

**Proceedings of XIX Workshop of
All India Coordinated Research Project on Spices**

23-25, November - 2007

Orissa University of Agriculture and Technology
Bhubaneswar, Orissa

ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES

Indian Institute of Spices Research

(Indian Council of Agricultural Research)

CALICUT – 673 012, KERALA

CONTENTS

- 1 Programme
- 2 Technical programme (2006-07)
- 3 Inaugural session
Presentation of research report (2006-07)
- 4 Technical sessions
Technical session I : Genetic Resources
Technical session II : Crop Improvement
Technical session III : Crop Production
Technical session IV : Crop Protection
Technical session V : Release of varieties and technologies for adoption
- 5 Plenary session
- 6 Technical programme (2007-08 and 2008-09)
- 7 List of concluded projects
- 8 List of participants

P R O G R A M M E

23.11.2007

09.00 – 10.00 AM

Registration

INAUGURAL SESSION (10.00 – 11.05 AM)

10.15 – 10.20 AM

Welcome address

Dr. D. Naik, Dean (Research), OUAT

10.20 – 10.25 AM

Inauguration of workshop by lighting lamp

Prof. D.P. Ray, Vice Chancellor, OUAT

10.25 – 10.35 AM

Presentation of AICRPS report

Dr. M. Anandaraj, Project Coordinator (Spices)

10.35 – 10.40 AM

Release of Agenda notes (Chief guest)

10.40 – 10.50 AM

Address by Chief guest

10.50 – 11.00 AM

Presidential address

Dr. B. B. Vashishtha, Director, NRC Seed Spices, Ajmer

11.00 – 11.05 AM

Vote of thanks

Dr. N. C. Mishra, ADR, RRTTS, Semiliguda

Rapporteurs

Dr. S. J. Ankegowda (IISR, Appangala)

Sri. K. Giridar (ANGRAU, Guntur)

11.05 – 11.30 AM

Tea Break

SESSION I

GENETIC RESOURCES (11.30 AM – 4.00 PM)

Chairman

: **Dr. L.D. Mishra**, Prof. and Head (Plant Breeding, OUAT)

Co-Chairman

: **Dr. K.K. Thakkral** (CCSHAU, Hisar)

Rapporteurs

: **Dr. D. Prasath** (IISR, Calicut)

Sri. K. Giridhar (ANGRAU, Guntur)

11.30 AM – 01.15 PM

Presentations:

Black pepper (Prof. R.N. Nawale, KKV, Dapoli)

Cardamom (Dr. K. J. Madhusoodanan, ICRI, Myladumpara)

Ginger (Dr. B. N. Korla, YSPUHF, Solan)

Turmeric (Dr. R. K. Bisen, IGAU, Raigarh)

01.15 PM – 02.00 PM – Lunch

02.00 PM – 04.00 PM

Presentations

Tree Spices (Dr. Swarnapirya, TNAU, Pechiparai)

Coriander (Dr. C. Sarada, ANGRAU, Guntur)

Cumin (Dr. Dharendra Singh, RAJAU, Jobner)

Fennel (Dr. S. K. Tehlan, CCSHAU, Hisar)

Fenugreek, Paprika (Dr. K. Giridar, ANGRAU, Guntur)

04.00 PM – 04.15 PM

Tea

SESSION II

CROP IMPROVEMENT (04:15 PM – 07:15 PM)

- Chairman : **Dr. B.B. Vashishtha** (NRCSS, Ajmer)
Co-Chairman : **Dr. P. Mahapatra** Prof. (Horticulture), OUAT
Rapporteurs : **Dr. K.N. Shiva** (IISR, Calicut)
Dr. (Mrs.) Swarnapirya (TNAU, Pechiparai)

04.15 PM – 07.15 PM

- Presentations: Black pepper (Dr. V. P. Neema, KAU)
Cardamom (Dr. B. M. Dushyanthakumar, UAS-Bangalore)
Ginger (Dr. D. K. Dash, OUAT, Pottangi)
Turmeric (Dr. N. Bowmick, UBKV, Pundibari)
Tree Spices (Prof. R. N. Nawale, KKV, Dapoli)

24.11.2007

8.00 – 8.30 AM Breakfast

SESSION II

CROP IMPROVEMENT (08:30 AM – 10:15 AM)

8.30 AM – 10.15 AM

- Presentations: Coriander (Dr. J. Dixit, NDUAT, Faizabad)
Cumin (Dr. G. M. Patel, SDAU, Jagudan)
Fennel (Dr. E. V. D. Sastry, RAJAU, Jobner)
Fenugreek (Dr. R. P. Saxena, NDUAT, Faizabad)
New Research programmes

10.15 AM – 10.30 AM Tea

SESSION III

CROP PRODUCTION (10:30 AM – 01:30 PM)

- Chairman : **Dr. V.A. Parthasarathy** (IISR, Calicut)
Co-Chairman : **Dr. B. Chempakam** (IISR, Calicut)
Rapporteurs : **Dr. V. Srinivasan** (IISR, Calicut)
Dr. C. Sarada (ANGRAU, Guntur)

10.30 AM – 01.30 PM

- Presentations: Black pepper (Dr. D. Lakshmanan, TNAU, Yercaud)
Cardamom (Dr. K. M. Devaraju, UAS-Bangalore)
Ginger (Dr. J. C. Jana, UBKV, Pundibari)
Turmeric (Dr. N. Shoba, TNAU, Coimbatore)
Tree Spices (Dr. Swarnapirya, TNAU, Pechiparai)
Coriander (Dr. Khurana, CCSHAU, Hisar)
Cumin (Dr. N. L. Jat, RAJAU, Jobner)
Fennel (Dr. C. R. Gupta, IGAU, Raigarh)
Fenugreek (Dr. V. P. Pandey, NDUAT, Faizabad)
New Research programmes

01.30 PM – 02.00 PM Lunch

SESSION IV : CROP PROTECTION (2.00 PM – 5.30 PM)

- Chairman : **Dr. N.K. Dhal**, Head (Plant pathology, OUAT)
Co-Chairman : **Dr. S. Devasahayam** (IISR, Calicut)
Rapporteurs : **Dr. A. Kumar** (IISR, Calicut)
Dr. Jemla Naik (UAS, Mudigere)

2.00 PM – 3.30 PM

- Presentations: Black pepper (Dr. M. S. Lokesh, UAS-Darward)
Cardamom (Dr. G. Sivakumar, KAU, Pampadumpara)
Ginger (Dr. N. P. Dohroo, YSPUHF, Solan)
Turmeric (Dr. S. Bandyopadhyay, UBKV, Pundibari)

3.30 PM – 03.45 PM

Tea

**03.45 PM – 5.30 PM
(Cont..)**

- Tree Spices (Dr. V. A. Gadre, KKV, Dapoli)
Coriander (Dr. Muthulakshmi, TNAU, Coimbatore)
Cumin (Dr. K. D. Patel, SDAU, Jagudan)
Fennel (Dr. K. D. Patel, SDAU, Jagudan)
Fenugreek (Dr. R. P. Saxena, NDUAT, Faizabad)
New Research programmes

05.30 PM – 07.00 PM

SESSION V : RELEASE OF VARIETIES & RECOMMENDATIONS

- Chairman : **Dr. K.V. Ramana** (ADG -Hort.II, ICAR, New Delhi)
Co-chairman : **Dr. B.B. Vashishtha**, Director, NRC SS, Ajmer
Rapporteurs : **Dr. K. Kandiannan** (IISR, Calicut)
Dr. C. Pathe (KKV, Dapoli)

25.11.2007

PLENARY SESSION (8.30 – 10.00 AM)

- Welcome : **Prof. N. C. Mishra**, ADR & Organising Secretary, OUAT
Chairman : **Dr. H.P Singh**, DDG (Hort.), ICAR, New Delhi
Co-chairmen : **Dr. K. V. Ramana**, ADG (Hort. II)
Dr. V. A. Parthasarathy, Director, IISR
Rapporteurs : **Dr. C.K. Thankamani** (IISR, Calicut)
Dr. G. Sivakumar (KAU, Pampadumpara)

Release of AICRP Spices Annual Report 2006-07 by Dr. H.P. Singh, DDG (Hort.)

Presentations of proceedings of sessions:

Session I (Genetic resources)	:	Dr. D. Prasath
Session II (Crop Improvement)	:	Dr. K.N. Shiva
Session III (Crop Production)	:	Dr. V. Srinivasan
Session IV (Crop Protection)	:	Dr. A. Kumar
Session V (Release of varieties)	:	Dr. K. Kandiannan
Concluding remarks	:	Dr. H. P. Singh, DDG (Hort.), ICAR, New Delhi.
Vote of thanks	:	Dr. M. Anandaraj, Project Coordinator, Spices

TECHNICAL PROGRAMME (2006 – 07)

Project Code	Title	Centers
BLACK PEPPER		
PEP/CI/1 Genetic Resources		
PEP/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Chintapalle, Dapoli, Panniyur, Pundibari, Sirsi 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/3.1	CVT 1991 – Series IV	Yercaud and Ambalavayal
PEP/CI/3.2	CVT 2000 – Series V	Chintapalle, Pampadumpara, Panniyur, Sirsi and Ambalavayal
PEP/CI/3.3	CVT 2006	Chintapalle, Dapoli, Panniyur, Pampadumpara, Pundibari, Sirsi and Yercaud
PEP/CM/4 Nutrient Management Trial		
PEP/CM/4.1	Effect of biofertilizers, <i>Azospirillum</i> on black pepper production	Panniyur, Sirsi and Yercaud
PEP/CM/4.2	Effect of biofertilizers, P-solubilizer on black pepper	Panniyur, Sirsi, Yercaud and Ambalavayal
PEP/CM/4.3	Organic farming in black pepper	Panniyur, Sirsi, Yercaud and Ambalavayal
PEP/CM/4.4	Development of organic package for spices based cropping system – Observational trial	Chintapalle, Sirsi, Panniyur, Yercaud and Dapoli
PEP/CM/4.5	Organic farming in black pepper - 2006	Panniyur, Dapoli, Ambalavayal, Peechiparai, Sirsi and Yercaud
PEP/CP/5 Disease Management Trial		
PEP/CP/5.1	Adaptive trial on management of <i>Phytophthora</i> foot rot of black pepper in farmers field	Ambalavayal, Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/5.2	Trail on management of <i>Phytophthora</i> foot rot of black pepper in existing plantation	Ambalavayal, Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/5.3	Trail on management of <i>Phytophthora</i> foot rot of black pepper in new plantations	Ambalavayal, Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/6 Pest Management Trial		
PEP/CP/6.1	Management of scale-insects of black pepper with organic products	Mudigere, Pampadumpara

TECHNICAL PROGRAMME (2006 – 07)

Project Code	Title	Centers
CARDAMOM		
CAR/CI/1	Genetic Resources	
CAR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Mudigere and Pampadumpara
CAR/CI/2	Hybridization and Selection	
CAR/CI/2.1	Evaluation of OP progenies under intensive management	Mudigere
CAR/CI/3	Coordinated Varietal Trial	
CAR/CI/3.4	CVT 2000- Series IV	Mudigere, Pampadumpara, Myladumpara and Sakleshpur
CAR/CI/3.5	CVT 2005-series V	Pampadumpara, Mudigere
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	Integrated nutrient management in cardamom	Mudigere
CAR/CM/5.2	Effect of biofertilizer, <i>Azospirillum</i> on cardamom	Mudigere, Pampadumpara and Myladumpara
CAR/CM/5.3	Effect of biofertilizers, P. solubilizers on cardamom	Mudigere, Pampadumpara and Myladumpara
CAR/CM/5.4	Effect of neem cake on productivity, pest and disease incidence in cardamom	Mudigere and Pampadumpara,
CAR/CP/6	Pest Management Trial	
CAR/CP/6.1	Bioecology of natural enemies of major pests of cardamom	Mudigere and Pampadumpara
CAR/CP/6.2	Estimation of quantitative and qualitative losses due to thrips damage in cardamom	Mudigere and Pampadumpara
CAR/CP/6.3	Management of shoot fly in cardamom	Mudigere and Pampadumpara
CAR/CP/6.4	Management of cardamom root grub through entomopathogenic nematodes	Mudigere and Pampadumpara
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
GINGER		
GIN/CI/1	Genetic Resources	
GIN/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Dholi, Kumarganj, Pottangi, Pundibari, Raigarh, Chintapalle and Solan

TECHNICAL PROGRAMME (2006 – 07)

Project Code	Title	Centers
GIN/CI/2	Coordinated Varietal Trial	
GIN/CI/2.1	CVT 2000 – Series V	Pundibari, Raigarh and Pottangi
GIN/CI/2.2	CVT 2005 – Series VI	Solan
GIN/CI/3	Varietal Evaluation Trial	
GIN/CI/3.1	Initial evaluation trial (IET)	Solan, Pottangi, Raigarh
GIN/CI/4	Quality Evaluation Trial	
GIN/CI/4.1	Evaluation of germplasm for quality	Solan
GIN/CM/5	Nutrient Management Trial	
GIN/CM/5.1	Effect of micronutrients on ginger	Dholi, Kumarganj, Pottangi, Pundibari and Raigarh
GIN/CM/5.2	Organic farming in ginger - 2006	Solan, Pundibari, Pottangi, Dholi, Kumarganj and Raigarh
GIN/CP/6	Disease Management Trial	
GIN/CP/6.1	Disease surveillance and etiology of rhizome rot in ginger	Pundibari and Solan
GIN/CP/6.2	Biocontrol studies on rhizome rot of ginger	Kumarganj, Pottangi, Raigarh and Ambalavayal
GIN/CP/6.3	Integrated management of <i>Pythium</i> , <i>Fusarium</i> and <i>Ralstonia</i> on ginger	Dholi, Kumarganj, Pundibari and Raigarh
GIN/CP/6.4	Survey and monitoring of diseases in ginger	Pundibari, Kumarganj and Raigarh
GIN/CP/6.5	Management of rhizome rot in ginger	Mudigere, Pampadumpara, Chintapalle, Sirsi and Dapoli
TURMERIC		
TUR/CI/1	Genetic Resources	
TUR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Coimbatore, Dholi, Jagtial, Solan, Kumarganj, Pottangi, Pundibari and Raigarh
TUR/CI/2	Coordinated varietal trial	
TUR/CI/2.1	CVT 2000 - Series V	Jagtial, Pundibari, Raigarh, Coimbatore and Kumarganj
TUR/CI/2.2	CVT-2004-Series VI	Chintapalle, Coimbatore, Jagtial, Kumarganj, Pottangi, Pundibari and Raigarh
TUR/CI/3	Varietal evaluation trial	
TUR/CI/3.1	Comparative yield trial 1999-2000	Pundibari and Raigarh
TUR/CI/3.1	Comparative yield trial 2005-06	Jagtial and Coimbatore

TECHNICAL PROGRAMME (2006 – 07)

Project Code	Title	Centers
TUR/CI/3.2	Initial evaluation trial	Dholi, Pottangi, Kumarganj and Pundibari
TUR/CI/4	Quality evaluation trial	
TUR/CI/4.1	Quality evaluation of germplasm	Coimbatore
TUR/CI/4.2	Impact of environment on quality of turmeric	Coimbatore
TUR/CM/5	Nutrient Management Trial	
TUR/CM/5.1	Effect of biofertilizer, <i>Azospirillum</i> on turmeric	Coimbatore, Kumarganj and Pundibari
TUR/CM/5.2	Organic farming in turmeric	Pundibari, Pottangi
TUR/CP/6	Disease Management Trial	
TUR/CP/6.1	Survey and identification of disease causing organisms in turmeric and screening of turmeric germplasm against diseases	Coimbatore, Dholi, Pundibari and Raigarh
TUR/CP/6.2	Investigations on the causal organism of rhizome rot of turmeric and screening of biocontrol agents for its management	Coimbatore, Jagtial, Pundibari, Dholi, Kumarganj, Pottangi and Raigarh
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 and Pechiparai
TSP/CI/2.2	CVT 1992 - cinnamon	Ambalavayal
TSP/CI/2.3	CVT 2001- nutmeg	Dapoli and Pechiparai
TSP/CI/2.4	CVT 2001 - cassia	Dapoli, Pechiparai and Ambalavayal
TSP/CM/2	Propagation/Multiplication Trial	
TSP/CM/2.1	Softwood grafting in clove	Dapoli
TSP/CP/3	Disease Management Trial	
TSP/CP/3.1	Survey for disease incidence in tree spices	Dapoli, Pechiparai and Ambalavayal
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

TECHNICAL PROGRAMME (2006 – 07)

Project Code	Title	Centers
COR/CI/2	Coordinated Varietal Trial	
COR/CI/2.1	CVT 2001 – Series V	Coimbatore, Hisar, Jobner, Kumarganj, Dholi, Jagudan, Guntur and Raigarh
COR/CI/2.2	CVT 2004 – Production of leafy type coriander during off-season	Coimbatore, Guntur and Hisar
COR/CI/2.3	CVT 2005	Jagudan, Jobner, Guntur, Dholi, Raigarh and Kumarganj
COR/CI/3	Varietal Evaluation Trial	
COR/CI/3.1	Initial evaluation trial	Hisar, Guntur, Jobner and Jagudan
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, <i>Azospirillum</i> on coriander	Hisar, Coimbatore and Kumarganj
COR/CM/5.2	Effect of bio-regulators on coriander	Jobner, Kumarganj, Dholi, Coimbatore, Hisar and Guntur
COR/CM/5.3	Identification of drought/ alkalinity tolerant source in coriander	Guntur and Kumarganj
COR/CP/6	Disease Management Trial	
COR/CP/6.1	Management of powdery mildew and stem gall in coriander	Coimbatore, Jagudan, Jobner, and Raigarh
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/CI/2.1	CVT 2005	Jobner and Jagudan
CUM/CI/3	Varietal Evaluation Trial	
CUM/CI/3.1	Initial evaluation trial	Jobner and Jagudan
CUM/CI/4	Quality Evaluation Trial	
CUM/CI/4.1	Quality evaluation in cumin	Jobner
CUM/CP/5	Disease Management Trial	
CUM/CP/5.1	Management of wilt and blight diseases in cumin	Jagudan and Jobner

TECHNICAL PROGRAMME (2006 – 07)

Project Code	Title	Centers
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/2.1	CVT – 2004 –Series V	Dholi, Hisar, Jagudan, Jobner and Kumarganj
FNL/CI/3	Varietal Evaluation Trial	
FNL/CI/3.1	Initial evaluation trial	Hisar, Jobner and Jagudan
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, <i>Azospirillum</i> on fennel	Kumarganj
FNL/CM/5.2	Identification of drought/ alkalinity tolerance source in fennel	Kumarganj
FENUGREEK		
FGK/CI/1	Genetic Resources	
FGK/CI/1.1	Germplasm collection, characterization, evaluation conservation and screening against diseases	Dholi, Guntur, Hisar, Jagudan, Jobner and Kumarganj
FGK/CI/2	Coordinated Varietal Trial	
FGK/CI/2.1	CVT 2001 – Series V	Jagudan
FGK/CI/2.2	CVT 2005 – Series VI	Jobner, Jagudan and Hisar
FGK/CI/2.3	CVT 2006	Kumarganj, Dholi, Guntur, Jobner, Jagudan and Hisar
FGK/CI/3	Varietal Evaluation Trial	
FGK/CI/3.1	Initial evaluation trial	Guntur, Hisar, Jagudan and Jobner
FGK/CM/4	Nutrient Management Trial	
FGK/CM/4.1	Effect of biofertilizers, <i>Azospirillum/ Rhizobium</i> on fenugreek	Coimbatore and Kumarganj
FGK/CM/4.2	Identification of drought/tolerance source in fenugreek	Coimbatore and Guntur
FGK/CM/4.3	Effect of bio-regulators on fenugreek	Jobner, Coimbatore and Dholi
PAPRIKA		
PAP/CI/1.1	Germplasm collection, characterization, evaluation and conservation of paprika	Coimbatore, Guntur and Yercaud

INAUGURAL SESSION

The National group meeting (XIX workshop) of research workers of AICRPS on spices was held at Orissa University of Agriculture and Technology (OUAT), Bhubaneswar, Orissa during 23-25, November, 2007. Dr. D. Naik, Dean (Research), OUAT, Bhubaneswar has given the welcome address. The group meeting was inaugurated by Prof. D. P. Ray, Vice Chancellor, OUAT, Bhubaneswar and delivered the inaugural address. He has highlighted the various Agricultural zones of Orissa and the areas suitable for cultivation of spices. He also pointed out that OUAT has released seven spice varieties. He urged the breeders to develop more varieties suitable for various locations and to develop agro techniques to realize the optimum production and quality potential. He mentioned about the need for assuring quality planting material. He also identified certain gaps in research especially on post harvest processing, storage of the produce. He mentioned about the persisting problem of rhizome rot of ginger despite the management practices developed. The need for seed health was emphasized, Dr. M. Anandaraj, Project coordinator, Spices presented achievements and progress report of AICRPS. The major achievements have been in enrichment and evaluation of germplasm and development of new varieties and testing in multiple locations. Dr. B.B. Vashishtha, Director, NRCSS, Ajmer delivered presidential address. He mentioned about the need to identify the research gaps and evolve suitable technologies. He also emphasized the need to work on organic spices and introduction of spices as inter crops in orchards. The group meeting was attended by over 100 scientists from 19 AICRPS centres which are located in 13 agricultural regions of India. There were also representatives from voluntary centres and from North East where new centres are being proposed. Dr. N.C. Mishra, ADR, RRTTS, OUAT, Semiliguda proposed vote of thanks.

PROJECT COORDINATOR'S REPORT

The All India Coordinated Research Project on Spices (AICRPS) is vested with the mandate to conduct and coordinate research in 12 spice crops with its headquarter at Indian Institute of Spices Research, Calicut. AICRPS has at present 19 centres spread over 14 states based in 15 State Agricultural Universities (SAUs). In addition 4 Voluntary Centres including Indian Cardamom Research Institute (Spices Board) are collaborating with this project. The X Plan budget of AICRPS was Rs. 700 lakhs with Rs. 115.459 lakhs (ICAR share) during 2006-2007. About 100 Research Programmes covering the mandate spice crops are being conducted at various centres.

Black pepper

A total of 691 black pepper germplasm have been maintained under different AICRPS centres. Dapoli and Pundibari centres have collected two and seven new germplasm from Ratnagiri and Sub-Himalayan region, respectively. The characterization resulted in identification of high yielding accessions viz., Karimunda III (4.57 kg), TMB IV (4.09 kg) and Karimunda II (3.75 kg/ vine) by panniyur. At Yercaud, Panniyur -3 recorded maximum yield of 2.6 kg/vine. Trials at Panniyur and Sirsi revealed maximum yield per vine with the application of biofertilizers (*Azospirillum* @50g/ *Phosphobacteria* @ 50g) + FYM 10 kg along with recommended dose of NPK. A combined application of *Azospirillum* and *Phosphobacteria* along with VAM found to enhance yield under organic farming. Trials on management of *Phytophthora* foot rot of black pepper at Panniyur, Sirsi, Mudigere and Pampadumpara revealed that application of potassium phosphonate (0.3%) with *Trichoderma harzianum* (50 g/vine) as effective in disease control and for maximum yield.

Cardamom

Three hundred and five germplasm have been maintained by two (Pampadumpara and Mudigere) centers. Under CVT trial at Pampadumpara maximum per plant yield was recorded in S1 (510.15g) followed by PS 44 (417.43 g). Based on the initial yield evaluation trials for yield two entries each from Mudigere, Pampadumpara and Sakleshpur are proposed for new CVT. Biofertilizer trial conducted in cardamom revealed superior performance of the treatment, inorganic N (100%) + *Azospirillum* (50 g) + 5 kg FYM, for yield. Application of neem cake @ 0.5 or 1.0 kg/plant has significantly reduced the shoot and capsule borer damage and significant increase in yield. Initial studies at Pampadumpara and Mudigere showed application of entomopathogenic nematode as effective in reducing the population of cardamom root grub. The results of AP cess fund scheme revealed that superiority of Indian cardamom with high yield of 1, 8-cineole (27.59%) and α -terpinyl acetate (41.65%) compared to Guatemalan and Sri Lankan products.

Ginger

Ginger germplasm of 660 accessions have been maintained under AICRPS centers. The CVT trial at Pottangi showed maximum yield of 20.34 t/ha in Gorubathan compared to check Acc 117 (12.95 t/ha). The genotypes viz. SG 707, SG 827, SG 716, SG 682 and 51/04 exhibited better quality attributes along with yield. The

experimental results at various centers revealed that soil and foliar application of Zn, bo and Fe recorded significant increase in yield and quality parameters. At Pundibari, the treatment combination of soil application of 10 kg borax, 25 kg zinc sulphate and 10 kg Ferrous sulphate per hectare recorded highest fresh rhizome yield of 35.17 t/ha, 1.33% essential oil and 6.52% oleoresin. Study on rhizome rot of ginger revealed the effectiveness seed treatment (mancozeb 3 g/l + carbendazim 1 g/l + chloropyriphos 2 ml/l for 30 min) and soil application of thimet 10G (1 kg ai/ha) for highest fresh rhizome yield (17.96t/ha).

Turmeric

One thousand two hundred and eighty germplasm accessions have been maintained by eight centers under AICRPS. Three germplasm were collected from Salem district of Tamil Nadu by Coimbatore and two accessions of *C. longa* were collected by Pottangi and included in the germplasm. Characterization of germplasm led to the identification of promising accessions viz., Dholi (RH-80, RH-16 RH-407 and RH9/90) and Kumarganj (NDH-79, NDH-18 and NDH-9). The promising entries identified in the CVT at Pundibari are TCP-2 (25.01t/ha), RH5 (22.48 t/ha) and TCP1 (22.40t/ha). At Pottangi, highest fresh rhizome yield was recorded in PTS-39 (23.73 t/ha) followed by PTS 47 (23.21 t/ha). The biofertilizer experiment at Coimbatore revealed inorganic N (50%) + *Azospirillum* (5 kg/ha) + 5 t FYM recorded the highest yield. At Kufmarganj, application of 50% recommended dose of inorganic fertilizer (60:40:40 kg/ha NPK) + 50% FYM (10t/ha) + 5 kg/ha *Azospirillum* + seed treatment and soil application of *Pseudomonas fluorescens* + *Trichoderma* @ 50 g/m² recorded maximum fresh rhizome yield (34.01 t/ha). Recommended dose of NPK + FYM + seed and soil application of consortia of *Trichoderma viride* and *Pseudomonas fluorescens* @ 4g/kg and 12.5 kg/ha and 25 kg/ha as basal and top dressing respectively was found to be effective for control of rhizome rot of turmeric with cost : benefit ratio of 1:2.8.

Tree spices

A total of 37 clove, 119 nutmeg, 39 cinnamon and 6 cassia germplasm have been maintained under AICRPS. Characterization of cinnamon germplasm at Peechiparai led to the identification of two high yielding accessions viz. Sel. 65 and a local collection with bark yield of 400 and 440 g and leaf yield of 6.0 and 6.1 kg/tree, respectively.

Coriander

One thousand and eight hundred and ninety five germplasm of coriander have been maintained by different centres. The CVT trials at Jobner identified a high yielding line UD 480 (1342.82 kg/ha) followed by UD 118 (1167.28 kg/ha). In another trial on leafy coriander at Coimbatore, the highest leaf yield was recorded in DH 232 (2.6 kg/20 m²). Among accessions evaluated for quality UD-728 ranked first in terms of volatile oil yield (5.35 l/ha) followed by ICS-2 (4.91 l/ha), K Selection (4.72 l/ha), RD-366 (4.54 l/ha) and J. Cori-375 (4.53 l/ha). The results on different growth structures for leaf production at Guntur indicated that maximum leaf yield was obtained under shade net (75%) (8988 kg/ha) followed by palmyra leaf thatched housing (8145 kg/ha) and tree shade (7541 kg/ha). The study at Hisar indicated maximum seed yield (1795 kg/ha) with Inorganic N

(100%) + *Azospirillum* + 5 t FYM/ha. Maximum seed yield of 2.11 t/ha was obtained with Tricantanol 1 ml/l of water after 30, 40 and 60 days of sowing at Kumarganj. Seed treatment with *Pseudomonas fluorescens* IISR 6 @ 10 g / kg of seed followed by foliar spraying @ 10^8 CFU on 60 days after sowing was found to be effective to contain the powdery mildew disease (18 PDI) and recorded the maximum cost benefit ratio of 1:2.5.

Cumin

Jobner and Jagudan centres maintained 623 germplasm of cumin. Screening under sick plot for wilt revealed GC-4 (39.30 %) as moderately resistant at Jagudan. Among the entries under CVT, UC-345 recorded maximum seed yield (607.64 kg/ha) followed by RZ-209 check (557.29 kg/ha), JC-95-30 (523.96 kg/ha), RZ-19 check (512.15 kg/ha), UC-347 (510.76 kg/ha) and GC-3 check (450.00 kg/ha). The maximum volatile oil of 5.30% was observed in UC-347 followed by 5.25% in RZ-209, 5.03% in GC-3, 4.85% in JC-95-30 and 4.78% in UC-345 and minimum of 4.20 in local check. Minimum wilt incidence (5 %) and blight (3.33 %) was recorded in the treatment, soil solarization + soil application of *Trichoderma* + FYM (5 t/ha) + Mancozeb 0.25% spray with maximum seed yield 485 kg/ha.

Fennel

A total of 617 fennel germplasm have been maintained under AICRPS. Among the CVT entries at Jobner, maximum yield was recorded in UF-205 (1255.00 kg/ha) followed by UF-207 (1153.89 kg/ha) compared to GF-2 check (1034.45 kg/ha). The initial evaluation trial at Kumarganj identified NDF -5 with maximum seed yield of 1.26 t/ha followed by 1.12 t/ha in NDF-12. In the quality evaluation at Jobner, highest mean volatile oil content of 2.72% was recorded in UF-205 followed by 2.55% in NDF-12, 2.45% in UF-206 and RF-101 (check) and 2.42% in local check. Application of FYM @ 10 t/ha + 1.5 kg/ha of *Azospirillum* as seed treatment produced maximum seed yield (0.91 t/ha) at Kumarganj.

Fenugreek

AICRPS centres maintain 967 germplasm accessions of fenugreek. Among CVT entries, JFg-244 recorded significantly superior yield (2001 kg ha^{-1}) than checks, it was 11.29 and 12.16 per cent higher than GM-1 and Hisar Sonali, respectively. Maximum seed yield (1925 kg/ha) was recorded in HM-232 followed by RM-18 (1860 kg/ha) and JFg.-273 (1855 kg/ha) under Hisar conditions. Application of FYM (5 t/ha) + inorganic nitrogen (100 %) and *Azospirillum* (1.5 kg/ha) was highly suitable among the different treatments imposed for getting a higher seed yield at Coimbatore. At Jobner, application of NAA 50 ppm resulted in significantly higher seed yield of fenugreek but it was at par with Triacantanol 1.0 ml/l. Application of mustard cake @ 5g/kg soil has been found very effective for the management of *M. incognita* in fenugreek and coriander.

M. Anandaraj

TECHNICAL SESSION I

GENETIC RESOURCES

- Chairman: Dr. L.D. Mishra, Professor & Head (Plant Breeding), OUAT.
Co-Chairman: Dr. K.K. Thakral, Professor (Plant Breeding), CCSHAU, Hisar.
Rapporteurs: Dr. D. Prasath, Scientist (Horticulture), IISR, Calicut
Sri K. Giridhar, Scientist (Horticulture), RARS, Lam, Guntur.

Nine reports were presented on genetic resources of Black pepper, Cardamom, Ginger, Turmeric, Tree Spices and Seed Spices.

Recommendations

A. Black pepper

1. Pundibari center has to intensify efforts for collecting local germplasm lines.

B. Cardamom

2. Entries CRSP 4 and CRSP 72 are to be evaluated next year for confirmation of their tolerance to thrips and shoot borer (**Action** : Pampadumpara).

C. Tree Spices

3. In nutmeg, mace yield and nut yield should be reported separately (**Action** : Pechiparai).

General recommendations

1. Uniform plot size as communicated by the project coordinator has to be followed while evaluating and characterizing the germplasm by all the centers.
2. Yield should be reported as per plant yield taking in to consideration a minimum of five plants.
3. To characterize the germplasm, yield and yield attributes should be reported for the characters as circulated by the project coordinator.
4. Uniform accession numbers should be given for the collections held by the centers for all the crops.
5. It is decided to explore the possibilities of including the ICAR – Research Complex, Regional Center, Barapani, & Mizoram for conducting research on ginger and turmeric germplasm.
6. ICRI, Regional Center, Sikkim may be considered for large cardamom germplasm trials.
7. Pedigree of all the accessions in all the crops has to be maintained by all the centers.
8. The relevant information generated through AICRP centers should be published for the use of farmers and scientific community.
9. Different mutants generated under crop improvement can be considered as germplasm material.
10. Augmented block design should be followed for evaluation of germplasm if the germplasm is more than fifty.
11. Collection of germplasm has to be taken up on regular basis and intensified.
12. Whenever germplasm collected from any other center/organization, original accession numbers should be represented.

13. Evaluation of germplasm, besides yield – quality, reaction to biotic and abiotic stresses has to be recorded properly.
14. Minimum number of promising entries should be reported based on the yield performance over the control.
15. Exotic germplasm entries having good yield and yield attributing characters should be identified for further use in breeding programs.
16. All data should be presented with proper statistical analysis.

TECHNICAL SESSION: II

CROP IMPROVEMENT

Chairman: Dr. B.B. Vashishtha (NRCSS, Ajmer)
Co-chairman: Dr. P. Mahapatra (OUAT, Bhubaneswar)
Rapporteurs: Dr. KN. Shiva (IISR, Calicut)
Dr. BM. Dushyanthkumar (UAS-B, Mudigere)

Recommendations

A. Black pepper

1. In CVT of black pepper, the year of planting/replanting of cuttings should be clearly indicated. The scientist working in the center should take necessary steps for establishment of the cuttings (**Action:** Chintapalle)
2. PEP/CI/3.2: CVT -1991 series IV
The trial may be concluded and final report is to be submitted to PC (**Action:** Yercaud and Daploi)

B. Cardamom

3. In CVT, original accession number or cultivar/variety as given by the donor center should be mentioned and maintained (**Action:** All the centers)
4. CAR/CI/3.4:CVT 2000-series IV
The trial may be concluded and final report to be submitted to PC after pooled and stability analysis (**Action:** Pampadumpara, Mudigere and Sakleshpur)
5. The nucleus planting materials should only be supplied to other centres and centre concerned can multiply the same for planting in CVT and CVT may be initiated simultaneously at all the centers (**Action:** Mudigere, Myladumpara, Pampadumpara)
6. The short-listed entries of CAR/ CI /4.4: The initial evaluation trial II namely, CL-726 and CL-691 may be promoted to CVT (**Action:** Mudigere)
7. CAR/CI/2.1: Evaluation of OP progenies under intensive management. The trial may continue for one more year (**Action:** Mudigere)
8. The entry, MCC-346 may be included in the new CVT (**Action:** Myladumpara and PC Unit).

C. Ginger

9. GIN/CI/2.2:CVT 2000 Series V
The trial may be concluded and final report to be submitted to PC (**Action:** Pundibari and Raigarh)
10. If there is no scope for local collections, the IET may be discontinued (**Action:** Chintapalle)
11. Chintappalli center may be included in GIN/CI/2.3 CVT 2006 (**Action:** Chintapalle)

D. Turmeric

12. TUR/CI/2.2:CVT 2000-series V
The centers may recheck the raw data and submit the final report to the PC (**Action:** Coimbatore, Raigarh, Jagital and Pundibari)

13. If the yield level is too low, the scientists should record the reasons thereof and submit it in the report (**Action:** All the centers)
14. The University experts may visit Chinthapalle center to analyse the reasons for poor yield Black pepper, Ginger and Turmeric and submit the final report to PC (**Action:** ANGRAU authorities and Chinthapalle)
15. TUR/CI/2.3: CVT series VI 2005
The pooled analysis may be done after completing third year (2007-08) and final report is to be submitted to PC (**Action:** All the centers)
16. TUR/CI/4: Quality evaluation trial
The promising lines having the high curcumin content of Coimbatore center may be confirmed with IISR, Calicut (**Action:** Coimbatore and IISR)
17. TUR/CI/4.2: Impact of environment on quality of turmeric may be concluded and final report to be submitted to PC Unit (**Action:** Coimbatore)
18. The promising entries identified namely, NDH-18 and NDH-19 by the Kumarganj center may be promoted to CVT (**Action:** Kumarganj)
19. In the trial, G x E interaction on quality of turmeric, the entry, Narendra Haldi -1 of Kumarganj Center may be included (**Action:** Kumarganj and PC Unit)

E. Tree Spices

20. TSP/CI/2.3: CVT 2001 in Nutmeg and TSP/CI/2.4: CVT 2001 in Cassia. The trails may be continued at all the centers (**Action:** Dapoli and Yercaud/Pechiparai)

F. Coriander

21. COR/CI/2.6: CVT 2005
The trail may be continued for one more year at all the centers (**Action:** All the centers)
22. COR/CI/2.5: CVT 2004 – Production of leafy type coriander during off-season. The trail may be concluded and a new trail may be proposed (**Action:** All the centers)

G. Cumin

23. CUM/CI/3.4: CVT 2005 – Series VI
The trail may be continued for two more years at all the centers (**Action:** All the centers)

H. Fennel

24. FNL/CI/3.4 – CVT – Transplant. The advantage of early transplant may be analysed critically including the cost of cultivation after three years of the experimentation (**Action:** All the centers)

I. Fenugreek

25. The high diosgenin content of Guntur entry, FGK-14 (1.27%) may be confirmed (**Action:** Coimbatore).
26. FGK/CI/3.3: CVT 2001 Series V
The trial may be concluded and final report to be submitted to PC (**Action:** All the centers).
27. FGK/CI/4.3: IET
The trial may be confirmed and the data should be analysed critically with the help of NRCSS, Ajmer (**Action:** Jagudan, PC Unit and NRC SS).

II. New research programme proposals:

Research programme: 1	
Crop	Cardamom
Title of the programme ಕೆ.ಸಿ.ಸಿ.	Co-ordinated Varietal Trial COR/C1/3.
Centres	Myladumpara, Pampadumpara, Mudigere, Sakleshpur and Appangala
Date/Year of start	June 2008
Duration of the project	2008-2012
No. of entries	Appangala: 4 (IC 34987, IC 349651, IC 547167, IC 547185) Mudigere: 2 (CI 726 and CI 691) Pampadumpara: 2 (PI 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	Three
Plot size/spacing	3 m x 3m
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

Research programme: 2	
Crop	Ginger
Title of the programme ಕೆ.ಸಿ.ಸಿ.	Co-ordinated Varietal Trial (CVT 2009)
Centres	Pundibari, Pottangi, Raigarh, Kumarganj Solan and Calicut
Date/Year of start	April 2009
Duration of the project	2009-2011
No. of entries	Pundibari 2 (GCP 05 and 31) Pottangi 3 (PGS 8, KG 42 and V2E5-2) Raigarh 3 (IG 1, 2 and 3) Kumarganj 3 (NDG 1, 2 and 5) Solan 2 (SG 707 and 827) Calicut 1 (Acc. 578) Checks: 2 (Suprabha and IISR Varada))
No. of treatments/genotypes with details	15 + 2 checks
Design	RBD
No. of replications	Three
Plot size/spacing	3 m x 1 m, 30 x 20 cm
Observation to be recorded in detail	Morphological characters, yield/plot (kg/3m ²), and yield/ha

Research programme: 3

Crop	Turmeric
Title of the programme	Genotype x Environment interaction on quality of turmeric
Centres	Coimbatore, Jagtial, Dholi, Pottangi, Raigarh, Kumarganj, Pundibari, Chintapalle, Barapani, Mizoram and Calicut
Date/Year of start	2008
Duration of the project	2008-2011
No. of entries	Pl see table below
No. of treatments/genotypes with details	11
Design	RBD
No. of replications	Three
Plot size/spacing	Bed size 3 x 1 m
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Weekly weather data (Rainfall, maximum & minimum temperature, morning & evening relative humidity (incase no facility is available for recording weather data it may be intimated to PC) Sunshine hours & solar radiation). 2. Morphological characters (plant height, leaf area, number of tillers, yield per plant, dry recovery, yield per hectare) 3. Quality parameters (curcumin, oleoresin) – at harvest. 4. Soil parameters (major & micronutrients)

Sl.No.	Variety	Research Centre
1.	Megha Turmeric	ICAR Research Centre, NEH Region, Shillong, Meghalaya
2.	IISR Alleppy Supreme	IISR, Calicut, Kerala
3.	IISR Kedaram	-do-
4.	IISR, Prathibha	-do-
5.	BSR-2	TNAU, Coimbatore, Tamil Nadu
6.	Suranjana(TCP-2)	UBKVV, Pundibari, West Bengal
7.	Rajendra Sonia	RAU, Dholi, Bihar
8.	Roma	OUAT, Pottangi, Orissa
9.	Rasmi	-do-
10.	Duggirala Red	ANGRAU, Jagtial
11	Narendra Haldi-1	NDUAT, Kumarganj

Research programme: 4	
Crop	Fennel
Title of the programme	Co-ordinated Varietal Trial
Centres	Jobner, Jagudan, Hisar and Kumarganj
Date/Year of start	October 2007
Duration of the project	2007-2010
No. of entries	Jobner: 3 (UF 33, 145, 175) Jagudan: 2 (JF 501-2, JF 472-2-3) Hisar: 2 (HF 131, 143) Checks: 2 (RF 101, GF 2)
No. of treatments/genotypes with details	9
Design	RBD
No. of replications	Three
Plot size/spacing	4 x 2.5 m ²
No. of plants/plot/treatment	50 x 20 cm
Observation to be recorded in detail	Plant height, days to flowering, branches per plant, umbels per plant, umbellets per plant, seeds per umbel, test weight, seed yield per ha, essential oil

Research programme: 5	
Crop	Fennel
Title of the programme	Initial Evaluation Trial (IET)
Centres	Jagudan, Hisar
Date/Year of start	October 2007
Duration of the project	2007-2010
No. of genotypes with details	12
Design	RBD
No. of replications	Three
Plot size/spacing	4 x 2.5 m ²
No. of plants/plot/treatment	50 x 20 cm
Observation to be recorded in detail	Plant height, days to flowering, branches per plant, umbels per plant, umbellets per plant, seeds per umbel, test weight, seed yield per ha, essential oil

General decisions:

1. In order to promote the promising lines of IET to CVT, stability analysis may be carried out by the respective centers
2. DDG (Hort) may be requested to supply a copy of the proceedings of the Central Variety Release Committee (CVRC) to PC and IISR (Action: PC and IISR)
3. In order to update the variety list in spices, all the centers are advised to send the proceedings of the State Variety Release Committee (SVRC) to PC (Action: PC).
4. The possibility of including the Director, IISR and PC (Spices), as representatives for spices in the CVRC may be discussed with DDG (Hort).
5. Replication-wise data of all the experiments may be sent to PC Unit for monitoring of the projects (Action: All the centers).
6. For reporting and presentation of the research projects, common format may be prepared and supplied to the centers (Action: PC Unit and IISR).
7. The Director, NRC Seed Spices, Ajmer may help in monitoring the projects and reviewing for statistical analysis of the data of 'Seed Spices' centers along with PC and IISR, Calicut.
8. The original name of the accession/cultivar/variety/hybrid supplied by the donor center (s) should not be changed by other centers.
9. The seed/planting materials of CVT entries should be multiplied in sufficient quantity and distributed to the coordinating centers well in advance to enable them to lay out the trails in time.

TECHNICAL SESSION: III

CROP PRODUCTION

Chairman: Dr. V. A. Parthasarathy, Director, IISR, Calicut

Co-chairman: Dr. B. Chempakam, Head (CP&PHT), IISR, Calicut

Rapporteurs: Dr. V. Srinivasan, IISR, Calicut
Dr. C. Sarada, ANGRAU, Guntur

Black Pepper

- 1 Organic farming experiments (4.4 & 4.5) are in their first year of experimentation, hence to draw meaningful conclusion it may be continued further. For all the experiments data on soil nutrients status and details on treatments should be provided.

Cardamom

- 2 All the trials (5.1, 5.2, 5.3 & 5.4) are concluded. The data recorded on soil nutrient availability, quality, pest and disease incidence over years (2004-07) may be pooled and presented to Project Coordinator for finalizing results and recommendations (Action: Mudigere).
- 3 The result of experiments on *Azospirillum* and P solublizer that were conducted for past seven years may be pooled for obtaining effective recommendations with cost benefit ratio. New programmes may be proposed on water and nutrient use efficiency (Action: Mudigere).

Ginger

- 4 Ambalavoyal center has not presented the data. All centers may conclude the experiments on micronutrients and biofertilizers (5.1, 5.3 and 5.4) on ginger as four years of data has been already generated. The soil nutrient status may also be pooled to draw meaningful conclusion and the pooled data may be analysed and recommendation may be given.
- 5 Crop production experiments at Kumarganj may be discontinued as the crop is failing continuously over years due to inherent problems.

Turmeric

- 6 The experiment on *Azospirillum* (5.1) has been conducted for 4 years and the data may be pooled, analysed for obtaining effective recommendations.
- 7 The optimum dose of micronutrients (5.2) may be worked out using the response functions.

Tree Spices

- 8 For better establishment and success rates grafting elite clove lines on clove root stocks may be explored at Dapoli center.

Coriander

- 9 The experiment on bio-regulators (5.2) may be concluded and the results from centers may be compiled, analysed and recommendations may be drawn.
- 10 The identified drought tolerant lines (in project 5.3) at different centers may further tested under stress conditions for confirmation at NRC on Seed Spices and may be presented in the next workshop.
- 11 The centers may supply the promising materials to NRC on Seed Spices with MTA. This programme of identification of drought tolerant lines can be shifted to genetic resources.

Fennel

- 12 The experiment on biofertilizers (5.1) may be concluded and the data over years may be analysed with cost benefit ratio, in comparison with other centers data.

- 13 Appropriate statistical analysis may be followed for identifying efficient genotypes for the alkalinity tolerant fennel lines (in project 5.2) and the same may be tested in problematic locations under field conditions.

Fenugreek

- 14 The experiments on biofertilizers (4.2) may be concluded and the results may be compared with other centers and report may be submitted with cost benefit ratio.
- 15 The drought tolerant experiments (4.2) may be conducted in pot culture for getting more controlled environment.

General

- 16 Ambalavoyal is a voluntary center. No data has been provided for any trial. Hence the center may be deleted.
- 17 All centers are advised to carry out experiments scientifically, data properly analysed, data on soil/ tissue analysis etc. collected.

New Proposals

In this session the following seven new proposals were approved.

Research programme: 1	
Crop	Black pepper
Title of the programme	Rooting of orthotropic shoots of black pepper
Centres	<i>Panniyur, Sirsi, Yercaud, Pechiparai, Dapoli</i>
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	2 factors
No. of treatments/genotypes with details	<p>Factor 1 : Number of nodes: 3</p> <ol style="list-style-type: none"> 1. Two nodes 2. Three nodes 3. Five nodes <p>Factor 2: Rooting hormone : 3</p> <ol style="list-style-type: none"> 1. Common sugar (2%) 2. IBA – commercial formulation 3. PGPR (<i>Pseudomonas fluorescens</i> - 10⁸cfu) 4. Control
Design	FCBD
No. of replications	Three
No. of plants/plot/treatment	Twenty five cuttings per replication
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Time taken to sprouting (days) 2. Per cent success of rooting 3. No. of roots/cutting 4. Fresh weight of roots/cutting (g) 5. Dry weight of roots/cutting (g) 6. No. of leaves/cutting 7. Fresh weight of leaves/cutting (g) 8. Dry weight of leaves/cutting (g) 9. Height of cuttings (cm) 10. No. of branches

Age of mother vines and season should be specified by each center.

Research programme: 2	
Crop	Cinnamon (<i>C.verum</i>)
Title of the programme	Post harvest technology studies in cinnamon
Centres	<i>Dapoli and Pechiparai</i>
Date/Year of start	June 2008
Duration of the project	2008-2011
No. of treatments	Two (any two promising genotypes from germplasm)
No. of treatments/genotypes with details	Genotypes : 2 Length of the stem : 0.5 m and 1 m Thickness of the stem : 1.0 - 2.0 cm, 2.0 - 3.0 cm and 5.0 - 6.0 cm
Design	Split Plot
No. of replications	Two
Plot size/spacing	4 x 2.4 m, 30 x 10 cm
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Bark thickness (before and after drying) 2. Wet weight (g) of Quills, Quillings and others 3. Dry weight (g) of Quills, Quillins and others 4. Eessential oil (%) 5. Oleoresin (%) 6. Coumarin

Research programme: 3	
Crop	Coriander
Title of the programme	Production of leafy type coriander in off season (summer)
Centres	Coimbatore, Guntur, Hisar, Kumarganj
Date/Year of start	2008
Duration of the project	2008-2011
No. of treatments	3 factors
No. of treatments/genotypes with details	<p>Factor 1 : Production technologies: 3</p> <p>25% shade</p> <p>50% shade</p> <p>75% shade</p> <p>Factor 2: No of entries : 4 (centers can select)</p>
Design	FRBD
No. of replications	Three
Plot size/spacing	4 x 2.4 m, 30 x 10 cm
No. of plants/plot/treatment	-
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Days taken for germination. 2. Days taken for harvest. 3. Compound leaves/plant 4. Yield (kg/plot) 5. Cost benefit ratio 6. Light intensity and soil temperature

Research programme: 4	
Crop	Coriander
Title of the programme	Role of <i>Rhizobacteria</i> in growth promotion of Coriander
Centres	Coimbatore, Guntur, Hisar, Jagudan, Raigarh
Date/Year of start	2007
Duration of the project	2007-2010
No. of treatments	8
No. of treatments/genotypes with details	T ₁ Rhizobacteria FK 14 (Seed treatment) T ₂ Rhizobacteria FK 14 (Seed treatment + Soil application) T ₃ Rhizobacteria FL 18 (Seed treatment) T ₄ Rhizobacteria FL 18 (Seed treatment + Soil application) T ₅ Rhizobacteria FK 14+FL 18 (Seed treatment) T ₆ Rhizobacteria FK 14+FL 18 (Seed + Soil treatment) T ₇ Trichoderma MTCC 5179 (Recommended dose) T ₈ Control
Design	RBD
No. of replications	Three
Plot size/spacing	4 x 2.4 m, 30 x 10 cm
No. of plants/plot/treatment	-
Observation to be recorded in detail	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)

All treatment receive uniform recommended dose of fertilizers

Research programme: 5	
Crop	Fennel
Title of the programme	Role of Rhizobacteria in growth promotion of fennel
Centres	Jagudan, Hisar, Raigarh
Date/Year of start	2007
Duration of the project	2007-2010
No. of treatments	8
No. of treatments/genotypes with details	T ₁ Rhizobacteria FK 14 (Seed treatment) T ₂ Rhizobacteria FK 14 (Seed treatment + Soil application) T ₃ Rhizobacteria FL 18 (Seed treatment) T ₄ Rhizobacteria FL 18 (Seed treatment + Soil application) T ₅ Rhizobacteria FK 14+FL 18 (Seed treatment) T ₆ Rhizobacteria FK 14+FL 18 (Seed + Soil treatment) T ₇ Trichoderma MTCC 5179 (Recommended dose) T ₈ Control
Design	RBD
No. of replications	Three
Plot size/spacing	4 x ⁵⁰ 2.4 m, 50 x 20 cm
No. of plants/plot/treatment	-
Observation to be recorded in detail	

All treatment receive uniform recommended dose of fertilizers

Research programme: 6	
Crop	Fenugreek
Title of the programme	Role of Rhizobacteria in growth promotion of fenugreek
Centres	Jobner, Jagudan, Guntur, Hisar, Kumarganj
Date/Year of start	2007
Duration of the project	2007-2010
No. of treatments	8
No. of treatments/genotypes with details	T ₁ Rhizobacteria FK 14 (Seed treatment) T ₂ Rhizobacteria FK 14 (Seed treatment + Soil application) T ₃ Rhizobacteria FL 18 (Seed treatment) T ₄ Rhizobacteria FL 18 (Seed treatment + Soil application) T ₅ Rhizobacteria FK 14+FL 18 (Seed treatment) T ₆ Rhizobacteria FK 14+FL 18 (Seed + Soil treatment) T ₇ <i>Trichoderma</i> MTCC 5179 (Recommended dose) T ₈ Control
Design	RBD
No. of replications	Three
Plot size/spacing	4 x 2.4 m, 30 x 10 cm
No. of plants/plot/treatment	-
Observation to be recorded in detail	

All treatment receive uniform recommended dose of fertilizers

Research programme: 7	
Crop	Cumin
Title of the programme	Role of Rhizobacteria in growth promotion of cumin
Centres	Jobner, Jagudan
Date/Year of start	2007
Duration of the project	2007-2010
No. of treatments	8
No. of treatments/genotypes with details	T ₁ Rhizobacteria FK 14 (Seed treatment) T ₂ Rhizobacteria FK 14 (Seed treatment + Soil application) T ₃ Rhizobacteria FL 18 (Seed treatment) T ₄ Rhizobacteria FL 18 (Seed treatment + Soil application) T ₅ Rhizobacteria FK 14+FL 18 (Seed treatment) T ₆ Rhizobacteria FK 14+FL 18 (Seed + Soil treatment) T ₇ <i>Trichoderma</i> MTCC 5179 (Recommended dose) T ₈ Control
Design	RBD
No. of replications	Three
Plot size/spacing	4 x 2.4 m, 30 x 5 cm
No. of plants/plot/treatment	-
Observation to be recorded in detail	

All treatment receive uniform recommended dose of fertilizers

TECHNICAL SESSION IV

CROP PROTECTION

Chairman: Dr. N.K. Dhal, Prof. and Head, OUAT, Bhubaneswar
Co-chairman: Dr. S. Devasahayam, Head (Crop Protection), IISR, Calicut
Rapporteur: Dr. A. Kumar, IISR, Calicut
Dr. Jemla Naik, UAS-B, Mudigere

Black Pepper

1. Pathogen involved in the disease may be confirmed while attributing the treatment effectiveness
2. While collecting yield data, the diseased and dead vine should be accounted while compiling the yield

Cardamom

3. Reasons for non establishment due to disease or pest should be clearly indicated the while attributing the treatment effectiveness
4. Project CAR/CP/6.1 may be concluded and final report will be submitted
5. Project CAR/CP/6.2 may be concluded and final report will be submitted
6. A new project on mass multiplication of natural enemies will be taken up and field trials will be conducted

Ginger

7. Only accepted names of the disease will be cited in the report (Soft rot, Bacterial wilt, Yellows)
8. Projects GIN/CP/6.4, GIN/CP/6.5, may be concluded and final report will be submitted
9. New projects on *Pythium* rot, *Ralstonia* wilt, *Fusarium* yellows management including newer options will be formulated

Turmeric

10. Screening for rhizome rot resistance must be conducted with pathogen specific for particular location
11. New projects on foliar disease management including newer options will be formulated

Tree spices

12. Project TSP/CP/3.1 may be concluded and final report will be submitted

Coriander

13. Project COR/CP/6.1 may be concluded and final report will be submitted. The promising (resistant/moderately resistant) lines identified at Jobner, Jagudan, and Kumarganj against powdery mildew and wilt may be multiplied at respective centre and distributed to other centers for initiating IET
14. Benefit cost ratio of the most effective treatment for powdery mildew/wilt/stem gall management (Biocontrol agents+chemical) may be worked out and recommendation may be transferred to extension agencies

Cumin

15. New projects on wilt disease management including newer options will be formulated as none of the treatment could control the wilt

New Research Programmes	
Research programme: 1	
Crop	Black pepper
Title of the programme	Management of <i>Erythrina</i> gall wasp, a popular standard of black pepper
Centres	Pampadumpara, Mudigere
Date/Year of start	2008
Duration of the project	2008-2011
No. of treatments	8
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. Pest surveillance and assessing severity of damage Pampadumpara: Idukki, Waynad Mudigere: Chickmagalur, Coorg 2. Pruning (once, twice, thrice) 3. Biorationals (different neem products) 4. Insecticides (Carbofuran, Imidachlorpid)
Design	FRBD
No. of replications	Three
Plot size/spacing	6 plants/replication
No. of plants/plot/treatment	-
Observation to be recorded in detail	Number of malformed shoots after one month of treatment

Research programme: 2	
Crop	Ginger
Title of the programme	Management of soft rot of ginger (biofumigation using Mustard)
Centres	Pundibari, Pottangi, Solan, Chintapalle, Raigarh, Kumarganj and Dhali
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	5
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. Soil treatment by biofumigation using Mustard 2. Rhizome treatment by Metalaxyl Mancozeb 72 %WP (1.25 g/l of commercial formulations) 3. Rhizome treatment by rhizobacterial antagonist* 4. Rhizome treatment by endophytic bacterial* antagonist 5. Absolute control
Design	RBD
No. of replications	Four
Plot size/spacing	Raised bed (3x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	4 beds per treatments/replication
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Germination count 2. Soft rot incidence 3. Bacterial wilt incidence 4. Shoot borer incidence 5. Leaf spot incidence 6. Rhizome Yield 7. Mustard biomass/bed in kg (before biofumigation)

Biofumigation: Beds are to be sown with mustard (during march-April) cultivated for about 30-45 days and the leaves are to be incorporated into soil by ploughing. After this the beds are to be solarized by polythene mulching for about 15-30 days followed by planting with rhizome

Rhizobacterial treatment: Rhizomes are to be treated with rhizobacteria (IISR-GRB) 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) 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.

Research programme: 3	
Crop	Ginger
Title of the programme	Management of soft rot of ginger (biofumigation using Cabbage)
Centres	Pundibari, Pottangi, Solan, Chintapalle, Raigarh, Kumarganj
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	5
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. Soil treatment by biofumigation using Cabbage 2. Rhizome treatment by Metalaxyl Mancozeb 72 %WP (1.25 g/l) 3. Rhizome treatment by rhizobacterial antagonist* 4. Rhizome treatment by endophytic bacterial* antagonist 5. Absolute control
Design	RBD
No. of replications	Four
Plot size/spacing	Raised bed (3x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	4 beds per treatments/replication
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Germination count 2. Soft rot incidence 3. Bacterial wilt incidence 4. Shoot borer incidence 5. Leaf spot incidence 6. Rhizome Yield 7. 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.

Rhizobacterial treatment: Rhizomes are to be treated with rhizobacteria (IISR-GRB) 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) 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.

Research programme: 4	
Crop	Ginger
Title of the programme	Management of bacterial wilt of ginger (biofumigation using Mustard)
Centres	Solan, Pundibari, Pottangi and Pampadumpara
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	6
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. Soil treatment by biofumigation using Mustard 2. Soil treatment using bleaching powder @ 10g/bed 3. Rhizome treatment by heat** 4. Rhizome treatment by rhizobacterial antagonist* 5. Rhizome treatment by endophytic bacterial* antagonist 6. Absolute control
Design	RBD
No. of replications	Four
Plot size/spacing	Raised bed (3x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	4 beds per treatments/replication
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Germination count 2. Soft rot incidence 3. Bacterial wilt incidence 4. Shoot borer incidence 5. Leaf spot incidence 6. Rhizome Yield 7. Mustard biomass/bed in kg (before biofumigation)

Biofumigation: Beds are to be sown with mustard (during march-April) cultivated for about 30-45 days and the leaves are to be incorporated into soil by ploughing. After this the beds are to be solarized by polythene mulching for about 15-30 days followed by planting with rhizome

****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) 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) 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: 5	
Crop	Ginger
Title of the programme	Management of bacterial wilt of ginger (biofumigation using cabbage)
Centres	Solan, Pundibari, Pottangi and Pampadumpara
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	6
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. Soil treatment by biofumigation using cabbage 2. Soil treatment using bleaching powder @ 10g/bed 3. Rhizome treatment by heat** 4. Rhizome treatment by rhizobacterial antagonist* 5. Rhizome treatment by endophytic bacterial* antagonist 6. Absolute control
Design	RBD
No. of replications	Four
Plot size/spacing	Raised bed (3x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	4 beds per treatments/replication
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Germination count 2. Soft rot incidence 3. Bacterial wilt incidence 4. Shoot borer incidence 5. Leaf spot incidence 6. Rhizome Yield 7. 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) 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) 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: 6	
Crop	Turmeric
Title of the programme	Management of foliar diseases in turmeric
Centres	Coimbatore, Jagtial, Dholi, Raigarh, Kumarganj, Pundibari, Pottangi and Chintapalle
Date/Year of start	2008
Duration of the project	2008-2010
No. of treatments	9
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. Rhizome treatment* with Hexaconazole (0.1%) + Foliar spray – Hexaconazole (0.1%) on 45 and 90 days 2. Rhizome treatment with Propiconazole (0.1%) + Foliar spray – Propiconazole (0.1%) on 45 and 90 days 3. Rhizome treatment with Tricyclozole (0.1%) + Foliar spray – Tricyclozole (0.1%) on 45 and 90 days 4. Rhizome treatment with Carbendazim+Mancozeb (0.1%) + Foliar spray – Carbendazim+Mancozeb (0.1%) on 45 and 90 days 5. Foliar spray – Hexaconazole (0.1%) on 45 and 90 days 6. Foliar spray – Propiconazole (0.1%) on 45 and 90 days 7. Foliar spray – Tricyclozole (0.1%) on 45 and 90 days 8. Foliar spray – Carbendazim+Mancozeb (0.1%) on 45 and 90 days 9. Check
Design	RBD
No. of replications	Three
Plot size/spacing	Raised bed (3x1 m) system of cultivation is to be adopted
No. of plants/plot/treatment	5 beds per treatments/replication
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Germination per cent 2. Yield per plot (kg) 3. Estimated yield (t/ha) 4. Percent Disease Index (PDI) 5. Percent disease reduction over control

Seed rhizome must be soaked in respective fungicide suspension for 30 minutes and dried in shade before planting

Research programme: 7	
Crop	Cumin
Title of the programme	Management of cumin wilt through biocontrol agents
Centres	Jobner, Jagudan
Date/Year of start	2008
Duration of the project	2008-2011
No. of treatments	Main plot: 2, Sub plot: 10
No. of treatments/genotypes with details	<ol style="list-style-type: none"> 1. <i>Trichoderma harzianum</i> talk base powder @ 10 kg/ha 2. <i>T. harzianum</i> talk base powder @ 20kg/ha 3. <i>T. harzianum</i> @ 10kg/ha + FYM @ 3 t/ha 4. <i>T. harzianum</i> @ 10kg/ha + FYM @ 6 t/ha 5. <i>T. harzianum</i> @ 20kg/ha + FYM @ 3 t/ha 6. <i>T. harzianum</i> @ 20kg/ha + FYM @ 6 t/ha 7. <i>T. harzianum</i> @ 10kg/ha + Vermicompost @ 1.6 t/ha 8. <i>T. harzianum</i> @ 10kg/ha + Vermicompost @ 3.2 t/ha 9. <i>T. harzianum</i> @ 20kg/ha + Vermicompost @ 1.6 t/ha 10. <i>T. harzianum</i> @ 20kg/ha + Vermicompost @ 3.2 t/ha 11. Bavistin drenching @ 0.1% (Control) 12. Control
Design	RBD
No. of replications	Three
Plot size/spacing	4 x 2.4 m, 30 x 5 cm
No. of plants/plot/treatment	-
Observation to be recorded in detail	<ol style="list-style-type: none"> 1. Germination per cent 2. Per cent wilt incidence 3. Seed yield (kg/ha) 4. Volatile oil (%) 5. Test weight 6. Microbial load before planting 7. Count on VAM propagules in soil and root 8. Benefit cost ratio

TECHNICAL SESSION V

RELEASE OF VARIETIES & TECHNOLOGIES FOR ADOPTION AND

ICAR ADHOC SCHEMES

Chairman: Dr. K.V. Ramana, Assistant Director General (Hort –II)

Co-chairman: Dr. B.B. Vashishtha, Director, NRC SS, Ajmer

Rapporteur: Dr. K. Kandiannan, IISR, Calicut

Dr. C. Pathe, KKV, Dapoli

1. The proposal of Coriander variety DH – 228 from CCS HAU, Hisar Centre is accepted and recommended for Haryana State release. However, the data and units used to represent yield may be verified critically before submitting to State Variety Release Committee. The seed material may be supplied to other centers for further testing for national level release.
2. In future, centers indent to release variety should submit the proposal for Project Coordinator (Spices) two months in advance for critical comments and circulation to experts.
3. It is mandatory to bring samples of proposed variety for AICRPS workshop in order to verify the distinct traits.

Following technologies are identified from different centers for adoptive trial.

Coimbatore

1. In turmeric, three years trial indicated that Inorganic N (50%) + Azospirillum (5 kg/ha) Soil application + 5 t FYM recorded the highest yield (41.66 t/ha).
2. In coriander, the seed yield /ha was highest (631.26 kg) in the treatment FYM (5 t/ha) + inorganic N (50%) + *Azospirillum* 1.5 kg (seed treatment). Highest benefit cost ratio of 1.94 was also obtained by the same treatment. Hence the application of FYM (5 t/ha) + inorganic N (50%) + *Azospirillum* 1.5 kg (seed treatment) was found to be the best treatment among the different treatment imposed in the study.
3. In Fenugreek, highest seed yield of 690kg/ha was recorded by the application of FYM (5 t/ha) + Inorganic nitrogen (100%) and *Azospirillum* (1.5 kg/ha) followed by N (75%) + *Azospirillum* 1.5 kg/ha seed treatment + FYM 5 t/ha (627.33 kg/ha).
4. For the management of rhizome rot of turmeric seed and soil application of *Trichoderma viride* and *Pseudomonas fluorescens* @ 4g/kg of seed and 12.5 kg and 25 kg/ha as basal and top dressing at 150 DAP was found to be effective which recorded the least disease incidence of 5.59% with the maximum yield of 47.54 t/ha. The same treatment also recorded the maximum c: ratio of 1:3.3.

Guntur

5. Spraying of either NAA 10 ppm or Triacantanol @ 1 ml/l twice at 40 and 60 DAS resulted in significantly superior yield (904 and 882 kg) over control in coriander.

Hisar

6. In coriander, the maximum seed yield was recorded with the application of Zinc sulphate @ 20 kg/ha as soil application which was statistically at par with Ferrous sulphate @ 5kg/ha soil application + 0.125% as foliar application.

Sirsi

7. The black pepper yield has improved by application of *Azospirillum* of 50 g, P solublizer of 50 g and 10 kg of burnt earth during June and August along with recommended dose of fertilizer and 10 kg of FYM.
8. Application of *Azospirillum* @ 50 g along with recommended 100% inorganic NPK with 10 kg FYM / vine recorded higher fresh berry yield (6.83 kg) compared to RDF alone (6.12 kg). It also resulted in obtaining maximum C:B ratio of 1:3.29. This was followed by the vines supplied with *Azospirillum* @ 50 g along with recommended 75% Nitrogen and 10 Kg FYM /vine (6.57 kg).
9. Application of *P solubilizer* @ 50 g along with recommended 100% inorganic P and 10 kg FYM / vine recorded higher fresh berry yield (6.81 kg) compared to other treatments. It was also resulted in obtaining maximum C:B ratio of 1:3.30. This was followed by the vines supplied with *P solubilizer* @ 50 g along with recommended 75% inorganic P and 10 kg FYM / vine (6.43 kg).

Pundibari

10. Application of inorganic N 100% + *Azospirillum* 50g + FYM 5 kg per 3 sq.m. plot produced highest yield compared to control (recommended dose of fertilizer @ 80:80:120 NPK per hectare) in ginger.
11. Seed treatment as well as soil application of *Trichoderma viride* and *Pseudomonas fluorescens* @ 12.5 kg /ha and 25.0 kg /ha as basal and top dressing respectively with application of recommended NPK and FYM was proved to be the best treatment for management of rhizome rot of turmeric.
12. CCS HAU, Hisar Centre may arrange to send a copy of a report on the ICAR Adhoc project "Studies on salt tolerance in seed spices (Fennel, Coriander and Fenugreek) to Project Coordinator (Spices).
13. The newly proposed centers in the north east may indicate the specific spices production problems pertaining to the location to PC (Spices) so as to formulate suitable research programme.
14. Newly proposed ICRI Regional Center at Sikkim may include the research project on collection and evaluation of large cardamom germplasm and management of *Colletotrichum* leaf spot in AICRP on Spices.
15. Guntur Center may exclude AICRP research on fenugreek owing to limited cultivation in that region and intensify paprika germplasm collection and evaluation.

PROPOSAL FOR RELEASE

1. Name of the crop and species : **CORIANDER (*Coriandrum sativum* L.)**
2. a) Name of variety under which tested : **DH-228**
b) Proposed name of the variety : **HISAR BHOOMIT**
3. Sponsored by : **CCS Haryana Agricultural University,
Hisar – 125 004 (Haryana)**
4. a) Institution or agency responsible for developing variety (with address) : **Department of Vegetable Science, CCS Haryana
Agricultural University, Hisar – 125 004 (Haryana)**
b) Name of the persons who helped in the development of the variety : **Dr. S. K. Tehlan, Scientist
Dr. K.K. Thakral, Sr. Vegetable Botanist**
5. a) Parentage with details of its pedigree : **Selection from local germplasm**
b) Source of material in case of introduction : **This variety is selection from the local material collected from farmer's field at Bahadurgarh (Haryana)**
c) Breeding method : **Mass selection**
d) Breeding objective : **To develop high green leaf yielding variety of coriander with high oil content**
6. State the varieties which are most closely resemble the proposed variety in general characteristics : **None of varieties resembles this variety**
7. a) Whether recommended by seminar/ Conference/workshop/ state seed sub-committee : **Recommended for farmer's field trial by the Horticulture Officers Workshop (Haryana).**
b) If so, its recommendations with specific justification for the release of the proposed variety : **This variety has higher leaf yield than Pant Haritima and Rajendera Sawati (released varieties for green leaf production) and Local varieties of Haryana. Besides its high green leaf yield potential and oil content, it is resistant to stem gall disease which severely affects the coriander crop.**
c) Specific area of its adaptation : **All coriander growing areas of the country for green leaf production.**
8. Adaptability : **Under Co-ordinated Varietal Trials of AICRP on Spices, this variety has out yielded other varieties and Pant Haritima (national check) at Hisar and Coimbatore centers. This shows its wide adaptability. It also showed superiority over earlier released varieties for leaf production i.e. Pant Haritima and Rajendera Swati under IET and CVT at Hisar.**
9. Recommending ecology : **Suitable for cultivation through out the country.**
10. Description of variety/hybrid :
 - a) Plant height : **118.0 –126.4 cm**
 - b) Distinguishing morphological characters :
 - i) Growth habit : **Bushy leafy type with 7 – 8 primary branches**
 - ii) Leaves : **Green spreading broader leaves.**

- iii) Stem : Greenish stem with streaks gradually changing to purple at later stages of growth
- iv) Inflorescence : Purplish white spreading with 58.0 – 65.8 umbels per plant 5.8 – 6.4 umbellets per umbel and 6.4-7.2 seeds per umbellets. The seeds per umbel ranges 39.2 – 43.4.
- v) Seed colour : Yellowish-brown at full maturity
- vi) Weight of 1000-seeds : 6.4-7.5 g
- c) Maturity (Range in No.of days) :
- i) 50% flowering : 110 days.
- ii) Maturity : 160-170 days after sowing
- d) Maturity group : Late
- e) Reaction to major diseases and pest : Resistant to stem gall disease and aphid infection intensity is at par with other varieties.
- 11. a) Average yield under normal conditions : Green leaf yield =180 –200 q/ha Seed yield
(yield in q/ha) = 14-15 q/ha
- 12. a) Agency responsible for maintaining breeder seed : Department of Vegetable Science, CCS Haryana Agril. University, Hisar-125 004
- b) Quantity of breeder seed in stock : 15 kg
- 13. Information on the acceptability of the variety by farmers/ consumers/industries : The variety DH-228 is late in flowering and suitable for green leaf production .It is resistant to stem gall disease and seeds are small size with high oil content. The variety plots were visited by the farmers during Kisan Mela and expressed their choice for the variety and demanded seed.
- 14. Specific recommendations, if any, for seed production : The seed of the variety can be multiplied by maintaining isolation distance.
- 15. Any other pertinent information : DH-228 is suitable for green leaf production.

PLENARY SESSION

Chairman: Dr. H. P. Singh, Deputy Director General (Horticulture)

Co-chairmen: Dr. K.V. Ramana, ADG (Hort. II)

Dr. V.A. Parthasarathy, Director, IISR

Rapporteurs: Dr. C.K. Thankamani, IISR, Calicut

Dr. G. Sivakumar, KAU, Pampadumpara

Chairman's remarks

1. Proposal for starting new centres of All India Coordinated Research Project on Spices (AICRPS) will be submitted after conducting a meeting with Director IISR and Project Coordinator Spices.
2. Region-wise recommendations has to be formulated through AICRP Workshops
This was followed by presentation of proceedings of technical session by rapporteurs. The following are the remarks of chairman.
3. Emphasis should be given on aspects like plant nutrition, water productivity and plant architecture for increasing the productivity of the crop
4. Studies to be focused on pest problems with respect to agro climatic conditions
5. Fixed plot survey has to be done to reveal climatic conditions
6. Emphasis may be given in the areas of seed health management, pathogen detection techniques, seed treatment, better storage conditions for ginger for the production of disease free seeds.
7. Technology should be tested in farmers plot for further refinement.
8. Finger printing is to be done for newly released varieties.

This session came to end with vote of thanks by Dr. M. Anandaraj (PC).

TECHNICAL PROGRAMME (2007-08 & 2008-09)

Project Code	Title	Centers
BLACK PEPPER		
PEP/CI/1	Genetic Resources	
PEP/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Chintapalle, Dapoli, Panniyur, Pundibari, Sirsi 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/3.1	CVT 2000 – Series V	Chintapalle, Pampadumpara, Panniyur, Sirsi and Ambalavayal
PEP/CI/3.3	CVT 2006	Chintapalle, Dapoli, Panniyur, Pampadumpara, Pundibari, Sirsi and Yercaud
PEP/CM/4	Nutrient Management Trial	
PEP/CM/4.1	Development of organic package for spices based cropping system – Observational trial	Chintapalle, Sirsi, Panniyur, Yercaud and Dapoli
PEP/CM/4.2	Organic farming in black pepper – 2006	Panniyur, Dapoli, Ambalavayal, Pechiparai, Sirsi and Yercaud
PEP/CM/4.3	Rooting of orthotropic shoots of black pepper	Panniyur, Sirsi, Yercaud, Pechiparai, Dapoli
PEP/CP/5	Disease Management Trial	
PEP/CP/5.1	Adaptive trial on management of <i>Phytophthora</i> foot rot of black pepper in farmers field	Ambalavayal, Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/5.2	Trail on management of <i>Phytophthora</i> foot rot of black pepper in existing plantation	Ambalavayal, Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/5.3	Trail on management of <i>Phytophthora</i> foot rot of black pepper in new plantation	Ambalavayal, Chintapalle, Dapoli, Panniyur, Pampadumpara, Mudigere and Sirsi
PEP/CP/6	Pest Management Trial	
PEP/CP/6.1	Management of scale-insects of black pepper with organic products	Mudigere, Pampadumpara
PEP/CP/6.2	Management of <i>Erythrina</i> gall wasp, a popular standard of black pepper	Pampadumpara, Mudigere

CARDAMOM

CAR/CI/1	Genetic Resources	
CAR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Mudigere and Pampadumpara
CAR/CI/2	Hybridization and Selection	
CAR/CI/2.1	Evaluation of OP progenies under intensive management	Mudigere
CAR/CI/3	Coordinated Varietal Trial	
CAR/CI/3.1	CVT 2005-series V	Pampadumpara, Mudigere
CAR/CI/3.2	CVT 2007-series VI	Myladumpara, Pampadumpara, Mudigere, Sakleshpur and Appangala
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	
	To be finalized in the proposed group meeting	
CAR/CP/6	Pest Management Trial	
CAR/CP/6.1	Management of shoot fly in cardamom	Mudigere and Pampadumpara
CAR/CP/6.2	Management of cardamom root grub through entomopathogenic nematodes	Mudigere and Pampadumpara
CAR/CP/6.3	Trial on management of panicle and clump rot of cardamom in existing plantation	Mudigere and Pampadumpara
CAR/CP/6.4	Trial on management of panicle and clump rot of cardamom in new plantation	Mudigere and Pampadumpara

GINGER

GIN/CI/1	Genetic Resources	
GIN/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Dholi, Kumarganj, Pottangi, Pundibari, Raigarh, Chintapalle and Solan
GIN/CI/2	Coordinated Varietal Trial	
GIN/CI/2.1	CVT 2005 – Series VI	Solan
GIN/CI/2.2	CVT 2008 - Series VII	Pundibari, Pottangi, Raigarh, Kumarganj, Solan and Calicut
GIN/CI/3	Varietal Evaluation Trial	
GIN/CI/3.1	Initial evaluation trial (IET)	Solan, Pottangi, Raigarh
GIN/CI/4	Quality Evaluation Trial	
GIN/CI/4.1	Evaluation of germplasm for quality	Solan

GIN/CM/5	Nutrient Management Trial	
GIN/CM/5.1	Organic farming in ginger – 2006	Solan, Pundibari, Pottangi, Dholi and Raigarh
GIN/CP/6	Disease Management Trial	
GIN/CP/6.1	Disease surveillance and etiology of rhizome rot in ginger	Pundibari and Solan
GIN/CP/6.2	Management of soft rot of ginger (biofumigation using Mustard)	Pundibari, Pottangi, Solan, Chintapalle, Raigarh, Kumarganj
GIN/CP/6.3	Management of soft rot of ginger (biofumigation using Cabbage)	Pundibari, Pottangi, Solan, Chintapalle, Raigarh, Kumarganj
GIN/CP/6.4	Management of bacterial wilt of ginger (biofumigation using Mustard)	Solan, Pundibari, Pottangi and Pampadumpara
GIN/CP/6.5	Management of bacterial wilt of ginger (biofumigation using cabbage)	Solan, Pundibari, Pottangi and Pampadumpara
TURMERIC		
TUR/CI/1	Genetic Resources	
TUR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Coimbatore, Dholi, Jagtial, Solan, Kumarganj, Pottangi, Pundibari and Raigarh
TUR/CI/2	Coordinated varietal trial	
TUR/CI/2.1	CVT-2004-Series VI	Chintapalle, Coimbatore, Jagtial, Kumarganj, Pottangi, Pundibari and Raigarh
TUR/CI/3	Varietal evaluation trial	
TUR/CI/3.1	Comparative yield trial 2005-06	Jagtial and Coimbatore
TUR/CI/3.2	Initial evaluation trial	Dholi, Pottangi, Kumarganj and Pundibari
TUR/CI/4	Quality evaluation trial	
TUR/CI/4.1	Quality evaluation of germplasm	Coimbatore
TUR/CI/4.2	Genotype x Environment interaction on quality of turmeric	Coimbatore, Jagtial, Dholi, Pottangi, Raigarh, Kumarganj, Pundibari, Chintapalle, Barapani, Mizoram and Calicut
TUR/CM/5	Nutrient Management Trial	
	To be finalized in the proposed group meeting	
TUR/CP/6	Disease Management Trial	
TUR/CP/6.1	Survey and identification of disease causing organisms in turmeric and screening of turmeric germplasm against diseases	Coimbatore, Dholi, Pundibari and Raigarh

TUR/CP/6.2	Management of foliar disease in turmeric	Coimbatore, Jagtial, Dholi, Raigarh, Kumarganj, Pundibari, Pottangi and Chintapalle
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 and Pechiparai
TSP/CI/2.2	CVT 1992 - cinnamon	Ambalavayal
TSP/CI/2.3	CVT 2001- nutmeg	Dapoli and Pechiparai
TSP/CI/2.4	CVT 2001 - cassia	Dapoli, Pechiparai and Ambalavayal
TSP/CM/2 Propagation/PHT Trials		
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		
	To be formulated based on the need	
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/2.1	CVT 2005	Jagudan, Jobner, Guntur, Dholi, Raigarh and Kumarganj
COR/CI/3 Varietal Evaluation Trial		
COR/CI/3.1	Initial evaluation trial	Hisar, Guntur, Jobner and Jagudan
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, <i>Azospirillum</i> on coriander	Hisar, Coimbatore and Kumarganj
COR/CM/5.2	Identification of drought/ alkalinity tolerant source in coriander	Guntur and Kumarganj
COR/CM/5.3	Production of leafy type coriander in off season (summer)	Coimbatore, Guntur, Hisar, Kumarganj
COR/CM/5.4	Role of <i>Rhizobacteria</i> in growth promotion of Coriander	Coimbatore, Guntur, Hisar, Jagudan, Raigarh

COR/CP/6	Disease Management Trial	
	To be finalized in the proposed Brain storming session at NRCSS, Ajmer	
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/CI/2.1	CVT 2005	Jobner and Jagudan
CUM/CI/3	Varietal Evaluation Trial	
CUM/CI/3.1	Initial evaluation trial	Jobner and Jagudan
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	Role of <i>Rhizobacteria</i> in growth promotion of Cumin	Jagudan, Jobner
CUM/CP/6	Disease Management Trial	
CUM/CP/6.1	Management of wilt and blight diseases in cumin	Jagudan and Jobner
CUM/CP/6.2	Management of cumin wilt through biocontrol agents	Jagudan and 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/2.1	CVT – 2004 –Series V	Dholi, Hisar, Jagudan, Jobner and Kumarganj
FNL/CI/2.2	CVT – 2007 –Series VI	Jobner, Jagudan, Hisar and Kumarganj
FNL/CI/3	Varietal Evaluation Trial	
FNL/CI/3.1	Initial evaluation trial	Hisar, Jobner and Jagudan
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	Identification of drought/ alkalinity tolerance source in fennel	Kumarganj
FNL/CM/5.2	Role of Rhizobacteria in growth promotion of fennel	Jagudan, Hisar, Raigarh
FENUGREEK		
FGK/CI/1	Genetic Resources	
FGK/CI/1.1	Germplasm collection, characterization, evaluation conservation and screening against diseases	Dholi, Guntur, Hisar, Jagudan, Jobner and Kumarganj
FGK/CI/2	Coordinated Varietal Trial	
FGK/CI/2.1	CVT 2005 – Series VI	Jobner, Jagudan and Hisar
FGK/CI/2.2	CVT 2006	Kumarganj, Dholi, Guntur, Jobner, Jagudan and Hisar
FGK/CI/3	Varietal Evaluation Trial	
FGK/CI/3.1	Initial evaluation trial	Guntur, Hisar, Jagudan and Jobner
FGK/CM/4	Nutrient Management Trial	
FGK/CM/4.1	Identification of drought/tolerance source in fenugreek	Coimbatore and Guntur
FGK/CM/4.2	Effect of bio-regulators on fenugreek	Jobner, Coimbatore and Dholi
FGK/CM/4.3	Role of Rhizobacteria in growth promotion of fenugreek	Jobner, Jagudan, Guntur, Hisar, Kumarganj
PAPRIKA		
PAP/CI/1.1	Germplasm collection, characterization, evaluation and conservation of paprika	Coimbatore, Guntur and Yercaud

LIST OF CONCLUDED PROJECTS

Black pepper		
PEP/CI/3.1	CVT 1991 – Series IV	Yercaud and Dapoli
Cardamom		
CAR/C1/3.4	CVT 2000- Series IV	Mudigere, Pampadumpara, Myladumpara and Sakleshpur
CAR/CM/5.1	Integrated nutrient management in cardamom	Mudigere
CAR/CM/5.2	Effect of biofertilizer, <i>Azospirillum</i> on cardamom	Mudigere, Pampadumpara and Myladumpara
CAR/CM/5.3	Effect of biofertilizers, <i>P. solubilizers</i> on cardamom	Mudigere, Pampadumpara and Myladumpara
CAR/CM/5.4	Effect of neem cake on productivity, pest and disease incidence in cardamom	Mudigere and Pampadumpara,
CAR/CP/6.1	Bioecology of natural enemies of major pests of cardamom	Mudigere and Pampadumpara
CAR/CP/6.2	Estimation of quantitative and qualitative losses due to thrips damage in cardamom	Mudigere and Pampadumpara
Ginger		
GIN/CI/2.1	CVT 2000 – Series V	Pundibari, Raigarh and Pottangi
GIN/CM/5.1	Effect of micronutrients on ginger	Dholi, Kumarganj, Pottangi, Pundibari and Raigarh
GIN/CP/6.4	Survey and monitoring of diseases in ginger	Pundibari, Kumarganj and Raigarh
GIN/CP/6.5	Management of rhizome rot in ginger	Mudigere, Pampadumpara, Chintapalle, Sirsi and Dapoli
Turmeric		
TUR/CI/2.1	CVT 2000 - Series V	Jagtial, Pundibari, Raigarh, Coimbatore and Kumarganj
TUR/CI/3.1	Comparative yield trial 1999-2000	Pundibari and Raigarh
TUR/CI/4.2	Impact of environment on quality of turmeric	Coimbatore
TUR/CM/5.1	Effect of biofertilizer, <i>Azospirillum</i> on turmeric	Coimbatore, Kumarganj and Pundibari
TUR/CM/5.2	Organic farming in turmeric	Pundibari, Pottangi
TUR/CP/6.2	Investigations on the causal organism of rhizome rot of turmeric and screening of biocontrol agents for its management	Coimbatore, Jagtial, Pundibari, Dholi, Kumarganj, Pottangi and Raigarh
Tree Spices		
TSP/CP/3.1	Survey for disease incidence in tree spices	Dapoli, Pechiparai and Ambalavayal

Coriander

COR/CI/2.2	CVT 2004 – Production of leafy type coriander during off-season	Coimbatore, Guntur and Hisar
COR/CM/5.2	Effect of bio-regulators on coriander Coimbatore, Hisar and Guntur	Jobner, Kumarganj, Dholi,
COR/CP/6.1	Management of powdery mildew and stem gall in coriander	Coimbatore, Jagudan, Jobner, and Raigarh

Fennel

FNL/CM/5.1	Effect of biofertilizer, <i>Azospirillum</i> on fennel	Kumarganj
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