where maintenance of germplasm is difficult may be dropped for germplasm trials and new voluntary centres – ICAR Research Complex, Barapani and Mizoram centres, College of Horticulture and Forestry (CAU), Pasighat and GBPA & T, Pantnagar may be included

Turmeric

* Consolidated/cumulative yield may be presented along with curcumin content for the promising lines for including in IET.

* Quality analysis should be taken up by Solan centre. All AICRPS centers are advised to send samples to Solan centre for analysis.

* New voluntary centres – ICAR Research Complex, Barapani and Mizoram centres, College of Horticulture and Forestry (CAU), Pasighat, GB PUA and Technology, Pantnagar may be included.

Coriander

* Uniform parameters may be followed in each centre for reporting.

* Besides yield, pest and disease incidence and quality parameters may be studied.

* Coriander may be classified for various purposes i.e., grain type, leafy type and minimal descriptor may be developed for evaluating leaf type and seed type of coriander separately and also taking into consideration the weather depend of coriander.

* Quality aspects should be given importance for each type.

* These issues may be finalized in Ajmer workshop in August 2009.

Cumin

* Screening of germplasm against drought tolerance may also be presented in genetic resources.

* Sufficient quantity of seeds should be supplied to other coordinating centres to take up CVT.

* Joint explorations may be carried out by the centres in consultation with NRCSS, Ajmer/ NBPGR.

Fenugreek

- Apart from yield data, yield attributing characters are to be submitted to PC for compiling results (Action: Dholi, Kumarganj, Hisar).

Tree spices

* Available variability may be explored
* Dwarfness and earliness characters may be given importance while collecting the clove germplasms.

NBPGR

Dr. K.K. Gangopadhyay, Sr. Scientist, NBPGR, New Delhi briefly presented the "Status of plant genetic resources activities on spices at NBPGR" and "management of PGR in IPR regime".

Multilocation evaluation of germplasm of seed spices

The new programme on multilocation evaluation of germplasm of important seed spices *viz.*, coriander, cumin, fennel & fenugreek. The detailed technical programme and centers for each crop will be discussed in the meeting to be held September 15 – 18, 2009 at NRCSS, Ajmer.

TECHNICAL SESSION: II

CROP IMPROVEMENT

Chairpersons: Dr. N.Vijayan Nair
Director, SBI,
Coimbatore

Dr. S. Thamburaj
Former Dean (Horticulture)
TNAU, Coimbatore

Rapporteurs: Dr. K.N. Shiva
Sr. Scientist,
IISR, Calicut

Dr. K. Giridhar
Jr. Breeder
APHU, Guntur

Recommendations

Black pepper

1. PEP/CI/3.1 CVT 1991 may be concluded by Yercaud centre. G x E interactions may be carried out to identify stable lines. Consolidated reports should be submitted by the centres to PC unit within six months.

2. PC may examine critically the poor performance of the Chintapalle centre over the years and take up the matter with the University officials.

3. Yield should be expressed per standard (of 4 vines) taking into account height of the canopy.

Cardamom

1. CAR/CI/3.1 CVT 2000 Pooled analysis of the trial should be submitted to PC by end of June 2009. (Action: All the centres).

2. CAR/CI/3.3 CVT 2007 The trial should be re laid in the coming season strictly (Action: All the centers).

3. Target yield of more than 1.0 t/ha by the centre should only be promoted for further trials.

Ginger

The seed material of Pottangi centre for CVT trials may be taken to Semiliguda and sent to coordinating centres by speed post to avoid delay. The necessary financial assistance may be provided by PC Unit as per the request from centre. (Action: PC and Pottangi centre).

Turmeric

The experimental data should be presented with statistical analysis. (Action: Turmeric centers)

Coriander

The wide variations/difference in yield under CVT should be re-examined critically (Action: Dholi centre).

Cumin

The proposal of release of the entry, UC-345 may be submitted with pooled analysis data (Action: Jobner centre).

Fennel

1. The data sheets do not match the trials allocated which must be rechecked critically (Action: Dholi centre).
2. The entry, UF- 205 may be proposed for release (Action: Jobner centre).
3. The entries, NS-63 and NS-46 may be promoted to CVT (Action: Jobner centre).
4. Yield should be mentioned only in Kg/ha uniformly by all the centers.
5. Entries having the yield data supported with oil content should only be promoted to CVT.
6. The entries identified by the workshop should only be exchanged for conducting CVT through PC unit.

Fenugreek

1. The entry, UM-361 (Jobner) may be proposed for release with pooled analysis data.
2. The importance of diosgenin content may be looked into from health point of view.
3. Chemical constituents responsible for the cure of diabetics may be taken up by NRCSS.

Tree spices

1. Yield and yield attributing characters should be given importance.

General

1. All the centers should take up the CVT trials simultaneously and the participating centres should ensure that sufficient quantity of seed /planting material and timely despatch of the materials to the concerned centres
2. Pooled analysis should be done in all the IET and CVT, CV (%) and CD should also be given in the table. Each centre should identify promising entries to promote for further trials.
3. In case of CVT a single local and national check should be included and compared with.
4. Each centre should ensure that the entries allotted to the specific technical programme should not be mixed up.
5. All the CVT trials should be analyzed across locations to identify the promising line.
6. In all the trials, yield should be supported with yield attributing characters and quality aspects.
7. A standing committee may be formulated to assess the variety release.

II. New research programmes

New Research Programme: 1	
Crop	Ginger
Title of the programme	Genotype X Environment interaction on quality of ginger
Centers	Appangala , Ambalavayal, Barapani, Calicut , Chintapalle, Dapoli, Dholi, Kanke, Kalyani, Mizoram, Navsari , Pantnagar, Pasighat, Pottangi, Pundibari, Raigarh and Solan
Year of start	2009-10
Duration of the project	3 years
No. of entries	Suprabha , Suruchi, Surabhi, V3S1-8, V1E8-2 (Pottangi) Himgiri (Solan), Varada, Mahima, Rejatha (IISR) (9 + local check)
Design	RBD
No. of replications	3 replications
Plot size/spacing	Bed size 3 m x 1m, 25 cm x 30 cm
No. of plot/plot treatment	40 plants/plot
Observation to be recorded	1. Weekly weather data (Rainfall, maximum & minimum temperature, morning & evening relative humidity (sunshine hours & solar radiation) (incase no facility is available for recording weather data it may be intimated to PC) 2. Morphological and yield characters (plant height, leaf area, number of tillers, yield per bed, dry recovery, yield per hectare) 3. Quality parameters - crude fibre, oil, oleoresin at harvest 4. Soil nutrient status before planting and at harvest (major, secondary & micronutrients) *Based on nutrient status of soil fertilizer recommendation will be given.
* Before planting each centre will send the soil for analysis of nutrient status to Project Coordinator Spices. The facilities of IISR will be used for this and recommendations provided.	

New Research Programme: 2	
Crop	Turmeric
Title of the programme	Initial Evaluation Trial – 2009
Centres	Dholi
Date/Year of start	2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	16
Design	R.B.D
No. of replications	3 replications
Plot size/spacing	3m x 1m bed ; 30 cm x 25 cm
No. of plants /plot / treatment	40 plants /plot
Methodology and procedure	Recommended package of practices will be followed
Date of sowing/planting	Kharif season
Observation to be recorded in detail	1. Plant height (cm) 2. No. of tillers/plant 3. No of days to maturity 4. Yield (kg/plot) or (t/ha) 5. Curcumin, essential oil, oleoresin content and dry recovery % 6. Disease & pest incidence

New Research Programme: 3	
Crop	Turmeric
Title of the programme	Coordinated Varietal Trial – 2009
Centres	Ambalavayal , Chintapalle, Coimbatore, Dholi, Jagtial, Kumarganj, Navsari, Pottangi, Pundibari, Pasighat, Pantnagar and Raigarh
Date/Year of start	2010-11
Duration of the Project	Three years
No. of treatments/genotypes with details	Dholi: RH-9/90, RH-13/90, RH-80, RH-50 Pottangi: PTS-47, PTS-3 Pundibari: TCP-129, TCP-17 National check from Pottangi, Local check (8 + 2 checks)
Design	RBD
No. of replications	3 replications
Plot size/spacing	3 m x 1m bed; 30 cm x 25 cm spacing
No. of plants /plot / treatment	40 plants /plot
Date of sowing	Kharif season
Methodology & procedure	Standard recommended package of practices
Observation to be recorded in detail	1. Plant height (cm) 2. No. of tillers/plant 3. No. of leaves/tiller 4. No. of days for maturity 5. Yield kg/plot 6. Disease & pest incidence 7. Quality - Curcumin, oleoresin, essential oil and dry recovery %

New Research Programme: 4	
Crop	*Coriander*
Title of the programme	Coordinated Varietal Trial - 2009
Centres	Ajmer, Dholi, Guntur , Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Navasari, Pantnagar, Raigarh and Udaipur
Date/Year of start	Rabi, 2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	Jobner: UD- 475 and UD-801 Guntur: LCC-237, LCC-236 Hisar: DH-220, DH-233 Kumarganj: NDCor- 30, NDCor-49 Ajmer: ACr-1 Udaipur: RKD-13, RKD-18 National check - Hisar Anand All centers should include a National check &, State check (11+2 Checks)
Design	R.B.D
No. of replications	3 replications
Plot size/spacing	4.00 m x 2.40 m; x 30 cm x 10 cm drilling
No. of plants /plot / treatment	8 rows/plot 320 plant/plot
Date of sowing/planting and season	First week of October/November (Rabi)
Methodology & Procedure to be adopted	As per the recommended package of practices
Observation to be recorded in detail	1. Plant height (cm) 2. Primary branches per plant 3. No. of secondary branches/plot 4. Days to 50% flowering 5. Umbel per plant 6. Umbellets per umbel 7. Seeds per umbellete 8. Test weight (g) 9. Seed yield (kg/ha) 10. Disease and pest incidence, if any 11. Quality parameters

Note: For conducting the CVT 100 g of 12 packets seed samples for each entry is required. Sufficient quantity of entries must be sent to PC's Unit by September every year for coding and redistribution

New Research Programme : 5	
Crop	Cumin
Title of the programme	Initial Evaluation Trial -2009
Centres	Jobner
Date/Year of start	Rabi 2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	UC-292, UC-339,UC-272,UC-267,UC-293,Wt-5, UC-336, UC-259 with four checks namely RZ-19, RZ-223, RZ-341 and Local check
Design	R.B.D
No. of replications	3 replications
Plot size/spacing	3 m x 2.4 m spacing/ 30 cm x 5 cm 1.80 m x 4.00 m, Broadcasting
No. of plants /plot / treatment	8 rows/plot 480 plants per plot
Date of sowing/planting season	Last week of October (Rabi)
Methodology & procedure to be adopted	As per the recommended package of practices
Observation to be recorded in detail	1. Plant height (cm) 2. Primary branches per plant 3. Secondary branches/plot 4. Days to flowering 5. Days to 50% flowering 6. Umbels per plant 7. Umbellets per umbellate 8. Seeds per umbel 9. Test weight (g) 10. Seed yield (kg/ha) 11. Disease and pest incidence, if any 12. Quality

New Research Programme: 6	
Crop	Cumin
Title of the programme	Coordinated Varietal Trial – 2009
Centres	Jobner, Jagudan, Ajmer and Jabalpur
Date/Year of start	Rabi - 2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	Ajmer: AC-167 Jagudan: GC - 2002-41, GC 2002-27 Jobner: UC- 239 and UC-299 National check - GC-4 All centres should include a Local check
Design	R.B.D
No. of replications	3 replications
Plot size/spacing	4.00 m x 2.40 m, spacing 30 cm x 5 cm /Broad casting
No. of plants /plot / treatment	8 rows/plot 640 plants per plot
Date of sowing/planting and season	Last week of October (Rabi)
Methodology & procedure to be adopted	As per the recommended package of practices
Observation to be recorded in detail	1. Plant height (cm) 2. Primary branches per plant 3. Secondary branches/plot 4. Days to flowering 5. Days to 50% flowering 6. Umbels per plant 7. Umbellets per umbellate 8. Seeds per umbel 9. Test weight (g) 10. Seed yield (kg/ha) 11. Disease and pest incidence, if any 12. Quality

Note: For conducting the CVT 100 g of 4 packets seed samples for each entry is required. Sufficient quantity of entries must be sent to PC's Unit by September every year for coding and redistribution.

New Research Programme: 7	
Crop	Fenugreek
Title of the programme	Initial Evaluation Trial
Centres	Jobner
Date/Year of start	Rabi 2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	UM-137, UM-100, UM-193, UM-126, UM-124, UM-136, UM-140, UM-222,UM-325, UM-228 with four checks namely RMt-1 RMt-305, RMt-351 and local check (10+4 checks)
Design	R.B.D
No. of replications	Three
Plot size/spacing	1.8 m x 4.0 m; 30 cm x10 cm drilling
No. of plants /plot / treatment	6 rows /plots
Date of sowing/planting and season	Last week of October (Rabi)
Methodology & Procedure to be adopted	As per the recommended PoP
Observation to be recorded in detail	1. Plant height (cm) 2. Primary branches per plant 3. No. of secondary branches/plant 4. Days to 50% flowering 5. Days to 50% maturity 6. Pods per plant 7. Pod length (cm) 8. Seeds per pod 9. Test weight (g) 10. Seed yield (kg/ha) 11. Disease and pest incidence, if any 12. Quality

New Research Programme: 8	
Crop	Fennel
Title of the programme	Co-ordinated Varietal Trial - 2009
Centres	Ajmer, Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj , Pantnagar, Udaipur and Raigarh
Date/Year of start	Rabi 2009-10
Duration of the Project	3 years
No. of treatments/genotypes with details	Ajmer: AF-1 Dholi: RF-21 & RF-31 Hisar:HF-131,HF-143 Jagudan: JF-586-2 Jobner: NS-63, NS-46 Kumarganj: NDF-16, NDF-24 National Check GF-11 All centers should include a Local check (10 + 2 Checks)
Design	R.B.D
No. of replications	3 replications
Plot size/spacing	4.0 m x 2.5 m; 45cm x 20 cm drilling
No. of plants /plot / treatment	20 plants/row
Date of sowing/planting season	1st week of November (Rabi)
Procedure to be adopted	As per the recorded package of practices
Observation to be recorded in detail	1. Plant height (cm) 2. No. of primary branches / plant 3. No. of secondary branches/plot 4. Days to flowering 5. No. of umbels/plant 6. Umbellets/plant 7. No. of days to maturity seeds /umbel 8. Yield (kg/plot) or (t/ha) 9. Test weight 10. Quality 11. Pest & disease incidence

Note: For conducting the CVT 100 g of10 packets seed samples for each entry is required. Sufficient quantity of entries must be sent to PC's Unit by September every year for coding and redistribution.

New Research Programme: 9	
Crop	Fenugreek
Title of the programme	Coordinated Variety Trial 2009 Series VII
Centres	Ajmer, Coimbatore, Dholi, Guntur, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Pantnagar, Raigarh and Udaipur
Date/Year of start	Rabi 2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	Ajmer -AFg-3, AFg-4 Guntur - LFC 105, LFC-103 Hisar - HM-348, HM-355 Jobner - UM-330, UM-364, UM-366 and UM-365 Kumarganj - NDM-19, NDM-20 Udaipur-PRM 45 National check -Hisar Sonali All centers should include a Local check (13 + 2 checks)
Design	R.B.D
No. of replications	3
Plot size/spacing	4.0 m 2.4 m; 30x10cm drilling
No. of plants /plot treatment	8 rows/plot 320 plants/plot
Date of sowing/planting and season	Last week of October Rabi
Methodology & Procedure to be adopted	As per the recommended PoP
Observation to be recorded in detail	1. Plant height (cm) 2. Primary branches per plant 3. No. of secondary branches/plant 4. Days to 50% flowering 5. Days to 50% maturity 6. Pods per plant 7. Pod length (cm) 8. Seeds per pod 9. Test weight (g) 10. Seed yield (kg/ha) 11. Disease and pest incidence, if any 12. Quality

Note: For conducting the CVT -2009, 150 g of 12 packets seed samples for each entry is required. Sufficient quantity of seeds of the entries must be sent to PC's Unit by September every year for coding and redistribution.

New Research Programme: 10	
Crop	Large Cardamom
Title of the programme	Germplasm collection, characterization, evaluation and conservation
Centres	ICRI, R.S. Gangtok
Date/Year of start	2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	To be fixed by the centre
Design	To be fixed by the centre
No. of replications	
Plot size/spacing	
No. of plants /plot treatment	
Date of sowing/planting and season	
Observation to be recorded in detail	1. Growth yield & Quality attributes 2. Plant height (cm) 3. No. of bearing suckers 4. No. of panicle 5. Length of panicle 6. No. of capsules/plant 7. Yield & quality

New Research Programme: 11	
Crop	Large Cardamom
Title of the programme	Initial Evaluation Trial (IET 2009)
Centres	Gangtok
Date/Year of start	2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	
Design	RBD
No. of replications	Three
Plot size/spacing	6x3 feet
No. of plants /plot treatment	
Date of sowing/planting and season	
Observation to be recorded in detail	1. Plant height 2. No. of tillers pelr plant 3. No. of bearing suckers 4. No. of panicle 5. Racemes per panicle 6. Length of panicle 7. No. of capsules per panicle 8. No. of capsules/plant 9. Yield & quality

TECHNICAL SESSION: III

CROP PRODUCTION

Chairman: Dr. P. Rethinam, Former Asst. Director General, Plantation Crops
Rapporteurs: Dr. R. Senthil Kumar, Sr. Scientist (Hort), IISR, Appangala
Dr. (Mrs.) Sarada, Scientist (Hort), APHU, Guntur

The session was chaired by Dr. P. Rethinam, Former ADG, Plantation Crops. In the opening remarks, the chairman addressed the house on the importance of good variety and agronomic practices with optimum dose of inputs to realize the maximum yield potential. Nine participants presented the progress on Crop Production aspects of black pepper, cardamom, ginger, turmeric, coriander, cumin, fennel, fenugreek and tree spices. The recommendations emerged after discussions in the house are presented below.

Recommendations

Black Pepper

* The experiment on rooting of orthotropic shoots of pepper can be concluded and recommendation of dipping of three node cuttings of pepper in PGPR shall be recommended as a technology to be adopted.
* While formulating experiments on organic farming on spice crop, nutrient which is equivalent to organic manures shall be taken into account.

Cardamom

* Fertilizer management trials on cardamom are concluded. The final report should be submitted to the PC unit at the earliest. The outcome of the project shall go as technologies for transfer.

Ginger

* Experiment on the effects of micronutrients on ginger shall be concluded and recommendations to be passed on.
* Holistic approach of organic management including organic mode of plant protection shall be followed in all organic experiments.

Turmeric

* The project on foliar application of micronutrients in turmeric shall be closed and the results emerging in the project shall be incorporated for transfer of technology.
* A new experiment on water management may be formulated focusing on moisture conservation.

Cumin

* The trial on the effect of Tricontanol shall be concluded.

Coriander

* The experiment on the effects of rhizobacteria on the yield of coriander shall be concluded and the recommendation of application of rhizobacteria (FL$_{\bullet}$18) as seed treatment + soil application shall be included for technology transfer.
* For screening drought resistant lines, the precise moisture regime under which the drought resistance lines identified shall be reported. About 4 short listed drought resistant entries may be further evaluated at Guntur and Coimbatore.

Fennel

* Experiments on the effects of ESP levels x genotype interaction on seed yield of fennel shall be concluded.
* The results of concluded experiments on crop production may be incorporated in the transfer of technology.

Fenugreek

* Experiments on the effects of *Azospirillum* on the seed yield of fenugreek shall be closed.

Clove

* Experiments on softwood grafting/wedge grafting of clove may be continued for another six months. Stem cutting may be tried along with different doses of PGPRs /hormones.

Cinnamon

* Developing standards for post harvest quality parameters of cinnamon may be continued by including CARI, Port Blair as Voluntary Centre.

New Projects

It was felt that developing Good Agricultural Practices, developing complete package for production of organic spices, water management and fertigation are essential. Full fledged experimental details may be developed and implemented.

The following new projects were proposed and discussed and were suggested with modifications.

1. *Standardization of processing in turmeric*: The project shall be taken up only at 2 Centers namely, Coimbatore and Calicut after making necessary modifications.
2. *Standardization of fertigation in turmeric:* The centres identified for this project are Coimbatore and Jagtial.
3. Observation trial on *mechanical harvesting in turmeric:* The Coimbatore centre may take up this trial and generate data.
4. *Effect of vermicompost on growth and yield of ginger:* The project was not approved in the present form and shall be taken up after modifications.
5. *Effect of different irrigation schedules on yield of cardamom:* will be taken up at Mudigere, Pampadumpara & Myladumpara and Sakleshpur after modifications.
6. *Irrigation management for sustainable coriander production*: proposed by Guntur shall be modified.
7. A common project on *Good Agricultural Practices* for all crops shall be formulated to test at all centres.

8. Projects on organic package of practices for large cardamom and production of quality planting materials (QPM) in large cardamom may be started (ICRI, Spices Board-Sikkim & ICAR Research Complex for NEH Region, Sikkim Centre).
9. "Experiments on evaluation of black pepper grafts" and "Evaluation of black pepper cuttings from runner and orthotropic shoots" shall be taken up as a common project - Vegetative propagation of pepper (Panniyur, Ambalavayal and Sirsi).

General

* All the AICRPS Centres has to submit replication-wise data of the concluded experiments within 3 months for further analysis at PC unit.
* The trial identification / code number allotted by the PC unit for each experiment should invariably be maintained without alteration.
* All the centres should follow Good Agronomic Practices (GAP) as whole package starting from nursery management to main field management.
* Reporting yield data should be in uniform manner, either per plant/plot/ha.
* All agronomic experiments should have C: B ratio.

New Research Programme :12	
Crop	Cardamom
Title of the programme	Effect of irrigation scheduling on yield of cardamom varieties
Centres	Mudigere
Date/Year of start	2009-10
Duration of the Project	Three years
No. of treatments/genotypes with details	**1. Main (irrigation from December to May)** Irrigation at 30 days interval Irrigation at 20 days interval **2. Sub** Recd. * FYM +Recd. NPK at 2 intervals (May and September) 125% Recd. FYM + Recd. NPK at 2 intervals (May and September) 150% Recd. FYM + Recd. NPK at 2 intervals (May and September) Recd. FYM + Recd. NPK at 3 intervals (May, September and January) 125% Recd. FYM + Recd. NPK at 3 intervals (May, September and January) 150% Recd. FYM + Recd. NPK at 3 intervals (May, September and January)
Design	Split plot
No. of replications	Four
Plot size/spacing	1.8 m x 1.8 m
Observation to be recorded in detail	1. Plant height 2. No. of bearing suckers/clump 3. No. of panicles/clump 4. No. of capsules 5. Dry capsule yield kg/ha 6. Uptake of nutrients 7. Soil analysis for available nutrients 8. Quantum of water

* Recd = Recommended

New Research Programme: 13	
Crop	Black pepper
Title of the programme	Evaluation of grafts, orthotropic and runner shoots in black pepper
Centres	Ambalavayal, Panniyur, Sirsi and Yercaud
Date/Year of start	2009-10
Duration of the Project	5 years
Variety	Panniyur-1
No. of treatments/genotypes with details	Treatments 1. Rooted runner shoots (Use 3 noded cuttings for rooting) 2. Rooted terminal orthotropic shoots (use 5 noded cuttings for rooting) 3. Grafts of runner shoots on *Piper colubrinum* rootstock 4. Grafts of orthotropic shoots on *Piper colubrinum* rootstock 5. Grafts of runner shoots on *Piper nigrum,* variety IISR Thevam as rootstock 6. Grafts of orthotropic shoots on *Piper nigrum* variety IISR Thevam as rootstock 7. Grafts of runner shoots on *Piper nigrum,* variety IISR Shakthi as rootstock 8. Grafts of orthotropic shoots on *Piper nigrum* variety IISR Shakthi as rootstock
Design	R.B.D
No. of replications	3
Plot size/spacing	3 m x 3 m 6 plants/replication
Observation to be recorded in detail	1. Growth parameters 2. Spiking details 3. Yield and yield related attributes 4. Disease and pest incidence 5. Tolerance to drought

New Research Programme : 14	
Crop	Ginger
Title of the programme	Nutrient supplementation though organic manures for growth and yield of ginger
Centres	Dholi and Kumarganj
Date/Year of start	2009-10
Duration of the Project	3 years
No. of treatments/genotypes with details	1. FYM (100%)-20t/ha 2. VC* (100%)- 5t/ha 3. FYM (50%) + VC* (50%) 4. FYM (25%) + VC* (75%) 5. FYM (75%) + VC* (25%) 6. RDF alone- **Chemical sources 7. Recommended INM package of the centre 8. Absolute control (No fertilizer/manure)
Design	RBD
No. of replications	3
Plot size/spacing	3.0 m x1.0 m & 25 cm x 30 cm
No. of plants /plot / treatment	40 plants/plot
Methodology & Procedure to be adopted	Recommended dose of chemical fertilizers
Observation to be recorded in detail	1. Plant height (cm) 2. No of tillers/ plant 3. No of leaves/tiller 4. No of days to maturity 5. Yield (kg/plot) or (t/ha) 6. Quality - dry recovery, crude fibre 7. Soil nutrient buildup

*VC = Vermicompost
** RDF = Recommended doze of fertilizer

New Research Programme: 15	
Crop	Turmeric
Title of the programme	Standardization of fertigation in turmeric
Centres	Coimbatore and Jagtial
Date/Year of start	2009-10
Duration of the Project	3 years
No. of treatments/genotypes with details	Treatment details: (Emitter @ 4 liter/hour. Irrigation to be provided every day through drip upto one month before harvest. But fertilizer application only as per the treatment i.e weekly or fortnightly. Starting from 10 days after gene of shoot or one month before harvest)) Treatments 1. 100% recommended dose of fertilizer (RDF) through conventional method of application-control (No drip). 2. 100% RDF through drip – weekly once 3. 100% RDF through drip – fortnightly once 4. 75% RDF through drip – weekly once 5. 75% RDF through drip – fortnightly once 6. 50% RDF through drip – weekly once 7. 50% RDF through drip – fortnightly once
Design	RBD
No. of replications	3
Plot size/spacing	For drip irrigation, drip lines are normally laid out end-to end. We may plant the crop at 30 x 15 cm spacing and plot size may be 5m x 4m or 4m x 3m
No. of plants /plot/ treatment	No. of plants = $\frac{5m \times 4m}{0.3 \times 0.15}$ = 444 plants/400 plot
Observation to be recorded in detail	1. Plant population at 30 DAP 2. No. of leaves at 150 days after planting (DAP) 3. No. of tillers 4. Leaf area 5. Plant height & Dry matter production at harvest, Days to maturity 6. Plant population at harvest 7. Fresh weight of rhizomes (Mother, primary & secondary) 8. Volume of rhizomes (Mother, primary & secondary) 9. Quality analysis

New Research Programme: 16	
Crop	Turmeric
Title of the programme	Effect of micronutrients on turmeric
Centres	Dholi, Kumarganj and Pundibari
Date/Year of start	2009-10
Duration of the Project	3 years
No. of treatments/genotypes with details	Number of factors: Two **Factor 1: Micronutrients** i) Zinc ($Zn SO_4$) ii) Iron ($Fe_2 SO_4$) iii) Boron (Borax) iv) Manganese ($Mn SO_4$) **Factor 2: Micronutrient Levels** i) Control (No micronutrients) ii) 25 kg ha^{-1} Soil application iii) 0.5% foliar spray (2 sprays 60 and 90 days after planting) Total treatments - 12
Design	F.R.B.D
No. of replications	3
Plot size/spacing	3.0 m x1.0 m beds; 25 cm x 30 cm
Observation to be recorded	1. Plant population at 30 DAP 2. No. of leaves at 150 day s after planting (DAP) 3. No. of tillers 4. Leaf area 5. Plant height & Dry matter production at harvest, Days to maturity 6. Plant population at harvest 7. Fresh weight of rhizomes (Mother, primary & secondary) 8. Volume of rhizomes (Mother, primary & secondary 9. Quality parameters (dry recovery, curcumin) 10. Yield kg/plot or t/ha 11. Soil nutrient status (major & micronutrients) before planting and after harvesting

New Research Programme : 17	
Crop	Turmeric
Title of the programme	Standardization of processing in turmeric
Centres	Calicut and Coimbatore
Date/Year of start	2009-10
Variety	Local variety
Duration of the Project	3 months
No. of treatments	8
Design	CRBD
No. of replications	3
Treatment details	Treatment details: Use uniform quantity of rhizome for all the treatments with mother, primary and secondary rhizomes in the ratio 20:60:20 Treatments 1. Traditional processing by boiling for 40 minutes and drying 2. Traditional processing by boiling for 60 minutes and drying 3. Traditional processing by boiling for 90 minutes and drying 4. Improved processing 10 minutes and drying (using TNAU model) 5. Improved processing 20 minutes and drying (using TNAU model) 6. Improved processing 30 minutes and drying (using TNAU model) 7. Dipping in boiling water for 10 minutes and drying 8. Raw rhizomes sliced and dried. (3 mm thick slices).
Observation to be recorded in detail	1. Initial weight of rhizomes 2. Final weight of rhizomes 3. Quality parameters

	a. Curcumin % b. Oil, Oleoresin %, c. Essential oil % d. Dry recovery % e. Colour of rhizome -Inner care- - outer care f. Colour of powder 1-5 (grade) 4. Time taken for drying (In hours- hours exposed to sunlight)

New Research Programme: 18	
Crop	Turmeric
Title of the programme	Mechanical harvesting in turmeric (Observational trial)
Centres	Coimbatore
Date/Year of start	2009-10
Duration of the Project	2 years
Variety	Local variety
No. of treatments	(Planting has to be done adjusting the space between the beds for easy movement of tractor mounted and power tiller mounted harvester and in sufficient length suitable for mechanical harvesting with a minimum of 20 meters length) Treatments 1. Tractor mounted TNAU model harvester 2. (Width of each bed 120 cm; Length of each bed 20 m; Space between two beds 30 cm) 3. Power tiller mounted TNAU model harvester -(Width of each bed 75 cm; Length of each bed 20 m; Space between two beds 25 cm) 4. Manual harvesting I : (Width of each bed 120 cm; Length of each bed 20 m; Space between two beds 30 cm) 5. Manual harvesting II : (Width of each bed 75 cm; Length of each bed 20 m; Space between two beds 25 cm)
Plot size/spacing	25 cm x 30 cm (Between rows: 25 cm; Between plants:30 cm) Length of bed : 20 m
Observation to be recorded in detail	1. Total yield 2. Percentage of damaged rhizome 3. Time and man power used for mechanical harvesting and sorting 4. Time and man power used for manual harvesting and sorting 5. Economics

New Research Programme: 19	
Crop	Coriander
Title of the programme	Nutrient supplementation through organic manures for growth and yield of coriander
Centres	Coimbatore, Dholi, Hisar, Jagudan, Jobner Kumarganj and Raigarh
Date/Year of start	2009-10
Duration of the Project	3 years
No. of treatments/genotypes with details	1. FYM (100%)-10t/ha 2. VC* (100%)- 5t/ha 3. FYM (50%) + VC (50%) 4. FYM (25%) + VC (75%) 5. FYM (75%) + VC (25%) 6. RDF alone- Chemical fertilizers 7. Recommended INM package of the centre 8. Absolute Control
Design	RBD
No. of replications	3
Plot size/spacing	4.0 m x 2.7 m; 30 cm x20 cm
No. of plants /plot / treatment	180 plants/plot
Observation to be recorded in detail	1. Plant height (cm) 2. No of primary branch/plant 3. No. of secondary branches/plant 4. Days to 50% flowering 5. No of umbels/plant 6. No of umbellets/umbel 7. No of grains/ umbel 8. Yield (kg/plot) or (t/ha) 9. Disease & pest incidence 10. Quality parameters 11. Soil nutrient availability

* Vermicompost

New Research Programme: 20	
Crop	Coriander
Title of the programme	Effect of micronutrients on yield of coriander
Centres	Coimbatore and Dholi
Date/Year of start	2009-10
Duration of the Project	3 years
No. of treatments	No. of factors: Two **Factor 1** **Micronutrients** i) Zinc as Zinc sulphate ii) Iron as Ferrous sulphate iii) Copper as Copper sulphate iv) Manganese as Manganese sulphate **Factor 2** **Micronutrient Levels** i) Control (no micronutrients) ii) 25 kg ha^{-1} Soil application iii) 0.5% Foliar spray (2 sprays- 45 & 60 days of sowing) Total no. of treatments : 12
Design	F. R.B.D
No. of replications	3
Plot size/Spacing	4 m x 2.4 cm, 30 cm x 10 cm
Observation to be recorded	1. Plant height (cm) 2. No. of primary branch/plant 3. No. of secondary branches/ plant 4. Days to 50% flowering 5. No of umbels/plant 6. No of umbellets/umbel 7. No of seeds/ umbel 8. Yield (kg/plot) or (t/ha) 9. Soil nutrient status (major & micronutrients) before planting and after harvesting 10. Quality parameters 11. Disease & pest incidence

New Research Programme: 21	
Crop	Coriander
Title of the programme	Irrigation management for sustainable coriander production
Centres	Guntur
Date/Year of start	2009-10
Duration of the Project	3 years
No. of treatments/genotypes with details	**Factors: 3** Flooding with 30 cm furrows either side of 2.4 m flat bed Sprinkler Rain gun (Area 1000 sq.m) **Levels: 5** Irrigation once at 30 DAS Irrigation once at 45 DAS Irrigation twice at 30 and 45 DAS Irrigation twice at 30 and 60 DAS Control
Design	F.R.B.D
No. of replications	3
Plot size/spacing	4 m x 2.4 m
No. of plants /plot / treatment	300-400 plant/plot
Date of sowing	Recommended PoP to be followed and recommended dose of manure/fertilizers
Observation to be recorded in detail	1. Seed germination (%) 2. Root & shoot ratio 3. Vigour (Plant height in cm) 4. Branching pattern at monthly intervals 5. No. of days to 50% flowering 6. No. of primary branches/plant 7. No. of secondary/branches/plant 8. No. of umbel 9. No. of umbellets/umbel 10. No. seeds/umbel 11. Duration (No. of days to maturity) 12. Height of the plant at maturity & total biomass 13. Yield kg/plot & Kg/ha 14. Quantity of water applied 15. Soil moisture content before and after irrigation

Large scale Demonstration Trial: 22

Crop	Fennel
Title of the programme	Large scale demonstration of the role of rhizobacteria in growth promotion of fennel
Centres	Hisar, Jagudan, and Raigarh
Date/Year of start	2009-10
Duration of the project	2 years
No. of treatments	Three
No. of treatments	T_1 & T_2 * (The best two treatment for each respective centers may be selected) T_3 Control (Farmers practices)
Design/Variety	RBD with 10 replications The ruling variety
No. of replications/ Location/Season	Ten - Farmers plot (Rabi season) One for each treatment in paired plot technique
Plot size	0.1 ha /treatment
No. of farmers	Ten* *
Observation to be recorded	1. Plant height 2. Days to 50% flowering 3. Primary branches/plant 4. Secondary branches/plant 5. Umbels/plant 6. Umbellets/umbel 7. Seeds/umbel 8. Days to maturity 9. Yield (kg/ha) 10. Check yield (Farmers practice) 11. Yield increase (%) over check 12. B: C ratio-farmers practice 13. Disease incidence if any 14. Impact analysis

All treatments should receive uniform recommended dose of fertilizers

* 250 g each of the culture FK-14 & culture FL-18 (10 packets each for 10 farmers) will be supplied by PC's Unit, IISR, Calicut

** Each farmer's plot will be considered as one replication for analysis of data

Large scale Demonstration Trial: 23

Crop	Fenugreek
Title of the programme	Large scale demonstration of the role of rhizobacteria in growth promotion of fenugreek
Centres	Jagudan, Jobner, Guntur, Hisar and Kumarganj
Date/Year of start	2009-10
Duration of the project	2 years
No. of treatments	Three
No. of treatments	T_1 & T_2 * (The best two treatment for each respective centers may be selected) T_3 Control (Farmers practices)
Design/Variety	RBD with 10 replications The ruling variety
No. of replications/ Location/ Season	Ten - Farmers Plot (Rabi season) One for each treatment in paired plot technique
Plot size	0.1 ha/treatment
No. of farmers	Ten**
Observation to be recorded	1. Plant height 2. Days to 50% flowering 3. Primary branches/plant 4. Secondary branches/plant 5. Umbels/plant 6. Umbellets/umbel 7. Seeds/umbel 8. Days to maturity 9. Yield (kg/ha) 10. Check yield (Farmers practice) 11. Yield increase (%) over check 12. B: C ratio-farmers practice 13. Disease incidence if any 14. Impact analysis

All treatments should receive uniform recommended dose of fertilizers

* 250 g each of the culture FK-14 & culture FL-18 (10 packets each for 10 farmers) will be supplied by PC's Unit, IISR, Calicut

** Each farmer's plot will be considered as one replication for analysis of data

Large scale Demonstration Trial: 24

Crop	Cumin
Title of the programme	Large scale demonstration of the role of rhizobacteria in growth promotion of cumin
Centres	Jagudan and Jobner
Date/Year of start	2009-10
Duration of the project	2 years
No. of treatments	Three
No. of treatments	T_1 & T_2 * (The best two treatment for each respective centers may be selected) T_3 Control (Farmers practices)
Design/Variety	RBD with 10 replications The ruling variety
No. of replications / Location/Season	Ten - Farmers plot (Rabi season) One for each treatment in paired plot technique
Plot size	0.1 ha/treatment
No. of farmers	Ten**
Observation to be recorded	1. Plant height 2. Days to 50% flowering 3. Primary branches/plant 4. Secondary branches/plant 5. Umbels/plant 6. Umbellets/umbel 7. Seeds/umbel 8. Days to maturity 9. Yield (kg/ha) 10. Check yield (Farmers practice) 11. % of yield increase over check 12. B: C ratio-farmers practice 13. Disease incidence if any 14. Impact analysis

All treatments should receive uniform recommended dose of fertilizers

* 250 g each of the culture FK-14 & culture FL-18 (10 packets each for 10 farmers) will be supplied by PC's Unit, IISR, Calicut

** Each farmer's plot will be considered as one replication for analysis of data

Large scale Demonstration Trial: 25

Crop	Coriander
Title of the programme	Large scale demonstration of the role of rhizobacteria in growth promotion of coriander
Centres	Coimbatore, Guntur, Hisar, Jagudan and Raigarh
Date/Year of start	2009-10
Duration of the project	2 years
No. of treatments	Three
No. of treatments	T_1 & T_2 * (The best two treatment for each respective centers may be selected) T_3 Control (Farmers practical)
Design/ Variety	RBD with 10 replications. The ruling variety
No. of replications/ Location/Season	Ten - Farmers plot (Rabi season) One for each treatment in paired plot technique
Plot size	0.1 ha/treatment
No. of farmers	Ten**
Observation to be recorded	1.Plant height 2. Days to 50% flowering 3. Primary branches/plant 4. Secondary branches/plant 5. Umbels/plant 6. Umbellets/umbel 7. Seeds/umbel 8. Days to maturity 9. Yield (kg/ha) 10. Check yield (Farmers practice 11. % of yield increase over check 12. B: C ratio-farmers practice 13. Disease incidence if any 14. Impact analysis

All treatments should receive uniform recommended dose of fertilizers

* 250 g each of the culture FK-14 & culture FL-18 (10 packets each for 10 farmers) will be supplied by PC's Unit, IISR, Calicut

** Each farmer's plot will be considered as one replication for analysis of data

Technical session IV

CROP PROTECTION

Chairpersons: Dr. S. Devasahayam, IISR, Calicut
Dr. KP. Mammootty, PRS, Panniyur (KAU)
Dr. G. Chandrasekharan, TNAU, Coimbatore

Rapporteur : Dr. A. I. Bhat, IISR, Calicut
: Dr, P. Muthulakshmi, TNAU, Coimbatore

General decisions

- For disease and pest surveillance, systematically and statistically laid out plan to be prepared and provided by the Project Co-ordinator.
- For all closed projects where disease/pest management trials are involved, economics of various treatments may be worked out before recommendation.
- Feasibility of employing contractual staff may be explored to carry out identified technical programmes wherever regular staffs are not available

Black pepper

- Project PEP/CP5.1 may be concluded and final report should be submitted.
- While collecting yield data, the diseased and dead vine should be accounted.
- Project PEP/CP5.2 may be conducted for two more years.
- Project PEP/CP6.1 may be closed and final report submitted
- Identity of various species of *Erythrina* need to be confirmed.
- Surveillance for *Erythrina* gall wasp may be continued.

Cardamom

- Project CAR/CP6.3 may be concluded and final report submitted.
- The work identified for the Pampadumpara centre could not be undertaken during second year due to lack of personnel.
- Management of root grub through EPNS should be continued

Ginger

- Trials on bio-fumigation may be continued
- In rhizome heat treatment experiments, the temperature of the rhizome may be monitored to avoid over heating of rhizomes.

Turmeric

- Uniform index may be used for screening germplasm against diseases.
- Surveillance for disease may be continued with multi locations.

Coriander

- COR/CP/6.1 may be closed and final report submitted.
- Highly resistant accessions against stem gall and powdery mildew may be passed on to breeders for evaluation under IET.

Cumin

- CUM/CP/5.1 In this project best treatment in the management of wilt and blight may be taken up as a new adaptive trial. Involving wilt resistant variety GC-4.
- Cost benefit ratio of the management of wilt and blight disease may be worked out.

Tree Spices

- TSP/CP/3.1. In this project role of soil physical factors in the wilt of nutmeg may be studied.
- Incidence of wilt and dieback may be recorded separately for all the treatments.

New Research Programme: 26	
Crop	Cardamom
Title of the programme	Evaluation of new insecticides/biopesticide in cardamom against thrips and shoot and capsule borer
Centres	Mudigere and Pampadumpara
Date/Year of start	2009-10
Duration of the Project	3 Years
Treatments	1. Acetamiprid 0.4 g/l of water 2. Chloropyriphos 50SL 1 ml /l of water 3. Methomyl 40 SP 1.5 ml/l of water 4. Imidacloprid 200SL 0.5 ml/l of water 5. Fenobucarb 50 EC 1 ml/l of water 6. Carbosulfan 20 EC 2 ml/l of water 7. Ponneem * 8. Existing recommendation of Mudigere centre (Spraying monocrotophos 0.05% in March followed by two sprays of Phosalone (0.05%) in May & August 9. Existing recommendation of Pampadumpara Centre (six rounds of insecticidal application – endosulfan (0.05%/quinalphos 0.05%) 10. Control
No. of sprays	25-30 days interval
Design	RBD
No. of replications	3
No. of plants /plot / treatment	16 plants
Observation to be recorded	Incidence of thrips and borers based on damage 1. Cumulative percentage of thrips infested capsules in *various treatments.* 2. Cumulative percentage of borer infested campsules in various treatments 3. Cumulative percentage of borer infested psedostems in various treatments 4. Any difference in bee activity/fruit set

* Initial sample will be supplied from PC's Unit, Calicut

TECHNICAL SESSION : V

RECOMMENDATION OF VARIETIES & TECHNOLOGIES FOR ADOPTION

Chairpersons :1. Dr M. Tamil Selvan, Director, DASD, Calicut
2. Dr N. Vijayan Nair, Director, SBI, Coimbatore

Rapporteurs : 1. Dr. K. Kandiannan, Senior Scientist (Agronomy), IISR, Calicut
2. Dr. K. N. Shiva, Senior Scientist (Horticulture), IISR, Calicut

Varieties

There were 14 varieties proposed as follows

Black pepper : Entry HB 20052 from Panniyur as Panniyur – 8 for State release

Ginger : VIE8-2 from Pottangi as Subhada for State release

Turmeric : CL 101 from Coimbatore as CO-2 for State release
PTS-59 from Pottangi as Surangi for state release
NDH-18 from Kumarganj already released by State Variety release committee, hence not considered

Coriander : UD-728 from Jobner as RCr-728 for National release;
LCC-170 from Guntur as APHU-Dhania-1 for Andhra Pradesh and Tamil Nadu
: DH-206 from Hisar for National release

Cumin : UC-345 from Jobner as RZ-345 for State release

Fennel : UF-205 from Jobner as RF-205 for National release
: JF-444-1 from Jagudan for National release (***Proposal as per the format has to be submitted to Project Coordinator, AICRP on Spices for records.***

Fenugreek : UM-361 from Jobner as RMt-361 for national release
HM-219 from Hisar for national release (***Proposal as per the format has to be submitted to Project Coordinator AICRP on Spices for records.***
LFC-84 from Guntur as APHU- Methi 1 for State release.

All the varieties except NDH-18 are accepted and recommended for release. Following general suggestions are also made

1. Time period between completion of the experiment and proposal for release has to be fixed
2. Proposals should accompany photographs of crop stage; yield etc., incomplete proposal will not be considered hereafter and last minute rush should be avoided.
3. In future, DUS guidelines have to be used for description and proposal should contain DUS characters.
4. Distinctive characters of variety has to be highlighted
5. Entries evaluated under AICRPS must get it approved by workshop before submitting the proposal for central/state variety release committee
6. Large scale evaluation of proposed variety through KVK in farmers field may be taken up depending on the mandate of SAUs
7. It has to be ensured that planting material / seed of the proposed variety are in sufficient stock before the proposal is submitted.

Technologies

The technologies proposed for consideration in different crops

1. **Black pepper**

   i) Two sprays of 0.1% Propiconazole 25 EC @ 5 litre per vine during last week of May and August for the management of anthracnose (Mudigere)
   ii) Use of fish oil for management of mussel scale is recommended (Mudigere)

2. **Cardamom**

   i) Application of *Azospirillum* 50g + P solubilizer 50 g + 5 kg FYM + 75 % recommended N & P per clump is recommended for nutrient management in Karnataka
   ii) For Kerala, 100% N + *Azospirillum* 50g + P solubilizer 50 g+ 5 kg FYM per clump is recommended for nutrient management
   iii) Application of Thiamethoxan 1 g / clump for control of shoot fly (Mudigere)

3. **Ginger**

   i) Seed treatment of *Trichoderma harzianum* @ 250 g in 10 litre of water for 10 kg of seed rhizome to check rhizome rot causing organism (Pundibari)

4. **Turmeric**

   i) Application of 20 t FYM + half recommended dose of NPK per ha and seed treatment with P solubilizing bacteria (*Pseudomonas florescens*) + *Trichoderma viride* is recommended (Coimbatore)

5. **Coriander**

   i) Spray of wettable sulphur @ 0.02 % at ^) DAS is recommended for the control of powdery mildew for Gujarat (Jagudan)
   ii) Seed treatment with *Pseudomonas florescens* (IISR 6) @ 10 / kg and foliar spray of the same @ 10^8 CFU after 60 DAS for effective control of powdery mildew in Tamil Nadu
   iii) Seed treatment and soil drenching with Calxin @ 0.1 % and foliar spay of the same at 60 DAS for the control of powdery mildew and stem gall at Rajasthan.

6. **Fenugreek**

   Effect of bioregulators on fenugreek

   i) Foliar spay of 50 ppm NAA at 40 and 60 DAS is recommended for higher yield for Rajasthan

General recommendations

i) IISR Scientists may look into the aspect of application of neem cake and shoot borer incidence in cardamom
ii) Twenty percent of higher cost may be added for organically produced crop while working out the economics / C: B ratio.
iii) Standard procedure has to be adopted for calculating C: B ratio by including all the factors / inputs used for production not by considering only the treatment studied.
iv) Units used in recommendations for farmers should be in easily understandable form.

PROPOSAL FOR RELEASE

Black pepper

1. HB 20052 (Panniyur) Recommended for state release as **Panniyur -8**

Ginger

1. VIE8-2 (Pottangi) Recommended for state release as **Subhada**

Turmeric

1. CL 101 (Coimbatore) Recommended for state release as **CO-2**
2. PTS-59 (Pottangi) Recommended for state release as **Surangi**

Coriander

1. UD-728 (Jobner) Recommended for National release as **RCr-728**
2. LCC – 170 (Guntur) Recommended for states of Andhra Pradesh & Tamil Nadu as **APHU-Dhania 1**
3. DH – 206 (Hisar) Recommended for National release

Cumin

1. UC-345 (Jobner) Recommended for state release as **RZ-345**

Fennel

1. UF-205 (Jobner) Recommended for National release as **RF- 205**
2. JF-444-1 (Jagudan) Recommended for National release

Fenugreek

1. UM - 361 (Jobner) Recommended for National release as **RMt- 361**
2. HM-219 (Hisar) Recommended for National release
3. LFC – 84 (Guntur) Recommended for state release as **APHU-Methi 1**

PLENARY SESSION

Chairpersons	:	Dr. R. Rethinam For Asst. Director General Plantation Crops	Dr. M. Anandaraj Project Coordinator AICRP on Spices
Rapporteurs	:	Dr. V. Srinivasan Sr. Scientist (Soil Science) IISR, Calicut	Dr. A.K. Johny Technical Information Officer IISR, Calicut

Dr. K. Rajamani, Prof. & Head welcomed the gathering.

The Rapporteurs of different technical sessions presented the report.

Recommendations:

Session I :

* Germplasm collection of ginger may be discontinued at those centres where the climatic conditions are not suitable for ginger. But the ginger trials will continue.

* Selected/identified seed spices germplasms may be tested in MLT in collaboration with NBPGR & NRCSS. The procedures may be sorted out at the proposed meeting at NRCSS, Ajmer.

Session II :

* In future all the varieties proposed for release has to be critically verified by a standing committee consisting of PC and other members by visiting the respective centres.

* The variety release proposal document should be supplemented with clear photos/videos of the variety.

* While conducting MLTs/CYTs, along with national check, only an important/best local check need to be tested instead of 4-5 local checks.

Session III :

* The proceeding was approved without any modifications.

Session IV :

* In cardamom, the project on management of root grub may be continued. The Project Coordinator may write letter to the Universities again to fill up the vacant posts. If the centre is still not filling up the post, the budget allotment may be reduced accordingly. It may also be informed to the University authorities that any delay in filling up the post may lead to discontinuation of the centre.

Session V:

AICRPS approved/recommended 13 varieties/hybrids for release in State/Central Variety release.

- All the Universities may be communicated to get the vetting of the varieties by AICRPS before state release

- A clearly written management package may be brought out in the form of bulletin for the control of *Pythium, Fusarium & Rhizobacteria* on ginger by Pundibari centre.

- While giving the varieties proposed & approved, details on name of variety, centre, variety/hybrid, parentage, yield/quality attributes & improved performance over previous var. may be given.

In his remarks Dr. E. Vadivelu, Dean, College of Hort., TNAU stressed the need for multidisciplinary research for effective transfer of technology package. He also suggested for farmer's participatory operational research for identifying researchable issues, needed by the farming community.

Project Coordinator Dr. M. Anandaraj, in his remarks briefed about the newly launched outreach programme on *Phytophthora, Ralstonia & Fusarium* and informed the AICRPS Centres to make use of the facilities. He also asked the centers to supply the details of the newly proposed spice varieties with photos/videos to display in the AICRPS website. He also mentioned about the proposal on awarding the best AICRPS worker/centre through spices societies.

Dr. M.M. Anwer highlighted the need for collaborative work among the scientists/centres for achieving better benefits.

Dr. P. Rethinam in his remarks once again stressed the need for multidisciplinary work in maintaining/observing/exploiting germplasms, need to avoid duplication of germplasms by properly giving them the IC nos & exploiting the exotic germplasms. He also highlighted the need for technology package as a whole for cropping systems rather than individual technologies. The need for compiling and bringing out the details of research from all the centers, from their inception was also felt, for highlighting the performance of centres.

The meeting came to end with the vote of thanks by Dr. M. Anandaraj.

Technical Programme (2009-10 and 2010-11)

Project Code	Title	Centres
BLACK PEPPER		
PEP/CI/1	**Genetic Resources**	
PEP/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Chintapalle, Dapoli, Panniyur, Pundibari, Sirsi, Ambalavayal and Yercaud
PEP/CI/2	**Hybridization Trial**	
PEP/CI/2.1	Intervarietal hybridization to evolve high yielding varieties	Panniyur
PEP/CI/3	**Coordinated Varietal Trial (CVT)**	
PEP/CI/3.2	CVT 2000 – Series V	Chintapalle, Pampadumpara, Panniyur, Sirsi and Ambalavayal
PEP/CI/3.3	CVT 2006 – Series VI	Chintapalle, Dapoli and Panniyur, Pampadumpara, Pundibari, Sirsi , Ambalavayal and Yercaud / Pechiparai
PEP/C1/3.4	Evaluation of grafts, orthotropic and runner shoots in black pepper	Ambalavayal, Panniyur, Sirsi and Yercaud
PEP/CM/4	**Nutrient Management Trial**	
PEP/CM/4.4	Development of organic package for spices based cropping system – Observational trial	Chintapalle, Sirsi, Panniyur, and Dapoli
PEP/CM/4.5	Organic farming in black pepper - 2006	Panniyur, Dapoli, Pechiparai, Sirsi and Yercaud
PEP/CP/5	**Disease Management Trial**	
PEP/CP/5.1	Adaptive trial on management of *Phytophthora* foot rot of black pepper in farmers field	Ambalavayal (2009-10)
PEP/CP/5.2	Trial on management of *Phytophthora* foot rot of black pepper in existing plantation	Chintapalle, Dapoli and Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/5.3	Trial on management of *Phytophthora* foot rot of black pepper in new plantation	Chintapalle, Dapoli, Panniyur, Pampadumpara, Pechiparai, Mudigere and Sirsi

PEP/CP/6	**Pest Management Trial**	
PEP/CP/6.2	Management of *Erythrina* gall was, a popular standard of black pepper	Mudigere
CARDAMOM		
CAR/CI/1	**Genetic Resources**	
CAR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Mudigere and Pampadumpara
CAR/CI/2	**Hybridization**	
CAR/CI/2.1	Evaluation of OP progenies under intensive management	Mudigere
CAR/CI/2.2	Hybridization and selection in cardamom	Mudigere
CAR/CI/3	**Coordinated Varietal Trial**	
CAR/CI/3.5	CVT 2005-series V	Pampadumpara, Mudigere and Myladumpara
CAR/CI/3.6	CVT 2007/2009 -series VI	Mudigere, Pampadumpara, Sakleshpur, Ambalavayal and Myladumpara
CAR/CI/4	**Varietal Evaluation Trial (VET)**	
CAR/CI/4.1	Initial evaluation trial - I	Mudigere
CAR/CI/4.2	Initial evaluation trial - II	Mudigere
CAR/CM/5	**Nutrient Management Trial**	
CAR/CM/5.1	Effect of different irrigation schedule and fertilizers on yield of cardamom	Mudigere
CAR/CP/6	**Pest and Disease Management Trial**	
CAR/CP/6.5	Trial on management of panicle and clump rot of cardamom in existing plantation	Mudigere and Pampadumpara
CAR/CP/6.6	Trial on management of panicle and clump rot of cardamom in new plantation	Mudigere and Pampadumpara
CAR/CP/6.7	Evaluation of new insecticides/ biopesticide in cardamom against thrips and shoot and capsule borer	Mudigere and Pampadumpara

LARGE CARDAMOM

LCA/C1	**Genetic Resources**	
LCA/CI.1	Germplasm of Large cardamom	Gangtok
LCA/CI/2	**Varietal Evaluation Trial**	
LCA/CI/2.2	Initial Evaluation Trial	Gangtok

GINGER

GIN/CI/1	**Genetic Resources**	
GIN/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Dholi, Kumarganj, Pottangi, Pundibari, Raigarh and Solan
GIN/CI/2	**Coordinated Varietal Trial**	
GIN/CI/2.2	CVT 2005 – Series VI	Solan, Pottangi and Pechiparai
GIN/CI/2.3	CVT 2006 – Series VII	Pottangi
GIN/CI/3	**Varietal Evaluation Trial**	
GIN/CI/3.2	Comparative yield trial	Pottangi
GIN/C1/3	Genotype X Environment interaction on quality of ginger	Appangala, Ambalavayal, Barapani, Calicut, Chintapalli, Dapoli, Dholi, Kanke, Kalyani, Mizoram, Navsari, Pantnagar, Pasighat, Pottangi, Pundibari, Raigarh and Solan
GIN/CI/4	**Quality Evaluation Trial**	
GIN/CI/4.1	Evaluation of germplasm for quality	Solan
GIN/CI/4.2	Evaluation of germplasm from other centers for quality	Solan
GIN/CM/5	**Nutrient Management Trial**	
GIN/CM/5.2	Organic farming in ginger - 2006	Solan, Pundibari, Pottangi, Dholi and Kumarganj
GIN/CM/5.3	Nutrient supplementation though organic manures for growth and yield of ginger	Dholi and Kumarganj
GIN/CP/6	**Disease Management Trial**	
GIN/CP/6.1	Disease surveillance and etiology of rhizome rot in ginger	Solan and Dholi

GIN/CP/6.2	Biocontrol studies on rhizome rot of ginger	Pottangi
GIN/CP/6.5	Management of rhizome rot in ginger	Chintapalle, Sirsi , Mudigere and Dapoli
GIN/CP/6.6	Management of soft rot of ginger (Biofumiation using mustard)	Dholi, Solan, Chintapalle, Pundibari, Kumarganj and Raigarh
GIN/CP/6.7	Management of soft rot of ginger (Bioregulator using cabbage)	Dholi, Solan, Chintapalle, Pottangi, Kumarganj, Ambalavayal and Raigarh
GIN/CP/6.8	Management of bacterial wilt of ginger (Bioregulator using mustard)	Dholi, Solan and Pundibari
GIN/CP/6.9	Management of bacterial wilt of ginger (Biofumigation using Cabbage)	Dholi, Solan, Ambalavayal and Pottangi
TURMERIC		
TUR/CI/1	**Genetic Resources**	
TUR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Coimbatore, Dholi, Kumarganj, Pottangi, Jagtial and Raigarh
TUR/CI/2	**Coordinated Varietal Trial**	
TUR/CI/2.3	CVT 2009-Series VIII	Ambalavayal
TUR/C1/2.4	Coordinated Varietal Trial - 2009	Ambalavayal, Chintapalle, Coimbatore, Dholi, Jagtial, Kumarganj, Pottangi, Pundibari, Pasighat, Pantnagar, Raigarh and Navsari
TUR/CI/3	**Varietal Evaluation Trial**	
TUR/CI/3.1	Comparative Yield Trial 2005-06	Jagtial and Pottangi
TUR/CI/3.2	Initial Evaluation Trial 2006	Kumarganj, Pottangi and Pundibari
TUR/C1/3.3	Initial Evaluation Trial 2009	Dholi
TUR/CM/3.4	Genotype x Environmental interaction on quality	Dholi, Chintapalle, Pottangi, Kumarganj, Pundibari, Jagtial, Coimbatore and Mizoram
TUR/CI/4	**Quality Evaluation Trial**	
TUR/CI/4.1	Quality evaluation of germplasm	Coimbatore

TUR/CM/5	**Nutrient Management Trial**	
TUR/CM/5.2	Effect of organic farming in turmeric	Dholi
TUR/CM/5.3	Standardization of fertigation in turmeric	Coimbatore and Jagtial
TUR/CM/5.4	Effect of micronutrients on turmeric	Dholi, Kumarganj, Pundibari
TUR/CM/6	**Processing & Harvesting**	
TUR/CM/6.1	Standardization of processing in turmeric	Calicut and Coimbatore
TUR/CM/6.2	Mechanical harvesting in turmeric (Observational trial)	Coimbatore
TUR/CP/6	**Disease Management Trial**	
TUR/CP/6.1	Efficacy of biocontrol agents for control of rhizome rot of turmeric	Pottangi
TUR/CP/6.2	Survey and identification of disease causing organisms in turmeric and screening of turmeric germplasm against diseases	Coimbatore, Pundibari, Raigarh and Dholi
TUR/CP/6.3	Management of foliar disease of turmeric	Dholi, Chintapalle, Pottangi, Kumarganj, Pundibari, Jagtial, Raigarh and Coimbatore
TREE SPICES		
TSP/CI/1	**Genetic Resources**	
TSP/CI/1.1	Germplasm collection, characterization, evaluation and conservation of clove, nutmeg and cinnamon	Dapoli and Yercaud/ Pechiparai
TSP/CI/2	**Coordinated Varietal Trial**	
TSP/CI/2.1	CVT 1992 - clove	Yercaud/ Pechiparai
TSP/CI/2.2	CVT 2001- nutmeg	Dapoli and Pechiparai
TSP/CI/2.3	CVT 2001 - cassia	Pechiparai and Dapoli

TSP/CM/2	**Propagation/Multiplication Trial**	
TSP/CM/2.1	Softwood grafting in clove	Dapoli
TSP/CM/2.2	Post harvest technology studies in cinnamon	Dapoli and Pechiparai
TSP/CP/3	**Disease Management Trial**	
TSP/CP/3.2	Management of die back and wilt disease of nutmeg	Dapoli
SEED SPICES		
CORIANDER		
COR/CI/1	**Genetic Resources**	
COR/CI/1.1	Germplasm collection, description, characterization, evaluation, conservation and screening against diseases	Coimbatore, Dholi, Guntur, Hisar, Jagudan, Jobner and Kumarganj
COR/CI/2	**Coordinated Varietal Trial**	
COR/CI/2.4	Coordinated Varietal Trial - 2009 - Series-VIII	Ajmer, Dholi, Guntur, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Navasari, Pantnagar, Raigarh and Udaipur
COR/CI/3	**Varietal Evaluation Trial**	
COR/CI/3.1	Initial evaluation trial 2008	Jabalpur
COR/CI/4	**Quality Evaluation Trial**	
COR/CI/4.1	Quality evaluation in coriander	Jobner
COR/CM/5	**Nutrient Management Trial**	
COR/CM/5.1	Effect of biofertilizer, *Azospirillum* on coriander	Dholi
COR/CM/5.2	Production of leafy type of coriander in off season	Kumarganj
COR/CM/5.3	Identification of drought/ alkalinity tolerant source in coriander	Guntur , Coimbatore, Kumarganj and Jobner
COR/CM/5.4	Role of rhizobacteria in growth promotion of coriander	Hisar and Jagudan
COR/CM/5.5	Nutrient supplementation though organic manures for growth and yield of coriander	Coimbatore, Dholi, Hisar, Jagudan, Jobner, Kumarganj and Raigarh

COR/CM/5.6	Effect of micronutrients on yield of coriander	Coimbatore & Dholi
COR/CM/5.7	Irrigation management for sustainable coriander production	Guntur
COR/CM/5.8	Large Scale Demonstration of the role of *Rhizobacteria* in growth promotion of Coriander	Coimbatore, Guntur, Hisar, Jagudan and Raigarh
COR/CP/6	**Disease Management Trial**	
COR/CP/6.2	Survey to identify the disease incidence collection and identification of casual organism	Dholi
CUMIN		
CUM/CI/1	**Genetic Resources**	
CUM/CI/1.1	Germplasm collection, characterization, evaluation conservation and screening against diseases	Jagudan and Jobner
CUM/CI/2	**Coordinated Varietal Trial**	
CUM/C1/2.2	Coordinated Varietal Trial - 2009	Jobner, Jagudan, Ajmer and Jabalpur
CUM/CI/3	**Varietal Evaluation Trial**	
CUM/CI/3.2	Initial evaluation trial -2008	Jabalpur
CUM/CI/3.3	Initial evaluation trial-2009	Jobner
CUM/CI/4	**Quality Evaluation Trial**	
CUM/CI/4.1	Quality evaluation in cumin	Jobner
CUM/CM/5	*Nutrient management trial*	
CUM/CM/5.1	Identification of drought tolerance	Jobner
CUM/CM/5.2	Role of rhizobacteria on growth and yield of cumin	Jagudan
CUM/CM/5.3	Effect of bioregulators on cumin	Jobner
CUM/CM/5.4	Large scale demonstration of the role of Rhizobacteria in growth promotion of cumin	Jagudan and Jobner

CUM/CP/6	**Disease Management Trial**	
CUM/CP/6.1	Management of wilt and blight diseases in cumin	Jobner
FENNEL		
FEL/CI/1	**Genetic Resources**	
FNL/CI/1.1	Germplasm collection, characterization, evaluation, conservation and screening against diseases	Dholi, Hisar, Jagudan, Jobner and Kumarganj
FNL/CI/2	**Coordinated Varietal Trial**	
FNL/CI/2.3	CVT 2007 – Series VI	Jagudan, Jobner, Kumarganj and Hisar
FNL/C1/2.4	Coordinated Varietal Trial - 2009 – Series VII	Ajmer, Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Pantnagar, Udaipur and Raigarh
FNL/CI/3	**Varietal Evaluation Trial**	
FNL/CI/3.1	Initial evaluation trial	Hisar, Jobner , Kumarganj and Jagudan
FNL/CI/3.2	Initial evaluation trial-2009	Jabalpur
FNL/CI/4	**Quality evaluation trial**	
FNL/CI/4.1	Quality evaluation in fennel	Jobner
FNL/CM/5	**Nutrient Management Trial**	
FNL/CM/5.1	Effect of biofertilizer, *Azospirillum* on fennel	Dholi
FNL/CM/5.2	Identification of drought/alkalinity tolerance source in fennel	Kumarganj
FNL/CM/5.3	Role of rhizobacteria on growth and yield of fennel	Jagudan and Hisar
FNL/CM/5.4	Large scale demonstration of the role of Rhizobacteria in growth promotion of Fennel	Hisar, Jagudan, and Raigarh
FNL/CP/6	**Disease Management Trial**	
FNL/CP/6.1	Survey, identification of disease causing organisms and survey of germplasm against disease	Dholi
FENUGREEK		
FGK/CI/1	**Genetic Resources**	
FGK/CI/1.1	Germplasm collection, characterization,	Dholi, Hisar, Jagudan, Jobner and

	evaluation conservation and screening against diseases	Kumarganj
FGK/CI/2	**Coordinated Varietal Trial**	
FGK/C1/2.1	Coordinated Variety Trial - 2009 Series VII	Ajmer, Coimbatore, Dholi, Guntur, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj Pantnagar, Raigarh and Udaipur
FGK/CI/3	**Varietal Evaluation Trial**	
FGK/CI/3.2	Initial evaluation trial-2009	Jobner and Jabalpur
FGK/CM/4	**Nutrient Management Trial**	
FGK/CM/4.2	Identification of drought/tolerance source in fenugreek	Jobner and Guntur
FGK/CM/4.4	Large scale demonstration of the role of Rhizobacteria in growth promotion of Fenugreek	Jagudan, Jobner, Guntur, Hisar and Kumarganj
FGK/CP/5	**Disease Management Trial**	
FGK/CP/5.1	Survey and identification of disease causing organisms and screening germplasm against disease	Dholi

LIST OF CONCLUDED PROJECTS

Black pepper

PEP/CM/4.7	Rooting of orthotropic shoots in black pepper	Dapoli, Panniyur, Pechiparai, Sirsi and Yercaud
PEP/CP/5.1	Adaptive trial on management of *Phytophthora* foot rot of black pepper in existing plantation	Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/6.1	Management of scale-insects of black pepper with organic products	Pampadumpara

Ginger

GIN/C1/3.1	Initial evaluation trial (IET 2006)	Raigarh, Solan, Pottangi and Dholi
GIN/CM/5.1	Effect of micronutrients on ginger	Kumarganj, Pottangi and Raigarh

Turmeric

TUR/C1/2.2	CVT-2004-Series VI	Chintapalle, Coimbatore, Jagtial, Kumarganj, Pottangi and Raigarh
TUR/CM/5.1	Effect of biofertilizer, *Azospirillum* on Turmeric (Adaptive Trial)	Dholi
TUR/CM/5.3	Organic farming in turmeric	Coimbatore, Dholi, Kumarganj and Pundibari
TUR/CM/5.5	Effect of micronutrients on turmeric	Pottangi

Tree Spices

TSP/CP/3.1	Survey for disease incidence in tree spices	Dapoli and Pechiparai

Coriander

COR/C1/2.2	CVT 2004 – Production of leafy typeof Coriander during off-season	Coimbatore, Guntur and Hisar
COR/C1/2.3	CVT 2005-VII	Jagudan, Jobner, Guntur Hisar and Kumarganj

COR/C1/3.1	Initial evaluation trial	Hisar, Guntur, Jobner, Kumarganj and Jagudan
COR/CM/5.2	Effect of bio-regulators on coriander	Jobner
COR/CM/5.4	Role of rhizobacteria in growth promotion of coriander	Coimbatore, Guntur, Hisar, Jagudan and Raigarh
COR/P/6.1	Management of powdery mildew and Stem gall in coriander	Coimbatore and Jobner
Cumin		
CUM/C1/2.1	CVT 2005 –Series VI	Jobner and Jagudan
CUM/C1/3.1	Initial evaluation trial	Jobner and Jagudan
Fennel		
FNL/C1/2.1	CVT-2004 Series V	Jagudan, Jobner and Kumarganj
FNL/C1/2/2	CVT-Transplant early rabi 2006	Jagudan and Hisar
Fenugreek		
FGK/C1/2.2	CVT 2005 – Series VI	Jobner and Kumarganj
FGK/C1/3.1	Initial evaluation trial	Guntur, Hisar, Jagudan Kumarganj and Jobner
FGK/CM/4.1	Effect of biofertilizers, *Azospirillum* /Rhizobium on fenugreek	Dholi
FGK/CM/4.3	Effect of bio-regulators on fenugreek	Jobner, Coimbatore and Dholi

Proceeding of the recommendations made by the committee after Screening of Varietal Release Proposals to be considered in XX AICRP Spices Workshop held at TNAU, Coimbatore from 6 to 8.6.2009.

A committee of following members, constituted by DDG (Hort.) and conveyed by Project Co-ordinator met on 06.06.2009 at 6:30 PM in the committee room under the **Chairmanship** of **Dr. N. Vijayan Nair, Director** Sugarcane Breeding Institute, Coimbatore.

Dr. V.A. Parthasarathy, Director, IISR, Calicut, Member
Prof. S. Thamburaj, Former Dean (Hort.), TNAU, Coimbatore, Member
Dr. V.A. Parthasarathy, Director, IISR, Calicut, Member
Dr. M. Anandaraj, Project Co-ordinator, AICRP on Spices, Member
Dr. Z.A. Abraham, Head, NBPGR, Regional Centre, Thrissur, Member
Dr. S.K. Malhotra, Principal Scientist (Hort.), ICAR, New Delhi, Member Secretary

Nine varietal release proposals received from different AICRP Spices centres were presented for screening by the committee. Each proposal was thoroughly discussed and following recommendations emerged out.

Black Pepper (Panniyur 8), KAU PRS, Panniyur

Recommended but following points may be clarified.
Since no research based data is available for drought tolerance, hence not recommended for drought tolerance
Data is required to be given for yield and quality parameters along with check for comparison
Data for multilocation testing is required, before variety is considered for National release, otherwise can be considered for state release only.
Data is required to be revisited for all the characters for the hybrid/parents eg. 900-1000 spike number for hybrid and 43 to 50 for parents etc.
Quantity of breeder seed in stock is too less
Distinguishable unique morphological marker be given

Ginger (Subhada), OUAT, Bhubaneshwer

Recommended with the condition to provide information on following:
The breeder should give details of mutagenic treatments and also confirmation of mutagen
Distinguishable unique morphological marker be given
Data under irrigation and non-irrigation (rainfed) be given along with checks for comparison
Data for high yield and quality parameters be given as compared to check for the same experiment
The information in 7 (c) i.e areas of adoption, hill areas and plains needs to be revised if testing has been done as mentioned in 11 (c) at the multilocations and data is depicted along.
Quantification of data for resistance/tolerance be given with scale against various diseases.

Turmeric (CL 101), HCRI, TNAU, Coimbatore

Recommended with subject to clarification sought on following points
Breeding methodology mentioned needs to be corrected as clonal selection
One or two, distinguishable unique morphological marker be given

Turmeric (NDH 18) NDUA&T, Faizabad

Recommended with subject to clarification sought on following points
For disease reaction scale and disease name be mentioned in Table 9 and Col. 9.
One or two, distinguishable unique morphological marker be given

Turmeric (PTS 59), OUAT, Pottangi

Recommended with subject to clarification on following points
For disease reaction scale and disease be mentioned.
One or two, distinguishable unique morphological marker be given with respect to comparison with Roma
How this variety is better than check be made clear
Data for early maturity, high dry turmeric finger etc. is not given.

Coriander (UD 728), RAU, Jobner

Recommended, if following clarifications are made
Col. 3, 4 a, 3a, 5 are required to be filled with correct information
One or two, distinguishable unique morphological marker be given

Cumin (UC 345), RAU, Jobner

Recommended, if following clarifications are made
One or two, distinguishable unique morphological marker be given
Data pertaining to all CVT locations i.e from Gujarat is required before it is considered for release/presentation

Fennel (UF205), RAU, Jobner

Recommended, if following clarifications are made
One or two, distinguishable unique morphological marker be given
Data pertaining to five CVT locations is required before it is considered for release at National level

Fenugreek (UM 361), RAU, Jobner

Recommended, if following clarifications are made
One or two, distinguishable unique morphological marker be given
Data pertaining to five CVT locations is required before it is considered for release at National level

The meeting ended with the remarks of Chairman, that each and every institute shall deposit the seed of each variety to NBPGR/NAGS, IISR and NRCSS.

Dr. N. Vijayan Nair (Chairman)	Dr. V.A. Parthasarathy (Member)	Prof. S. Thamburaj (Member)
Dr. M. Anandaraj (Member)	Dr. Z.A. Abraham (Member)	Dr. S.K. Malhotra (Member Secretary)

Decisions of National Workshops on Cumin, Fennel, Coriander and Fenugreek - NRCSS, Ajmer (September 15 – 18, 2009)

A Series of National Workshops on Cumin, Fennel, Coriander and Fenugreek was organized by NRCSS, Tabiji, Ajmer during September 15 – 18, 2009. About 50 delegates working in the field of Seed Spices attended the workshop. Registration of the delegates was done on the morning of 15th September, 2009. The Chief Guest for inaugural session Mrs Nasim Aktar, MLA, Pushkar was welcomed by the Director, NRCSS Ajmer

This workshop is being organized in collaboration with AICRP on Spices to prepare a road map for the important issue of Plant Genetic Resource Management in Seed Spices. Germplasm of seed spices collected so far by different centres is a true wealth of this country. To optimize the use of this wealth for development of improved varieties, thorough screening as per descriptors should be carried out as early as possible. Work on these crops has started recently therefore these are not so worked thoroughly. There is a need to standardize the screening procedure and characters to be studied for maximum exploitation of plant genetic resources by each and every seed spice workers.

The workshop is being organized with the following objectives:

* To work out the final descriptors and plan for the evaluation and characterization of crops
* To plan for multilocational testing of germplasm
* Standardization and submission of production technologies from different agro climatic zones for incorporating in the newly developed expert system on seed spices
* Exploration plan for different seed spices crops
* Free exchange of germplasm
* Submission of germplasm accessions to the NBPGR for obtaining a unique IC/EC number to avoid duplication and to deposit a duplicate set to NRCSS

Dr. M. M. Anwer, Director, NRCSS, Tabiji, Ajmer and Dr. M. Anadraj, Project Coordinator (Spices) gave emphasis on different research issues besides development of descriptors, namely germplasm exploration, submission of accessions to NPBGR and NRCSS, multilocation testing of the germplasm lines etc. The issues were discussed in the house and Dr. R. K. Kakani was invited to present the status of seed spices related to above issues.

To cover the objective of exploration plan for different seed spices crops. Dr. R. K. Kakani, Sr. Scientist (PB), NRCSS presented the exploration programme for 2010, 2011 and 2012 and also invited the centres to participate in exploration to harvest maximum benefit possible through these programme. This programme was prepared in consultation with NBPGR, New Delhi in which scientist of respective NBPGR Regional Station and one scientist from NRCSS will participate. In the six explorations planned for 2010 following AICRP centers will also participate detailed as under:

S. No.	Exploration area	Collector	Coordinating centre	AICRP Centre
1.	MP and Chhattisgarh	NBPGR RS, Ranchi	NRCSS	Jabalpur
2.	Punjab	NBPGR, New Delhi	NRCSS	
3.	Maharashtra	NBPGR RS, Akola	NRCSS	Dhapoli
4.	Himachal Pradesh (Higher altitude)	NBPGR, RS, Shimla	NRCSS	Solan
5.	Parts of Andhra Pradesh	NBPGR, RS, Hyderabad	NRCSS	Guntur
6.	Parts of Karnataka	NBPGR, RS, Hyderabad	NRCSS	Dharwar

Exploration programme of seed spices available with NRCSS, Ajmer for the year 2011, and 2012 were also presented and discussed.

To cover the objective of submission of germplasm accessions to the NBPGR for obtaining a unique IC/EC number to avoid duplication and to deposit a duplicate set to NRCSS which is the National Active Germplasm site for Seed Spices. The status of germplasm holding was presented by Dr. Kakani and it was decided by the house that each centre will send 2500 seeds of each collected lines with passport data so far available to Director, NBPGR for allotment of IC numbers. One sample of 2500 seeds will also be deposited to NRCSS as National Active Germplasm Site for proper storage and easy accessibility for users. This must be carried out with most priority up to October, 2009 to save this national wealth.

(Action: All centres)

To discuss the objective plan for multilocational testing of germplasm following decision were taken for multilocation testing of germplasm of seed spices. A roadmap for multilocation evaluation has been prepared for six seed spices crops viz. cumin, coriander, fennel, fenugreek, ajowain and dill.

The procedure and methodology of germplasm evaluation and characterization was discussed and it was decided that during 2009-10, 90 entries of each seed spices crop will be evaluated at three locations. Therefore, group of three centres were also prepared for each crop and contributors of entries were also finalized. The details of each seed spice group of centres are summarized crop wise. At least 40-50 accessions of respective seed spices should be sent by all contributing centres of each group directly to testing centres under intimation to crop curator of National Research Centre on Seed Spices (NRCSS), Ajmer and Project coordinator, All India Coordinated Research Project on Spices (AICRPS).

Cumin

Three centres namely NRCSS, Ajmer, Jagudan and Jobner working on cumin will contribute 30 entries each thus a pool of 90 entries will be evaluated at each centre during 2009-10. At least 50 seeds of each germplasm line should be sent to other centres by the end of Sept, 09 under intimation to Dr. R. S. Meena, Scientist (Plant Breeding), NRCSS, Ajmer, National Curator of Cumin. Likewise checks should be sent along with test entries. Evaluation observation will be taken by each centre and remaining characterization observation will be taken by lead centre i.e. NRCSS, Ajmer. The checks for this trial will be GC-4, RZ19, GC-2 and RZ-209.

(Action: Respective centres)

Coriander

Four groups of three centres each have been formed as detailed in Table1. At least 50 seeds of each GP line should be send to respective testing centres as indicated in table by the end of September 09 positively under intimation to Dr. G. Lal, Principal Scientist, NRCSS, Ajmer, National Curator of coriander. There will be four checks out of which two will be national checks viz. Hisar Sugandh and Hisar Anand, one local checks for Group I – Sudha, Group II – Rajendra Swati, Group III – Pant Haritama and for Group IV – RCr-435 and the other local check will be taken by each centre. Evaluation observation will be taken by each centre and remaining characterization observation will be taken by group leader.

Table 1: Centres for Coriander evaluation

Group	Testing centre and lines to be contributed by that centre to other group members			Additional lines to be contributed to each centre of the group	Group Leader
I	Guntur (60)	Coimbatore (30)	Dharwar (0)	---	Guntur
II	Raigarh (7)	Dholi (30)	Kumarganj (30)	Jobner (23)	Dholi
III	Solan (8)	Pantnagar (0)	Ajmer (30)	Jobner (52)	Ajmer
IV	Jobner (30)	Hisar (30)	Jagudan (30)	---	Jobner

Fennel

Three groups of three centres each have been decided and detailed in Table 2. At least 50 seeds of each GP line should be send to respective testing centres as indicated in the under mentioned table by the end of Sept,09 positively under intimation to Mr. R.S.Mehta, Scientist (SG) , NRCSS, Ajmer, National Curator of Fennel . There will be four checks out of which two will be National checks viz.GF-11 and RF-125, local checks for Grade I – AF-1 & RF-101, Grade II – Rajendra Saurabh, Hisar Swaroop and for Grade -III Pant Madhurika & local. Evaluation observation will be taken by each centre and remaining characterization observation will be taken by group leader.

Table 2: Centers for evaluating Fennel

Group	Testing centre and lines to be contributed by that centre to other group members			Additional lines to be contributed to each centre of the group	Group Leader
I	Ajmer (20)	Jobner (40)	Jagudan (30)	---	Jagudan
II	Hisar (30)	Dholi (25)	Kumarganj (30)	Jagudan (5)	Kumargang
III	Pantnagar (0)	Raigarh (0)	Guntur (0)	Jobner (30), Jagudan (30), Hisar (30)	Pantnagar

Fenugreek

Four groups of three centres each have been decided and detailed in Table 3. At least 50 seeds of each Germplasm line should be send to other testing centres as indicated in the under mentioned table by the end of Sept, 09 positively under intimation to Dr. R. K. Kakani, Senior Scientist, NRCSS, Ajmer, National Curator of fenugreek. There will be four checks out of which two will be national checks viz. RMt-1 and GM-2 and the two local checks will be taken by each centre. Evaluation observation will be taken by each centre and remaining characterization observation will be taken by group leader.

Table 3: Centers identified for Fenugreek

Group	Testing centre and lines to be contributed by that centre to other group members			Additional lines to be contributed to each centre of the group	Group Leader
I	Guntur (10)	Coimbatore (40)	Dharwar (0)	Jagudan (30), Jobner (10)	Coimbatore
II	Jabalpur (0)	Dholi (25)	Kumarganj (30)	Jobner (20), Hisar (15)	Jabalpur
III	Solan (0)	Pantnagar (0)	NBPGR, ND (30)	Ajmer (30)	NBPGR, ND
IV	Jobner (30)	Hisar (30)	Jagudan (30)	---	Hisar

PROCEDINGS OF THE GROUP MEETING OF AICRPS SCIENTISTS OF KAU HELD AT IISR, CALICUT ON 4th AUGUST 2009

A one day group meeting of AICRPS Scientists of the Regional Agricultural Research Station, Ambalavayal and Pepper Research Station, Panniyur (KAU) station was held in the AICRPS headquarters at IISR, Calicut on 4 August 2009.

The following members attended the meeting

1. Dr. M. Anandaraj, Project Coordinator, Spices
2. Dr. V.S. Devadas, Assoc. Director of Research, RARS, Ambalavayal
3. Dr. Neema V.P., Professor, PRS, Panniyur
4. Dr. Jacob. D. Assistant Professor, PRS, Panniyur
5. Mr. B. Krishnamoorthy, Head, Crop Improvement, IISR, Calicut
6. Dr. J. Rema, Principal Scientist (Hort.), IISR, Calicut
6. Dr. A.K. Johny, Technical Information Officer, IISR, Calicut

A field visit was arranged in the morning to study the field performance of black pepper raised from orthotropic and runner shoots.
The meeting was held in Project Coordinator's chamber after the field visit and the following decisions were taken on various ongoing experiments at Ambalavayal and Panniyur centres.

As a follow up of the decisions taken in the Brain storming session in germplasm held at NBPGR, New Delhi on 21 April 2009, this meeting was held on germplasm conservation in AICRPS. Ambalavayal centre has been identified as an alternate centre for conservation of black pepper germplasm. It has been decided to collect and conserve about 100 germplasm in the first phase from AICRPS Center Panniyur. For field conservation rooted orthotropic shoots has to be used. It was decided to maintain four replications for each accession. It was also decided to maintain two separate blocks for wild and cultivated germplasm.

All germplasm should have IC/EC numbers. If IC numbers have not been obtained steps should be initiated immediately for submission of passport data to NBPGR for obtaining national identity number. Since IISR has obtained EC numbers for all its germplasm collections. Panniyur station may collect the IC numbers from IISR for all IISR germplasm.

3. For the trial on evaluation of grafts, orthotropic & runner shoots in black pepper the grafts for evaluation would be supplied from Panniyur station to all the centers viz. Ambalavayal, Sirsi & Yercaud centers for undertaking the trial.

The following projects were finalized for Ambalavayal centre.

On going projects at RARS Ambalavayal centre

CVT -2000 (Series V)
The trial would continue.

Programmes to be initiated at RARS Ambalavayal

Black pepper

1. Germplasm collection, characterization evaluation and conservation (2009-10)
   CVT -2006 Series VI (2006-07)
2. Management of *Phytophthora* foot rot of black pepper in farmers field (Adaptive Trial) (2006-07)
3. Evaluation of grafts, runner and orthotropic shoots in black pepper (2009-10)

Ginger

1. Management of soft rot of ginger (biofumigation using cabbage) - 2009-10
2. Management of bacterial wilt of ginger (biofumigation using cabbage) - 2009-10
3. G X E interaction on quality in ginger (2010-11)

Turmeric

CVT 2009 in turmeric (2010-11)

Cardamom

CVT 2008 in cardamom (2008-09)

The planting material for the trial may be obtained from Pampadumpara and Myladumpara centres.

The details of the existing technical programmes to be implemented at RARS, Ambalavayal is provided in the following pages.

Regional Agricultural Research Station, Ambalavayal (KAU)
AICRPS Technical Programmes

Research Programme in black pepper

Crop	Black pepper
Title of the programme	PEP/CI/3.4 CVT 2006 Germplasm collection, conservation and evaluation
Date/Year of start	2006-07
Duration of the project	6 years
Details of Technical Programme	
Design	RBD
No. of treatments/genotypes	Promising lines identified by the centers
Entries	Panniyur-HB 20052, PRS-64 Sirsi-Acc.No.53 (ademane pepper) Acc.No.106 (Kudragutta) Yercaud – Acc.Nos.33 and 57 IISR, Calicut – C- 1090 (*Phytophthora* and nematode tolerant) HP -39 (Nematode tolerant) Checks-National, State and local
No. of replications	3
Plot size/spacing	6 plants/plot (3 m x 3 m)
No. of plants/plot/treatment	2 plts/std
Date of planting season	2006-07
Observations to be recorded	• Growth parameters up to third year (height of vine, internodal length, branches etc.) • Yield and attributing characters from third year onwards (no. of spikes, spike weight, spike length, no. of berries/spike, pollu count for fungal and insect pollu)

Crop	Black pepper
Title of the programme	PEP/CP/1.7 Management of *Phytophthora* foot rot disease in black pepper (adaptive trial)
Centre	Ambalavayal, Chintapalle, Dapoli, Dapoli, Pampadumpara, Panniyur, Sirsi & Mudigere
Design	RBD
No. of plants	50 vines/ treatment (The experiment must be conducted in blocks of 50 vines only for the treatment. However, for the purpose of statistical analysis the observations recorded on 50 vines may be analyzed as seven replications of 6 vines each)
No.of replications	7 replications
No. of treatments/genotypes	Potassium phosphonate (0.3%) + *Trichoderma harzianum* (MTCC-5179) Bordeaux mixture spray (1.0%) – COC (0.1%) drench Farmers practice
Time of Application	May-June and July-August
Observations to be recorded	Yellowing 0-3 (0=No yellowing ; 1 = upto 25% of leaves yellowing ; 2 = upto 50% yellowing; 3=>75% yellowing) Defoliation 0-3 (0 = No defoliation; 1= upto 25% defoliation, 2 = upto 25% defoliation; 3 =>75% defoliation. Death of vines Canopy size- At 3M (Existing plantations) Gall / lesion index Yield / vine

New Programmes in Ginger

Management of soft rot of ginger (biofumigation using cabbage (2009-10)

Crop	Ginger
Title of the programme	Management of soft rot of ginger (biofumigation using Cabbage)
Centres	Ambalayal, Chintapalle, Kumarganj, Pottangi, Pundibari, Raigarh and Solan
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	5
No. of treatments/genotypes with details	Soil treatment by biofumigation using Cabbage Rhizome treatment by Metalaxyl Mancozeb 72 %WP (1.25 g/l) Rhizome treatment by rhizobacterial antagonist* Rhizome treatment by endophytic bacterial* antagonist Absolute control
Design	RBD
No. of replications	4 replications
Plot size/spacing	Raised bed (3m x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	4 beds per treatments/replication
Observation to be recorded in detail	Germination count Soft rot incidence Bacterial wilt incidence Shoot borer incidence Leaf spot incidence Rhizome Yield Cabbage biomass/bed in kg (before biofumigation)

Biofumigation with cabbage refuse: Since cabbage is cultivated during winter (October – November) in the place where ginger is proposed to be planted in the next season, cabbage may be cultivated and after harvest the leaves and roots are to be incorporated into soil by ploughing. After this the beds are prepared and solarized by polythene mulching for about 15-30 days. Planting with ginger rhizome has to be done after solarization.

Rhizobacterial treatment: Rhizomes are to be treated with rhizobacteria (IISR-GRB-51) in 2% CMC or starch and stored for about 2-3 days prior to planting

*(will be supplied by PC Unit, IISR, Calicut)

Endophytic bacterial treatment: Rhizomes are to be treated with rhizobacteria (IISR-GEB-17) in 2% CMC or starch and stored for about 2-3 days prior to planting

*(will be supplied by PC Unit, IISR, Calicut)

Chemical treatment: Metalaxyl Mancozeb 72 %WP (1.25 g/l) is suspended in water and the seed rhizomes are dipped for 30 min (1kg rhizome in 2 litres of the fungicide solution). The remaining solution may be sprinkled over beds @ 1.5-2.0 l/bed.

Management of bacterial wilt of ginger (fumigation using cabbage (2009-10)

Crop	Ginger
Title of the programme	Management of bacterial wilt of ginger (biofumigation using cabbage)
Centres	Pampadumpara, Pottangi, Pundibari and Solan
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	6
No. of treatments/genotypes with details	Soil treatment by biofumigation using cabbage Soil treatment using bleaching powder @ 10g/bed Rhizome treatment by heat** Rhizome treatment by rhizobacterial antagonist* Rhizome treatment by endophytic bacterial* antagonist Absolute control
Design	RBD
No. of replications	3 replications
Plot size/spacing	Raised bed (3m x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	4 beds per treatments/replication
Observation to be recorded in detail	Germination count Soft rot incidence Bacterial wilt incidence Shoot borer incidence Leaf spot incidence Rhizome Yield Cabbage biomass/bed in kg (before biofumigation)

Biofumigation with cabbage refuse: Since cabbage is cultivated during winter (October – November) in the place where ginger is proposed to be planted in the next season, cabbage may be cultivated and after harvest the leaves and roots are to be incorporated into soil by ploughing. After this the beds are prepared and solarized by polythene mulching for about 15-30 days. Planting with rhizome has to be done after solarization.

** **Rhizome heat treatment**: The rhizomes are to be heat treated to attain the rhizome temperature of 46-48°C by solarization. Heat treated rhizomes are kept in storage for about two to three days and the good ones selected for planting

Rhizobacterial treatment: Rhizomes are to be treated with rhizobacteria (IISR-GRB-51) in 2% CMC or starch and stored for about 2-3 days prior to planting

*(will be supplied by PC Unit, IISR, Calicut)

Endophytic bacterial treatment: Rhizomes are to be treated with rhizobacteria (IISR-GEB-18) in 2% CMC or starch and stored for about 2-3 days prior to planting

*(will be supplied by PC Unit, IISR, Calicut)

Research programme in Cardamom:

Crop	Cardamom
Title of the programme	Co-ordinated Varietal Trial
Centres	Ambalavayal, Mudigere, Myladumpara, Pampadumpar and Sakleshpur
Date/Year of start	June 2008
Duration of the project	2008-12
No. of entries Variety	**Centers:** Appangala: 4 (IC 34987, IC 349651, IC 547167, IC 547185) Mudigere: 2 (Cl 726 and Cl 691) Pampadumpara: 2 (Pl No. 14, and CR 6) Myladumpara: 1 (MCC 346) Sakleshpur: 2 (SKP 104, SKP 164) Checks: 2 (Green Gold, Local check)
No. of treatments/genotypes with details	13
Design	RBD
No. of replications	3 replications
Plot size/spacing	3 m x 3 m
No. of plants/plot/treatment	12 plants / plot
Observation to be recorded in detail	Plant height, number of tillers per plant, bearing tillers plant, panicles per plant, racemes per panicle, capsules per panicle, fresh weight per plant, dry recovery, dry weight per hectare, essential oil per cent

List of participants - XX AICRP on Spices Workshop (6-8 June 2009), TNAU Coimbatore

LIST OF DELEGATES

A. Indian Council of Agricultural Research, New Delhi

1. Dr. H.P. Singh, Deputy Director General (Hort.)

B. Project Coordinator's Unit

2. Dr. M. Anandaraj, Project Coordinator, AICRP on Spices
3. Dr. J. Rema, Principal Scientist (Hort.)
4. Dr. A.K. Johny, Technical Information Officer

C. Special Invitees

5. Dr. V.A.. Parthasarathy, Director, IISR, Calicut
6. Dr. P. Rethinam, Plantation Crops Management Specialist, Coimbatore
7. Dr. N. Vijayan Nair, Director, Sugarcane Breeding Institute, Coimbatore
8. Dr. M.M. Anwer, Director, National Research Centre for Seed Spices, Tabiji Farm, Ajmer-305 206, Rajasthan
9. Dr. S. K. Malhotra, Principal Scientist (Horticulture), Indian Council of Agricultural Research, Horticulture Division, Krishi Anusandhan Bhavan-II, Pusa, New Delhi-110 012

D. COORDINATING CENTRES

Regular Centers

Cardamom Research Station, KAU, Pampadumpara

10. Dr. K. Geetha, Agronomist (Hort.)

Horticultural Research Station, UHS Bagalkot, Mudigere

11. Dr. S.D. Rangaswamy, Pathologist
12. Dr. K.M. Devaraju, Agronomist (Hort.)
13. Mr. D. Jemla Naik, Jr. Entomologist
14. Dr. D. Lakshmana, Breeder

Horticultural Research Station, TNAU, Yercaud/Pechiparai

15. Dr. V. Lakshmanan, Agronomist (Hort.), Yercaud
16. Dr. J. Prem Joshua, Jr. Breeder (Hort.), Pechiparai

Pepper Research Station , KAU, Panniyur

17. Dr. K.P. Mammootty, Assoc. Professor (Pl.Path)
18. Dr. V.P. Neema, Asst. Professor (Jr. Breeder)
19. Dr. P. Jayaraj, Asst. Prof. (Soil Science & Agril. Chemistry)

Horticultural Research Station, APHU, Chintapalle

20. Dr. K. Ravendra Kumar (Hort.)
21. Dr. N. Rajakumar, Jr. Pathologist

Horticultural Research Station (UHS Bagalkot), Sirsi

22. Dr. M.S. Lokesh, Associate Professor (Pl.Path.)

Dept. of Vegetable Crops, Dr. YSPUHF, Solan

23. Dr. R.K. Bharadwaj, Scientist
24. Dr. N.P. Dohroo (Jr. Path)
25. Dr. (Mrs. Neerja Rana (Jr. Biochemist)

High Altitude Research Station, OUAT, Pottangi

26. Dr. N.C. Mishra, Assoc. Director of Research, OUAT, Bhubaneswar
27. Dr. D.K. Dash, Jr. Breeder

Main Research Station, SDAU, Jagudan

28. Dr. K.D. Patel (Path)
29. Mr. G.M. Patel (Jr. Breeder)
30. Dr. Y. Ravindra Babu, Research Scientist (Spices)

Dept. of Spices & Plantation Crops, TNAU, Coimbatore

31. Dr. (Mrs.) N. Shoba, Breeder (Hort.)
32. Dr. (Mrs.) P. Muthulakshi (Jr. Patho.)
33. Dr. K. Rajamani, Prof. & Head

Regional Agricultural Research Station, APHU, Jagtial

34. Dr. S. Narasimha Rao, Scientist (Pl. Path)

Department of Vegetable Crops, CCS HAU, Hisar

35. Dr.T.P. Malik, Scientist, Dept. of Veg. Sciences
36. Dr. Suresh Tehlan, Asst. Scientist (VC)

Tirhut College of Agriculture, RAU, Dholi

37. Dr. S.P. Singh, Horticulturist
38. Dr. A.K. Mishra, Jr. Pathologist

Department of Plant Breeding, SKN College of Agriculture, RAJAU, Jobner

39. Dr. V.D. Sastry, (Sr. Breeder)
40. Dr. Dhirendra Singh (Breeder)
41. Dr. N.L. Jat, Jr. Agronomist (Hort.)
42. K.S. Shekhawat (Jr. Pathologist)

Regional Agricultural Research Station, APHU, Guntur

43. Smt. C. Sarada, Horticulturist
44. Sri K. Giridhar, Jr. Breeder (Hort.)

Narendra Dev University of Agriculture and Technology, Kumarganj

45. Dr. V.P. Pandey (Jr. Breeder)
46. Dr. R.P. Saxena (Jr. Patho.)

Regional Agricultural Research Station, Raigarh

47. Dr. Ajit Kumar Singh, Scientist (Sr. Scale)
48. Dr. D.J. Pophaly, Principal Scientist (Hort.)

Uttara Banga Krishi Vishwavidhyalya, Pundibari

49. Dr. S. Bandopathyay (Jr. Patho.)
50. Prof. B.C. Saha (Jr. Breeder)
51. Dr. J.C. Jana, Horticulturist

Konkan Krishi Vidhya Peeth, Dapoli

52. Prof. R.N. Nawale (Hort.)
53. Mr. U.B. Peethe (Jr. Breeder)
54. Dr. U.A. Gadre (Jr. Patho)

Co-opting Centers

Indian Cardamom Research Institute (ICRI-Spices Board), Myladumpara

55. Dr. K.J. Madhusoodanan, Dy. Director
56. Dr.V.V. Radhakrishnan, Sr. Scientist

ICRI Regional Research Station, Spices Board, Sakleshpur

57. Dr. K. Dhanapal, Scientist-in-Charge
58. Dr. Sree Krishna Bhat, Scientist

ICRI Regional Station, Spices Board, Yakthung, Tadong, Sikkim

59. Dr. Utpal Gupta, Sr. Scientist

Regional Agricultural Research Station (KAU), Ambalavayal

60. Dr.V.S. Devadas, Assoc. Director

ICAR Res. Complex for NEH Region, Sikkim Centre, Tadong, Gangtok, Sikkim

61. Dr. R. Karuppaiyan, Scientist

ICAR Res. Complex for NEH Region, Umiam, Shillong, Meghalaya

62. Dr. Bidyut C. Deka, Principal Scientist & Head

63. Dr. A.K. Jha, Senior Scientist (Hort.)

Voluntary Centers

Central Agricultural University, Pasighat

64. Dr. Rakesh Kumar Dubey, Asst. Prof. (Veg. Sci.)

Govind Ballabh Pant University of Agriculture & Technology, Pantnagar

65. Dr. J.P. Singh, Prof. & Joint Director

BIRSA Argciultural University, Kanke, Ranchi, Jharkhand

66. Dr. R.N. Ray, Assoc. Prof. cum Sr. Scientist (Hort.)

Navsari Agricultural University, Navsari, Gujarat

67. Dr. R.T. Desai, Assoc. Professor

Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur

68. Dr. A.K. Naidu, Sr. Scientist

Bidhan Chandra Krishi Vishwa Vidyalaya, Kalyani

69. Dr. R. Chatterjee, Professor

Tamil Nadu Agricultural University (Host SAU) / Other Participants

70. Dr. K. Rajamani, Prof. & Head
71. Dr. S. Thamburaj, Former Dean (Hort.)
72. Dr. T. Thangaraj, Former Dean (Hort.)
73. Dr. M.S. Ramalingam, Sr. Field Officer, Spices Board, Coimbatore
74. Mr. P. Sengottaiyan, Jain Irrigation System Ltd., Coimbatore
75. Th. S.R. Devaraj, 12/40 SMC Palayam, MGC Palayam P.O, SS Kulam (Via)
76. Th. R. Ashok Kumar, 12/200 SMC Palayam, MGC Palyam P.O., SS Kulam (Via)
77. Dr. S. Praneetha, Assoc. Prof. (Hort.) ARS, Bhavanisagar

University of Horticultural Sciences, Karnataka

78. Dr. C. Agasimani

Directorate of Areanut & Spices Development, Calicut

79. Dr. Tamil Selvan, Director
80. Dr. Homey Cherian Dy. Director

Indian Institute of Spices Research, Calicut

81. Dr. S. Devasahayam, Head, Division of Crop Protection
82. Dr. M.S. Madan, Principal Scientist
83. Dr. K. Kandiannan, Sr. Scientist
84. Dr. V. Srinivasan, Sr. Scientist
85. Dr. K.N. Shiva, Sr. Scientist
86. Dr. Senthil Kumar, Sr. Scientist, CRC, Appangala

National Bureau of Plant Genetic Resources, New Delhi / Trichur

87. Dr. K.K. Gangopadhyay, Sr. Scientist (Hort)
88. Dr. Z.A. Abraham, NBPGR, Regional Station, Trichur

National Research Centre on Seed Spices, Ajmer

89. Dr. Goapl Lal, Principal Scientist (Hort)
90. Dr. S.N. Saxena, Sr. Scientist
91. Dr. R.S. Meena, Sr. Scientist (Hort)
92. Dr. K. Kakani, Sr. Scientist (Pl. Breeding)