



**Symposium on Spices and Aromatic Crops
(SYMSAC -VIII)**



Towards 2050 - Strategies for sustainable spices production

16-18 December 2015

at

Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu

PROCEEDINGS & RECOMMENDATIONS

Inaugural Session

The inaugural function of the National symposium on Spices and Aromatic Crops (SYMSAC – VIII) jointly organized by Tamil Nadu Agricultural University, Coimbatore and Indian Society for Spices, Kozhikode with the theme “Towards 2050- Strategies for sustainable Spices Production” was held on 16th December 2015 at Tamil Nadu Agricultural University, Coimbatore.

The symposium was inaugurated with the lighting of lamp by Dr. N.K. Krishna Kumar, Deputy Director General (Hort. Science), ICAR, New Delhi. Addressing the inaugural function Dr. N.K. Krishna Kumar highlighted that Indian spices face the challenge of high level of microbial contaminants including mycotoxin in the finished product. He stressed the need for higher productivity, clean spices through improved post harvest processing, packaging and storage systems for sustainable spices production.

Dr. K. Ramasamy, Vice-Chancellor, TNAU in his presidential address stated that both agricultural and horticultural sector provide opportunities for alternate systems of medicine and suggested that studies may be thrust towards indication of maturity index and right time of harvest that may have positive effect on the alternate systems of medicine. Further, the Vice-Chancellor advised the forum to suggest suitable strategies for marketing of spices products and to work e more on quality parameters of the spice products.

In his key note address, Professor R.R. Hanchinal, Chairperson, PPV&FRA, New Delhi said that Indian spices have nomenclatured with geographical indicators such as Malabar Pepper, Alleppey Green Cardamom, Coorg Green Cardamom, Naga Chilli and Erode Turmeric. He stressed the need for protecting the varieties developed by State Agricultural Universities and farmers through PPV&FRA. He appreciated Tamil Nadu Agricultural University for its systematic work on protecting the varieties of this region.

Earlier, Dr. K. Nirmal Babu, President, ISS, Kozhikode welcomed the gathering.

Dr. M. Anandaraj, Director, ICAR-IISR, Kozhikode, Dr. V.A. Parthasarathy, Former Director, ICAR-IISR, Kozhikode, Dr. Jitendra Kumar, Director, ICAR-DMAPR, Anand, Gujarat, Dr. S. Mariappan, Dean (Hort.), HC&RI, TNAU, Coimbatore and Dr. Homey Cheriyan, Director, DASD, Kozhikode felicitated the symposium and cherished the efforts of the organizers.

This was followed by the ISS award ceremony which included Sugandha Bharathi Award to eminent scientists for their outstanding contribution in the field of spices research, ISS Fellowships for distinguished scientists who have made signified contributions through technology development, filing of patents, publications and other recognitions, Sugandhasree Innovative Farmer Award for farmers who have made significant contributions through involvement in spices cultivation, Dr. V.S. Korikanthimath Award for the best Ph.D. thesis, Smt. Vijaya V. Korikanthimath Award for the best M.Sc. thesis and Dr. J.S. Pruthi Award of the best research publications.

On the occasion, a Souvenir of the Symposium and Nilavembu powder, a TNAU product was released.

The Vote of thanks was proposed by Dr. J. Suresh, Organizing Secretary and Professor & Head, Dept. of Spices & Plantation Crops, HC & RI, TNAU, Coimbatore.

The inaugural function was followed by an award lecture and inauguration of exhibition.

List of Awards presented during the inaugural session

Sl. No.	Name of the Awards	Awardees
1	Sugandha Bharathi Award	Prof. K.V. Peter, Chairman, World Noni Research Foundation, Chennai
2	ISS Fellow	1) Dr. M. Tamil Selvan, Assistant Horticulture Commissioner, GOI, New Delhi 2) Mr. C.M. Pemmaiah, Planter, Kodagu 3) Dr. E. Jayashree, Senior Scientist, ICAR-IISR, Kozhikode, Kerala 4) Dr. D. Prasath, Senior Scientist, ICAR-IISR, Kozhikode, Kerala 5) Dr. Utpala Parthasarathy, Chief Technical Officer, ICAR-IISR, Kozhikode, Kerala 6) Dr. Dharendra Singh, Professor, SKN College of Agriculture, Jobner, Rajasthan
3	Sugandhasree Innovative Farmer Award	1) Shri. Mathew Sebastian, Farmer, Malappuram, Kerala 2) Shri. S.R. Sundararaman, Farmer, Sathyamangalam, Tamil Nadu
4	Dr. J.S. Pruthi Award for the best research paper published in JOSAC for the years 2013 & 2014	'Genetic diversity analysis of <i>Myristica</i> and related genera using RAPD and ISSR markers' by T E Sheeja, C Sabeesh, O V Shabna, R S Shalini & B Krishnamoorthy & 'Inter-regional variations and future household demand and production of major spices in India' by S K Srivastava, R Kumar, M Hema & R Hasan 'Evaluating the taxonomic status of <i>Solanum nigrum</i> L. using flow cytometry and DNA barcoding technique' by T Nandhini & P Paramaguru
5	Dr. V.S. Korikanthimath Award for the best Ph.D. thesis Award	Dr.(Mrs.) N. Sathya Prasad, Mysore, Karnataka
6	Smt. Vijaya V. Korikanthimath Award for the best M.Sc. thesis Award	Ms. Aswathy Dev, Thiruvananthapuram, Kerala

Special Session

Chairpersons:

Prof. K.V. Peter, Director, World Noni Research Foundation, Chennai, Tamil Nadu
Dr. M. Anandaraj, Director, ICAR-IISR, Kozhikode, Kerala

Rapporteurs:

Dr. Sharon Aravind, Scientist (Horticulture), ICAR-IISR Regional Station, Appangala, Karnataka
Dr. V. Jegadeeswari, Assistant Professor (Horticulture), TNAU, Coimbatore, Tamil Nadu

Dr. Ajit Shirodkar, Western Ghats Kokum Foundation, Goa and Dr. P.J. Kshirsagar, Dr. BSKKV, Dapoli narrated potentials and prospects of cultivation of Kokum (*Garcinia indica*) in Western Ghats. They indicated about the thrust areas for research in Kokum. It is a unique plant with more than 200 species capable of competing with coconut, cashew and cocoa. The fruit has wide variability for rind colour, thickness and anthocyanin content. Promotion of model plots and their development with co-operation of ayurveda firms were indicated. Emphases were also given on promotion of value added products of kokum viz., Kokum butter, Agal, Ansol, kokum syrup and pigment.

Special lecture I: “Challenges and options to sustainable crop production in spices” was delivered by Dr. M. Anandaraj, Director, ICAR-Indian Institute of Spices Research, Kozhikode. He mentioned about the current area, production and export of spices. The estimated per capita demand for major spices in 2050 was also emphasized and he highlighted the importance of conservation of genetic resources, barcoding and crop improvement in spice crops. He also narrated a couple of success stories of turmeric varieties. The lecture also included the challenges for spices production like climatic factors, competing countries, global warming, PAN-Asian connectivity ensuring easy flow of commodities across the borders. Mechanization in processing of spice crops has to be given importance. Awareness and adoption of released technologies among farmers and industries are the needs of the hour.

Special Lecture II: “Potentials and policy options for horticultural development in North East” was delivered by Dr. V.A. Parthasarathy, Former Director, ICAR-Indian Institute of Spices Research, Kozhikode. India is endowed with varied agro-climatic conditions and is rich in biodiversity in most of the spices. He indicated that, more than 61% of cultivated area in North East is under spices. Sikkim is known for its ginger and large cardamom while, Mizoram is known for Bird’s eye chilli. Geographical Indication (GI) has been obtained for Naga chilli, Tezpur Litchi, Khasi Mandarin and Kachai lemon. He concluded the lecture by indicating the significance on the conservation of horticultural produces cultivated in North Eastern states of India.

‘Dr. V.S. Korikanthimath Award for the best Ph.D. thesis’ was presented to Dr. N. Sathya Prasad, Mysore University Karnataka. The Ph.D. thesis entitled “Therapeutic propensity of selecting spice actives against experimentally induced neuropathy” was presented by Dr. (Mrs.) N. Sathya Prasad. She mentioned about screening of spice actives for neuroprotective effects in neurotoxicity and its validation in rat. Curative effects of eugenol in reducing oxidative stress and modulation of geraniol concentration to increase resistance to hot/cold stimuli were also emphasized.

Recommendations:

- Importance of Kokum and need for research on its medicinal properties.
- Need for industry in adopting technology and to give premium price to spice produces.
- Importance has to be given for research and development in North East, being a potential germplasm belt for spices and horticultural crops.

Session I

Genetic Resources, Crop Improvement & Biotechnology

Chairpersons:

Dr. V.A. Parthasarathy, Former Director, ICAR-IISR, Kozhikode, Kerala

Dr. M. Maheswaran, Director of Research, TNAU, Coimbatore, Tamil Nadu

Dr. D. Veeraraghavathatham, Former Dean (Horticulture), TNAU, Coimbatore, Tamil Nadu

Rapporteurs:

Dr. V. Jegadeeswari, Assistant Professor (Horticulture), TNAU, Coimbatore, Tamil Nadu

Ms. S. Aarthi, Scientist (Horticulture), ICAR-IISR, Kozhikode, Kerala

In this session, there were three lead lectures and three oral presentations.

Dr. K. Nirmal Babu made a detailed presentation on the status of crop improvement research activities in black pepper, ginger, turmeric, cardamom and tree spices. He detailed that 250 varieties have been released in India on various spices. He highlighted the major problems that are being addressed in breeding programmes. The main focus has been on quality, yield and resistance to biotic and abiotic stresses. He emphasized the need for maintaining genetic purity. He briefly narrated the promising technology of micro-rhizome in ginger.

Dr. E.V.D. Sastry presented the concept and procedures for designing seed spices. He stressed the importance of ideotype breeding and its application on seed spices. He presented the ideotype of coriander suitable for North and South Indian conditions. He indicated the use of mutation and specified crossing as a mean to develop desirable ideotypes. The constraint is the lack of any homozygous types for mutation research. The handicap in working on the research on breeding for quality is lack of understanding of biosynthetic pathways. In case of fenugreek, he suggested the possibility of using drought tolerance.

The lecture on NGS by Dr. Raja Mugasimangalam detailed the use of Next Generation Sequencing on non-model plants like spices. He listed the work done on Tulsi, *Costus*, Turmeric and *Momordica*.

Two oral papers for H.S. Mehta Award were also presented. The first paper by Mr. H.C. Vikram, Ph.D. Scholar, KAU, Thrissur on Developing minimal descriptor for nutmeg and characterization of germplasm and second by Mr. Y. Diwakar, Scientist, ICAR-NRC on Seed Spices, Ajmer on Characterization and evaluation of *Nigellasativa* L., genotypes for growth, yield and quality.

Dr. M. Maheswaran, Director of Research, TNAU, Coimbatore observed that, all the three presentations were towards the present status of each of the components. However, none of the presentations were complete towards establishing the methodology based on the biology of the crop. In the first presentation, varieties released in different spice crops were elaborated. However, clear-cut breeding methods adopted were not indicated. Moreover, most of the varieties were from germplasm collection without proper evaluation. Crop-specific and trait-specific approaches with appropriate breeding methodology are the need of the hour. In the second presentation, ideotype concept was introduced involving seed spices. For established ideotype breeding, the foremost requirement is understanding biology of the crop and specific traits. This requires the utilization of appropriate breeding methods and thorough understanding of quantitative genetics. In the third presentation, the latest tool available *i.e.*, genome sequencing, for exploiting the wealth of information from the genome of each plant was narrated. Genome sequencing and developing markers will be successful in crop breeding only when the markers developed are associated with specific trait of the crop concerned. If the phenotypes are not associated with markers, genome sequencing can be compared with non-stop driving in the highway. The success in crop breeding

essentially based on detailed biology, breeding methods and tools for understanding evolution and thorough evaluation after the evolution.

Recommendations:

- Use of germplasm selection as means for release of varieties should be avoided in the light of guidelines of PPV & FRA which permit registration of farmers' varieties.
- Care must be taken not to release introductions as varieties since it can attract IPR violations.
- Pedigree registers must be meticulously maintained.
- The purity for specific trait of the varieties released from various institutes should be maintained even it is multiplied in larger number.

Session II

Soil & Plant Health Management

Chairpersons:

Dr. V.S. Korikanthimath, Former Director, ICAR Research Complex, Goa

Dr. N. Ragupathy, Director, Students Welfare, TNAU, Coimbatore, Tamil Nadu

Dr. J. Thomas, Former Director (Research), ICRI, Myladumpara, Kerala

Rapporteurs:

Dr. M. Suganthy, Assistant Professor (Agricultural Entomology), TNAU, Coimbatore, Tamil Nadu

Dr. R. Praveena, Scientist (Plant Pathology), ICAR-IISR, Kozhikode, Kerala

In this session, 13 papers were presented which included four lead lectures, four oral presentations and five H.S. Mehta award presentations.

The lead lectures were:-

- “Good agricultural practices in medicinal plants” by Dr. Jitendra Kumar, Director, ICAR-DMAPR, Anand
- “Sustainable plant protection technologies in spice crops” by Dr. S. Devasahayam, Head (Crop Protection), ICAR-IISR, Kozhikode
- “Protected cultivation through effective technology interventions” by Dr. R.S. Mehta, Principal Scientist, NRC on Seed Spices, Ajmer
- “Carbon sequestration in spices cropping systems- future strategies for climate change” by Dr. E.V.S. Prakasa Rao, Former Chief Scientist, CSIR-CIMAP RC, Bangalore

The four oral presentations were:-

- “Importance of micronutrients and designer formulations for spices” by Dr. V. Srinivasan, Principal Scientist, ICAR-IISR, Kozhikode
- “Climate change in the cloud forest cardamom hot spots in relation to cardamom productivity in Guatemala and India” by Dr. Muthusamy Murugan, Professor & Head, KAU-CRS, Pampadumpara, Kerala
- “Status of pesticide residues in major spice commodities” by Dr. K. Bhuvaneshwari, Professor, TNAU, Coimbatore
- “The black pepper-*Colletotrichum* host-pathosystem: Biology, epidemiology and management” by Dr. C.N. Biju, Scientist, ICAR-IISR, Kozhikode

The presentations were followed by discussion.

In addition, the industry’s concern was presented by Dr. J. Thomas on behalf of Mr. Philip Kuruvila, Chairman, World Spice Organization, Kochi. The industry targets 3 billion US dollars by 2017. Industry is aiming at faster and sustainable growth benefitting all stakeholders along the value chain from farmer to consumer.

The real concerns of the industries are:

1. Reduced productivity in traditional spice growing areas with increasing demand for spices is the growing concern.
2. The gap between the existing technologies in various R&D institutions and the level of adoption at farm/manufacturing and processing unit, need to be bridged with effective campaigning.
3. Refocusing of research and development with larger focus on chemical free extraction, value addition and special products with nutraceutical/pharmaceutical properties.

4. A focus on digitalizing and mapping potential of spice growing areas in the country or abroad for finding new growing areas and strategies for addressing the existing concerns of production from the traditional areas.
5. Uniformity of global standard sets for spices quality and export.

Recommendations:

- All the production technologies should aim at bridging the gap between realized (actual) and realizable (potential) yield of spices.
- Preference should be given for undertaking farmer participatory farm trials on spices.
- Input use efficiency should be the priority in all the spices production packages.
- Efforts should be made to establish a referral pesticide residue analysis laboratory for all the spices and to fix MRL values for the pesticides used in spice production.
- Organic spices production technologies should be streamlined with organic certification systems.
- Emphasis should be laid on effective soil and water conservation measures for sustainable production of spices.
- Protected cultivation of high value spices should be cost effective with better quality parameters.
- Effort should be made to mechanize both production and processing of the spices.
- Eco-friendly management of spices keeping natural resources base undamaged should be the watchword for sustainable spices production.
- Climate change and ecological degradation is a concern and mitigation measures are to be defined for adoption at farm level.
- For organic farming, IPM module may be developed for major spice crops.

Session III

Mechanization, Post-Harvest Management & Quality Standards

Chairpersons:

Dr. M.R. Sudharshan, Former Director (Research), Spices Board, Kochi, Kerala
Dr. C. Divaker Durairaj, Dean (Agricultural Engineering), AEC & RI, TNAU, Coimbatore, Tamil Nadu
Dr. T. John Zachariah, Head (Crop Production & PHT), ICAR-IISR, Kozhikode, Kerala

Rapporteurs:

Dr. B. Senthamizh Selvi, Assistant Professor (Horticulture), TNAU, Coimbatore, Tamil Nadu
Ms. H.J. Akshitha, Scientist (Horticulture), ICAR-IISR, Kozhikode, Kerala

There were two oral presentations (HS Mehta Award) and three lead lectures.

Ms. V. Vedashree presented on microwave-assisted extraction of 6-gingerols from fresh ginger. Compared to the traditional method of extraction, the microwave-assisted extraction was found to be efficient and the yield was also high. The house suggested the presenter to use fresh ginger of known variety for the experiment instead of the material collected from the market.

Ms. Saranya Balu presented on the antioxidant potential of cinnamon and turmeric extracts. The speaker highlighted that, the extracts were having good anti-oxidant potential. The house suggested the speaker to characterize the compounds responsible for antioxidant property.

The lead lectures presented were;

Dr. M. Madhava Naidu gave an overview on innovations in spice processing. He gave an overview on the innovative technologies developed by CFTRI for processing spices *viz.*, turmeric, black pepper, chilli, ginger, vanilla, fenugreek, dill and coriander. Some of the innovative methods in case of turmeric are avoiding cooking which is time consuming and also which leads to loss of pigments and use of turmeric spent which is also a source of starch which can replace rice. In black pepper, innovative methods developed are white pepper production by enzymatic approach which takes 6-8 hours and dehydrated green pepper production at high temperature and short time drying, wherein no chemicals are used and drying is performed at 160° C for 2-3 minutes. In chilli, to avoid the development of aflatoxin during drying, CFTRI developed a method based on microwave drying where, drying is completed in 30 minutes as against drying for hours under sunlight as in conventional method. In *Z. zerumbet* for the preparation of zerumbone which is having anticancer property, to remove the starch they used pressing step as an innovative method. For vanilla, curing method has been developed by which the time taken for curing is reduced to 1 month instead of 6 months in conventional method. The speaker emphasized that there is need for development of machineries for tamarind de-seeding and peeling of garlic.

Dr. B. Shridhar in his talk on mechanization in spice crops spoke about the different machineries used in spices starting from field preparation to post harvest processing. He also gave a note on the cost, efficiency, capacity of each of the equipment. Some of the equipments discussed were chisel plough, rotary spading machine, tractor drawn bund former, tractor drawn turmeric rhizome planter, hand operated pepper thresher, mechanical pepper thresher, pepper pulper cum washer and turmeric boiling unit.

Dr. M.R. Sudharshan gave a view on need for harmonization of quality standards in spices. He emphasized on the export of spices from India, food safety and food quality issues. He asserted that, food safety is implicit part of food quality. Potential food contaminants are microbes, mycotoxins, heavy metals, pesticide residues, allergens, undeclared colours and processing aids. All

these components have role in food safety and quality. He explained about the food safety and quality requirements. There are different quality standards set up by international, national and private bodies. So it is difficult to know which quality standards to follow, for which harmonization of standards is important. He gave an overview on the CODEX and its role in maintaining the quality standards. Recently for spices, a Codex Committee for Spices and Culinary Herbs (CCSCH) has been set up in 2013. This committee is in the process of elaborating standards for black, white and green pepper, cumin, oregano and thyme and also grouping of spices is also done.

The session was concluded with the remarks of chairpersons. The importance of mechanization, postharvest technology and the quality of spices was highlighted for the sustained growth of spice industry.

Recommendations:

- There is need for development of machineries for tamarind de-seeding and peeling of garlic.
- There is need for harmonization of quality standards in spices.
- There is an urgent need to create a positive brand image based on product range with intrinsic quality.
- A sustainable production system with acceptable low level of external contaminants, pesticide residues, adulterations with dyes and chemicals by adopting good agricultural practices (GAP) and good manufacturing practices (GMP).

Session IV

Quality Planting Material Production

Chairpersons:

Dr. N. Kumar, Former Dean (Horticulture), TNAU, Coimbatore, Tamil Nadu
Dr. Homey Cheriyan, Director, DASD, Kozhikode, Kerala

Rapporteurs:

Dr. R. Chitra, Assistant Professor (Horticulture), TNAU, Coimbatore, Tamil Nadu
Dr. P. Alagupalamuthirsolai, Scientist, ICAR-IISR Regional Station, Appangala, Karnataka

In this session, there were two lead lectures and two oral presentations.

- 'Nursery standards and accreditation in spices' by Dr. Homey Cheriyan, Director, DASD, Kozhikode, Kerala
- 'Quality seed production in seed spices - Issues and strategies' by Dr. Gopal Lal, Principal Scientist, ICAR-NRCSS, Ajmer, Rajasthan

The oral presentations were;

- 'Perspectives on quality planting material production (QPMP) in black pepper' by Dr. K. Kandiannan, Principal Scientist, ICAR-IISR, Kozhikode, Kerala
- 'Plug production of turmeric transplants' by Dr. R. Chitra, Asst. Professor, HC & RI, TNAU, Coimbatore, Tamil Nadu

Recommendations:

- Accreditation of spice nurseries is being undertaken by the Directorate to regulate the multiplication and supply of quality of planting materials and improved varieties.
- Use orthotropic shoots to multiply black pepper to get early and higher yield.
- Pro-tray method of multiplication of improved varieties of turmeric has to be encouraged to produce quality planting material at a cheaper cost.

Session V

Scientist-Farmer-Industry Interface

Chairpersons:

Dr. D. Veeraragavathatham, Former Dean (Horticulture), HC & RI, TNAU, Coimbatore, Tamil Nadu

Dr. N. Kumar, Former Dean (Horticulture), TNAU, Coimbatore, Tamil Nadu

Dr. T.N. Balamohan, Dean, HC & RI, Periyakulam, Tamil Nadu

Rapporteur:

Dr. L. Nalina, Assistant Professor (Horticulture), TNAU, Coimbatore, Tamil Nadu

The papers presented in this session were;

- 'High production technology in black pepper – Farmers perspective' by Dr. S.J. Ankegowda, Head, ICAR-IISR, Regional Station, Appangala, Karnataka
- 'Organic Production Technology in Seed Spices' by Dr. Gopal Lal, Principal Scientist, ICAR-NRCS, Ajmer, Rajasthan
- 'Nutmeg and coconut based cropping system' by Mr. O.V.R. Somasundaram, Planter, Pollachi, Tamil Nadu
- 'Vanilla from Indian – An opportunity revisited' by Dr. R. Mahendran, Chairman, M/s. Expovan & Indian Vanilla Initiative Pvt. Ltd., Pollachi, Tamil Nadu
- 'Farmer producer company in turmeric – Success story' by Mr. Nallaswami, Chairman, M/s. Ulavan Farmer Producer Company, Erode, Tamil Nadu
- 'Industry: Status and opportunities' by Dr. J. Thomas (Retd. Director, Spices Board, Kochi) for World Spice Organization, Kochi, Kerala
- 'Strategies for sustainable spices production – Role of spices board' by Mr. P.C. Gopalakrishnan, Deputy Director, Spices Board, Kochi, Kerala

Recommendations:

- Irrigation management, shade regulation, phytosanitation measures should be followed properly during summer months to achieve maximum productivity in black pepper and the foot rot tolerant variety, IISR Sakthi is recommended to maximize the productivity.
- Community approaches may be adopted to control serious pests and diseases under coconut-based cropping systems.
- Area under vanilla may be increased with good agricultural production practices and processing techniques.
- Registered organizations may be well utilized to market the spice produces and products.
- The schemes available under State Department of Horticulture Tamil Nadu and the Central Government schemes under NHM, NABARD and Spices Board may be utilized to expand the area under spice crops.
- Phytosanitary measures to be adopted during production and processing of spice crops to achieve the export standards.
- The recommended dose of pesticides and fungicides are to be followed to reduce the residue level in spice produces.
- Location specific strategies should be followed for the production of black pepper.
- Multi varietal planting can be followed in black pepper to get high yield.
- Single picking method of chilli should be developed.
- Innovative drying technologies should be developed to avoid aflatoxin contamination.
- Selection of bold nuts in nutmeg to overcome the koel problem.

Plenary Session

Chairman:

Dr. K. Ramasamy, Vice Chancellor, TNAU, Coimbatore

Co-Chairman:

Dr. S. Edison, Former PC Spices & Former Director, ICAR-CTCRI, Thiruvananthapuram

The SYMSAC VIII, a biennial research & development activity hosted by the Indian Society for Spices (ISS) and ICAR-Indian Institute for Spices Research, Kozhikode, Kerala was held at Tamil Nadu Agricultural University, Coimbatore, Tamil Nadu during 16-18 December, 2015. The symposium was inaugurated by Dr. N.K. Krishna Kumar, DDG (HS) under the Chairmanship of Dr. K. Ramasamy, Vice Chancellor, TNAU. Dr. R.R. Hanchinal, Chairman, PPV & FRA, New Delhi was the Chief Guest and there were five technical sessions chaired by scientists cum administrators in the NARS system. Dr. K. Nirmal Babu, Project Coordinator (Spices) & the present President of the ISS made all the arrangements with the co-operation of the Faculty of Horticulture, TNAU. There were lead papers, invited research papers, competition papers, poster presentations as well as a special session to discuss the problems faced by the spice growers, processors, marketing professionals and the exporters.

At the end of the 3 day-symposium, the Plenary Session was held on the 18th afternoon with Dr. K Ramasamy, VC, TNAU and Dr. S, Edison (former PC Spices & FAO Spices Expert and Director ICAR-CTCRI, Thiruvananthapuram) who conducted the session. Several awards were also given away to the best papers presented. The proceedings and the final recommendations emanated from various sessions were presented by the concerned Chairmen, followed by a discussion.

The main aspects of the outcome are enumerated below:

- The theme of the Symposium being Strategies for sustainable spices production towards 2050, the lead lecture by Dr. M, Anandaraj emphasized the need for the conservation of the genetic resources, barcoding, challenges for spices production like climatic factors, competing countries, global warming, PAN-Asian connectivity, mechanization in processing, quality control and awareness and adoption of the released technologies. A special presentation was on Kokum by Dr. Ajit Shirodkar on the need for further development efforts on the kokum especially its ayurvedic medicinal properties and promotion of value-added products. The North Eastern region being a potential area for developing spices native to the region and the need for increasing efforts on the productivity was also discussed.
- Dr. K. Nirmal Babu made a detailed presentation on the various aspects of ensuring greater productivity and to take care of the resistance to biotic and abiotic stresses, emphasis on yield and quality. With over 250 varieties of different spices grown in India, he evoked the necessity to maintain the genetic purity and made special mention of the micro-rhizome technology in ginger. Dr. E.V.D, Sastry pleaded for homozygous types for effective mutation breeding on seed spices and also appealed to understand the biosynthetic pathway of the active molecules. A presentation was also made on the Next Generation Sequencing. Dr. Maheswaran cautioned the role of gene sequencing and developing markers for successful crop breeding programmes. It was recommended to maintain pedigree registers, beware of the IPR violations in releasing introductions as varieties and also the need to follow the provision of the PPV & FRA.
- There is an absolute need to follow GAPs especially because of the export potential of spices. Use of protected cultivation to grow seed spices was also discussed and this needed large scale demonstrations and the possibility of funding from NHM, NHB etc.,

- Importance of micronutrients and designer formulations for spices was a novel presentation from Dr. V, Srinivasan. In the case of cardamom, effect of climate change in affecting the productivity as compared to the situation in Guatemala was a matter of deep concern in view of the decline in production. A review was made on the role of sustainable pest and disease management to enhance productivity was presented by Dr. S Devasahayam and he also cautioned about the status of pesticide residues and the risk in our export scenario.
- The need for going-organic and the streamlining of the related procedure for certification, eco-friendly management by keeping the natural resources undamaged, preference to “farmer-participatory-farm trials” for establishing the high-productive varieties, following an IPM module etc., were emphasized to ensure sustainable production.
- There was a concern expressed by the Spices Exporters’ Forum which cautioned about the reduction in productivity of spices in traditional spice-growing areas, the wide gap between the yield obtained in R & D Institutions and the Farmer’s field, refocusing on “chemical-free extraction procedures, GAP & GMP, lowering the level of contamination and adulterations with dyes & chemicals and its impact on export, aim for a global-set of standards for spice-quality and also the need for digitalizing and mapping the potential spices producing areas/zones and the need to scout for newer areas. They also demand to create a positive brand image for our spices based on the range of products and the intrinsic quality.
- The Spices Codex Committee for Spices and Culinary Herbs (set up in 2013) guides on the implicit part of food quality and safety. As there are different quality standards set up by the domestic, international as well as by private bodies, it becomes difficult to settle on agreeable standards. Hence, the CODEX Committee is in the process of developing uniformly acceptable criteria, as explained by Dr. M.R. Sudharshan.
- The CFTRI has made detailed improvement in developing new machineries for field preparation to processing of various spices and this need to be experimented in different situations by the Extension agencies and in this activity, the KVKs of the ICAR and the SAUs can play a facilitatory role. There was also a presentation by Dr. M. Madhava Naidu on the innovative processing technologies to preserve the quality of spices.
- Accreditation of Spices nurseries and use of quality planting material was emphasized at length. New methods of multiplication of turmeric planting material by “Pro-tray” was also explained.
- The interaction with the farmers was very interesting. The role of farmer producing companies, need for registered markets for vanilla, multi-varietal planting in black pepper, once-over harvest of chilli, shade regulation in black pepper etc., were highlighted.

The session came to an end with a vote of thanks proposed by the Dean, Horticulture, TNAU.

Participated Institutions

ICAR Institutes

ICAR-Central Institute of Agricultural Engineering, Coimbatore, Tamil Nadu
ICAR-Central Plantation Crops Research Institute, Kasaragod, Kerala
ICAR-Directorate of Medicinal & Aromatic Plants Research, Boriavi, Gujarat
ICAR-Indian Institute of Horticultural Research, Bengaluru, Karnataka
ICAR-Indian Institute of Spices Research, Kozhikode, Kerala
ICAR-National Bureau of Plant Genetic Resources, New Delhi
ICAR-National Research Centre on Seed Spices, Ajmer, Rajasthan
ICAR-Research Complex for NEH Region, Umiam, Meghalaya

Other Institutes

Agricultural Technology Application Research Institute, Bengaluru, Karnataka
CSIR-Central Food Technological Research Institute, Mysore, Karnataka
CSIR-Central Institute of Medicinal & Aromatic Plants, Lucknow, Uttar Pradesh
CSIR-National Botanical Research Institute, Lucknow, Uttar Pradesh
Indian Cardamom Research Institute, Spices Board, Myladumpara, Kerala
Rajasthan Agricultural Research Institute, Jaipur, Rajasthan

Tamil Nadu Agricultural University

Agricultural College & Research Institute, Killikulam, Tamil Nadu
Agricultural College & Research Institute, Madurai, Tamil Nadu
Agricultural Engineering College & Research Institute, Coimbatore, Tamil Nadu
Agricultural Research Station, Bhavanisagar, Tamil Nadu
Coconut Research Station, Aliyarnagar, Tamil Nadu
Grapes Research Station, Anaimalayanpatty, Tamil Nadu
Horticultural College & Research Institute for Women, Trichy, Tamil Nadu
Horticultural College & Research Institute, Coimbatore, Tamil Nadu
Horticultural College & Research Institute, Periyakulam, Tamil Nadu
Horticultural Research Station, Ooty, Tamil Nadu
Horticultural Research Station, Palur, Tamil Nadu
Horticultural Research Station, Pechiparai, Tamil Nadu
Horticultural Research Station, Thadiyankudisai, Tamil Nadu
ICAR-Krishi Vigyan Kendra, Needamangalam, Tamil Nadu
ICAR-Krishi Vigyan Kendra, Ramanathapuram, Tamil Nadu
Krishi Vigyan Kendra, Sandhiyur, Tamil Nadu
Krishi Vigyan Kendra, Tirur, Tamil Nadu
Regional Research Station, Paiyur, Tamil Nadu
Soil & Water Management Research Institute, Thanjavur, Tamil Nadu

Other Universities/Colleges

Bharathiar University, Coimbatore, Tamil Nadu
Bidhan Chandra Krishi Viswavidyalaya, Nadia, West Bengal
Cardamom Research Station, Kerala Agricultural University, Pampadumpara, Kerala
CCS Haryana Agricultural University, Hisar, Haryana
CMS College of Science & Commerce, Coimbatore, Tamil Nadu
College of Agriculture & Research Station, Indira Gandhi Krishi Viswavidyalaya, Raigarh, Chhattisgarh
College of Agriculture, Thiruvananthapuram, Kerala
College of Horticulture, GKVK, Bengaluru, Karnataka

College of Horticulture, Kerala Agricultural University, Thrissur, Kerala
College of Horticulture, Rajgurunagar, Telangana
College of Horticulture, SKLTS Horticultural University, Rajendranagar, Telangana
Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra
Dr. NGP Arts & Science College, Coimbatore, Tamil Nadu
Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra
Farming Systems Research Station, Kerala Agricultural University, Sadanandapuram, Kerala
Horticultural College & Research Institute, Dr. YSR Horticultural University,
Venkataramannagudem, Andhra Pradesh
Horticultural Research Station, Dr. YSR Horticultural University, Lam, Andhra Pradesh
ND University of Agriculture & Technology, Kumarganj, Uttar Pradesh
Pandit Jawaharlal Nehru College of Agriculture, UT of Puducherry, Karaikal, Tamil Nadu
Seed Spices Research Station, SD Agricultural University, Jagudan, Gujarat
SKN College of Agriculture, SKN Agricultural University, Jobner, Rajasthan
University of Agricultural & Horticultural Sciences, Shivamogga, Karnataka
University of Horticultural Sciences, Bagalkot, Karnataka
Yogi Vemana University, Vemanapuram, Andhra Pradesh

Developmental Agencies

Directorate Arecanut & Spices Development, Kozhikode, Kerala
National Horticulture Board, Chennai, Tamil Nadu
Peermade Development Society, Idukki, Kerala
Spices Board, Kochi, Kerala
State Horticulture Mission, Tamil Nadu
Western Ghats Kokum Foundation, Goa
World Spice Organization, Kochi, Kerala

Private Companies

M/s. Eurovannile, Coimbatore, Tamil Nadu
M/s. Expovan & Indian Vanilla Initiative (P) Ltd., Pollachi, Tamil Nadu
M/s. Genotypic, Bengaluru, Karnataka
M/s. Jain Irrigation Systems, Jalgaon, Maharashtra
M/s. Parry Agro Industries, Valparai, Tamil Nadu
M/s. Synthite Industries, Kochi, Kerala
M/s. Ulavan Farmer Producer Company, Tamil Nadu

Farmers

Clove Growers Association, Nagercoil, Tamil Nadu
Nutmeg Growers Association, Pollachi, Tamil Nadu
OVR Farms, Pollachi, Tamil Nadu
Individual progressive famers from Tamil Nadu, Kerala and Karnataka

List of Sponsors

Indian Council of Agricultural Research, New Delhi

ICAR-Indian Institute of Spices Research, Kozhikode, Kerala

Directorate of Arecanut & Spices Development, Kozhikode, Kerala

Department of Horticulture & Plantation Crops, Chennai, Tamil Nadu

Protection of Plant Varieties & Farmers Rights Authority, New Delhi

National Horticultural Board, Gurgaon, Haryana

Spices Board, Kochi, Kerala

National Bank for Agricultural & Rural Development, Mumbai, Maharashtra

Goodness Vanilla, Pollachi, Tamil Nadu

Sakthi Masala, Erode, Tamil Nadu

VSR Farms, Pollachi, Tamil Nadu

OVR Farms, Pollachi, Tamil Nadu