

XXXIV वीं वार्षिक समूह बैठक का कार्यवृत्त Proceedings of XXXIV Annual Group Meeting

भाकृअनुप-अखिल भारतीय समन्वित मसाला अनुसंधान परियोजना ए आई सी आर पी एस
ICAR-All India Coordinated Research Project on Spices

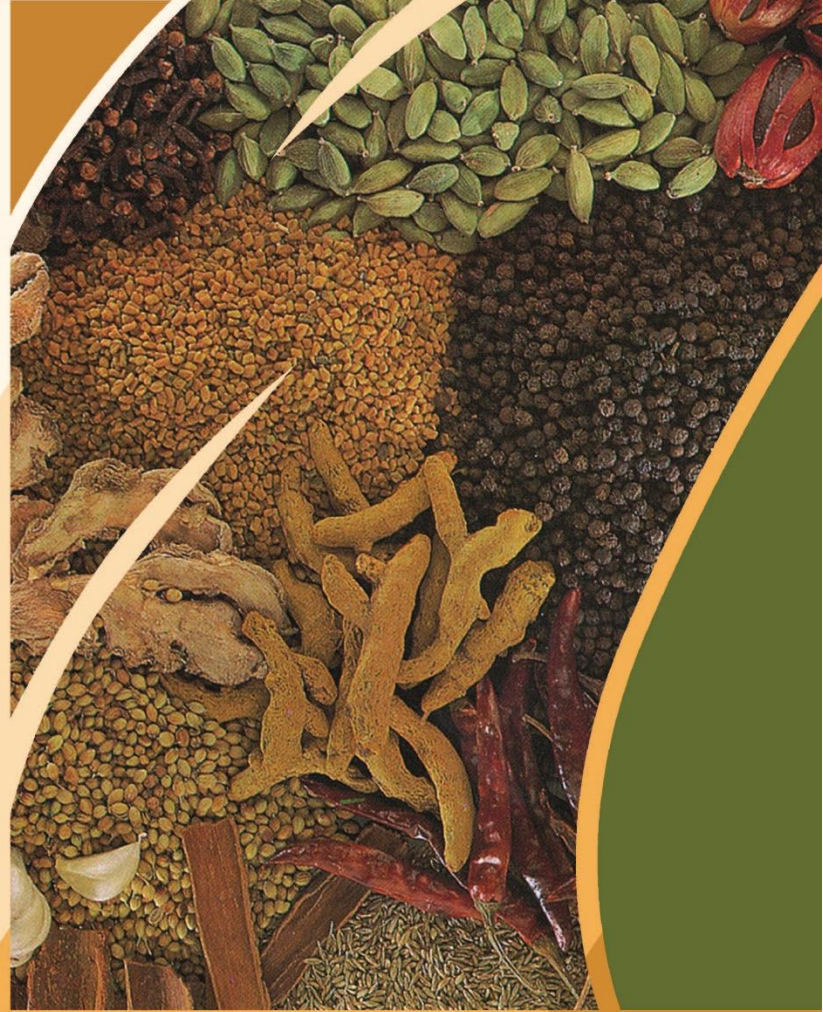


30 अक्टूबर - 01 नवंबर 2023

बागवानी विज्ञान विश्वविद्यालय, बागलकोट
बागवानी महाविद्यालय, बेंगलुरु, कर्नाटक

30 October- 01 November 2023

University of Horticultural Sciences,
College of Horticulture,
Bengaluru, Karnataka



भाकृअनुप-अखिल भारतीय समन्वित मसाला अनुसंधान परियोजना
ICAR- ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES
भाकृअनुप-भारतीय मसाला फसल अनुसंधान संस्थान
ICAR-Indian Institute of Spices Research
कोषिककोड Kozhikode-673 012, केरल Kerala

PROCEEDINGS OF XXXIV ANNUAL GROUP MEETING
ICAR- All India Coordinated Research Project on Spices

30 October – 01 November 2023

**Venue: College of Horticulture, University of Horticulture (Campus),
Bengaluru, Karnataka**



ICAR- ALL INDIA COORDINATED RESEARCH PROJECT ON SPICES
ICAR-Indian Institute of Spices Research
Kozhikode-673 012, Kerala

2023

December 2023

Compiled & edited by

Mukesh Sankar. S
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XXXIV Annual Group Meeting of ICAR-AICRP on Spices

Venue: College of Horticulture, University of Horticulture (Campus), Bengaluru, Karnataka

Date: 30 October – 01 November 2023

Organized by: ICAR-AICRPS, ICAR-IISR, Kozhikode

Inaugural Session		30 October 2023 (09.30 AM – 11.00 PM)
09.30 AM – 09.35 AM	Invocation Song	
09.35 AM – 09.45 AM	Welcome address	Dr. D. Prasath, Project Coordinator (Spices), ICAR-AICRP on Spices, Kozhikode, Kerala.
09.40 AM – 09.55 AM	Inauguration and address by Chief Guest	Dr. S. V. Suresha, Vice Chancellor, UAS Bengaluru, Karnataka.
09.55 AM - 10.25 AM	Address by Guest of Honour	Dr. N.K. Krishna Kumar Former DDG (HS), ICAR, New Delhi. Dr. S.B. Dandin, Former Vice Chancellor, UHS, Bagalkot, Karnataka. Dr. V. A. Parthasarathy Former Director & PC (Spices), ICAR-IISR, Kozhikode, Kerala
10.25 AM - 10.30 AM	Release of Publications	
10.30 AM - 10.40 AM	Felicitations	Dr. R. Dinesh, Director, ICAR-IISR, Kozhikode, Kerala. Dr GSK Swamy, Dean (Acting), COH-Bengaluru Campus, Karnataka.
10.40 AM - 10.45 AM	Presentation of Awards & Honours	
10.45 AM - 10.55 AM	Presidential address	Dr. Sudhakar Pandey, ADG (FVS & MP), ICAR, New Delhi
10.55 AM - 11.00 AM	Vigilance Awareness Week pledge	
11.00 AM - 11.05 AM	Vote of Thanks	Dr. H. P. Maheswarappa, DoR, UHS Bagalkot, Karnataka.
	Rapporteurs	Dr. Sharon Aravind, ICAR-IISR Dr. Nimisha Mathews, KAU
11.05 AM	National Anthem	

Session I	AICRP Progress Report	11.30 AM – 12.00 PM
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Chair Dr. Sudhakar Pandey, ADG (FVS & MP), ICAR
Co-chairs Dr K Nirmal Babu, Former Director, ICAR-IISR
Dr. R. Dinesh, Director, ICAR-IISR

Presentation of the report - Dr. D. Prasath, Project Coordinator, ICAR-AICRP on Spices

Rapporteurs Dr. H.J. Akshitha, ICAR-IISR

Session II	Genetic Resources & Crop Improvement	12.00 PM - 4.00 PM
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Chair Dr. V.A. Parthasarathy, Former Director, ICAR-IISR
Co-Chairs Dr. E.V.D. Sastry, Head, Jaipur National University
Rapporteurs Dr. M.S. Shivakumar, ICAR-IISR
Dr. Surabi S Chauhan, SDAU

Crop-wise presentations

Black Pepper	Dr. V. Sivakumar, Dr YSRHU, Chintapalli
Cardamom	Dr. H.J. Akshitha, ICAR-IISR
Large Cardamom	Dr. T.N. Deka, ICRI, Gangtok
Ginger	Dr. Parshuram Sial, OUAT, Pottangi
Turmeric	Dr. Ramkrishna Sarkar, UBKV, Pundibari
Tree Spices	Dr. P. C. Mali, Dr BSKKV, Dapoli
Nutmeg (Project mode)	Dr. Vikram H. C., KAU, Thrissur
Saffron & Kalazeera	Dr. Basheer Ahammed, SKUAST, Pampore
Coriander	Dr. Shrikant Sawargaonkar, IGKV, Raigarh
Cumin	Dr. Surabhi S Chauhan, SDAU, Jagudan
Fennel	Dr. R.S. Meena, ICAR-NRC-SS, Ajmer
Fenugreek	Dr. K. Giridhar, Dr YSRHU, Guntur
Ajwain	Dr. S. S. Meena, ICAR-NRC-SS, Ajmer
Nigella	Dr. S. S. Meena, ICAR-NRC-SS, Ajmer

Session III**Crop Management****4.00 PM –6.00 PM**

Chair Dr. R. Dinesh, Director, ICAR-IISR
Co-Chairs Dr. H. P. Maheswarappa, Director of Research, UHS-B
Dr Prakash Patil, Project Coordinator (AICRP on Fruits)

Rapporteurs Dr. R Shivaranjani, ICAR-IISR
Dr. Reena Nair, JNKV

Crop-wise presentations

Cardamom	Dr. Nimisha Mathews, KAU, Pampadumpara
Large Cardamom	Dr. Amit Kumar, ICAR Res. Complex - NEH Region, Gangtok
Ginger	Dr. P. Srinivas, SKLTSHU, Kammarpalli
Turmeric	Dr. M. Mohanalakshmi, TNAU, Coimbatore
Coriander	Mr. G. L. Kumawat, SKNAU, Jobner
Cumin	Mr. G. L. Kumawat, SKNAU, Jobner
Fennel	Dr. Ravindra Singh, ICAR-NRC-SS, Ajmer
Fenugreek	Dr. Ravindra Singh, ICAR-NRC-SS, Ajmer

31 October 2023**Session IV****Crop Protection****9.30 AM – 11.30 AM**

Chair Dr. N.K. Krishna Kumar, Former DDG (HS), ICAR
Co-Chairs Dr. S. N. Sushil, Director, ICAR-NBAIR, Bengaluru
Dr. S. J. Eapen, Former Director, ICAR-IISR

Rapporteurs Dr. Mohammed Faisal Peeran, ICAR-IISR
Dr. S. Maruthasalam, TNAU

Crop-wise presentations

Black Pepper	Dr. Mohammed Faisal Peeran, IISR, RS Appangala
Cardamom	Dr. K. A. Saju, ICRI, Myladumpara
Ginger	Dr. Anamika Debnath, UBKV, Pundibari
Turmeric	Dr. B. Mahender, SKLTSHU, Kammarpally
Coriander	Dr. A.K. Mishra, RCAU, Dholi
Cumin	Mr. G. L. Kumawat, SKNAU, Jobner
Fenugreek	Dr. S. Maruthasalam, TNAU, Coimbatore
Nigella	Dr. Pradip Kumar, NDUAT, Kumarganj
Seed spices	Dr. A.K. Mishra, RCAU, Dholi

Session V	Varietal Identification	11.30 AM-01.30 PM
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Chair Dr. Sudhakar Pandey, ADG (FVS & MP), ICAR
 Co-Chairs Dr. K. Nirmal Babu, Former Director, ICAR-IISR
 Dr. Augustine Jerard, Project Coordinator (Palms), ICAR-CPCRI

Rapporteurs Dr. Gobu R, ICAR-IISR
 Dr. Ramkrishna Sarkar, UBKV

Presentation of variety Identification proposals

Ajwain	Dr. Surabhi S Chauhan, SDAU, Jagudan
Nigella	Dr. S.K. Tehlan, HAU, Hisar
Mango ginger	Dr. S. Arathi, ICAR-IISR, Kozhikode
Black Pepper	Dr. L.S. Singh, ICAR-CPCRI, Kahikuchi
Ajwain	Dr Tanuja Priya, DrYSRHU, Guntur
Fenugreek, turmeric, mango ginger	Dr RK Patel, NAU, Navsari

Session VI	Transfer of Technology	2.00 PM – 5.30 PM
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Co-Chairs Dr. Vikramaditya Pandey, Principal Scientist, ICAR
 Dr. A. B. Rema Shree, Director (Research), Spices Board

Rapporteurs Dr. Honnappa Asangi, ICAR-IISR
 Dr. Tanuja Priya, Dr. YSRHU

Presentations of technology proposals

Black Pepper	Black pepper-based mixed cropping system for sustainable productivity	Dr. Reshmi Paul, KAU, Panniyur
Black Pepper	Biological control of soil borne pathogens	Dr. Mohammed Faisal Peeran, ICAR-IISR, RS Appangala
Cardamom	Management of pseudostem rot of cardamom	Dr. M. Shivaprasad, UAHS, Mudigere
Seed spices	Intercropping of Seed Spices with vegetables for higher yield and income	Mr. G. L. Kumawat, SKNAU, Jobner
Coriander	Integrated pest and disease management in coriander	Dr. A. K. Singh, IGKV, Raigarh
Fennel	Foliar application of iron and zinc on growth, yield and quality of fennel	Dr Ravindra Singh, ICAR-NRCSS, Ajmer
Fenugreek	Fertigation schedule for fenugreek	Dr Ravindra Singh, ICAR-NRCSS, Ajmer
Cumin	Integrated aphid management in cumin	Dr. N.R. Patel, SDAU, Jagudan

01 November 2023

Plenary Session

10.00 AM – 12.00 AM

Chair Dr. Vikramaditya Pandey, Principal Scientist, ICAR, New Delhi
Co-Chairs Dr. R. Dinesh, Director, ICAR-IISR
Dr Prakash Patil, Project Coordinator, AICRP (Fruits)

Rapporteurs Dr. Sharon Aravind, ICAR-IISR
Dr. Mukesh Sankar S, ICAR-IISR

Presentation of Rapporteurs Reports and Recommendations

Session I	Dr. H.J. Akshitha, ICAR, IISR
Session II	Dr. M.S. Shivakumar, ICAR-IISR
Session III	Dr. R Shivaranjani, ICAR-IISR
Session IV	Dr. Mohammed Faisal Peeran, ICAR-IISR
Session V	Dr. Gobu R, ICAR-IISR
Session VI	Dr. Honnappa Asangi, ICAR-IISR

Vote of thanks

National Anthem

INAUGURAL SESSION

The XXXIV Annual Group Meeting (AGM) of ICAR-All India Coordinated Research Project on Spices (AICRPS) was conducted during 30 October-01 November, 2023 at the College of Horticulture, University of Horticulture campus, Bengaluru, Karnataka.

Dr. D. Prasath, Project Coordinator, ICAR-AICRP (Spices), formally welcomed the gathering of eminent scientists from various AICRPS centers across the country. He highlighted the achievements of different centres under AICRP on Spices and the actions taken on recommendations that emerged during the XXXIII Group Meeting, with emphasis on various ongoing research activities, new initiatives, and flagship programs related to the Northeast regions, SCSP, and TSP.

The AICRPS Group meeting was formally inaugurated by Dr. S V Suresha, Honourable Vice Chancellor of the University of Agricultural Sciences (UAS) Bengaluru, Karnataka. In his inaugural address, Dr. S.V. Suresha emphasized the challenges faced by small and marginal farmers in the spice industry. He underscored the importance of extension outreach activities to bring technology to these farmers and enhance the productivity of spice crops. Furthermore, he emphasized enhancing the export potential of spices by adopting Good Management Practices. Dr. Suresha also highlighted the need for research in processing and value addition, particularly focusing on the medicinal and cosmetic aspects of spices to expand market share and export potential. Additionally, he stressed the importance of achieving seed standards, suggesting that such discussions should be a key focus in the Annual Group Meeting.

Dr. Sudhakar Pandey, ADG (FVS & MP), ICAR presided over the function and in his presidential address, outlined critical insights and imperatives for the spice industry. Notably, he underscored the pivotal role of horticultural crops, constituting 33% of the total GDP, and emphasized the need for identifying successful crop varieties to achieve the ambitious goal of doubling farmers' income. He suggested formulating appropriate research initiatives on the natural farming of spices under fluctuating soil nutrient status, microbial dynamics and climatic variations in the future to boost up the economy. He suggested the need for organized farming and expanding spice cultivation to non-traditional areas. Dr. Pandey proposed the exploration of artificial intelligence applications in the Annual Group Meeting to address these issues effectively. In recognition of the commendable efforts in the spice sector, Dr. Pandey expressed appreciation for the dedicated work of research centers and scientists, acknowledging their vital contributions to the advancement of the spice industry.

Dr. N. K. Krishna Kumar, Former Dy. Director General (HS), was the Guest of Honour during the occasion. In his address. He emphasised the need to address the pesticide residue in spices.

In his address, Dr. S. B. Dandin outlined pivotal strategies for the sustainable development of the spice sector, placing significant emphasis on the imperative of crop diversification. Notably, he proposed the establishment of spice gardens as showcases for heritage cultivation materials by farmers, providing a tangible platform for sharing expertise in spice cultivation. Addressing concerns associated with mono-cropping, Dr. Dandin strongly advocated for the incorporation of landraces and wild types in crop

diversification. This strategic approach aims to mitigate issues arising from an over-reliance on a single spice crop, promoting biodiversity and fostering resilience within the sector. Furthermore, Dr. Dandin underscored the necessity for product diversification in spices. This entails exploring and promoting a broader range of spice products to enhance market competitiveness and meet the evolving demands of consumers.

In an insightful address during the Annual Group Meeting Dr. V.A. Parthasarathy championed a forward-thinking approach for the spice industry. He strongly advocated for the introduction and exploration of herbal spices, underscoring their potential to significantly contribute to the diversification of the sector. Dr. Parthasarathy proposed a paradigm shift in the perception of germplasm materials, as genomic resources. This, he emphasized, should involve an extensive phenotyping-genotyping exercise across all research centers. Recognizing the transformative impact of such a shift, Dr. Parthasarathy highlighted its potential to advance spice research significantly. Furthermore, he stressed the pressing need for the research sectors to embrace digitalization in research practices. Dr. Parthasarathy underscored that it is high time to transition from traditional data books to electronic storage of research data. This transition, he argued, would lead to better utilization of data in future studies, marking a crucial step forward for the industry's research methodologies.

Dr. R. Dinesh, Director of ICAR-IISR, delivered a talk that encapsulated the critical essence of the challenges and opportunities within the spice industry. His address not only illuminated the urgent issues facing the sector but also advocated for strategic interventions to secure a sustainable and prosperous future for spice farmers. He shed light on critical concerns facing the spice industry encompassing declining productivity, soil health issues, food safety challenges, and the persistent problems of adulteration and contamination in spices. Emphasizing the imperative of profit maximization for farmers, Dr. Dinesh highlighted the significance of product diversification as a strategic measure. This approach not only ensures economic viability for farmers but also contributes to the resilience of the spice sector. Furthermore, he underscored the pivotal role of research and development in the evolution of tangible solutions for end-users. One of the notable initiatives mentioned was the organization of a brain-storming session dedicated to creating awareness among policymakers about the challenges associated with pesticide residues.

Dr GSK Swamy, Dean, CoH formally invited all the participants to visit the college and farm.

Best AICRPS centre award was conferred to SKN, College of Agriculture, Jobner, Rajasthan. Shri. Ramakanth Ramachandra Hegde, a progressive farmer was honoured for his endeavor in conserving indigenous land races and his contribution in developing farmer variety 'Sigandini'. A database on spice varieties - "Spice Var" was launched which gives detailed information on the significant characters of the spice varieties. Fifteen extension booklets/pamphlets on spices production technologies in English and regional languages from different AICRPS centres were released during the occasion. During this inaugural session, various AICRPS centres showcasing the genetic diversity and varietal wealth of spices was exhibited.

Dr. Nirmal Babu, Former Director of ICAR-IISR, Kozhikode; Dr. SJ Eapen, Former Director of ICAR-IISR; Dr. Augustine Jerard, Project Coordinator (AICRPS Palms); and Dr. EVD Sastri, Head of Jaipur University, along with HODs of ICAR-IISR, scientists from NRC on Seed Spices, and other delegates, graced the occasion.

The inaugural session was concluded with a vote of thanks by Dr. H.P. Maheshwarappa DoR, UHS Bagalkot.

ICAR-All India Coordinated Research Project on Spices Project Coordinators report (2022-23)

The ICAR-AICRP on Spices is the largest spices research system in India, with a network of 40 centres, focusing on 17 spice crops like black pepper, large cardamom, small cardamom, ginger, turmeric, mango ginger, cinnamon, nutmeg, clove, coriander, cumin, fennel, fenugreek, nigella, ajwain, saffron and kalazeera. The AICRP on Spices has contributed substantially, ever since its inception, in developing 182 high-yielding varieties with desirable agronomic traits, 182 technologies for increasing production and productivity, and management strategies for combating pests and pathogens, substantially reducing crop losses in these crops. The group meeting will provide a platform for researchers to come together and share their findings, ideas, and experiences in the field of spice research. The group meeting after three days of deliberations will identify high-yielding spices varieties and sustainable technologies for different spice-growing regions in India.

During 2022-23, 79 research programmes were carried out which included 44 in Genetic resources and crop improvement, 18 in crop management, and 17 in crop protection.

Genetic Resources and Crop Improvement

During the year, a remarkable living catalogue of genetic diversity comprising 9880 unique collections of spice crops is conserved under ICAR-AICRPS. The crop improvement efforts led to the documentation of a high-yielding cardamom hybrid, PH 13 under the CVT trial yielding 1.18 kg of dry capsules per plant with more than 66% of capsules exceeding 8mm in size. Similarly, a high-yielding large cardamom line of the dwarf Seremna type was also documented. The Coordinated varietal trials concluded with top-yielding entries in the spice crops such as.

- Mango ginger: IISR Amrit (Acc.347), a high-yielding variety with bold rhizome, developed by ICAR-IISR, Kozhikode
- Ajwain: JA-18-05 (Jagudan)
- Nigella: HKL 12 (Hisar)

The AICRP on Spices played a pivotal role in facilitating the assessment of a novel black pepper cultivar, Kamakhya-1, earmarked for release in the North-eastern region of India. This marks a significant milestone as Kamakhya-1 stands as the inaugural black pepper variety specifically identified for release in the Assam state which is a non-traditional region for black pepper cultivation, presenting promising prospects for the prospective expansion of black pepper cultivation in the region. Five new CVTs were initiated for large cardamom, bold ginger, high essential oil ginger, Ajwain, and black turmeric.

Furthermore, AICRPS also facilitated notification of the following seven improved spice varieties by CSCSS and VR (Horticultural Crops) during 2022-23:

1. Chhattisgarh Raigarh Haldi 3
2. Chhattisgarh Raigarh Dhanya 3
3. Phule Kasturi
4. Gujarat Ajwain 2

5. Chhattisgarh Ajwain 1
6. CG Karayat 1
7. Shalimar Saffron 1

These novel and improved crop varieties may usher in a newfound agricultural diversity heralding improved yields that fill farmers' coffers while promoting local adaptation and innovative cultivation.

Crop Management

ICAR-AICRPS has developed over 182 crop-wise technologies for soil and plant health management in various spice crops.

During the current year, the following technologies were standardized.

1. Mixed cropping systems in black pepper and elephant foot yam, a productive and profitable (B:C ratio of 3.21) system. Technology has the potential to boost farmers' income significantly.
2. Standardized foliar application of Fe and Zn for maximum growth and yield of fennel. FeSO_4 (0.4%) + ZnSO_4 (0.6%) @ 60, 75 and 90 days after sowing. Recommended for Bihar, Gujarat, Rajasthan and Uttar Pradesh
3. Drip irrigation interval and method of micronutrient application have been standardized for fenugreek.
4. Fennel-garlic and coriander-garlic crop combinations performed better in Uttar Pradesh, Bihar, Madhya Pradesh, Rajasthan and Chhattisgarh.

With these innovations in place, our tillers of the land possess the potential to augment their crop yields, curtail the cost of inputs, and diversify the sources of agricultural income from spice-based systems.

Crop Protection

In pursuit of agricultural excellence, AICRP on Spices championed the noble banner of ecological stewardship, forging a sustainable and profitable path for our steadfast farmers. As on the conclusion of current season trials, AICRPS emerges as a vanguard, bearing recommendations on

- Biological control of soil-borne pathogens in black pepper
- Integrated pest and disease management in coriander
- Identification of Coriander stem gall-tolerant donor lines (COR 174 and COR 178)
- Aphid management practices in cumin (Gujarat).

Thus orchestrating a symphony of progress that hold promise for future generations, securing their agricultural heritage and the legacy of ecological resilience, and nurturing a network of interconnected lives that endures beyond our time.

NEH, TSP and SCSP implementation

ICAR-AICRPS technologies have also percolated to the remote and inaccessible tribal lands of Andhra Pradesh, Odisha, Chhattisgarh and in six NE states through our seven centers involved in AICRPS. Effective implementation of SCSP (5 centres) and TSP programmes (7 centres). The programmes were structured to provide essential inputs

like seeds or planting materials, fertilizers, trainings and FLDs to beneficiaries including rural youth in motivating their involvement in spice-based farming or processing enterprise. These programs have brought positive transformations, promoting inclusive developments, and reducing disparities among marginalized tribal as well as backward communities.

Budget and staff position

The AICRP on spices has a total budget of Rs. 789.18 lakhs, with a utilization rate of 100%. It employs 32 scientific staff, 15 technical staff and 3 lab assistants.

**RECOMMENDATIONS OF XXXIII ANNUAL GROUP MEETING
and
ACTION TAKEN REPORT**

ICAR- All India Coordinated Research Project on Spices

Sl. No	Recommendation	Action	Action taken report
Genetic resources and crop improvement			
1.	Common procedure for screening for various biotic stress has to be developed by AICRPS, ICAR-NRCSS, Ajmer and ICAR-IISR, Kozhikode	PC-AICRPS ICAR-IISR ICAR-NRCSS	Technical bulletin on 'Pest and disease screening techniques and measurement of intensity in major spices' has been prepared by ICAR-AICRPS with technical inputs from ICAR-IISR and ICAR-NRCSS. All the centres will follow these guidelines strictly for recording various pest and disease incidence.
2.	Identify attributes for vegetable turmeric and evaluate genotypes for vegetable purposes based on the identified attributes	Navsari	The following attributes are identified for evaluation of the genotypes suitable for the vegetable purpose in turmeric. All the observations should be recorded at 130 days after sowing: <ol style="list-style-type: none"> 1. Fresh rhizome yield at 130 days after sowing 2. Fresh rhizome length (cm) 3. Fresh rhizome width (cm) 4. Number of primary fingers 5. Length of primary fingers 6. Width of primary fingers 7. Inner core colour of rhizome 8. Flavour /aroma of fresh rhizome 9. Taste 10. Texture of rhizome 11. Overall acceptability
3.	Schedule of spraying has to be formulated and communicated to all the centers by ICAR-IISR, Kozhikode for screening purpose in the cardamom trials (CAR/CI/4.4 and 4.5)	ICAR-IISR, Kozhikode	Instructions were given to centres not to undertake spraying of insecticides in trials intended for screening against cardamom thrips. However, for the management of diseases in those trials, the centres were advised to follow the package of practices of ICAR-IISR.

			The same has been communicated to all cardamom centres from AICRPS.
4.	CVT may be initiated in large cardamom centres. ICRI may provide the genotypes for multilocational testing	ICRI, Sikkim/PC	A new CVT trial, LCA/CI/2.1: CVT on large cardamom is initiated during 2023 at ICRI-Sikkim, ICAR-Sikkim, and Pasighat (KVK, Anjaw, Arunachal Pradesh) with seven promising genotypes (Ramla-2, Golley-2, Ramsey-1, Swaney-1, Varlangey-1) along with ICRI-Sikkim as National Check and two local checks.
5.	All the centers should submit the fenugreek (FGK/CI/3.7) samples of released varieties and entries under CVT to ICAR-NRCSS, Ajmer for chemoprofiling	Coimbatore, Guntur, Dholi, Hisar, Jobner, Kumarganj	Fenugreek seed samples were received from Kumarganj, Guntur, Coimbatore and profiling for diosgenin and 4-hydroisolucine content has been done and data will be communicated shortly. Coimbatore: Co.1 and Co.2 Dholi: Rajendra Kanti, RM-28 & RM-204 Jobner: Completed quality profiling of 10 varieties with the existing facilities. The essential oil content varied from 2.68 to 3.95%. The saponine content varied from 4.68 to 6.44% (RMt-1, RMt-43).
6	CVT on green leafy coriander may be initiated (focus must be on stem characters)	Jobner, Guntur, NRC SS	NRCSS: Preliminary selection of genotypes has been done during 2022-23 and replicated station trial of promising genotypes will be conducted during rabi 2023-24. The best-performing entries for leafy coriander will be contributed for conducting CVT during rabi 2024-25. Jobner: A new trail will be proposed during <i>Rabi</i> 2023-24. Coriander genotypes UD-828, and UD-833 were identified for leafy purpose. UD-828 recorded 750 g leaves/plot in first and second cutting each while UD-833 recorded 600 g leaves/plot in first cutting and 1300 g leaves/plot in second cutting.

			Guntur: Collected the genotypes, evaluation is under process and elite types will be identified to propose for CVT.
7	New CVT has to be proposed by the Jobner centre with the available data in the trial, FGK/CI/1.3: Identification of drought tolerance source in fenugreek	Jobner	The genotypes UM-38, UM-80, UM-66 and UM-89 are identified as drought tolerant. These entries are included in the proposed CVT. These were identified on the basis of TOL, SSI, STI and mean performance under moisture stress conditions.
8	A new CVT in nutmeg may be proposed	Dapoli, ICAR-IISR Pechiparai	ICAR-IISR: Three accessions are being proposed for testing under the new CVT on Nutmeg. Pechiparai: Two accessions have been identified for the proposed CVT from the existing germplasm collection of nutmeg maintained at HRS, Pechiparai Dapoli: Six promising accessions DBSKKVMF-17, 19, 23, 25, 26, 29) have been identified.
Crop management			
9.	Uniform management practices with schedule of spraying in small cardamom trial should be communicated to all the centres by ICAR-IISR, Kozhikode for screening purpose.	ICAR-IISR, Kozhikode	For the crop management and of diseases management, the centres were advised to follow the package of practices of ICAR-IISR. Instructions were also given to centres not to undertake spraying of insecticides in trials intended for screening against cardamom thrips.
10.	Large cardamom: Pesticide residue should be carried out in large cardamom capsules growing from Darjeeling Belt.	ICRI, Sikkim	Pesticide residue analysis of two large cardamom samples of Sikkim region (RF/0658/08/2021: ICRI RRS Farm at Kabi, Mangan District Sikkim; RF/0659/08/2021: Farmers field, Heegaon, Geyzing District) were carried out at KAU by AICRPS Sikkim centre (ICRI). No pesticide residues were detected from the samples.
Crop Protection			
11.	High altitude station such as Ambalavayal and	PC	The trial was concluded in high altitude centres of black pepper.

	Pampadumpara can terminate the trial PEP/CP/7.1, where the pest incidence is least.		
12.	For seed spices, entomologist and pathologist working on seed spices should invited to attend the review meeting.	ICAR-NRCSS PC	Invitation is extended to ICAR-IISR and ICAR-NRCSS scientists involved in AICRPS programmes and other scientists as technical experts. Accordingly, Directors of both the Institutes have deputed all the experts for AICRPS group meeting, including entomologist and pathologist working on seed spices.
13.	TUR/CP/7.8, Observations on scale insect incidence during storage of seed rhizomes of turmeric have to be recorded in priming experiment	Turmeric centres	The main aim of the priming experiment is to study the effect of rhizome priming on the incidence of storage rot & rhizome rot in turmeric. As an additional observation, scale insect incidence was recorded in turmeric by five centers and the other centers will be recording the data during 23-24.
14.	New diseases including virus, Phytoplasma and insect pests observed during the period should be documented and presented.	All the centres	Instructions regarding the this were communicated to all centres from PC Cell. No new pests are reported from any of the centres.
Varietal release			
15.	In future, co-dominant markers such as SSR markers may be used instead of ISSR and RAPD markers and molecular profiling should be compared with parental genotype.	All the centres	ICAR-IISR has established a DNAFF (DNA fingerprinting facility) for Spices. The facility has initiated work related to the identification of highly polymorphic SSR/SNP loci for fingerprinting in major spice crops. However, in most of the minor spice crops, genomic data is still limited or unavailable, in such cases, we currently rely on generic markers such as ISSR. Once sufficient genomic data is accessible, we will swiftly integrate SSR markers into our fingerprinting analysis.
16.	Weighted parameter indexing/score card (including quality parameters) for seed spices developed by ICAR-NRCSS	NRCSS	Score card for seed yield attribute and quality parameters for seed spices developed by ICAR-NRCSS will be presented during AICRP(S) group

	should be refined and to be used during variety identification		meeting 2023 for further refinement and finalizing the weighted scores for various parameters. After refinement and finalizing it would be used for variety identification.
17.	All the AICRP Spices recommended varieties have to be notified by CSCSS and VR (Horticultural Crops)	All the centres	Last year, seven varieties were notified by CSCSS and VR (Horticultural Crops). The notified varieties are: <ol style="list-style-type: none"> 1. Chhattisgarh Raigarh Haldi 3 2. Chhattisgarh Raigarh Dhanya 3 3. Phule Kasturi 4. Gujarat Ajwain 2 5. Chhattisgarh Ajwain 1 6. CG Karayat 1 7. Shalimar Saffron 1
18.	Varietal spread and impact of cumin varieties has to be undertaken	PC Jagudan	Undertaken varietal spread and impact of GC4 in India and same has been published as a technical Bulletin.

TECHNICAL SESSION: I
AICRP (SPICES) PROGRESS REPORT

Dr. D. Prasath, Project Coordinator, AICRP on Spices presented the progress report and Action taken report.

Recommendations

1. In large cardamom virus indexing should be done at ICAR-IISR and only virus-free material should be used in trials. All the centres will send samples of mother stock to IISR for virus indexing. (Action: ICRI-Sikkim and ICAR-IISR)
2. Data on heavy metals, need to be recorded in fenugreek and coriander used for leaf purposes (Action: Guntur, Coimbatore, Jobner and Jagudan)
3. Quarterly, half-yearly review of action taken report may be conducted with centres in online mode for better monitoring (Action: PC-AICRPS)

TECHNICAL SESSION: II

GENETIC RESOURCES AND CROP IMPROVEMENT

Recommendations

1. The germplasm collections have been well maintained in the NAGS at ICAR-IISR and ICAR-NRCSS. It was felt that a duplicate set of germplasm could be maintained in the following centers with strict control over its exchange (to be done with the consent of PC) (Action: All AICRPS Centres).
 - i. Black Pepper – Panniyur
 - ii. Cardamom-Pampadumara
 - iii. Large cardamom- ICRI, Sikkim
 - iv. Turmeric – Guntur
 - v. Ginger –Pottangi
 - vi. Tree spices – Dapoli
 - vii. Seed spices –Jobner
 - viii. Saffron – Pampore
2. The following programmes can be concluded with data from centres collated and analysed statistically using stability models and also for specific traits (Action: Concern AICRPS Centres).
 - i. PEP/CI/3.5: CVT 2015 Farmers' varieties of black pepper – Series VII
 - ii. CAR/CI/3.8: CVT 2015 Cardamom farmers varieties trial – Series VIII
 - iii. TUR/CI/2.7: CVT on Mango ginger
 - iv. FGK/CI/3.7: Chemoprofiling for identification of industrial types among released varieties of Fenugreek
 - v. AJN/CI/2.2: CVT on Ajwain-2019 series
 - vi. NGL/CI/2.2: CVT on Nigella-2019 series
3. Performance of certain centres such as Chintapalle, Mudigere etc need to be reviewed. PC may also, during his visit to centres, check the registers and records maintained in the centres (Action: PC-AICRPS).

Project-wise recommendations

Black pepper

PEP/CI/1.1: Germplasm collection, characterization, evaluation and conservation (Ambalavayal, Dapoli, Panniyur, Pundibari, Sirsi, Yercaud)

- Nil

PEP/CI/3.5: CVT 2015 on Farmers varieties of black pepper- Series VII (Chintapalli, Dapoli, Panniyur, Sirsi, Yercaud)

- The trial needs to be concluded. Four years of data need to be analyzed using stability analysis-regional adaptability needs to be identified.
- Data has to be analyzed as per the trait claimed by the farmer and should be reported to NAIF.
- Centres should submit a conclusion report on the trial by March 2024.

PEP/CI/3.6: CVT on black pepper 2015 – Series VIII (Chintapalli, Dapoli, Kahikuchi, Panniyur, Sirsi, Yercaud)

- The trial is continued till 2023 and concluded with the submission of conclusion report by March 2024.

PEP/CI/3.7: CVT 2018 on black pepper - Series IX (Ambalavayal, Chintapalli, Dapoli, Kozhikode, Panniyur, Sirsi, Yercaud)

- Nil

Cardamom

CAR/CI/1.1: Germplasm collection, characterization, evaluation, and conservation (Mudigere, Pampadumpara)

- It is recommended that Pampadumpara should be identified as an alternate site for cardamom germplasm conservation.

CAR/CI/3.8: CVT 2015 on Farmers varieties of cardamom-Series VIII (Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura)

- Stability analysis has to be done.
- The trial is continued till 2023 and concluded with the submission of conclusion report by March 2024.

CAR/CI/3.9: CVT on hybrids of small cardamom-2018 – Series IX (Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura)

- Nil

CAR/CI/4.4: Multi-location evaluation of thrips-tolerant cardamom lines (Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura)

- Nil

CAR/CI/4.5: MLT on leaf blight tolerant lines of small cardamom 2018 (Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura)

- Nil

Large Cardamom

LCA/CI/1.1: Germplasm collection and evaluation of large cardamom (ICAR Regional Station, Gangtok, ICRI Regional Research Station, Gangtok)

- Project coordinator should finalize the location for maintenance of disease-free mother block (virus-free).

LCA/CI/2.1: CVT on large cardamom (ICAR Regional Station, Gangtok; ICRI Regional Research Station, Gangtok; CAU, COH, Pasighat, Arunachal Pradesh/KVK, Anjaw)

- Regional Centre of ICAR NEHR, Basar, Arunachal Pradesh may be explored for future varietal trials and other trials on large cardamom.

Ginger

GIN/CI/1.1: Germplasm collection, characterization, evaluation and conservation (Barapani, Dholi, Kumarganj, Pottangi, Pundibari, Raigarh, Solan)

- Nil

GIN/CI/2.5: CVT on disease tolerance in ginger 2019 (Barapani, Chintapalli, Gangtok, Kozhikode, Nagaland, Pottangi, Pundibari, Raigarh)

- Nil

GIN/CI/2.6: CVT on bold ginger (Appangala, Kozhikode, Pottangi, Raigarh, Sikkim)

- Nil

GIN/CI/2.7: CVT on high essential oil ginger genotypes (Appangala, Kozhikode, Nagaland, Pottangi, Umiam)

- Nil

GIN/CI/4.3: Evaluation of genotypes of ginger for vegetable purpose (observational trial) (Chintapalli, Gangtok, Kozhikode, Mizoram, Nagaland, Pottangi, Pundibari)

- The trial should be concluded with the submission of the conclusion report by March 2024.

Turmeric

TUR/CI/1.1: Germplasm collection, characterization, evaluation and conservation (Barapani, Coimbatore, Dholi, Guntur, Kammarpally, Kumarganj, Pasighat, Pottangi, Pundibari, Raigarh, Solan)

- ICAR-IISR may take up quality parameters analysis

TUR/CI/2.7: CVT on mango ginger (Ambalavayal, Barapani, Dholi, Kozhikode, Navsari, Pottangi, Pundibari, Raigarh)

- The trial should be concluded with the submission of the conclusion report by March 2024.

TUR/CI/2.8: CVT on high yield and high curcumin(Coimbatore, Guntur, Kammarpally, Kanke, Kozhikode, Navsari, Pasighat, Pottangi, Raigarh,)

- Coimbatore centre data with traits having high CV may be omitted for data analysis.

TUR/CI/2.9: CVT on light yellow colour turmeric for specialty market (Coimbatore, Guntur, Kammarpally, Kanke, Kozhikode, Pasighat, Pottangi)

- Coimbatore centre data with traits having high CV may be omitted for data analysis.

TUR/CI/2.11: CVT on black turmeric *Curcuma caesia* (Barapani, Coimbatore, Kozhikode, Kumarganj, Mizoram, Navsari, Pottangi, Pundibari, Sirsi)

- The trial should be concluded with two years of data along with the submission of the conclusion report.

TUR/CI/3.9: Initial Evaluation Trial 2018 (Guntur)

- Continued as a station trial.

Tree Spices

TSP/CI/1.1: Germplasm collection, characterization, evaluation and conservation of clove, nutmeg and cinnamon (Dapoli, Pechiparai)

- Nil

TSP/CI/1.2: Collection of unique germplasm in tree spices (Dapoli, Pechiparai)

- Nil

TSP/CI/2.4: Coordinated Varietal Trial on farmer's varieties of nutmeg (Dapoli, Pechiparai, Thrissur)

- Nil

Project Mode: Evaluation of nutmeg genotypes (Thrissur)

- Nil

Coriander

COR/CI/1.1: Germplasm collection, description, characterization, evaluation, conservation and screening against diseases (Coimbatore, Dholi, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh)

- Nil

COR/CI/1.3: Identification of drought/ alkalinity tolerant source in coriander (Jobner)

- Continued as station trial

COR/CI/2.8: Coordinated varietal trial on coriander–2021- Series XI (Ajmer, Coimbatore, Dholi, Guntur, Hisar, Jabalpur, Jagudan, Jobner, Kalyani, Kota, Kumarganj, Navsari, Pantnagar, Raigarh, Sanand)

- Nil

COR/CI/4.1: Quality evaluation in coriander (Jobner)

- Nil

Cumin

CUM/CI/1.1: Germplasm collection, characterization, evaluation, conservation and screening against diseases (Jagudan, Jobner, Mandor, Sanand)

- Nil

CUM/CI/1.3: Identification of drought tolerance (Jobner)

- Continued as station trial

CUM/CI/2.5: Coordinated varietal trial on cumin–2021 (Ajmer, Jagudan, Jobner, Mandor, Sanand)

- Nil

Fennel

FNL/CI/1.1: Germplasm collection, characterization, evaluation, conservation and screening against diseases (Dholi, Hisar, Jagudan, Jobner, Kumarganj)

- Nil

FNL/CI/2.8: Coordinated varietal trial on fennel–2021 Series XI (Ajmer, Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Navsari, Pantnagar)

- Nil

Fenugreek

FGK/CI/1.1: Germplasm collection, characterization, evaluation, conservation and screening against diseases (Dholi, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh)

- Nil

FGK/CI/1.3: Identification of drought tolerance source in fenugreek (Jobner)

- Continued as station trial

FGK/CI/2.5: Coordinated varietal trial on fenugreek–2021 Series XI (Ajmer, Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kalyani, Kota, Kumarganj, Navsari, Pantnagar, Raigarh)

- Nil

FGK/CI/3.7: Chemo-profiling for identification of industrial types among the released varieties of fenugreek (Ajmer, Coimbatore, Dholi, Guntur, Hisar, Jobner, Kumarganj)

- The trial should be concluded with the submission of the conclusion report by March 2024.

Ajwain

AJN/CI/2.2 Coordinated Varietal Trial-2019 Series (Ajmer, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh)

- The trial should be concluded with the submission of the conclusion report by March 2024.

AJN/CI/2.1: Coordinated Varietal Trial-2022 Series (Ajmer, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh)

- Nil

Nigella

NGL/CI/2.2: Coordinated Varietal Trial-2019 (Ajmer, Hisar, Kota, Kumarganj, Pantnagar, Raigarh)

- The trial should be concluded with the submission of the conclusion report by March 2024.

Saffron

Project mode: Conservation, evaluation and utilization of exotic and indigenous saffron germplasm lines (Pampore)

- Weightage for quality parameters should be given during germplasm characterization.

Kalazeera

Project mode: Exploration, collection and conservation of kalazeera from high altitudes of northern Himalayas (Pampore)

- Nil

General suggestions: (Action: All AICRP Centres)

- Obtain IC/EC numbers for all the germplasm accessions. In future, only these numbers should be used in presentations and reports. Scientific names of diseases and pests should be mentioned in the presentation (Action: All AICRP Centres)
- The presentation on the programme of germplasm evaluation should emphasize the important additions to the collection and characterization.
- Data should be recorded as per guidelines
- Centre should provide reasons for drastic fluctuations in data points. Also, outliers should be identified before data analysis.
- All data should be statistically analyzed and presented.

SUMMARY OF THE TECHNICAL SESSION

Project code	Title	Centres	Comments
Black pepper			
PEP/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Ambalavayal, Dapoli, Panniyur, Pundibari, Sirsi, Yercaud	Continued
PEP/CI/3.5	CVT 2015 on Farmers varieties of black pepper-Series VII	Chintapalli, Dapoli, Panniyur, Sirsi, Yercaud	Concluded after season 2023
PEP/CI/3.6	CVT on black pepper 2015 – Series VIII	Chintapalli, Dapoli, Kahikuchi, Panniyur, Sirsi, Yercaud,	Concluded after season 2023
PEP/CI/3.7	CVT 2018 on black pepper - Series IX	Ambalavayal, Chintapalli, Dapoli, Kozhikode, Panniyur, Sirsi, Yercaud	Continued
Cardamom			
CAR/CI/1.1	Germplasm collection, characterization, evaluation, and conservation	Mudigere, Pampadumpara	Continued
CAR/CI/3.8	CVT 2015 on Farmers varieties of cardamom-Series VIII	Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura	Concluded after season 2023
CAR/CI/3.9	CVT on hybrids of small cardamom-2018 – Series IX	Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura	Continued
CAR/CI/4.4	Multi-location evaluation of thrips-tolerant cardamom lines	Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura	Continued
CAR/CI/4.5	MLT on leaf blight tolerant lines of small cardamom 2018	Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshapura	Continued
Large cardamom			
LCA/CI/1.1	Germplasm collection and evaluation of large cardamom	ICAR Regional Station, Gangtok, ICRI Regional Research Station, Gangtok	Continued

LCA/CI/2.1	CVT on large cardamom	ICAR Regional Station, Gangtok, ICRI Regional Research Station, Gangtok, CAU, COH, Pasighat, Arunachal Pradesh	Continued
Ginger			
GIN/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Barapani, Dholi, Kumarganj, Pottangi, Pundibari, Raigarh, Solan	Continued
GIN/CI/2.5	CVT on disease tolerance in ginger 2019	Barapani, Chintapalli, Gangtok, Kozhikode, Nagaland, Pottangi, Pundibari, Raigarh	Continued
GIN/CI/2.6	CVT on bold ginger	Appangala, Kozhikode, Pottangi, Raigarh, Sikkim	Continued
GIN/CI/2.7	CVT on high essential oil ginger genotypes	Appangala, Kozhikode, Nagaland, Pottangi, Umiam	Continued
GIN/CI/4.3	Evaluation of genotypes of ginger for vegetable purpose (observational trial)	Chintapalli, Gangtok, Kozhikode, Mizoram, Nagaland, Pottangi, Pundibari	Concluded after season 2023
Turmeric			
TUR/CI/1.1	Germplasm collection, characterization, evaluation and conservation	Barapani, Coimbatore, Dholi, Guntur, Kammarpally, Kumarganj, Pasighat, Pottangi, Pundibari, Raigarh, Solan	Continued
TUR/CI/2.7	CVT on mango ginger	Ambalavayal, Barapani, Dholi, Kozhikode, Navsari, Pottangi, Pundibari, Raigarh	Concluded
TUR/CI/2.8	CVT on high yield and high curcumin	Coimbatore, Guntur, Kammarpally, Kanke, Kozhikode, Navsari, Pasighat, Pottangi, Raigarh,	Continued
TUR/CI/2.9	CVT on light yellow colour turmeric for specialty market	Coimbatore, Guntur, Kammarpally, Kanke, Kozhikode, Pasighat, Pottangi	Continued

TUR/CI/2.11	CVT on black turmeric <i>Curcuma caesia</i>	Barapani, Coimbatore, Kozhikode, Kumarganj, Mizoram, Navsari, Pottangi, Pundibari, Sirsi	Concluded after season 2023
Tree spices			
TSP/CI/1.1	Germplasm collection, characterization, evaluation and conservation of clove, nutmeg and cinnamon	Dapoli, Pechiparai	Continued
TSP/CI/1.2	Collection of unique germplasm in tree spices	Dapoli, Pechiparai	Continued
TSP/CI/2.4	Coordinated Varietal Trial on farmer's varieties of nutmeg	Dapoli, Pechiparai, Thrissur	Continued
Project Mode	Evaluation of nutmeg genotypes	Thrissur	Continued
Coriander			
COR/CI/1.1	Germplasm collection, description, characterization, evaluation, conservation and screening against diseases	Coimbatore, Dholi, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh	Continued
COR/CI/1.3	Identification of drought/ alkalinity tolerant source in coriander	Jobner	Continued
COR/CI/2.8	Coordinated varietal trial on coriander-2021- Series XI	Ajmer, Coimbatore, Dholi, Guntur, Hisar, Jabalpur, Jagudan, Jobner, Kalyani, Kota, Kumarganj, Navsari, Pantnagar, Raigarh, Sanand	Continued
COR/CI/4.1	Quality evaluation in coriander	Jobner	Continued
Cumin			
CUM/CI/1.1	Germplasm collection, characterization, evaluation, conservation and screening against diseases	Jagudan, Jobner, Mandor, Sanand	Continued
CUM/CI/1.3	Identification of drought tolerance	Jobner	Continued
CUM/CI/2.5	Coordinated varietal trial on cumin-2021	Ajmer, Jagudan, Jobner, Mandor, Sanand	Continued
Fennel			
FNL/CI/1.1	Germplasm collection, characterization, evaluation, conservation and screening against diseases	Dholi, Hisar, Jagudan, Jobner, Kumarganj	Continued

FNL/CI/2.8	Coordinated varietal trial on fennel-2021 Series XI	Ajmer, Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Navsari, Pantnagar	Continued
Fenugreek			
FGK/CI/1.1	Germplasm collection, characterization, evaluation, conservation and screening against diseases	Dholi, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh	Continued
FGK/CI/1.3	Identification of drought tolerance source in fenugreek	Jobner	Continued
FGK/CI/2.5	Coordinated varietal trial on fenugreek-2021 Series XI	Ajmer, Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kalyani, Kota, Kumarganj, Navsari, Pantnagar, Raigarh	Continued
FGK/CI/3.7	Chemo-profiling for identification of industrial types among the released varieties of fenugreek	Ajmer, Coimbatore, Dholi, Guntur, Hisar, Jobner, Kumarganj	Concluded
Ajwain			
AJN/CI/2.2	Coordinated varietal trial-2019 Series	Ajmer, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh	Concluded
AJN/CI/2.1	Coordinated varietal trial-2022 Series	Ajmer, Guntur, Hisar, Jagudan, Jobner, Kumarganj, Raigarh	Continued
Nigella			
NGL/CI/2.2	Coordinated Varietal Trial-2019	Ajmer, Hisar, Kota, Kumarganj, Pantnagar, Raigarh	Concluded
Saffron			
Project mode	Conservation, evaluation and utilization of exotic and indigenous saffron germplasm lines	Pampore	Continued
Kalazeera			
Project mode	Exploration, collection and conservation of kalazeera from high altitudes of northern Himalayas	Pampore	Continued

TECHNICAL SESSION: III

CROP MANAGEMENT

Recommendations

- The new trials on crop management aspects of tree spices and black pepper should be proposed (Action: Panniyur, Dapoli, Thrissur, Kozhikode).
- AICRPS can form a sub-committee to decide the continuation of FGK/CM/6.1 and COR/CM/6.1 projects (Action: PC-AICRPS, Guntur)
- PC, Palms and PC, AICRPS can discuss the modalities to include trials involving common crops in their programmes (Action: PC-AICRPS).
- Hereafter, ICAR-IISR and ICAR-NRCSS scientists should look into the treatment details of a trial and make necessary corrections/modifications before the trial is implemented (Action: PC-AICRPS, ICAR-IISR and ICAR-NRCSS)
- Hereafter, ICAR-IISR, Kozhikode centre should participate in any new trials involving ginger, turmeric, black pepper and nutmeg (Action: PC-AICRPS, ICAR-IISR)

Project-wise recommendations

Cardamom

CAR/CM/5.5: Effect of micronutrients on growth and yield of small cardamom (Appangala, Mudigere, Pampadumpara, Myladumpara, Sakleshpur).

- The experimental design needs modifications for the next year trial.
- The number of replications should be increased to have statistically valid results

CAR/CM/5.6: Site specific recommendations for varying yield targets of cardamom (Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshpur)

- Restructure the experimental design by including more replications to have statistically valid results
- Data on observed yield and expected yield upon treatment should be highlighted

Large cardamom

LCA/CM/5.1 Effect of mulching on yield of large cardamom (Pasighat, ICAR Gangtok, ICRI Gangtok)

- Observations on improvement in soil parameters and quality parameters of large cardamom should be included.

Ginger

GIN/CM/4.1 Evaluation of different ginger-based intercropping systems for higher yield and income (Chintapalle, Dholi, ICAR Gangtok, Kanke, Kalyani, Mizoram, Nagaland, Pottangi, Pundibari, Sirsi, Solan.)

- Observations on improvement of soil fertility status due to intercropping should be recorded
- Soil analysis data should be included in the third year for meaningful conclusion
- While presenting the data, trend observed in first and second year should be mentioned for clarity
- Instead of BC ratio, economic equivalent ratio and return over investment may be calculated to highlight the higher income obtained due to intercropping

GIN/CM/5.1 Evaluation of Plant Growth Promoting Rhizobacteria, *Bacillus safensis* for Phosphorus (P) Solubilization Potential in Ginger (Ambalavayal, Chintapalli, Kalyani, Kammarpally, Kumarganj, Pasighat, Pottangi, Pundibari, Raigarh,)

- The data on soil fertility indicators to be recorded before the start and at regular intervals to know the status of the available soil phosphorus and its changes due to the treatment
- All centres should send the soil samples to ICAR-IISR for analysis, if centre is not having such facilities

GIN/CM/5.2 Evaluation of Plant Growth Promoting Rhizobacteria, *Bacillus safensis* for Zinc Solubilization Potential in ginger (Chintapalli, Kalyani, Kammarpally, Kumarganj, Pasighat, Pottangi, Raigarh,)

- Soil sample should be analysed for its Zn availability
- All centres should follow the standard package of practices
- Quality parameters such as essential oil, oleoresin and fibre should be analysed

Turmeric

TUR/CM/5.1 Evaluation of Plant Growth Promoting Rhizobacteria, *Bacillus safensis* for Phosphorus (P) Solubilization Potential in turmeric (Chintapalli, Coimbatore, Kahikuchi, Kalyani, Kammarpally, Kozhikode, Pasighat, Pottangi, Pundibari, Raigarh, Solan.)

- Soil samples should be analyzed for available nutrients to know the fertility status of the soil
- Quality parameters should be analyzed
- ICAR-IISR will facilitate the analysis of soil samples

TUR/CM/5.2: Evaluation of Plant Growth Promoting Rhizobacteria, *Bacillus safensis* for Zinc (Zn) Solubilization Potential in turmeric (Chintapalli, Coimbatore, Dholi, Kahikuchi, Kalyani, Kammarpally, Kanke, Kumarganj, Kozhikode, Pasighat, Pottangi, Pundibari, Raigarh.)

- Soil samples should be analyzed for available nutrients to know the fertility status of the soil
- Quality parameters should be analyzed
- ICAR-IISR will facilitate the analysis of soil samples

Coriander

COR/CM/5.1: Growth and yield of coriander as influenced by AMF and FGK/CM/5.1 Growth and yield of fenugreek as influenced by AMF (Ajmer, Dholi, Guntur, Kota)

- The species name of the AMF used in the trial should be mentioned
- The PI of Guntur centre should supply the AMF to the participating centres well before the trial starts
- Soil samples should be analysed for available nutrients to know the fertility status of the soil
- The trial should result in the technology to show the reduction in the application of synthetic fertilizer due to the application of AMF.

COR/CM/6.1: Effect of modern growth regulators on yield and quality of coriander (Guntur, Jabalpur, Jobner, Kota)

- Method and stage of application of growth regulators should be mentioned in the technical programme
- Harvest index due to growth regulator should be included as one of the parameters in the result
- Powdery mildew and stem gall monitoring can be included in coriander

Fennel

FNL/CM/5.1: Response of foliar application of Fe and Zn on growth, yield and quality of Fennel (Dholi, Hisar, Jagudan, Jobner, Kumarganj, Mandor, Pantnagar)

- The trial should be concluded with the submission of the conclusion report by March 2024.
- The pH of the solution should be mentioned in the recommendation
- Quality parameters should be included in the results.

Fenugreek

FGK/CM/5.1: Growth and yield of fenugreek as influenced by AMF (Arbuscular Mycorrhizal Fungi) (Dholi, Guntur, Kota, Mandor, Jabalpur)

- Nil

FGK/CM/5.9: Standardization of drip irrigation intervals and method of micronutrient fertigation in fenugreek (Coimbatore, Pantnagar)

- This trial should be concluded with the submission of the conclusion report by March 2024. While recommending the technology, month wise schedule and dripper discharge rate should be included
- Quality analysis of the product should be included in the result

FGK/CM/6.1: Effect of modern growth regulators on yield and quality of fenugreek (Ajmer, Dholi, Jobner, Kota)

- Method and stage of application of growth regulators should be mentioned in the technical programme

- Harvest index due to growth regulator should be included as one of the parameters in the result

Seed spices

SS/CM/4.1: Intercropping of seed spices with vegetables for higher yield and income (Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Mandor, Pantnagar, Raigarh)

- The trial should be concluded with the submission of the conclusion report by March 2024.
- The variety details of seed spices used in different zones should be mentioned

General suggestions: (Action: All AICRP Centres)

- In trials involving nutrient and water management, reduction in the RDF and water consumption due to treatments should be highlighted
- New programme on the effect of extreme climate events and its effect on crop phenology and yield may be planned.
- The interaction of personnel between centres should be facilitated by the PI before finalizing the data
- Effect of winter rain due to western disturbances on crop growth and yield should be noted down
- The status of soil nutrients and soil microbes should be included in the trials involving micronutrients and AMF PI should ensure that good research papers and good technology recommendations should come out the projects
- For multi-location data analysis, use of crop models developed by CIMMYT may be explored

TECHNICAL SESSION III

SUMMARY OF THE TECHNICAL SESSION

Project code	Title	Centres	Comments
Cardamom			
CAR/CM/5.5	Effect of micronutrients on growth and yield of small cardamom	Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshpur	Continued
CAR/CM/5.6	Site-specific recommendations for varying yield targets of cardamom.	Appangala, Mudigere, Myladumpara, Pampadumpara, Sakleshpur	Continued
Large cardamom			
LCA/CM/5.1	Effect of mulching on yield of large cardamom	Pasighat, ICAR Gangtok, ICRI Gangtok	Continued
Ginger			
GIN/CM/4.1	Evaluation of different ginger-based intercropping systems for higher yield and income	Chintapalle, Dholi, ICAR Gangtok, Kanke, Kalyani, Mizoram, Nagaland, Pottangi, Pundibari, Sirsi, Solan.	Continued for season 2024-25
GIN/CM/5.1	Evaluation of Plant Growth Promoting Rhizobacteria, <i>Bacillus safensis</i> for Phosphorus (P) Solubilization Potential in ginger	Ambalavayal, Chintapalli, Kalyani, Kammarpally, Kumarganj, Pasighat, Pottangi, Pundibari, Raigarh,	Continued
GIN/CM/5.2	Evaluation of Plant Growth Promoting Rhizobacteria, <i>Bacillus safensis</i> for zinc (Zn) solubilization potential in ginger	Chintapalli, Kalyani, Kammarpally, Kumarganj, Pasighat, Pottangi, Raigarh,	Continued
Turmeric			
TUR/CM/5.1	Evaluation of Plant Growth Promoting Rhizobacteria, <i>Bacillus safensis</i> for phosphorus (P) solubilization potential in turmeric	Chintapalli, Coimbatore, Kahikuchi, Kalyani, Kammarpally, Kozhikode, Pasighat, Pottangi, Pundibari, Raigarh, Solan.	Continued
TUR/CM/5.2	Evaluation of Plant Growth Promoting Rhizobacteria, <i>Bacillus safensis</i> for zinc (Zn) solubilization potential in turmeric	Chintapalli, Coimbatore, Dholi, Kahikuchi, Kalyani, Kammarpally, Kanke, Kumarganj, Kozhikode, Pasighat, Pottangi, Pundibari, Raigarh.	Continued
Coriander			

COR/CM/5.1	Growth and yield of Coriander as influenced by AMF (Arbuscular Mycorrhizal Fungi)	Ajmer, Dholi, Guntur, Kota	Continued
COR/CM/6.1	Effect of modern growth regulators on yield and quality of coriander	Guntur, Jabalpur, Jobner, Kota	PC to modify the programme
Fennel			
FNL/CM/5.1	Response of foliar application of iron and zinc on growth, yield, and quality of fennel	Dholi, Hisar, Jagudan, Jobner, Kumarganj, Mandor, Pantnagar	Concluded
Fenugreek			
FGK/CM/5.1	Growth and yield of fenugreek as influenced by AMF (Arbuscular Mycorrhizal Fungi)	Dholi, Guntur, Kota, Mandor, Jabalpur	Continued
FGK/CM/5.9	Standardization of drip irrigation interval and method of micro nutrient fertigation in fenugreek	Coimbatore, Pantnagar	Concluded
FGK/CM/6.1	Effect of modern growth regulators on yield and quality of fenugreek	Ajmer, Dholi, Jobner, Kota	PC to modify the programme
Seed spices			
SS/CM/4.1	Intercropping of seed spices with vegetables for higher yield and income	Dholi, Hisar, Jabalpur, Jagudan, Jobner, Kumarganj, Mandor, Pantnagar, Raigarh	Concluded

TECHNICAL SESSION: IV

CROP PROTECTION

Recommendations:

- The session name may be changed as Plant protection and food safety. (Action: PC-AICRPS)
- All the pesticide/bioagents evaluation trials should strictly comply with the guidelines of CIBRC (Action: PC Cell and concern Centres)
- Standard package of practice should be followed *in toto* by the centers while conducting trials and should be detailed while presentation or reporting. (All Centres)
- For all disease control trials, the pathogens including nematode should be monitored by the concerned centre or with the help of ICAR-IISR, Kozhikode. (Action: All Centres)

Project-wise recommendations

Black pepper

PEP/CP/5.8: Evaluation of strobilurin fungicides and actinomycetes for the management of foot rot and slow decline in black pepper (Appangala, Dapoli, Panniyur, Sirsi, Yercaud)

- Project is concluded. Detailed report may be submitted by March 2024.

PEP/CP/5.10: Observational trial on efficacy of *Trichoderma asperellum* and *Pochonia* for the management of *Phytophthora* foot rot and nematodes in black pepper (Appangala, Panniyur, Sirsi)

- Nil.

PEP/CP/7.1: Screening of insecticides for pollu beetle, *Lanka ramakrishnai* in black pepper (Appangala, Panniyur)

- Nil.

Cardamom

CAR/CP/6.11: Evaluation of fungicides against rhizome rot in small cardamom. (Appangala, Mudigere, Myladumpara, Pampadumpara)

- Nil

CAR/CP/6.12: Evaluation of fungicides against leaf blight in small cardamom. (Appangala, Mudigere, Myladumpara, Pampadumpara)

- Standard package of practice followed by the centers should be detailed during presentation in the meetings.

CAR/CP/6.13: Observational trial on the efficacy of *Trichoderma asperellum* and *Pochonia chlamydosporia* for the management of rhizome rot and nematode in small cardamom (Appangala, Myladumpara, Pampadumpara)

- The nematicide used in the experiment should be mentioned.
- Nematode population should be enumerated.

Ginger

GIN/CP/6.15: Priming of rhizomes for enhanced germination, vigour and storage rot suppression in ginger (Ambalavayal, Barapani, Chintapalli, Dholi, Kalyani, Kammarpally, Kanke, Nagaland, Pasighat, Pottangi, Pundibari, Raigarh, Solan.)

- Nil.

GIN/CP/7.1: Spray schedule optimization of effective insecticides for shoot borer (*Conogethes punctiferalis*) in ginger (Ambalavayal, Barapani, Kanke, Mizoram, Mudigere, Nagaland, Pasighat, Pottangi, Pundibari, Sirsi)

- Centers may take steps to document and preserve the biodiversity such as predators and pollinators.

GIN/CP/7.2: Observational trial on the efficacy of *Trichoderma asperellum* and *Pochonia chlamydosporia* for the management of rhizome rot and nematode in ginger (Barapani, Chintapalli, Kozhikode, Pottangi)

- Nil.

Turmeric

TUR/CP/7.8: Priming of rhizomes for enhanced germination, vigour and storage rot suppression in turmeric (Ambalavayal, Chintapalli, Coimbatore, Dholi, Kammarpally, Kahikuchi, Kanke, Kumarganj, Mizoram, Pasighat, Pottangi, Pundibari, Raigarh, Solan)

- Nil.

TUR/CP/7.9: Spray schedule optimization of effective insecticides for shoot borer (*Conogethes punctiferalis*) in turmeric (Ambalavayal, Barapani, Guntur, Kammarpally, Kanke, Mizoram, Mudigere, Pasighat, Pottangi, Pundibari, Sirsi)

- Nil.

TUR/CP/7.10: Observational trial on the efficacy of *Trichoderma asperellum* and *Pochonia chlamydosporia* for the management of rhizome rot and nematode in turmeric (Barapani, Coimbatore, Guntur, Kozhikode)

- Nil.

Coriander

COR/CP/7.1: Screening of coriander varieties against stem gall disease (Dholi, Hisar, Jabalpur, Kota, Kumarganj)

- Time of spray should be identified.

Cumin

CUM/CP/7.1: Eco-friendly management of cumin blight (Jaugdan, Jobner, Mandor)

- Pre and post rainfall data should be recorded and correlated with the disease incidence.

Fenugreek

FGK/CP/7.1: Bio-efficacy of fungicides against powdery mildew of fenugreek. (Coimbatore, Hisar, Jabalpur, Jagudan, Jobner, Kota)

- Nil.

Nigella

NGL/CP/7.1: Management of root rot of nigella (Dholi, Kumarganj, Raigarh)

- Nil.

Seed spices

SS/CP/7.1: Survey and monitoring of diseases and insect pests of seed spices for development of prediction models (Ajmer, Coimbatore, Dholi, Guntur, Jagudan, Jobner, Kammarpally, Kalyani, Kumarganj, Raigarh, Sanand.)

- Nil.

General suggestions: (Action: All AICRP Centres)

- Label claim on the use of pesticides expansion is urgently needed for spices sector especially keeping the export of spices. A high-level meeting involving officials from Ministry of Agriculture, Ministry of Commerce, CIBRC, ICAR, Spices board and other agency may be convened urgently to address this issue. Spices board may be requested to take up this matter at ministry level.
- There is an excellent scope for managing aphids and other sucking pests in seed spices using non-chemical means and biocontrol agents. This needs field trials and demonstration of technology.
- Heavy metal contamination especially in Fenugreek and other spices need to be conducted in peri-urban areas and methods to mitigate heavy metal toxicity will become more important in future.
- Trials should clearly indicate the take home message after 3 years of trial and wherever possible the indirect benefits by the best treatment to the environment and ecosystem should be mentioned.

SUMMARY OF TECHNICAL SESSION

Project code	Title	Centres	Comments
Black pepper			
PEP/CP/5.8	Evaluation of strobilurin fungicides and actinomycetes for the management of foot rot and slow decline in black pepper	Appangala, Dapoli, Panniyur, Sirsi, Yercaud	Concluded
PEP/CP/5.10	Observational trial on efficacy of <i>Trichoderma asperellum</i> and <i>Pochonia</i> for the management of <i>Phytophthora</i> foot rot and nematodes in black pepper	Appangala, Panniyur, Sirsi	Continued
PEP/CP/7.1	Screening of insecticides for pollu beetle, <i>Lanka ramakrishnai</i> in black pepper	Appangala, Panniyur	Continued
Cardamom			
CAR/CP/6.11	Evaluation of fungicides against rhizome rot in small cardamom	Appangala, Mudigere, Myladumpara, Pampadumpara	Continued
CAR/CP/6.12	Evaluation of fungicides against leaf blight in small cardamom	Appangala, Mudigere, Myladumpara, Pampadumpara	Continued
CAR/CP/6.13	Observational trial on the efficacy of <i>Trichoderma asperellum</i> and <i>Pochonia chlamydosporia</i> for the management of rhizome rot and nematode in small cardamom	Appangala, Myladumpara, Pampadumpara	Continued
Ginger			
GIN/CP/6.15	Priming of rhizomes for enhanced germination, vigour and storage rot suppression in ginger	Ambalavayal, Barapani, Chintapalli, Dholi, Kalyani, Kammarpally, Kanke, Nagaland, Pasighat, Pottangi, Pundibari, Raigarh, Solan.	Continued
GIN/CP/7.1	Spray schedule optimization of effective insecticides for shoot borer (<i>Conogethes punctiferalis</i>) in ginger	Ambalavayal, Barapani, Kanke, Mizoram, Mudigere, Nagaland, Pasighat, Pottangi, Pundibari, Sirsi	Continued

GIN/CP/7.2	Observational trial on the efficacy of <i>Trichoderma asperellum</i> and <i>Pochonia chlamydosporia</i> for the management of rhizome rot and nematode in ginger	Barapani, Chintapalli, Kozhikode, Pottangi	Continued
Turmeric			
TUR/CP/7.8	Priming of rhizomes for enhanced germination, vigour and storage rot suppression in turmeric	Ambalavayal, Chintapalli, Coimbatore, Dholi, Kammarpally, Kahikuchi, Kanke, Kumarganj, Mizoram, Pasighat, Pottangi, Pundibari, Raigarh, Solan	Continued
TUR/CP/7.9	Spray schedule optimization of effective insecticides for shoot borer (<i>Conogethes punctiferalis</i>) in turmeric	Ambalavayal, Barapani, Guntur, Kammarpally, Kanke, Mizoram, Mudigere, Pasighat, Pottangi, Pundibari, Sirsi	Continued
TUR/CP/7.10	Observational trial on the efficacy of <i>Trichoderma asperellum</i> and <i>Pochonia chlamydosporia</i> for the management of rhizome rot and nematode in turmeric	Barapani, Coimbatore, Guntur, Kozhikode.	Continued
Coriander			
COR/CP/7.1	Screening of coriander varieties against stem gall disease	Dholi, Hisar, Jabalpur, Kota, Kumarganj.	Concluded
Cumin			
CUM/CP/7.1	Eco-friendly management of cumin blight	Jaugdan, Jobner, Mandor	Continued
Fenugreek			
FGK/CP/7.1	Bio-efficacy of fungicides against powdery mildew of fenugreek.	Coimbatore, Hisar, Jabalpur, Jagudan, Jobner, Kota.	Continued
Nigella			
NGL/CP/7.1	Management of root rot of nigella	Dholi, Kumarganj, Raigarh	Continued
Seed spices			
SS/CP/7.1	Survey and monitoring of diseases and insect pests of seed spices for development of prediction models	Ajmer, Coimbatore, Dholi, Guntur, Jagudan, Jobner, Kammarpally, Kalyani, Kumarganj, Raigarh, Sanand.	Continued

TECHNICAL SESSION: IV

VARIETAL IDENTIFICATION

During the session on variety release, the following varieties were recommended for release

Crop	Variety	Centre	Salient Features	Recommendations
Ajwain	Gujarat Ajwain 3 (GA 3)	SDAU, Jagudan	High yielding with an average seed yield of 1035 kg/ha. It has a greater number of umbels per plant and a greater number of seeds per umbel with bold seed size (Test weight 1.15 g).	Recommended for all Ajwain growing regions of India viz., Rajasthan, Haryana, Gujarat, Uttar Pradesh, Chhattisgarh, and Andhra Pradesh,
Nigella	Hisar Kalonji – 12 (HKL - 12)	HAU, Hisar	Medium maturing (145-150 days) and high yielding variety, seed contains 24.84% total oil, moderately tolerant to root rot.	Recommended for all Nigella growing regions of India, viz., Rajasthan, Haryana, Uttar Pradesh, Chhattisgarh, and Uttarakhand subject to the submission of data pertaining to DUS characteristics compared with closely resembling variety, DNA fingerprinting data and IC number.
Mango ginger	IISR Amrit	ICAR – IISR, Kozhikode	High yield potential (average yield 31 t/ha, potential yield 45.75 t/ha), Bold and plumpy rhizomes, Light yellow core having desirable flavor with myrcene (55.54 %) & β pinene (14.53%). Good quality parameters with essential oil 0.32%.	Recommended for all Mango ginger growing regions of India viz., Kerala, Bihar, Orissa, West Bengal, Chhattisgarh, Gujarat, and North eastern Hills of India.
Black pepper	Kamakhya 1	ICAR – CPCRI, Kahikuchi	High-yielding black pepper variety with 6.02 kg of fresh yield per vine with a corresponding 2.14 kg in dry yield. Compact spike with higher quality under Assam condition, Essential oil content (3.43) with Piperine (5.1%), Oleoresin (9.36%) levels.	Recommended for the state of Assam regions subject to 1.Recommendation certificate of ITMU of ICAR – CPCRI, Kasaragod. 2. IRC recommendation of ICAR – CPCRI, Kasaragod.
Ajwain	Dr. YSRHU Lam Hima (LS – 14-8)	Dr. YSRHU, Guntur	-	Additional data on the yield performance and end-use quality profiles may be generated for Andhra Pradesh and may be submitted to Andhra Pradesh SVRC.

Recommendations:

1. The varieties that are not part of AICRP on Spices evaluation system and approved by state variety release committee should be directly submitted to CVRC for notification and a copy should be submitted to Project coordinator, AICRP on Spices (Action: All centres).
2. The minimum field and seed certification standards were presented for ten crops *viz.*, Black pepper, Cardamom, Mango ginger, Nutmeg, Cinnamon, Cassia, Clove, Malabar tamarind, Kokum and Allspice. All the proposals were recommended with minor changes in black pepper and allspice for forwarding to the Seed's Division of DAC, Government of India for notification. The following suggestions has to be incorporated in black pepper and allspice.

Black pepper:

- The initial planting material for serpentine multiplication should be replaced from mother block every three years.
- The permissible off type can be fixed as 1% (instead of 0.1%).

Allspice:

- The minimum isolation distance for foundation and certified seed should be 5 meters.

(Action: AICRPS-PC).

TECHNICAL SESSION: VI

TRANSFER OF TECHNOLOGY

Eight technologies were presented in the session. The summary of the technologies and the decisions there of are given below.

Recommendations

- Recommended technologies should be disseminated through various media viz. DD channel, AIR, etc., for wide spread of technologies (Action: All centres).
- Complete documentation of approved technologies should be submitted to the PC cell (Action: All centres).

Technologies-wise decision taken by chairs were given below: -

Sl. No.	Crop	Technology	Technology Statement	Decisions
1.	Black Pepper	Black pepper-based mixed cropping system for sustainable productivity and food security	Mixed cropping systems in pepper with elephant foot yam is highly productive and profitable technology, effectively utilizing pepper crop interspaces. With an average yield of 0.84 kg of dry pepper per vine, along with a 6.12 kg yield of EFY from an 8m ² interspace, the system can achieve a commendable benefit-to-cost (B:C) ratio of 3.21, compared to the sole cropped control of 1.77.	This technology is recommended for regions of Karnataka, Kerala, and Maharashtra
2.	Black Pepper	Biological control of soil borne pathogens in black pepper	Soil application of <i>Trichoderma harzianum</i> and <i>Pochonia chlamydosporia</i> at 50g/vine (twice) during the months of May/Jun and Aug/Sep along with the foliar spray with Bordeaux mixture (1%)	This technology is recommended for regions of Karnataka, Kerala, and Maharashtra
3.	Cardamom	Management of pseudostem rot in cardamom	Application of <i>Trichoderma harzianum</i> (50g with 1kg neem cake) + <i>Pseudomonas fluorescens</i> (2% spray) is effective in controlling pseudostem rot in cardamom	This technology is recommended for Karnataka region and subject to identification and deposition of the strain from NBAIM, Mau
4.	Seed spices	Intercropping of seed spices with vegetables for	Intercropping of coriander with garlic is an excellent way to increase productivity (44.2 over 14.8 q/ha) and profitability, with	This technology is recommended for Bihar, Uttar Pradesh,

		higher yield and income	the highest benefit-to-cost (B:C) ratio (2.86 over 1.8) from the coriander sole cropped area.	Chhattisgarh and Madhya Pradesh
			Intercropping of fennel with garlic is highly productive (35.7 over 18.2 q/ha) and profitable with a BC ratio of 5.4 over 3.25 in sole fennel-cropped area.	This technology is recommended for Rajasthan
			Intercropping of fennel with carrot is highly productive (18.9 over 12.07 q/ha in sole fennel plot), with a profitable BC ratio of 1.8 over 1.2 in sole cropped area	This technology is recommended for Gujarat
5.	Coriander	Integrated pest and disease management in coriander	Two foliar sprays of <i>Lecanicillium lecanii</i> 1.15WP (1×10^9 cfu/g) (40g/10 L.) + spray of Propiconazole 25 EC @ 0.05% (first spray) + Carbendazim @ 0.1% (second spray) is recommended for the control of stemgall and aphid	This technology is recommended for Bihar
			Three sprays of Hexaconazole 5 EC @ 0.005% + First foliar spray of Emamectin benzoate-5%SG @ 4.0g/10 lit and second spray of Azadiractin 3000 ppm @ 3 ml/lit is effective for the management of stem gall, PM and aphid	Uttar Pradesh
			Spray of Carbendazim 0.1% at 45 DAS and wettable sulphur 0.2% at 65 DAS + Imidacloprid @0.03% is effective for the management of Aphid and PM	Chhattisgarh
			Sprays of propiconazole 25 EC @ 0.025 % (first & second spray) + two sprays of acetamiprid 20SP (0.004%) is effective for the management of powdery mildew and aphid.	Rajasthan and Gujarat
			Two foliar sprays of Acetamiprid 20SP (0.004%) + Propiconazole 25 EC @0.05% (firstspray)+ Carbendazim 50 WP @ 0.1% second spray effective for the management of Aphid and PM	Madhya Pradesh
			Spray of Carbendazim 50 WP @ 0.1% (20 g/10 L water) (first &second spray) + Two foliar sprays of Acetamiprid 20SP	Uttarakhand

			(0.004%) is effective for the management of PM	
6.	Fennel	Foliar application of iron and zinc on growth, yield and quality of fennel	Foliar spray of zinc sulphate and iron sulphate, each @ 4g/l with RDF at 60, 75 and 90 days after sowing in fennel is recommended for higher yield of 14.7% over untreated and net returns with high BC ratio of 20.8% over untreated plot.	This technology is recommended for Rajasthan, Gujarat, UP and Bihar.
7.	Fenugreek	Fertigation schedule for fenugreek	Drip irrigation (2.1L discharge/hrs) at four-day interval along with recommended dose of fertigation NPK (20:30:30 kg/ha) and micronutrients ZnSO ₄ (15 kg/ha), FeSO ₄ (25 kg/ha), MnO (14 kg/ha) and B (10 kg/ha) in two splits (flowering and pod filling stage) is recommended for higher yield of 0.78%, increasing from 1,427 Kg/ha in the control to 1,738 kg/ha in the recommended treatment. This approach enhances water use efficiency by 23.7%, rising from 7.16 in the control to 8.86 kg ha ⁻¹ mm in the recommended method, leading to improved economic returns and a higher B:C ratio of 6.3%, increasing from 2.11 to 2.85 (control over recommended method)	This technology is recommended for Tamil Nadu and Uttarakhand regions.
8.	Cumin	Integrated aphid management in cumin	Two foliar sprays of thiamethoxam 25WG @ 0.0084% (First spray at initiation of aphid and the second spray after 10 days of the first spray) were found effective against aphid infestation in cumin.	This technology is recommended for Gujarat and Rajasthan regions

General suggestions

- All the technologies identified may be demonstrated through KVKs of the respective region of adoption.
- Use of biopesticides is emphasized rather than the chemical control of pest and disease management.

TECHNICAL SESSION: VII

PLENARY SESSION

Recommendations

- AICRP on Spices, should explore for collaborative planning for a combined research program involving AICRP on Fruits, AICRP on Palms, and AINP on Pesticide Residues (Action: PC-AICRPS).

New research Programmes

Genetic resources & Crop Improvement

1. New CVT on nutmeg

- Approved
- Participating centres: Dapoli, Kozhikode, Pechiparai and Thrissur.
- An online meeting shall be convened, uniting participating centers, for the purpose of reviewing the status of planting materials production and distribution.
- In the forthcoming year, the provision of IC/EC numbers for the contributing entities in the trial is an imperative requirement.
- The formulation of Standard Operating Procedures (SOP) for these trials shall be undertaken by the Dr. Muhammed Nissar (ICAR-IISR) and Dr. Vikram (KAU).

2. CVT on Nigella

- Approved
- An online meeting should be conducted to decide the entries contributed by each centres.
- Centres should provide the passport information of entries contributing along with IC/EC no. along with the performance summary of the concern entries in IET trials to PC cell.

3. Location specific trial on Large cardamom (*Amomum subulatum* (Roxb.) Kuntze in the hill zones of Idukki, Kerala

- Trial may be restricted to an observational/adaptive trial as University project

4. Evaluation of different accessions of Saffron suitable for Shervaroys hill zone

- Trial may be restricted to an observational trial as University project.

5. Collection, evaluation and conservation of Fennel germplasm for future breeding programme

- Trial may be restricted to an observational trial as University project.

Crop Management

6. **Trial on nutrient management in nutmeg for enhancing yield and quality**
 - Approved.
 - Participating centres: ICAR-IISR/TNAU Coimbatore/Dapoli/Thrissur
 - T₅ can be added to T₂
 - ICAR-IISR also need to take up the trial.
 - Online meeting should be done to decide the availability of plot for the study.
7. **Influence of plant growth regulators for enhancing yield and quality in small cardamom**
 - Not approved
 - Pampadumpara may conduct an initial trial to standardize growth regulators and dose optimization.
 - Also, application schedule and calendar need to work out.
8. **Effect of foliar and soil application of micronutrient mixtures in cardamom for enhanced yield and quality**
 - Trial may be restricted to an observational trial as University project.
9. **Observational trial on potential and prospects of saffron (*Crocus sativus* L.) in the high range temperate hill areas of Kerala**
 - Trial may be restricted to an observational trial as University project.
10. **Identification of ideal standard for black pepper**
Not approved

Crop protection

11. **Assessment of New nematicides in management of root lesion nematode *Pratylenchus* spp infecting on Turmeric**
 - ICAR-IISR may revise the list of chemicals/ molecules with correct dosage
12. **Evaluation of effective insecticides against pollu beetle, *Lanka ramakrishnai* infesting black pepper for label claim expansion**
 - The centres involved in the experiment has to be decide by PC based on the concern pest incidence over past five year with more than 20%.
 - All the chemical must be supplied by ICAR-IISR
13. **Evaluation of effective insecticides against shoot borer, *Conogethes punctiferalis* infesting ginger for label claim expansion**
 - The centres involved in the experiment has to be decide by PC based on the concern pest incidence over past five year with more than 20%.
 - All the chemical must be supplied by ICAR-IISR
14. **Evaluation of effective insecticides against shoot borer, *Conogethes punctiferalis* infesting turmeric for label claim expansion**

- The centres involved in the experiment has to be decide by PC based on the concern pest incidence over past five year with more than 20%.
- All the chemical must be supplied by ICAR-IISR

15. Comparative evaluation of different *Trichoderma* sp for the management of Fusarium rot of small cardamom

- Not Approved

General suggestions (Action: All AICRP Centres)

- Emphasizing stakeholders' needs and preferences when selecting specific demonstrations, training, and Frontline Demonstrations to ensure that the output and outcomes from technology and varieties align well with their specific requirements.
- The impact of technology, varieties, and training activities needs to be measured and assessed in the farmers' plots, including the extent of area coverage.
- Prioritize research areas towards addressing emerging food safety concerns in the spice sector, aiming to reduce pesticide residues and bio-contaminants, while also maintaining ecosystem balance
- The research group should extend their efforts from research to commercialization, including the potential for patents, variety registration, and protection under PPVFRA, while also translating research findings into high-quality publications.
- Exploring the feasibility and standardization of bio-capsule formulations and micronutrients initially developed for tropical spices, with necessary modifications, in the context of seed spices.
- In the programs that centers encounter challenges in securing germplasm from other centers, the AICRP shall act as a facilitator, under the condition that IC numbers are provided and material transfer agreements (MTAs) are adhered to.
- Centers that receive germplasm shall duly acknowledge the origin and source of the germplasm in their subsequent communications and publications.

TECHNICAL PROGRAMMES OF APPROVED PROJECTS

Genetic resources & Crop Improvement

Project Code:	TSP/CI/2.1
Project Title	CVT 2023- Nutmeg
Crop	Nutmeg
Centres	Dapoli, Kozhikode, Pechiparai and Thrissur
Year of start	2025
No. of entries: 11	<ol style="list-style-type: none"> 1. DBSKKVMF-65 (Dapoli) 2. DBSKKVMF-66 (Dapoli) 3. MF-4 (Pechiparai) 4. MF-6 (Pechiparai) 5. Accession 15 (KAU, Thrissur) 6. Accession 43 (KAU, Thrissur) 7. Acc 590 (IISR) 8. Acc 562 (IISR) 9. Acc 530 (IISR) 10. Konkan Sanyukta (Check)* 11. IISR Keralashree (Check)*
Design	Randomized Block Design (RBD)
No. of replications	Three
Plot size/spacing	7.5 x 7.5 m
Observation to be recorded	
Morphological Observations	<p>Average plant height (cm)</p> <p>Leaf blade: length (cm)</p> <p>Leaf blade: width (cm)</p> <p>Average stem girth (cm)</p> <p>Number of branches</p> <p>Average spread (m)</p>
Yield & Yield related Parameters	<p>Fruit length (cm)</p> <p>Fruit diameter (cm)</p> <p>Fruit weight (fresh) (g)</p> <p>Mace weight (fresh) (g)</p> <p>Mace weight (dry) (g)</p> <p>Nut weight (fresh) (g)</p> <p>Nut weight (dry) (g)</p> <p>Kernel weight (dry) (g)</p> <p>Number of fruits per m²</p> <p>Number of fruits per tree</p> <p>Fresh and dry nut yield per tree (kg)</p> <p>Fresh and dry kernel yield per tree (kg)</p> <p>Fresh and dry mace yield per tree (kg)</p>
Quality Parameters	<p>Kernel analysis:</p> <p>Volatile oil (%)</p> <p>Oleoresin (%)</p> <p>Fixed oil (%)</p> <p>Mace analysis:</p> <p>Volatile oil (%)</p>

	Oleoresin (%)
Drought Related Indices	If any
Disease and Pest Incidence	If any
Weather data	Year wise all parameters
Soil parameters	Soil pH EC Organic carbon Major nutrients: nitrogen, phosphorus, potassium Secondary and micro nutrients: magnesium, calcium, S, Zn, B

Recommended plant material should be provided by the contributing centres

1. Orthotropic shoots in budding
2. Rootstock used should be of cultivated nutmeg

* ICAR-IISR should provide the planting material of IISR Keralashree and Dapoli centre should provide the planting material of Konkan Sanyukhta for the testing centres

Crop Management

Project Code:	TSP/CM/5.1
Project title	Site-Specific Nutrient Management in Nutmeg (<i>Myristica fragrans</i>)
Crop	Nutmeg
Centers	Vellanikkara, Kozhikode, Dapoli and Coimbatore
Year of start	2024-25
Age of the tree	Standard bearing age (at farmers field, if not available in station/ Uniform stage opted in all centres, variety, and type of the tree need to be selected)
No. of treatments	Treatments: 4 1. Recommended nutrient application (As per PoP) 2. Soil test-based nutrient application 3. Soil test-based nutrient application + Application of micronutrients developed from ICAR-IISR 4. Farmers practices
Design	Randomized Block Design
No. of replications	6 (2 trees/ replication)
Plot size/spacing	Spacing between the trees 8*8
Observation to be recorded	
A. Morphological Observations	Average height (cm) Average girth (cm) Number of branches Average spread (m)
B. Yield & Yield related Parameters	Fruit length (cm) Fruit breadth (cm) Fruit weight (fresh) (g) Mace weight (fresh) (g) Mace weight (dry) (g) Nut weight (fresh) (g) Nut weight (dry) (g) Kernel weight (dry) (g) Number of fruits per m ² Number of fruits per tree Fresh and dry nut yield per tree (kg) Fresh and dry kernel yield per tree (kg) Fresh and dry mace yield per tree (kg)
C. Quality Parameters	Kernel analysis: Volatile oil (%) Oleoresin (%) Fixed oil (%) Mace analysis: Volatile oil (%) Oleoresin (%)
D. Trial-Specific Indices, if any	Soil nutrient analysis Plant samples nutrient analysis Growth and yield analysis

E. Disease and Pest Incidence	Incidence of <i>Phytophthora</i> leaf fall, <i>Thread blight</i> , <i>Colletotrichum</i> leaf spot.
F. Weather data	Max Temp (°C) and Min Temp (°C) RH-I (%) and RH-II (%) Rainfall (mm) and Total rainy days Wind Speed (km/h) Wind Direction Weather Condition (Code 0-9) BSS (hrs) Evaporation (mm)
G. Soil parameters	Soil pH EC Organic carbon Major nutrients: nitrogen, phosphorus, potassium Secondary and micro nutrients: magnesium, calcium, S, Zn, B

Note: Soil test data of the trail plot may be given to ICAR-IISR for the site specific nutrient recommendation and micronutrient supply.

Crop Protection

Project Code:	PEP/CP/7.2
Project Title:	Evaluation of effective insecticides against pollu beetle, <i>Lanka ramakrishnai</i> infesting black pepper for label claim expansion
Crop	Black pepper
Centres	Appangala, Kozhikode, Panniyur
Year of start	2024 (2 seasons)
No. of treatments	5 1. T ₁ - Chlorantraniliprole @ 0.375 ml/L 2. T ₂ - Chlorantraniliprole @ 0.5 ml/L 3. T ₃ - Chlorantraniliprole @ 0.625 ml/L 4. T ₄ - Chlorantraniliprole @ 1.0 ml/L 5. T ₅ -Untreated control
Design	RBD
No. of replications	Five
Plot size/spacing	<ul style="list-style-type: none"> One vine/replication. Spray interval – monthly (limited to two sprays only during July-August and September-October).
Observation to be recorded	<ol style="list-style-type: none"> Bio efficacy against pest Phytotoxicity grade (0-10 Scale) Bioefficacy against Natural Enemies Crop Yield BC Ratio (Please see the annexure below)
For residue analysis	250g of cured black pepper/replication are to be collected and to be sent for residue analysis to ICAR-IISR.

Annexure

1. BIO-EFFICACY AGAINST INSECTS PESTS

Table 1. Data requirement for Bio efficacy of (Chemical Name) against (Pest species) in (Crop Name)

T. No	Season 1			Season 2		
	Location			Location 1		
	BS*	DAA	% ROC	BS*	DAA	% ROC
T1						
T2						
T3						
T4						
T5						
S.E.m ±						
C.D. at 5%						

*BS: Before Spray (Not applicable); *DAA: Days After Application (Fill the data pertinent to the last observation-i.e. at the time of harvest); % ROC : % reduction over control

Note: Data to be provided at different intervals after each spray.

2. PHYTOTOXICITY

Table 2. Data requirement for phytotoxicity of (Chemical Name) against (Pest species) in (Crop Name)

T. No	Season 1						Season 2					
	Location 1						Location 1					
	Phytotoxicity grade (0-10 Scale)						Phytotoxicity grade (0-10 Scale)					
	DAA						DAA					
	0	1	3	5	7	10	0	1	3	5	7	10
T1												
T2												
T3												
T4												
T5												
S.E.m ±												
C.D. at 5%												

DAA: Days After Application; Observations should be recorded on 0,1,3,5,7, and 10 days after treatment

3. EFFECTS ON NATURAL ENEMIES (PREDATORS AND PARASITOIDS)

Table 3. Data requirement for Bioefficacy of (Chemical Name) against (Natural Enemies) in (Crop Name)

T. No	Season 1		Season 2	
	Location 1		Location 1	
	BS	DAA	BS	DAA
T1				
T2				
T3				
T4				
T5				
S.E.m ±				
C.D. at 5%				

BS: Before Spray (one day before spray); DAA: Days After Application (7 days after spray); %

*The population of spiders and coccinellid predators need to be documented before and after spray from 25 leaves/vine

- Yield and C:B ratio for season-I and season -II

Project Code:	GIN/CP/7.3
	Evaluation of effective insecticides against shoot borer, <i>Conogethes punctiferalis</i> infesting ginger for label claim expansion
Crop	Ginger
Centres	Ambalavayal, Appangala, Kozhikode, Mudigere, Raigarh
Year of start	2024 (2 seasons)
No. of treatments	9 1. T ₁ - Chlorantraniliprole 0.375 ml/L 2. T ₂ - Chlorantraniliprole 0.5 ml/L 3. T ₃ - Chlorantraniliprole 0.625 ml/L 4. T ₄ - Chlorantraniliprole 1.0 ml/L 5. T ₅ - Spinosad 0.375 ml/L 6. T ₆ - Spinosad 0.5 ml/L 7. T ₇ - Spinosad 0.625 ml/L 8. T ₈ - Spinosad 1.0 ml/L 9. T ₉ -Untreated control
Design	RBD
No. of replications	Four
Plot size/spacing	3 × 1 m, Spray interval – 21 days (limited to 4 sprays only), First spray need to be initiated 45 days after planting
Observation to be recorded	Bio efficacy against pest Phytotoxicity grade (0-10 Scale) Bioefficacy against Natural Enemies Crop Yield BC Ratio (Please see the annexure below)
For residue analysis	250g of fresh rhizomes/replication are to be collected and sent for residue analysis to ICAR-IISR.

Annexure

1. BIO-EFFICACY AGAINST INSECTS PESTS / DISEASE

Table 1. Data requirement for Bio efficacy of (Chemical Name) against (Pest species) in (Crop Name)

T. No	Season 1			Season 2		
	Location 1			Location 1		
	BS	DAA	% ROC	BS	DAA	% ROC
T1						
T2						
T3						
T4						
T5						
T6						
T7						
T8						
T9						
S.E.m ±						
C.D. at 5%						

BS: One day Before Spray; *DAA: 7 Days After every Application (Fill the data pertinent to the last observation); % ROC: % reduction over control

Note: Data to be provided at different intervals after each spray.

2. PHYTOTOXICITY

Table 2. Data requirement for phytotoxicity of (Chemical Name) against (Pest species) in (Crop Name)

T. No	Season 1						Season 2					
	Location 1						Location 1					
	Phytotoxicity grade (0-10 Scale)						Phytotoxicity grade (0-10 Scale)					
	DAA						DAA					
	0	1	3	5	7	10	0	1	3	5	7	10
T1												
T2												
T3												
T4												
T5												
T6												
T7												
T8												
T9												
S.E.m ±												
C.D. at 5%												

DAA: Days After Application; Observations should be recorded on 0,1,3,5,7, and 10 days after treatment

3. EFFECTS ON NATURAL ENEMIES (PREDATORS AND PARASITIDS)

Table 3. Data requirement for Bioefficacy of (Chemical Name) against (Natural Enemies) in (Crop Name)

T. No	Season 1		Season 2	
	Location 1		Location 1	
	BS	DAA	BS	DAA
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
S.E.m ±				
C.D. at 5%				

BS: Before Spray (one day before spray); DAA: Days After Application (7 days after spray); %

*The population of spiders and other predators and parasitoids need to be documented before and after spray from each replication.

- Yield and C:B ratio for season-I and season -II

Project Code:	TUR/CP/7.1
	Evaluation of effective insecticides against shoot borer, <i>Conogethes punctiferalis</i> infesting turmeric for label claim expansion
Crop	Turmeric
Centres	Appangala, Coimbatore, Guntur, Kammarpally, Kozhikode
Year of start	2024 (2 seasons)
No. of treatments	9 1. T ₁ - Chlorantraniliprole 0.375 ml/L 2. T ₂ - Chlorantraniliprole 0.5 ml/L 3. T ₃ - Chlorantraniliprole 0.625 ml/L 4. T ₄ - Chlorantraniliprole 1.0 ml/L 5. T ₅ - Spinosad 0.375 ml/L 6. T ₆ - Spinosad 0.5 ml/L 7. T ₇ - Spinosad 0.625 ml/L 8. T ₈ - Spinosad 1.0 ml/L 9. T ₉ - Untreated control
Design	RBD
No. of replications	Four
Plot size/spacing	3 × 1 m, Spray interval – 21 days (limited to 4 sprays only), First spray need to be initiated 45 days after planting
Observation to be recorded	Bio efficacy against pest Phytotoxicity grade (0-10 Scale) Bioefficacy against Natural Enemies Crop Yield BC Ratio (Please see the annexure below)
For residue analysis	250g of fresh rhizomes/replication are to be collected and sent for residue analysis to ICAR-IISR.

Annexure

1. BIO-EFFICACY AGAINST INSECTS PESTS / DISEASE

Table 1. Data requirement for Bio efficacy of (Chemical Name) against (Pest species) in (Crop Name)

T. No	Season 1			Season 2		
	Location 1			Location 1		
	BS	DAA	% ROC	BS	DAA	% ROC
T1						
T2						
T3						
T4						
T5						
T6						
T7						
T8						
T9						
S.E.m ±						
C.D. at 5%						

BS: One day Before Spray; *DAA: 7 Days After every Application (Fill the data pertinent to the last observation); % ROC: % reduction over control

Note: Data to be provided at different intervals after each spray.

2. PHYTOTOXICITY

Table 2. Data requirement for phytotoxicity of (Chemical Name) against (Pest species) in (Crop Name)

T. No	Season 1						Season 2					
	Location 1						Location 1					
	Phytotoxicity grade (0-10 Scale)						Phytotoxicity grade (0-10 Scale)					
	DAA						DAA					
	0	1	3	5	7	10	0	1	3	5	7	10
T1												
T2												
T3												
T4												
T5												
T6												
T7												
T8												
T9												
S.E.m ±												
C.D. at 5%												

DAA: Days After Application; Observations should be recorded on 0,1,3,5,7, and 10 days after treatment

3. EFFECTS ON NATURAL ENEMIES (PREDATORS AND PARASITIDS)

Table 3. Data requirement for Bioefficacy of (Chemical Name) against (Natural Enemies) in (Crop Name)

T. No	Season 1		Season 2	
	Location 1		Location 1	
	BS	DAA	BS	DAA
T1				
T2				
T3				
T4				
T5				
T6				
T7				
T8				
T9				
S.E.m ±				
C.D. at 5%				

BS: Before Spray (one day before spray); DAA: Days After Application (7 days after spray); %

*The population of spiders and other predators and parasitoids need to be documented before and after spray from each replication.

- Yield and C:B ratio for season-I and season -II

Project Code:	TUR/CP/7.2
Project Code:	Assessment of nematicide for the management of root lesion nematodes (<i>Pratylenchus</i> spp.), infecting turmeric.
Crop	Turmeric
Variety	Any one popular cultivar
Centres	Guntur (AP), Kammarapally (TG), Coimbatore (TN), Pundibari (WB) and Calicut;
Year of start	2024 (in 2 seasons)
No. of treatments (7 nos)	<p>T₁: Untreated control</p> <p>T₂: Application of Fluopyram 34.48 SC @ 0.35ml/L as a drench 15 days after planting</p> <p>T₃: Application of Fluopyram 34.48 SC @ 0.5ml/L as a drench 15 days after planting (x dose)</p> <p>T₄: Application of Fluopyram 34.48 SC @ 0.25ml/L as a drench 15 days after planting and second application 30 days after first application</p> <p>T₅: Application of Fluopyram 34.48 SC @ 1.0ml/L as a drench 15 days after planting (2x dose)</p> <p>T₆: Application of Carbofuran 3%G @ 20g/bed as broadcast 15 days after planting</p> <p>Note: The field should have slight moisture when applying nematicide solution with rose cane on the surface of the bed for drench</p>
Design	RBD
No. of replications	<ul style="list-style-type: none"> • Four replications for bio-efficacy (Each replication should include 5 beds, with a size of 1x3 m and 24 plants per bed, or 30 m² of area per replication) • Three replications for residual analysis
Plot size/spacing	<ul style="list-style-type: none"> • Bed system 1x3m (24 plants) according to local agronomic practices. or • Area size of 30 m² per replication in case of ridges and furrows system.
Observation to be recorded	Please see the annexure below
For residue analysis	250g of fresh rhizomes/replications are to be collected at various periods and sent for residue analysis at ICAR-IISR.

1. BIO-EFFICACY AGAINST INSECTS PESTS / DISEASE**Table 1. Data requirement for bio efficacy of Fluopyram against *Pratylenchus* spp in Turmeric**

T. No	Season 1			Season 2		
	Location 1			Location 1		
	BD	DAA	% ROC	BS	DAA	% ROC
T1 Untreated control						
T2 Application of Fluopyram 34.48 SC @ 0.35ml/L as a drench 15 days after planting						
T3 Application of Fluopyram 34.48 SC @ 0.5ml/L as a drench 15 days after planting (x dose)						
T4 Application of Fluopyram 34.48 SC @ 0.25ml/L as a drench 15 days after planting and second application 30 days after first application						
T5 Application of Fluopyram 34.48 SC @ 1.0ml/L as a drench 15 days after planting (2x dose)						
T6 Application of Carbofuran 3%G @ 20g/bed as broadcast 15 days after planting						
S.E.m ±						
C.D. at 5%						

BD: One day Before Drench; ***DAA:** 7 Days After every Application (Fill the data pertinent to the last observation); **% ROC:** % reduction over control

Note: Data to be provided at different intervals after each drench.

Observation to be recorded for efficacy on:

- Soil population of lesion nematodes/200cc soil
(Initial soil population recorded before first application of nematicides, 45days, 90 days and 135 days after sowing and at time of final harvest)
- Root population of lesion nematodes /10g rhizomes/roots
(At 45days, 90 days and 135 days after sowing and at time of final harvest)
- Observation on plant vigour /height (in cm) at 45 days, 60 and 75 days of after sowing
- Observation on plant mortality at 45days, 60days and 75 days after sowing
- Rhizome rot (%) : (At time of harvest severity of root necrosis was assessed on a 0–10 scale according to the percentage of the root/rhizome system that was necrotic (0=0%, 1=1–10%, 2=11–20%, 3=21–30%, 4=31–40%, 5=41–50%, 6=51–60%, 7=61–70%, 8=71–80%, 9=81–90% and 10=91–100% necrotic tissue)

2. PHYTOTOXICITY

Table 2. Data requirement for phytotoxicity of Fluopyram against *Pratylenchus* spp in Turmeric

T. No	Season 1						Season 2					
	Location 1						Location 1					
	Phytotoxicity grade (0-10 Scale)						Phytotoxicity grade (0-10 Scale)					
	DAA						DAA					
	0	1	3	5	7	10	0	1	3	5	7	10
T1 Untreated control												
T3 Application of Fluopyram 34.48 SC @ 0.5ml/L as a drench 15 days after planting												
T5 Application of Fluopyram 34.48 SC @ 1.0ml/L as a drench 15 days after planting												
S.E.m ±												
C.D. at 5%												

DAA: Days After Application; Observations should be recorded on 0, 1,3,5,7, and 10 days after treatment

Note: PHYTOTOXICITY

Phytotoxicity Rating Scale (PRS) (Rating shall be recorded individually for yellowing, stunting, necrosis, epinasty and hyponasty etc).

3. EFFECTS ON NATURAL ENEMIES (PREDATORY)

Table 3. Data requirement for Bioefficacy of Fluopyram against Natural Enemies in Turmeric

T. No	Season 1		Season 2	
	Location 1		Location 1	
	BD	DAA	BS	DAA
T1 Untreated control				
T2 Application of Fluopyram 34.48 SC @ 0.35ml/L as a drench 15 days after planting				
T3 Application of Fluopyram 34.48 SC @ 0.5ml/L as a drench 15 days after planting (x dose)				
T4 Application of Fluopyram 34.48 SC @ 0.25ml/L as a drench 15 days after planting and second application 30 days after first application				
T5 Application of Fluopyram 34.48 SC @ 1.0ml/L as a drench 15 days after planting (2x dose)				
T6 Application of Carbofuran 3%G @ 20g/bed as broadcast 15 days after planting				
S.E.m ±				
C.D. at 5%				

BD: Before drench (one day before drench); DAA: Days After Application (7 days after drench);

- **Observation on the population of free-living beneficial nematodes (FLBN) in soil**

(Soil population of Free-Living Beneficial Nematodes (FLBN) per 200 cm³ soil per replication per treatment to be recorded at Pre-treatment (before first application) and At final harvest

- **Observation on effect on natural enemies (Predatory Nematodes)**

Soil population of monochids (predatory nematodes) per 200 cm³ soil per replication per treatment to be recorded at following intervals:

- Pre-treatment (before first application)
- At 45 days after sowing
- At 60 days after sowing
- At 90 days after sowing
- At final harvest

- **Yield and C:B ratio for season-I and season -II**

✓ Yield per bed (kg) can be recorded at the time of harvest.

4. Residual analysis data:

Table 4. Data requirement for residual analysis of Fluopyram in Turmeric against *Pratylenchus* spp

Tr. No.		Method of application	No. of Applications
T1	Untreated control	-	-
T2	Application of Fluopyram 34.48 SC @ 0.5ml/L as a drench 15 days after planting	Soil application	One
T3	Application of Fluopyram 34.48 SC @ 0.625ml/L as a drench 15 days after planting	Soil application	One
T4	Application of Fluopyram 34.48 SC @ 0.25 ml/L as a drench 15 days after planting and 30 days after first drench	Soil application	Two
T5	Application of Fluopyram 34.48 SC 0.312ml as a drench 15 days after planting and 30 days after first drench	Soil application	Two
	S.E.m ±		
	C.D. at 5%		

- No. of Replications: Three

Mature fresh rhizome

- Samples of mature fresh rhizomes to be collected at harvest replication wise from all treatments for analysis of residues of Fluopyram. Local standard practices to be followed

like washing and removing of soil from rhizomes before analysis. Sufficient care to be taken to avoid contamination among the treatments while sampling

- Minimum 2 kg of mature fresh rhizome to be collected from per replication per treatment.

Dry rhizomes (processed)

- Samples of mature fresh rhizomes to be collected at harvest replication-wise from all the treatments. These rhizomes are processed as per standard methodology to make dry turmeric rhizomes for analysis of residues of Fluopyram. Sufficient care to be taken to avoid the contamination among the treatments while sampling
- Minimum 1 kg of dry turmeric rhizomes to be collected from per replication per treatment.

Soil

- Samples of soil around turmeric plants up to 10-15 cm depth to be collected at harvest of mature fresh rhizomes replication-wise from all treatments for analysis of residues of Fluopyram. Sufficient care to be taken to avoid contamination among the treatments while sampling.
- Minimum 500 g sample of soil to be collected per replication per treatment.

SAMPLE SEQUENCE

- Carefully clean all sampling equipment before use. When collecting both a control sample and a treated sample on the same day, always collect the control sample first. In this case, the sequence to be followed for the collection of samples on same day is T1, T2, T4 T3, and T5. Avoid contamination of the field sample (both treated and control) during sampling, packing, storage, and shipping.

TOTAL NO. OF SAMPLES TO BE ANALYZED

- Mature fresh rhizome: 15
- Dry rhizome (processed): 15
- Soil: 15

Mature fresh rhizome

Fluopyram

Dry rhizome (processed)

Fluopyram

Soil

Fluopyram

- Before first application of Velum Prime (Fluopyram 400 g/L SC), **soil samples (500 g/replication)** to be collected from all five treatments (replication-wise) for effect on soil physicochemical and biological property study (total 15 samples of soil).

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PROPOSED PLAN OF AICRP MONITORING

During the 2023-24 following monitoring schedule is proposed

Period	Monitoring Team	Place of visit
08.06.2023	Dr.D.Prasath	Mandor, Rajasthan
14.07.2023 To 15.07.2023	Mr. Mukesh Sankar S	Monitoring of Cardamom, and Ginger trials undertaken by Appangala centre
20.07.2023	Dr.D.Prasath	Myladumpara, Kerala
21.07.2023	Dr. D. Prasath	Pampadumpara, Kerala
09.08.2023	Dr. D. Prasath Mr. Mukesh Sankar. S	Panniyur, Kerala
13.09.2023	Dr. D. Prasath	Kahikuchi, Assam
14.09.2023	Dr. D. Prasath	Barapani, Meghalaya
09.10.2023	Dr. D. Prasath Dr. Shivakumar M.S. Mr. Mukesh Sankar	Monitoring & discussion with Centres involved in Black pepper, Cardamom, and Large cardamom trials (Virtual Mode)
10.10.2023	Dr. D. Prasath Mr. Mukesh Sankar. S. Dr. C.K. Thankamani Dr. Kandiannan Dr. Aarthi R	Monitoring & discussion with Centres involved in Ginger and Turmeric trials (Virtual Mode)
16.10.2023	Dr. D. Prasath Dr. M. Nisar Mr. Mukesh Sankar	Monitoring & discussion with Centres involved in Tree spices, Saffron, and Kalazerra trials (Virtual Mode)
19 to 20.10.2023	Dr. D. Prasath Dr. M. Nisar Mr. Mukesh Sankar	Monitoring & discussion with Centres involved in Seed spices trials (Virtual Mode)
25.10.2023	Dr. D. Prasath Dr. K.S. Krishnamurthy Mr. Mukesh Sankar	Initial evaluation of Variety Identification Proposals, Transfer of Technology Proposals, and New Research Project proposals (Virtual Mode)
30.10 to 01.11.2023	AICRP on Spices Group meet	Annual review of AICRP trials undertaken by various centres, UHS Bengaluru
15.11.2023	Dr. D. Prasath Dr. Giridhar Kalidasu Dr. Tanuja Priya Mr. Mukesh Sankar	Monitoring and discussion with Centres involved in Crop Management trials of Seed Spices (Virtual Mode)
16.11.2023	Dr. D. Prasath Dr. Praveena R Dr. V. Srinivasan Mr. Mukesh Sankar	Monitoring & discussion with Centres involved in <i>Bacillus safensis</i> trial and Priming Experiment trials in Ginger and turmeric (Virtual Mode)
20.11.2023	Dr. D. Prasath	Visited to monitor the AICRP trials at TRS, Kammarpally

04.12.2023	Dr. D. Prasath	Visited to monitor the AICRP trials TNAU, Coimbatore
19.12.2023	Dr. D. Prasath Dr. V. Srinivasan Mr. Mukesh Sankar	Discussion on Crop Management Trials in Small Cardamom (Virtual Mode)
17-19.01.2024	Dr. D. Prasath Mr. Mukesh Sankar. S	Monitoring of AICRP on Spices trials in Black pepper, Cardamom, and tree spices at ICAR-IISR, Kozhikode, and ICAR-IISR (RS), Appangala.
February 2024 (first week)	Dr. D. Prasath Mr. Mukesh Sankar. S	Monitoring meeting at AICRPS Centre, Guntur to monitor the AICRPS Activities undertaken by Ginger and the turmeric group.
February 2024 (last week)	Dr. D. Prasath	Monitoring meeting at AICRPS Centre, Guntur to monitor the AICRPS Activities undertaken by Ginger and turmeric group.
February 2024 (last week)	Dr. D. Prasath Mr. Mukesh Sankar. S	Monitoring meeting at Jobner/NRC on Seed spices, Ajmer to monitor the AICRPS Activities undertaken by seed spice group.
March 2024 (first week)	Dr. D. Prasath Mr. Mukesh Sankar. S	Monitoring meeting at Medziphema to monitor the AICRPS Activities undertaken for NEH development.

Research Programmes at a glance (Crop-wise)

Crop Name	GENETIC RESOURCES & CROP IMPROVEMENT		CROP MANAGEMENT		CROP PROTECTION		Total No. of Projects
	List of Projects	No.	List of Projects	No.	List of Projects	No.	
Black Pepper	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, PEP/CI/3.7	3	No project	0	PEP/CP/5.8, PEP/CP/5.10, PEP/CP/7.1	3	6
Cardamom	CAR/CI/1.1, CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5	5	CAR/CM/5.5, CAR/CM/5.6	2	CAR/CP/6.11, CAR/CP/6.12, CAR/CP/6.13	3	10
Large Cardamom	LCA/CI/1.1, LCA/CI/2.1	2	LCA/CM/5.1	1	No project	0	3
Ginger	GIN/CI/1.1, GIN/CI/2.5, GIN/CI/2.6, GIN/CI/2.7, GIN/CI/4.3	5	GIN/CM/4.1, GIN/CM/5.1, GIN/CM/5.2	3	GIN/CP/6.15, GIN/CP/7.1, GIN/CP/7.2	3	11
Turmeric	TUR/CI/1.1, TUR/CI/2.7, TUR/CI/2.8, TUR/CI/2.9, TUR/CI/2.11, TUR/CI/3.9	6	TUR/CM/5.1, TUR/CM/5.2	2	TUR/CP/7.8, TUR/CP/7.9, TUR/CP/7.10	3	11
Tree Spices	TSP/CI/1.1, TSP/CI/1.2, TSP/CI/2.4, Project Mode	4	No project	0	No project	0	4
Coriander	COR/CI/1.1, COR/CI/1.3, COR/CI/2.8, COR/CI/4.1	4	COR/CM/5.1, COR/CM/6.1	2	COR/CP/7.1	1	7
Cumin	CUM/CI/1.1, CUM/CI/1.3, CUM/CI/2.5	3	No project	0	CUM/CP/7.1	1	4
Fennel	FNL/CI/1.1, FNL/CI/2.8	2	FNL/CM/5.1	1	No project	0	3
Fenugreek	FGK/CI/1.1, FGK/CI/1.3, FGK/CI/2.5, FGK/CI/3.7	4	FGK/CM/5.1, FGK/CM/6.1	2	FGK/CP/7.1	1	7
Ajwain	AJN/CI/2.2, AJN/CI/2.1	2	No project	0	No project	0	2
Nigella	NGL/CI/2.2	1	No project	0	NGL/CP/7.1	1	2
Saffron	Project mode	1	No project	0	No project	0	1
Kalazeera	Project mode	1	No project	0	No project	0	1
Seed Spices	No project	0	SS/CM/4.1	1	SS/CP/7.1	1	2

Research Programmes at a glance (Centre-wise)

Centre Name	Research Institute Involved	Scientist Involved	Total Programs	List of Programs
ICAR-National Institutes on Spices				
Kozhikode	ICAR-Indian Institute of Spices Research, Kozhikode, Kerala	Dr. S. Arathy	11	PEP/CI/3.7, GIN/CI/2.5, GIN/CI/2.6, GIN/CI/2.7, GIN/CI/4.3, TUR/CI/2.7, TUR/CI/2.8, TUR/CI/2.11, TUR/CM/5.1, TUR/CM/5.2, TUR/CP/7.10
		Dr. C.K. Thankamani		
		Dr. V. Srinivasan		
		Dr. Praveena R		
Appangala	ICAR-Indian Institute of Spices Research, RS, Appangala, Karnataka	Dr. Sentil Kumar	14	CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5, GIN/CI/2.6, GIN/CI/2.7, CAR/CM/5.5, CAR/CM/5.6, PEP/CP/5.8, PEP/CP/5.10, PEP/CP/7.1, CAR/CP/6.11, CAR/CP/6.12, CAR/CP/6.13
		Dr. Ankegowda		
		Dr. Shivakumar M.S.		
		Dr. Akshitha HJ		
		Dr. Honnappa Asangi		
Ajmer	NRC on Spices, Ajmer, Rajasthan	Dr. M. Faisal Peeran	11	COR/CI/2.8, CUM/CI/2.5, FNL/CI/2.8, FGK/CI/2.5, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1, NGL/CI/2.2, COR/CM/5.1, FGK/CM/6.1, SS/CP/7.1
		Dr. Balaji		
		Dr. R.S. Meena		
		Dr. S.S. Meena		
		Dr. Ravinder Singh		
Pampadumpara	Cardamom Research Station, KAU, Pampadumpara, Kerala	Dr. Y.S. Sharma	10	CAR/CI/1.1, CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5, CAR/CM/5.5, CAR/CM/5.6, CAR/CP/6.11, CAR/CP/6.12, CAR/CP/6.13
		Dr. Krishnakant		
Panniyur	Pepper Research Station, Panniyur KAU, Kerala	Dr. Muthuswamy Murugan	6	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, PEP/CP/5.8, PEP/CP/5.10, PEP/CP/7.1
		Dr. Nimisha Mathews		
Mudigere	Zonal Agricultural & Horticultural Research Station, Mudigere, Karnataka	Dr. Reshmi Paul	11	CAR/CI/1.1, CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5, CAR/CM/5.5, CAR/CM/5.6, CAR/CP/6.11, CAR/CP/6.12, GIN/CP/7.1, TUR/CP/7.9
		Dr. Sanju Balan		
Sirsi	Horticultural Research Station, SIRSI, Karnataka	Dr. M. Shivaprasad	7	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, GIN/CM/4.1, PEP/CP/5.8, PEP/CP/5.10, GIN/CP/7.1
		Dr. Abdul Kareem		
Regular Centres				
Pampadumpara	Cardamom Research Station, KAU, Pampadumpara, Kerala	Dr. Sudheesh Kulkarni	10	CAR/CI/1.1, CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5, CAR/CM/5.5, CAR/CM/5.6, CAR/CP/6.11, CAR/CP/6.12, CAR/CP/6.13
		Dr. Muthuswamy Murugan		
Panniyur	Pepper Research Station, Panniyur KAU, Kerala	Dr. Reshmi Paul	6	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, PEP/CP/5.8, PEP/CP/5.10, PEP/CP/7.1
		Dr. Sanju Balan		
Mudigere	Zonal Agricultural & Horticultural Research Station, Mudigere, Karnataka	Dr. M. Shivaprasad	11	CAR/CI/1.1, CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5, CAR/CM/5.5, CAR/CM/5.6, CAR/CP/6.11, CAR/CP/6.12, GIN/CP/7.1, TUR/CP/7.9
		Dr. M. Shivaprasad		
Sirsi	Horticultural Research Station, SIRSI, Karnataka	Dr. Abdul Kareem	7	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, GIN/CM/4.1, PEP/CP/5.8, PEP/CP/5.10, GIN/CP/7.1
		Dr. Sudheesh Kulkarni		

Coimbatore	TNAU, Coimbatore, Tamil Nadu	Dr. M. Mohanalakshmi	14	TUR/CI/1.1, TUR/CI/2.8, TUR/CI/2.9, TUR/CI/2.11, COR/CI/1.1, COR/CI/2.8, FGK/CI/3.7, TUR/CM/5.1, TUR/CM/5.2, FGK/CM/5.9, TUR/CP/7.8, TUR/CP/7.10, FGK/CP/7.1, SS/CP/7.1
		Dr. S. Maruthasalam		
Yercaud	Horticultural Research Station, (TNAU), Yercaud, Tamil Nadu	Dr. P. Balasubramanian	5	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, PEP/CI/3.7, PEP/CP/5.8
Kammarpalli	Turmeric Research Station, SKLTSHU, Kammarpalli, Telangana.	Dr. B. Mahender	11	TUR/CI/1.1, TUR/CI/2.8, TUR/CI/2.9, GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2, GIN/CP/6.15, TUR/CP/7.8, TUR/CP/7.9, SS/CP/7.1
		Dr. P. Srinivas		
Chintapalli	Horticultural Research Station, Dr.Y.S.R. Horticultural University, Chintapalli, AP	Dr. V. Sivakumar	12	PEP/CI/3.5, PEP/CI/3.6, GIN/CI/2.5, GIN/CI/4.3, GIN/CM/4.1, GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2, GIN/CP/6.15, GIN/CP/7.2, TUR/CP/7.8
Guntur	Horticultural Research Station, Dr. Y.S.R. Horticultural University, Guntur, AP	Dr. K. Giridhar	16	TUR/CI/1.1, TUR/CI/2.8, TUR/CI/2.9, COR/CI/1.1, COR/CI/2.8, FGK/CI/1.1, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1, COR/CM/5.1, COR/CM/6.1, FGK/CM/5.1, FGK/CM/5.9, TUR/CP/7.9, TUR/CP/7.10, SS/CP/7.1
		Dr. B. Tanuja Priya		
Solan	Dept.of Vegetable Science, College of Horticulture (Dr YS Parmar Univ. of Horticulture & Forestry), SOLAN, HP	Dr. Meenu Gupta	6	GIN/CI/1.1, TUR/CI/1.1, GIN/CM/4.1, TUR/CM/5.1, GIN/CP/6.15, TUR/CP/7.8
Pottangi	High Altitude Research Station, (Orissa Univ. of Agrl. & Technology), POTTANGI, Odisha	Dr. Parshuram Sial	18	GIN/CI/1.1, GIN/CI/2.5, GIN/CI/2.6, GIN/CI/2.7, GIN/CI/4.3, TUR/CI/1.1, TUR/CI/2.8, TUR/CI/2.9, GIN/CM/4.1, GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2, GIN/CP/6.15, GIN/CP/7.1, GIN/CP/7.2, TUR/CP/7.8, TUR/CP/7.9
Jobner	SKN College of Agriculture, (Sri Karan Narendra Agriculture University) JOBNER, Rajasthan	Dr. Shailesh Marker	22	COR/CI/1.1, COR/CI/1.3, COR/CI/2.8, COR/CI/4.1, CUM/CI/1.1, CUM/CI/1.3, CUM/CI/2.5, FNL/CI/1.1, FNL/CI/2.8, FGK/CI/1.1, FGK/CI/1.3, FGK/CI/2.5, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1, COR/CM/5.1, COR/CM/6.1, FGK/CM/6.1, SS/CM/4.1, CUM/CP/7.1, FGK/CP/7.1, SS/CP/7.1
		Dr. A. C. Shivran		
		Sh. G L Kumawat,		
Jagudan		Dr. N.R. Patel	16	

	Centre for Research on Seed Spices (CRSS) , Sardarkrushinagar Dantiwada Agricultural University (SDAU), JAGUDAN, Gujarat	Dr. Surabhi S. Chauhan		COR/CI/1.1, COR/CI/2.8, CUM/CI/1.1, CUM/CI/2.5, FNL/CI/1.1, FNL/CI/2.8, FGK/CI/1.1, FGK/CI/2.5, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1 , FNL/CM/5.1, SS/CM/4.1 , CUM/CP/7.1, FGK/CP/7.1, SS/CP/7.1
Hisar	Department of Vegetable Science, (Chaudhary Charan Singh Haryana Agril. University), HISAR, Haryana	Dr. S.K. Tehlan	16	COR/CI/1.1, COR/CI/2.8, CUM/CI/1.1, FNL/CI/1.1, FNL/CI/2.8, FGK/CI/1.1, FGK/CI/2.5, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1, NGL/CI/2.2 , FNL/CM/5.1, COR/CM/5.1, COR/CM/6.1, SS/CM/4.1 , COR/CP/7.1, FGK/CP/7.1
Dholi	Department of Horticulture, Tirhut College of Agriculture (Rajendra Agril. University), DHOLI, Bihar	Dr. A. K. Mishra	25	GIN/CI/1.1, TUR/CI/1.1, TUR/CI/2.7, TUR/CI/2.11, COR/CI/1.1, COR/CI/2.8, CUM/CI/1.1, FNL/CI/1.1, FNL/CI/2.8, FGK/CI/1.1, FGK/CI/2.5, FGK/CI/3.7 , GIN/CM/4.1, TUR/CM/5.2, COR/CM/5.1, COR/CM/6.1, FGK/CM/5.1, FGK/CM/5.9, FGK/CM/6.1, SS/CM/4.1 , GIN/CP/6.15, TUR/CP/7.8, COR/CP/7.1, NGL/CP/7.1, SS/CP/7.1
Kumarganj	Department of Vegetable Science, (Narendra Deva University of Agriculture & Technology), KUMARGANJ, Uttar Pradesh	Dr. Pradip Kumar	22	GIN/CI/1.1, TUR/CI/1.1, TUR/CI/2.11, COR/CI/1.1, COR/CI/2.8, FNL/CI/1.1, FNL/CI/2.8, FGK/CI/1.1, FGK/CI/2.5, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1 , GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.2, COR/CM/6.1, SS/CM/4.1 , TUR/CP/7.8, TUR/CP/7.10, COR/CP/7.1, NGL/CP/7.1, SS/CP/7.1
Pundibari	Faculty of Horticulture, Uttara Banga Krishi Vishwavidyalaya, PUNDIBARI, West Bengal	Mrs. Anamika Debnath	15	GIN/CI/1.1, GIN/CI/2.5, GIN/CI/4.3, TUR/CI/1.1, TUR/CI/2.7, TUR/CI/2.11 , GIN/CM/4.1, GIN/CM/5.1, TUR/CM/5.1, TUR/CM/5.2 , GIN/CP/6.15, GIN/CP/7.1, GIN/CP/7.2, TUR/CP/7.8, TUR/CP/7.9
		Dr. Ramkrishna Sarkar		
Dapoli	Department of Horticulture (Dr. BS Konkan Krishi Vidyapeeth), DAPOLI, MH	Dr. P. C. Mali,	7	PEP/CI/1.1, PEP/CI/3.5, PEP/CI/3.6, TSP/CI/1.1, TSP/CI/1.2, TSP/CI/2.4 , PEP/CP/5.8
		Dr. A. V. Bhuwad		
Raigarh	Regional Agri. Research Station, (Indira Gandhi Krishi	Dr. Ajit Kumar Singh	24	GIN/CI/1.1, GIN/CI/2.5, GIN/CI/2.6, GIN/CI/4.3, TUR/CI/1.1, TUR/CI/2.7, TUR/CI/2.8, TUR/CI/2.11, COR/CI/1.1, COR/CI/2.8, FGK/CI/1.1, FGK/CI/2.5, AJN/CI/2.2,
		Dr. Shrikant Laxmikant Swargaonkar		

	Viswavidyalaya), RAIGARH, Chhattisgarh			AJN/CI/2.1, NGL/CI/2.2 , GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2, SS/CM/4.1 , GIN/CP/6.15, TUR/CP/7.8, NGL/CP/7.1, SS/CP/7.1
Myladumpara	Indian Cardamom Research Institute, MYLADUMPARA,, Kerala	Dr. K. Pradip Kumar,	9	CAR/CI/3.8, CAR/CI/3.9, CAR/CI/4.4, CAR/CI/4.5 , CAR/CM/5.5, CAR/CM/5.6 , CAR/CP/6.11, CAR/CP/6.12, CAR/CP/6.13
		Dr. K.A. Saju		
		Dr. Manoj Oommen		
		Dr.K.Dhanapal		
ICRI GANGTOK, Sikkim	ICRI GANGTOK, Sikkim	Dr. T.N. Deka	5	LCA/CI/1.1, LCA/CI/2.1 , LCA/CM/5.1, GIN/CM/4.1, GIN/CM/5.1
Sakleshpur,	ICRI , SAKLESHPUR, Karnataka	Dr. K.N. Harsha	19	COR/CI/2.8, CUM/CI/2.5, FNL/CI/2.8, FGK/CI/2.5, FGK/CI/3.7, AJN/CI/2.2, AJN/CI/2.1, NGL/CI/2.2, GIN/CM/4.1, GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2, PEP/CP/5.8, PEP/CP/5.10, PEP/CP/7.1, CAR/CP/6.11, CAR/CP/6.12, CAR/CP/6.13
Ambalavayal	RARS, KAU, AMBALAVAYAL, Kerala	Ms. Athulya MM	8	PEP/CI/1.1, PEP/CI/3.7, TUR/CI/2.7, GIN/CM/5.1, GIN/CP/6.15, GIN/CP/7.1, TUR/CP/7.8, TUR/CP/7.9
Pechiparai	Horticultural Research Station, (Tamil Nadu Agricultural University), PECHIPARAI, TN	Dr. Prem Joshua	3	TSP/CI/1.1, TSP/CI/1.2, TSP/CI/2.4
		Dr. Jaya Jasmine		
Barapani, Meghalaya	(Umiam) 'ICARNEH'.	Dr. M. Bilshini Devi	10	GIN/CI/1.1, GIN/CI/2.5, TUR/CI/1.1, TUR/CI/2.7, TUR/CI/2.11, GIN/CP/6.15, GIN/CP/7.1, GIN/CP/7.2, TUR/CP/7.9, TUR/CP/7.10
		Dr. Veerendra Verma		
Mizoram	ICAR Res. Complex for NEH Region Regional Station, Mizoram Centre, Kolasib-796 081, Mizoram	Dr. Lungmuana	6	GIN/CI/4.3, TUR/CI/2.11 , GIN/CM/4.1 , GIN/CP/7.1, TUR/CP/7.8, TUR/CP/7.9
ICAR Res. Sikkim Centre, Tadong,	ICAR Res. Complex for NEH Region, Regional Station, Sikkim Centre, Tadong	Dr. Amit Kumar	5	
Nagaland	Department of Horticulture, SASRD, Nagaland University, Medziphema-797 106, Dimapur, Nagaland	Dr. C. S. Maiti,	6	GIN/CI/2.5, GIN/CI/2.7, GIN/CI/4.3 , GIN/CM/4.1 , GIN/CP/6.15, GIN/CP/7.1
		Dr. Graceli I Yeptomi		

Assam AAU	Horticultural Research Station, Assam Agricultural University, Jorhat- 785013, Assam AAU	Dr. Kusum Kr. Deka,	10	GIN/CI/1.1, GIN/CI/2.5, GIN/CI/4.3, TUR/CI/1.1, TUR/CI/2.7, TUR/CI/2.11 , FNL/CM/5.1, FGK/CM/5.9, SS/CM/4.1 , CUM/CP/7.1
Pasighat	College of Horticulture & Forestry, Central Agricultural University, PASIGHAT, Arunachal Pradesh	Dr. Arwankie Shadap	11	TUR/CI/1.1, TUR/CI/2.8, TUR/CI/2.9, LCA/CM/5.1, GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2, GIN/CP/6.15, GIN/CP/7.1, TUR/CP/7.8
Pantnagar	GovindBallabh Pant University of Agriculture and Technology, College of Agriculture, Pantnagar, Uttarakhand	Dr. Dharendra Singh	5	COR/CI/2.8, FNL/CI/2.8, FGK/CI/2.5, NGL/CI/2.2, FGK/CM/5.9
Kanke	BIRSA Agricultural University, College of Agriculture, Kanke , Jharkhand	Dr.Arun Kumar Tiwary	8	TUR/CI/2.8, TUR/CI/2.9 , GIN/CM/4.1, TUR/CM/5.2 , GIN/CP/6.15, GIN/CP/7.1, TUR/CP/7.8, TUR/CP/7.9
Kalyani	Bidhan Chandra KrishiVishwaVidhyalay ,Kalyani, WB	Dr. AnupamPariari,	10	COR/CI/2.8, FGK/CI/2.5, FGK/CI/3.7 , GIN/CM/4.1, GIN/CM/5.1, GIN/CM/5.2, TUR/CM/5.1, TUR/CM/5.2 , GIN/CP/6.15, SS/CP/7.1
Navsari	N.M. College of Agriculture, Navsari Agricultural University, Navsari, Gujarat	Dr. Ritesh K. Patel	6	TUR/CI/2.8, TUR/CI/2.11, COR/CI/2.8, FNL/CI/2.8, FGK/CI/2.5, FGK/CI/3.7
Jabalpur	Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur, Madhya Pradesh	Dr. Reena Nair	10	COR/CI/2.8, FNL/CI/2.8, FGK/CI/2.5, FGK/CI/3.7 , COR/CM/6.1, FGK/CM/5.1, FGK/CM/5.9, SS/CM/4.1 , COR/CP/7.1, FGK/CP/7.1
Kota	Agricultural Research Station, Agriculture University, Kota, Rajasthan	Dr. Preeti Verma	11	COR/CI/2.8, FGK/CI/2.5, FGK/CI/3.7, NGL/CI/2.2 , COR/CM/5.1, COR/CM/6.1, FGK/CM/5.1, FGK/CM/5.9, FGK/CM/6.1 , COR/CP/7.1, FGK/CP/7.1
Sanand	Castor-Seed Spices Research Station, (Anand Agricultural University), Sanand, Gujarat	Dr. T T Patel	4	COR/CI/2.8, CUM/CI/1.1, CUM/CI/2.5, SS/CP/7.1

Mandor	Agriculture research Station, (Agricultural University Jodhpur), Mandor, Rajasthan	Dr. Motilal Mehriya	6	CUM/CI/1.1, CUM/CI/2.5, COR/CM/6.1, FGK/CM/5.1, FGK/CM/5.9, CUM/CP/7.1
Thrissur	Kerala Agricultural University, Vellanikkara, Kerala	Dr. Vikram H. C	2	TSP/CI/2.4, Project Mode (Nutmeg)
Pampore	SRS, Sher-e-Kashmir Univ of Agricultural Sciences & Technology of Kashmir, Shalimar	Dr. Mudasir H. Khan	2	Project Mode (Saffron), Project Mode (Kalazeera)



VARIETIES RECOMMENDED FOR RELEASE DURING XXXIV ANNUAL GROUP MEETING 2023



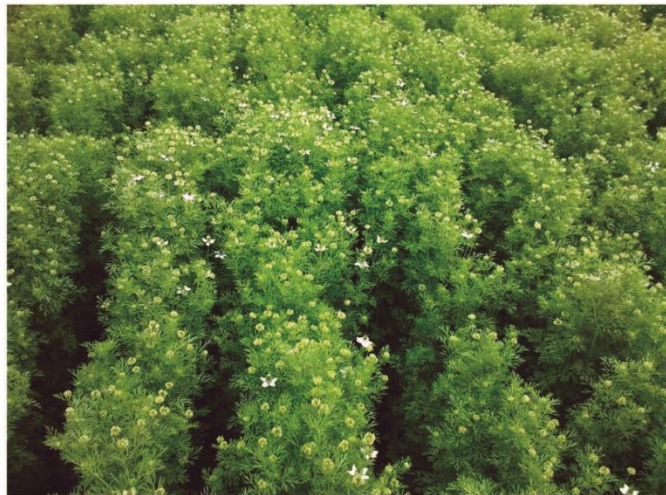
Kamakhya 1



Kamakhya 1



Gujarat Ajwain 3



Hisar Kalonji -12



IISR Amrit



IISR Amrit

ICAR-All India Coordinated Research Project on Spices

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