



CONFEDERATION OF HORTICULTURE
ASSOCIATIONS OF INDIA

CHAI

Annual Report 2022-23



CHAI

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2022-23



CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA

(An ISO 9001:2015 Certified Organisation)

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From the Desk of the Founder and Chairman

Dr. H.P. Singh

Chairman, CHAI

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The **Confederation of Horticulture Associations of India (CHAI)**, established in the year 2010, is committed to the furtherance of Horticultural/Agricultural development through knowledge creation, dissemination and implementation of the programmes. Horticulture comprising of fruits, vegetables including tubers, floriculture, spices, plantation crops, medicinal and aromatic plants, has emerged as vital for the socio-economic development of the country, to ensure nutritional security, environmental services, employment generation, health care and above all, effective and productive land use. The emerging trend worldwide and also in the country is indicative of a paradigm shift in dietary preferences with health consciousness and rise in expandable income. This change is demanding more horticultural produce. A trend of horticulture development in the past, particularly during the last two decades, has been satisfying. The adoption of horticulture crops in the systematic manner has improved the quality of life of the people in many regions, as farm profitability increased. The current challenges to the horticulture are investment and capital access to technology and initial learning for development of the acquired skills. Attempts to address many of these issues were made through mission mode approach, which brought a revolution in horticulture, referred to as **Global Revolution**.

The **CHAI** took an initiative to organise Knowledge Sharing Workshops at several locations on topical issues involving institution, industry, the farmers and other stakeholders. The Workshops were designed to provide opportunity to all the stakeholders, for sharing the knowledge and its dissemination for the formulation of policy, which became a guiding principle for achieving the goal and objectives of smart horticulture. Deliberations in workshop on the issues in the thematic areas provided more time for discussion to arrive at the logical conclusions. In past, 15 workshops have been organised, besides, supporting conferences, symposia and Sangosthi, at different locations on various themes to catalyse the efforts of farmers, which have succeeded in empowering farmers with new knowledge and providing policy frame work. During the year 3 workshops were organised as well as conference, Sangosthi and training organised by the ASM Foundations were supported.

The National Conference on **Climate Resilient and Sustainable Development of Horticulture**, organised at CSAUA&T, Kanpur, Uttar Pradesh, supported by the CHAI was a great success in terms

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of participation, technical contents and outcome. Kisan Sangosthi organised at Pusa on 3rd September was also supported and the training on organic farming was also partnered. The CHAI organised 3 workshops at different locations on topical issues. The Chairman, Dr. H.P. Singh, delivered keynote lectures on micro-irrigation, horticulture and innovations at various conferences. The lectures attracted lot of discussion. The chairman visited farmers' fields, guided the farmers and provided technical guidance to agriculture related companies from time to time.

Recognising the role of CHAI in transforming Horticulture/Agriculture, there has been an overwhelming response and the fellowships have reached to 400, including Institutional and Corporate Fellows. The growing interest for joining hands with CHAI from corporate, institutions, societies and individuals has build-up confidence to serve the community for achieving the mandate of the confederation, is highly encouraging. I am confident that CHAI shall emerge as an organisation to make us proud, to be its fellow, for the furtherance of agriculture/horticulture. I congratulate all the awardees of CHAI. I express my heartiest thanks to all the fellows for their effective cooperation. I thank all, who helped in bringing out this CHAI-Annual Report. I am sure for the continued support of all the Fellows. Finally, I look forward for making the Confederation global, second to none, in the service to mankind with focus on Horticulture.

Dr. H.P. Singh
The Founder and Chairman

EXECUTIVE SUMMARY

The Confederation of Horticulture Associations of India (CHAI) continued its efforts for the furtherance of horticulture/agriculture by bringing together, the organisations and individuals, to work together and achieve the goal of technology-led development and provide strategic solutions to the problems. National/International conferences and workshops were organised to share knowledge and develop policy papers. The CHAI continued to recognise the contributions of scientists, students, farmers and extension workers through the awards and rewards. The CHAI also published International Journal of Innovative horticulture, and strategic papers for innovations in horticulture.

The CHAI was a key partner in organisation of National conference on climate resilient and sustainable development of horticulture, organised at CSAUAT, Kanpur, May 28-31, 2022 by ASM Foundation. The conference deliberated on the issues in 16 technical sessions having on 9 plenary lectures, 65 Keynote address, 159 oral presentations and 165 posters to develop the recommendations. Several publications were released. Recommendations were adopted for action in the plenary session. Kisan Sangosthi on Precision Horticulture and its management and Training organised at AMRIT, Mahamada, Pusa, Samastipur, Bihar by ASM Foundation on 3rd September, 2022 and 22 November, 2022, respectively were supported by the CHAI. The Sangosthi was attended by more than 80 farmers and discussed the approaches for precision horticulture. Besides the lectures by the scientists, farmers also shared their experiences. In training on Organic farming, farmers told about various products used for effective management of organic horticulture, They prepared many products under the guidance of experts. Finally, trainees were evaluated and certificates were given to successful trainees,

The CHAI organised a National Workshop on digital horticulture at CSAUAT, Kanpur, on 28th May, 2022. Advancement coupled with digitalisation, use of sensors, ICT, IoT, use of drones and Block Chain Technologies were emphasised for achieving progress in horticulture. The workshop identified the challenges to harness the opportunities which exist for digital horticulture. A national workshop to deliberate on management of Cucumber Mosaic Virus (CMV) was organised at Raver, Maharashtra, on 30th September, 2022 to take stock of current status of CMV and develop strategies for its management. The workshop discussed the details with participation of farmers and concluded that change in cropping pattern and weather have been the cause for inter se severity of CMV in Raver, which is not so intense in other regions. However, there is a need for systematic studies to manage this disease which is causing a serious loss to banana farmers. During the meeting it was also suggested to avoid planting banana in Raver in July and August. A knowledge sharing workshop on banana and potato- a farmers' perspective was organised at the farm of progressive farmer, Mr. Sudhansu Kumar, Nayanagar, Rosra, Samastipur, Bihar. The farmer has adopted automation in water and nutrient management in banana and is going for taking up seed production of potato under contract farming with JISL, Jalgaon. The workshop discussed the issues of banana and potato in the background of presentations made by experts. The workshop was attended by more than 359 farmers who were highly motivated.

During the year, award and fellowships of 2022 were conferred on selected nominations. CHAI-Honoured Fellow- 2022, which recognises the contributions and leadership par excellence, was conferred on Dr. A. K. Srivastava, Chairman, ASRB, DARE, MoA&FW, New Delhi. The CHAI-Life Time Achievement Award-2022 was conferred on Dr. T. Janakiram, VC, Dr. YSRHU, Venkataramannagudem, A.P. CHAI-Life Time Recognition Award-2022 was conferred on Dr. Anoop K. Srivastava, CCRI, Nagpur for their

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exceptionally outstanding contributions to horticulture. CHAI-Honorary fellow- 2022 were conferred on Dr. B. Neeraja Prabhakar, VC, SKLTSHU, Mulugu, Siddipet Dist; Dr. R. K. Singh, Former Director/VC, IVRI, Bareilly, U.P.; Dr. Narendra Kumar Gontia, VC, JAU, Junagadh, Gujarat and Prof. (Dr.) K. P. Singh, VC, MJPRU, Bareilly, U.P. for their contribution and providing leadership of par excellence. Other awards like Dr R S Paroda award of excellence, Dr. B. H. Jain award for excellence in dissemination of Knowledge, Ramnandan Babu Award for excellence in farming, Appreciation Award, JISL Fellowship, Institutional fellowship and Fellowship of CHAI were also conferred during AGCM on 28th May evening. Various categories of award have been finalised for the year 2023 which shall be conferred on 28th May, 2023 at JISL, Jalgaon, Maharashtra.

The Chairman, chaired, RAC of 3 ICAR Institutes and provided guidance. He continued as Independent Director in the Board of Jain Irrigation Systems Ltd and Vindychal Agro to provide guidance. He also provided consultancy for H P SHIVA project in Himachal Pradesh through EY, New Delhi. He is providing guidance for developing vision document of agriculture in Odisha.

The CHAI continued to publish International Journal of Innovative Horticulture, Volume 11 has been published and circulated, and Volume 12 has been processed for publication. Award and Fellowships, Year Book and Annual Report were also published. During the year nomination for the CHAI Awards have been finalised, which will be conferred to selected nominations. The chairman inaugurated many events, on line and was part of important meetings

The AGCM of CHAI, was held on 28thMay, 2022 where, beside the agenda, selected candidatures were conferred the Fellowships. The genesis, mission, vision and activities of CHAI was released and circulated. The inputs from the fellows were noted. Appreciation for the Chairman was placed on the record by the Fellows for the progress and achievements. The meeting of the Board of Directors was held in every quarter, which reviewed the progress and approved the decisions taken by the chairman for effective functioning. During the year financial position has further strengthened despite expenditure. The balance sheet of CHAI is improving and corpus fund of 100 lakh has been created. Recognising the progress of CHAI and its achievements, many organisations and individuals have joined. The numbers have risen to 415, including institutions.

ABOUT OBJECTIVES, GOAL, MISSION AND ACTIVITIES OF THE CHAI

Confederation of Horticulture Associations of India (CHAI), an ISO- 9001:2015 certified non- profiting organisation, established during 2010, is committed for the furtherance of horticulture/agriculture research, education and development, through bringing organisations and individuals to work together in mission mode. The CHAI, with specific objectives of strengthening, coordinating, facilitating and converging policies at the grass root level for sustaining integrated development nationally and internationally, is emerging as a think-tank as well as a consultative body. The mission and objectives of CHAI and its network include, *inter alia*, to serve as a platform to provide critical inputs to public policy on major issues concerning innovations in facilitating the development of rural economy and promote development of rural India, in the global context and dimensions. The CHAI is also committed towards capacity building at all levels and is striving hard to achieve its goal of technology-led development by exploring and providing innovative solutions. CHAI is working on horticulture and agriculture tirelessly with set goals and commitments. It conducts and organizes number of national/international/global conferences and workshops for the exchange of information and knowledge, to develop the strategies for addressing the emerging concerns with scientific solutions. For the dissemination of knowledge, the CHAI brings out various publications like Books, Journals, Reports and News Letters. **International Journal of Innovative Horticulture**, which publishes scientific articles, short notes, reviews, articles and case studies, is brought out six monthly. To promote innovative ideas, the CHAI has instituted many awards which inspire individuals and team for the innovations and excellence. The CHAI offers various categories of Fellowships i.e. organisation, associations, corporate, and individual. The CHAI is headed by Dr. H.P. Singh as The Founder and Chairman, who is well known globally for his outstanding contributions to horticulture/agriculture research, education and development. The CHAI has established its units in many states to serve agriculture/horticulture at regional level also.

Mission

Development of agriculture/horticulture by providing strategic solutions to the problems, utilising the services of talented experts in the field of agriculture/ horticulture, and disseminate the knowledge.

Vision

Bring synergy among different societies/associations, experts and entrepreneurs to encourage effective participation of all stakeholders for accelerating the economic growth through technological interventions and human resource development.

Goal of CHAI

To play a catalytic role, in addressing the concern of food and nutritional security and also livelihood options, through interventions of technology-led agriculture / horticulture development.

Aims and Objectives of CHAI

- Furtherance of agriculture / horticulture through improved cooperation by integrating scientific study, education and knowledge exchange of biological, ecological, environmental, sociological and economic issues that affect agriculture / horticulture.
- To catalyze the efforts of development by creating associations for interaction among all agriculture/horticulture societies/ associations, growers, entrepreneurs, policy planners and activists through consultations, organisation of seminars, conferences, meetings, national dialogue and trainings.
- To establish, promote, run, maintain and support the community for the promotion in advancement of agriculture/horticulture, and to serve as an apex organisation concerned with promotion of agriculture / horticulture, having linkages with various commodity/ input, organisations, institutes, Governmental and Non-Governmental organisations.
- To establish education and training institutions for human resource development and skills upgradation for meeting the needs of empowered human resource.
- To recognize the services of people in horticulture through incentives, awards and encourage the scientists for their participation in national and international events.
- To establish education and research institutions and provide expert guidance to organisations as well as individual to capitalise on the strength and build human resource.
- To take up all the activities, deemed to be fit, in achieving goals and mission of the Confederation for furtherance of horticulture/agriculture for economic developments.

Initiatives of CHAI

The confederation has successfully organised and supported national and international conferences, workshops and national consultations and, services in education, and is providing solutions to the problems. Awards and Fellowships have been instituted to recognise the contributions of scientists and other stakeholders in the research and development, in the country and abroad. The Confederation has instituted various awards, which includes, CHAI-Honoured Fellowship for leadership of par excellence, the CHAI-Life Time Achievement Award for distinguished life time contributions in horticulture, the CHAI-Honorary Fellowship for noticeable contributions and commitment to furtherance of horticulture, the CHAI-Dr. R. S. Paroda Award for excellence in research and academics, the CHAI-Dr. B.H. Jain Award for excellence in transfer of knowledge and diffusion of technology, and the CHAI-Ram Nandan Babu Award for excellence in farming. The CHAI-Life Time Recognition Award has been instituted to recognise outstanding contributions and providing leadership in specific crop commodity. The CHAI-Appreciation Award is given for distinguished contributions and excellence in the field of specialisation. To encourage the students, the CHAI has instituted the CHAI-Dr. Ray Best Dissertation Award in recognition of significant post graduate research work. CHAI-Best Paper Award is given for scientific article published in International Journal of Innovative Horticulture (IJIH). CHAI Fellowship is conferred to subscribers for their commitment in furtherance of agriculture/horticulture. The CHAI-JISL Fellowship is provided for training abroad to meritorious fellows. During the year the CHAI instituted Achiever's Award to recognise the fellows who excelled in their career and reached to the level of Vice Chancellor or equivalent owing to outstanding contributions and leadership quality. A CHAI- Associate Fellow was

also instituted to recognise meritorious and young upcoming scientist. Considering the needs for dissemination of science-based knowledge among scientists for the furtherance of agricultural/ horticultural science, an International Journal of Innovative Horticulture (IJIH) is also being published besides newsletter, books, annual report, CHAI Year Book and Gyan Manthan, which have over whelming response.

Strength of CHAI

- The CHAI has wide spectrum of experts, who are enrolled as fellow to support the technology-led development and provide strategic expert advice.
- The Chairman, having held the position of DDG, ICAR; Vice-Chancellor, RAU, Pusa; Horticulture Commissioner, Govt. of India and many other positions, known nationally and internationally in the field of research, education and development has expertise in horticulture, water management, nutrient management, quality seeds and planting material production and above all coordination, planning and execution of project and its final s evaluations.
- More than 325 fellows of CHAI have expertise in various aspects of agriculture/ horticulture.
- Besides, the fellows, more than 100 experts in different fields from India and abroad are enrolled with CHAI.
- CHAI has offices in Delhi, Patna, and Bengaluru to attend to all the types of work for business solution options.
- The CHAI is a non-profiting company, and has established network with institutions, academy, corporate, business house, NGOs and also international organisations.
- The network of CHAI, expertise of skilled fellow and standing experts makes the confederation to offer knowledge and its management strategies for modernising agriculture/horticulture and serve the nation.

Activities of CHAI

The Confederation has catalysed the development of Horticulture though partnering in activities of conference organised on emerging issues, which has helped in developing strategies for research and development. The conferences supported in past are **National Conference on Production of Quality Seeds and Planting Material - Health Management in Horticultural Crops**, 11-14th, March, 2010 New Delhi; **National Conference on Horticultural Bio-diversity for Livelihood, Economic Development and Health Care**, 28-31st, May, 2010, Bengaluru; **International Conference on Coconut Biodiversity for Prosperity**, 25-28th, October, 2010, Kasargod, Kerala; **Global Conference on Meeting the Challenges in Banana and Plantain for Emerging Biotic and Abiotic Stresses**, 10-13th, December, 2010, Trichy, Tamil Nadu; **National Symposium on Molecular Approaches for Management of Fungal Diseases of Crop Plants** 15-20th, December, 2010, Bengaluru; **National Conference on Horti Business-Linking Farmers with Market**, 28-31st May, 2011, Dehradun, Uttarakhand; **Global Conference on Augmenting Production and Utilization of Mango: Biotic and Abiotic Stresses**, 21-24th, June, 2011 Lucknow; **Global Conference on Horticulture for Food, Nutrition and Livelihood options**, 28-31st, May, 2012, Bhubaneswar; **National Conference on Sub-Tropical Fruits**, 9-12th, January, 2013, Navsari, Gujarat; **Brain Storming Session on Nano-Bio-Information Technology for the Development of North Western Himalayan States**, 12-13th, July, 2013, Pantnagar, Uttarakhand; **National Workshop on Urban and Peri-Urban Horticulture**, 21st December, 2013, Navsari, Gujarat; **National Conference on Value Chain Management in Mango**, 20-22nd, March, 2014 Kolar, Karnataka; **Global Conference on Technological Challenges**

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and Human-Resource for Climate Smart Horticulture- Issues and Strategies, 20-31st, May, 2014, GAU, Navsari, Gujarat; **National Conference on Dynamics of Urban and Peri-Urban Horticulture**, 21st October, PHD house, New Delhi; **National Conference on Dynamics of Smart Horticulture for Livelihood and Rural Development**, at MGCGV, Chitrakoot, Satna, Madhya Pradesh, 28-31st May, 2015. The CHAI was a Knowledge Partner in Smart Agriculture- Geo Agri with the theme Technologies empowering Indian Agriculture organised at NOIDA on 2nd -3rd March 2016. The Confederation supported the conference organised on Pomegranate, at JISL, Jalgaon, April, 2016. The CHAI partnered a **Global Conference on Challenges and Options in Agriculture** organized at Jain Hills, Jalgaon, Maharashtra, on 28-31st May, 2016, The CHAI supported the organisation of two days **conference on pomegranate** at Jain Hills Jalgaon, on 16-17, April, 2016. The CHAI facilitated the organisation of **Kisan Sangosthi, on 3rd September** at Mahmada and 1st November at Dholi, Muzaffarpur. In the year 2017-18, CHAI supported the organisation of a **National Conference on Technological changes and innovations in Agriculture**, organised at JAU, Junagadh, Gujarat 28-31st May, 2017. **Knowledge Sharing Workshop on Tropical Fruits-banana and pomegranate** was organized at Hotel Masineni Grand, Anapuramu, A.P., on 5th November, 2017. The **National Conference on Challenges and Options in Litchi Production and Utilisation**, 6-7th June, 2017, Muzaffarpur was organised a **National Workshop on Technological Changes and Innovations in Potato and Pomegranate-Production for Utilization for Enhancing Farmers' Income**, was organized at Deesa, Banaskantha, Gujarat, October 06, 2017. The Chairman, as the Chairperson of ASSOCHAM Council on Agriculture and Food Security organised many meetings and conferences and chaired meetings, where CHAI was highlighted for its contributions. National Conference and Awards Function -**Organic World – Advantage India** was organised on 21st March, 2018, at Hotel Meredien, New Delhi, by the ASSOCHAM in association with Ministry of Agriculture and Farmers' Welfare. The CHAI supported and partnered in **National Conference on Intensification and Diversification of Agriculture for enhancement of income and livelihood**, at RAU, Pusa, Samastipur, Bihar, 28-31, May, 2018. In the year 2019, the CHAI supported and partnered an **International Conference on Innovative Horticulture and Value Chain Management – Shaping Future Horticulture**, organised at Pantnagar, Uttarakhand, 28-31, May 2019 by ASM Foundation, New Delhi. In the year 2020, the CHAI partnered a Webinar on **Post Pandemic (COVID-19) Challenges and Options in Agriculture including Horticulture** organised by ASM Foundation, New Delhi, on 28th May, 2020. The webinar was a grand success in terms of participation and outcome. CHAI also patterned in organising the conference by ICFA, New Delhi, CNRI, New Delhi, and CALIDA, India. In 2021, CHAI could organize a webinar “New Paradigms in Production and Utilisation of Fruits and Vegetables for Health and Livelihood” on 11th February, 2021 to commemorate International Year of Fruits & Vegetables (IYFV) by UN which was a grand success and more than 200 stakeholders could participate. The CHAI had partnered in organizing a **Global Conference on Innovative Approaches for Enhancing Water Productivity in Agriculture including Horticulture**, organised at PJTSAU, Rajendranagar, Hyderabad, Telangana from 16-19 September.2021. During the year 2022, CHAI partnered and supported a **National Conference on Climate Resilient and Sustainable Development of Horticulture organized at CSAUA&T**, Kanpur, Uttar Pradesh, May 28-31, 2022, which was highly successful in term of technical content, participation and development of strategic recommendations, During the year the CHAI supported Kisan Sangosthi on Precision Horticulture and it's management, and the Training organised at AMRIT, Mahamada, Pusa, Samastipur, Bihar by ASM Foundation on 3rd September, 2022 and 22nd Novemer,2022. In Sangosthi, farmers discussed the approaches for precision horticulture. In training on Organic farmers farmers were told about various products used for effective management of organic horticulture, They prepared various products under the guidance of experts. In the year, 2023-24 the CHAI is supporting in the preparation for **Global Conference on Precision Horticulture for Improved Livelihood, Nutrition, Economic and Environmental Services**.

Conferences/Workshops Organised

The CHAI has been organising workshops on the topical issues. First workshop organised by the CHAI was on **Urban and Peri-Urban Horticulture, Bangaluru**, on 2nd March, 2013 with the theme—Greening the cities, utilising the waste, meeting the needs and servicing the environment. The workshop deliberated issues and concluded adoption of Bangalore Declaration for catalysing the Urban and Peri-Urban Horticulture. In the year 2014 on 1-2nd March, CHAI organised a **Knowledge Sharing Workshop on Tropical Fruits - Value Chain Management for Enhancing Farm Profitability**. An **International Conference on Floriculture and Landscape Gardening –Challenges and Opportunities**: was organised at Pune on 27th February. The CHAI organised 4th National Workshop on **Quality Production of Banana for Export and Domestic Market**, 29th May 2016 at Jain Hills Jalgaon. 5th workshop on **Dynamics of Challenges and Options in Integrated Aquacultures**, was organised on 2nd November, 2016 at Patna, The 6th National Workshop on **Technological Changes and Innovations in Pomegranate Production and Utilization for Enhancing Farmers’ Income**, was organized on 26th September, 2016, at JAU, Junagadh, Gujarat. With the similar objectives and theme, 7th Workshop was also organised at Agriculture University, Jodhpur, Rajasthan, India on 10th December, 2016, for the benefit of Rajasthan farmers, which provided an option to discuss pomegranate for improving the income of the farmers through technological interventions. The CHAI organised two-days 8th National Conference on **Perspective of Challenges and Options in Maize Production and Utilization**, 3-4th March 2017 at DRPCA, Pusa, Samastipur, Bihar. 9th National Workshop on **Technological Changes and Innovations in Potato and Pomegranate-Production & Utilization for Enhancing Farmers’ Income**, was organized at Deesa, Banaskantha, Gujarat, October 06, 2017. The 10th National Conference on **Challenges and Options in Litchi Production and Utilisation** 6-7th June, 2017, Muzaffarpur were organised. 11th Knowledge Sharing Workshop on **Tropical fruits-Banana and pomegranate**, was organised at Anantpuram, 5th November, 2017. 12th Workshop (webinar) on **National Education Policy – Perspective and Prospect in Agriculture**, was organised in September, 2020 in association with MPUAT, Udaipur, which brought out the fact that the NEP is innovative and needs to be opted in agriculture. 13th Workshop (webinar) on **International Year of Fruits and Vegetables, 2021 on the topic New Paradigm in Production and Utilisation of Vegetables**, was organised on 11th Feb., 2021, in association with Dhanuka Agritech. 14th National Workshop was also organized on **Innovative Approaches for Enhancing Water Productivity in Dry Land Eco-system**, 29th Sept., 2021. The 15th National Workshop on **Digital Horticulture** was organised at CSAUAT, Kanpur, on 29th May, 2022. 16th National Workshop on **Management of CMV** was organised at Raver, Maharashtra, on 30th September, 2022. The 17th Knowledge Sharing Workshop on **Banana and Potato- A Farmers’ Perspective** was organised at the farm of progressive farmer, Mr. Sudhansu Kumar, Nayanagar, Rosra, Samastipur, on 22nd November, 2022.

Meetings of Board of Directors and General Council Meeting

1. To review the technical and financial progress, the Board of Directors meets as per the needs, at least, 4 times in a year. General Council meet is held once in a year on 28th or 29th May. First Executive Council and General Council meetings were held on 29th and 30th May, 2012, respectively, and distinguished fellows were honoured with CHAI Fellowship for their commitment to furtherance of horticulture, and various awards were conferred. Second Executive Council and General Council meeting were held on 29th May, 2013 at Jalgaon, wherein various issues were discussed. Besides, report of secretary and treasures, the distinguished members were conferred with the fellowship of CHAI. All the members, present, appreciated the efforts of the Chairman and ensured for the support in achieving the objectives of the CHAI. The **Council authorised the Chairman** to take all the action, as he deems it fit, in the best interest of CHAI. Third Annual General Council Meeting was held at Navsari on 29th May 2014, where in fellowships were conferred to all the members, who joined CHAI in 2013-14. 4th Annual General Council Meeting was held at MGCGV, Chitrakoot, Satna, Madhya Pradesh on 29th May 2015.

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5th AGCM of CHAI was held at JISL, Jalgaon, 28th May, 2016. The 6th AGCM of the CHAI was held at JAU Junagadh, 28th May, 2017. 7th AGCM of the CHAI was held at DRPCA, Pusa, Samastipur, Bihar on 28th May, 2018. Dr. A.K. Srivastava was the Chief Guest. Awards and Fellowships were conferred to individual and Institutions, for their contributions. Fellowship for attending IHC, 2018 was also announced. The overall progress was very much appreciated. 8th AGCM of CHAI was held at GBPUAT, on 28th May, 2019, where in Dr C.D. Mayee, Patron, CHAI was the Chief-guest. Award and Fellowships were conferred on individual and institutions. Report of secretary and financial reports were presented and approved, all fellows including the chief-guest appreciated the progresses and authorised the chairman to take up all the activities as he deems it fit. The 9th and 10th AGCM of CHAI was held at PJTSAU, Hyderabad, Telangana. Dr. S.K. Pattanayak, Former Secretary, Ministry of Agriculture and Farmers' Welfare was the Chief Guest. The meeting reviewed the progress and financial status. The corpus has reached to Rs. 90 lakh. The progress was appreciable. Selected candidatures were given various awards. This year to recognise the excellence in career of fellow of CHAI-Achievers Award were conferred to selected candidatures. Various awards and fellowships were conferred to selected nominations.

Participation in Exhibitions

The Confederation of Horticulture Associations of India continues to participate in Horti Expo, to exhibit the activities of CHAI to draw the attention in furtherance of horticulture.

Institution of Awards and Fellowships

To recognise the contributions of scientists and other stakeholders in the research and development of horticulture/agriculture in the country and also abroad, the Confederation has instituted several awards to recognise the distinguished and noticeable services of individuals and organisations. The distinguished personalities, who have provided leadership of par excellence for the development of Indian Agriculture are recognised by conferring the **CHAI-Honoured Fellow**. The **CHAI-Life Time Achievement Award** is given for outstanding contributions, in research and development of horticulture. The distinguished members are also honoured with the **CHAI-Honorary Fellow**, for their excellence and commitment to furtherance of horticulture. The **CHAI-Dr. R.S. Paroda Award** is given for excellence in science and technology, The **CHAI-Dr. B.H. Jain Award** recognises an excellence in knowledge empowerment and dissemination and the **CHAI-Ram Nandan Babu Award** recognises innovative farmers for their excellence in farming, the **CHAI-JISL Fellowship** is given for visit abroad to attend conferences and training. The **CHAI-Life Time Recognition Award** is given for outstanding contributions and providing leadership in specific crop commodity, The **CHAI-Appreciation Award**, is given for distinguished contributions and excellence in the field of specialisation. The **CHAI-Dr. Ray Dissertation Award** is given for Best Dissertation at master's level and the **CHAI- Dr. Kirti Singh Best Paper Award** is given for the best scientific article published in IJIH. The distinguished members including institution with the commitment to the furtherance of horticulture are conferred with Fellow of CHAI in different categories. The Achievers' Award was also instituted to recognise the excellence in career of CHAI Fellow. A fellowship – Donor fellow has also been started to recognise the entrepreneur in horticulture. During the year **CHAI-Kautilya Lokniti Award** has been instituted to recognise the contributions to public policy, strategic analysis and Governance and also Ancient Philosophy. It is proposed to institute CHAI-H.P. Singh Young Scientist Award from 2023-24.

PUBLICATIONS

International Journal of Innovative Horticulture

Considering the needs for dissemination of science-based knowledge among scientists for the furtherance of horticultural science and on request of members from across the country and abroad, it was felt essential to bring out a journal. Accordingly, an **International Journal of Innovative Horticulture (IJIH)** was started. Peer reviewers are of national and international repute. The first issue of the journal

was launched by His Excellency, Governor of Karnataka at Bangalore. The Journal published by CHAI, has an international look and shall consider original papers on multi-disciplinary aspects. The journal is published bi-annually. The types of papers include Original Research Articles, Reviews, Case studies, New cultivars and technologies, Commentaries and opinions, Policy issues, Abstract of Ph.D. thesis, Book Reviews, Features, Colloquia and Workshops. So far 11 volumes have been published and the NAAS also enlisted the Journal. The publication of Volume 12(1), 2023 is in process.

MoU Development with Organisations

The CHAI has also developed MoU with Dainik Jagran for effective outreach and technological up-gradation as well as to work as a knowledge partner.

Membership Benefits of CHAI

The CHAI team consists of different categories of membership i.e. Institutional, Corporate, Association, Non-profitting Organization (NPO) and Individual Members. Membership of the Confederation is open to individuals/ firms, organisations and societies/associations subscribing to the objectives of the CHAI by donation ranging from Rs.35000 to Rs.1,50,000/-. The CHAI being a professional academic association envisions promotion of horticulture/agriculture in the country.

- Associations, corporate, entrepreneurs and individuals who are committed for the furtherance of horticulture shall request for the membership. Right to admission rests with Board of Directors and the Founder and Chairman.
- Nominations shall be accepted for consideration, which are endorsed by two members of CHAI or Institutional Head certifying their candidature.
- Member admitted to the CHAI shall be given a certificate of subscription, with a plaque of honour in the Annual Council Meeting as Fellowship of CHAI.
- Every member can attend the Council's meeting, whenever called, on his own cost or at the cost of CHAI, depending upon the terms and conditions, as approved by the Founder and Chairman.
- All the members/fellows are entitled to receive the International Journal of Innovative Horticulture for 15 years, free of cost.
- All members/fellows shall be eligible to request for awards including Dr. R.S. Paroda, Dr. B.H. Jain award, Ram Nandan Babu Award and any other awards instituted by CHAI.

Members/Fellows shall be eligible to seek the financial assistance, if his or her paper is accepted in International Conference/ Symposia, which shall be considered on merit by the committee constituted by the Founder and Chairman. Only one or two fellowships for visit abroad will be available in a year.

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Activities of the CHAI for the Year 2022-23

1. Support to Conferences / Workshops as a knowledge partner

1.1 National conference on Climate Resilient and Sustainable Development of Horticulture, 28-31 May 2022



The CHAI partnered and supported the National conference on **Climate Resilient and Sustainable Development of Horticulture**, organised by the **ASM Foundation** in association with **Chandra Shekhar Azad University of Agriculture & Technology, Kanpur-208002, Uttar Pradesh**, from May 28-31, 2022 at Kanpur. The conference was structured to deliberate and discuss the issues systematically through Plenary Lectures, Keynote Lecture and Oral presentations and finally adopt the recommendations in the plenary session to provide policy guidance for its adoption to achieve accelerated growth of Indian horticulture. The Plenary lectures

and keynote lectures were delivered by reputed theme leaders in their respective fields. The keynote speakers were also an expert of international repute. The conference deliberated on issues in 16 technical sessions, besides, introductory and valedictory sessions. There was an open session for the industry, entrepreneurs and field functionaries besides workshop and panel discussion. The conference was attended by over 250 delegates including farmers physically and >500 online.



A farmers' quiz was organized to empower the farmers with new knowledge. The issues on climate resilience and sustainable development of horticulture were discussed. Awards of Confederation of Horticulture Associations of India (CHAI), in various categories *i.e.*, Honoured Fellow, Honorary Fellow, Life Time Achievement Award and Life Time Recognition Awards were also conferred on selected nominations. ASM Foundation Awards that were conferred are, Amit Krishi Rishi Award-2022, Amit Padma Jagariti Award-2022 and Amit Prabudh Manisi Award-2022 and also Amit Udyan Ratna Award-22. The Shodh Chintan Vol.14, other publications such as, Book of Abstract, Award and Fellowship of CHAI, Award and Awardees of ASM Foundation and CD of Conference were released.



The Technical Sessions were: Paradigms in Climate Resilient and Sustainable Development of Horticulture - Challenges and Options; Technological Challenges and Approaches for Climate Resilient Development of Horticulture; Innovations in Production Systems Management of Perennial Horticulture for Climate Resilient and Sustainability; Innovations in Production System Management for Vegetables, Tubers, Spices and Flowers for Climate Resilience and Sustainability; Innovations for

Climate Smart Production Systems in Horticulture for Resilience to Climate Change; Varietal Improvement for Resilience to Climate Change and Sustainability in Production; Water Management for Enhancing Resilience to Climate Change; Nutrient Management for Enhancing Resilience to Climate Change; Plant Health Management for Resilience to Climate Change and Sustainability in production; Human Resource Development and Diffusion of Knowledge for Technological Changes for Climate Resilient and Sustainable Development of Horticulture; *National Workshop on Digital Horticulture for Resilience to Climate Change and Sustainability*; Post harvest management Access to Market and Value Chain Management for Sustainable Production of Horticulture Crops; Farmers' Participatory Discussion for Climate Resilient and Sustainable Development of Horticulture and Knowledge Empowerment of Farmers through Farmers' Quiz. A panel discussion for Climate Resilient and Sustainable Development of Horticulture was also organised.

After deliberations and discussion in 16 technical sessions with the presentation of 9 plenary lectures, 31 keynote presentations, 65 oral presentations, recommendations were developed and were presented in valedictory session for adoption. The recommendations which emanated and adopted are:



1.2 Recommendations

1. Considering that young students and farmers are future of the nation, there is a need for inculcation of the spirit of patriotism through education, secured health, economic upliftment and social values. Life has its beginning, and its maturity comes into being, when an individual rises above self to something greater for the country and community, which is a must, for improving quality of life of people in rural areas. Agriculture/horticulture based allied sector have potential to play a significant role in economic development of the people.
2. Horticulture, generally referred to as gardening, has expanded in its scope and activities, moving from rural confines to commercialisation, and now it is providing best option for land use, nutritional security, employment opportunity, health care and above all environmental services. The trend of development in the past, especially during the last decade, has been satisfying, that adoption of horticultural crops in a systematic manner has improved the quality of life of people in many regions of the country. However, to address the emerging challenges, innovations in technologies through institutional support, as well as, import of required knowledge and technological backing for the development, through skills are inevitable.
3. Diversification to horticulture has resulted in unprecedented development in last decades, as the production has reached to 333 million tonnes, with annual dacadal growth rate of 6%. The farmers' income has also increased many folds by adoption of horticulture. However, potential still exist for enhancing the farmers income through diversification to horticulture. This will require a focus on the development of appropriate cultivar, quality planting material, appropriate root stocks, plant architecture engineering and management, efficient system of pest and diseases management, on farm value addition and above all, linking the farmer to the market. Therefore, horticulture must have to be a priority for research and development.
4. Climate change, a cause of concern globally, will have impact on horticultural crops due to erratic rainfall, rise in temperature and CO₂ concentration, which is likely to lead to enhanced biotic and abiotic stresses and high demand for water. However, the changes will not only be harmful, as enhanced CO₂ concentration may enhance photosynthesis, and increased temperature may hasten the process of maturity. Innovations and concerted efforts may convert weakness into the opportunities. Thus, addressing the issue of resilience to climate change is essential. This demands for better understanding of the impact of climate change variables on horticulture to develop strategies to mediate and achieve resilience to climate change.
5. The potential of perennial fruit and plantation crops for higher carbon sequestration provides an opportunity to be a sink for increased carbon dioxide and, additionally, opportunity for soil carbon sequestration. Interior and exterior landscape gardening has proven beneficial in reducing carbon concentration. Taking stock of current knowledge about the effect of climate variables and their synthesis for new knowledge in relation to climate change is imperative for adaptive strategies.
6. There is a need to promote and support urban and peri-urban horticulture. The carbon credit scheme should be extended to vertical gardens. Trees furnish live green technology to suffice environmental moderation with cooler, healthier and aesthetic touch in urban life. Tree plantation should be encouraged in the residential as well as private and public urban



neighbourhoods. Interior-landscaping with indoor plants should be increased in homes and offices, as these are found to be linked with improved indoor air quality and better human health. Thus, there is a need to promote environmental horticulture.

7. The strategies should be considered to formulate innovative packages of options based on past experiences to promote improved and innovative development options. In this context, precision horticulture has emerged as one of the options, considering that it is economically rewarding and intellectually satisfying and has potential to provide better employment and involves more skilled people in the diverse activities, above all, enhancing farmers' income.
8. Digital horticulture aims to improve industrial matrix such as, yield, profit and sustainability and to transform the sector's commodity trading, purchase of inputs, and traceability of product. The technique used are Block Chain, IoT (Internet of things) and data information platform. The Block Chain is a type of distributed ledger that is to be used to capture, organise and validate data. Blockchain makes complex transaction quicker and cheaper to execute, which benefits the stakeholders. Thus, digital horticulture needs a focused attention
9. Internet of Things (IoT) is the network of physical devices that collect, connect and exchange data. The devices measure variability of parameters at multiple places for effectively managing the crop. The crop management is tailored on information about, within field variability in soil and/or nutrient and water. A well architected Artificial Intelligence (AI) helps in achieving higher yields while optimising resources efficiency, thus, enabling farm to be more sustainable, viable and profitable. However, AI (Artificial Intelligence) has to be integrated with IA (Information Architecture).
10. Digital marketing, referred as online marketing is a promotion of brands to connect with potential customers using the internet and other form of digital communication. There is a growing interest on digital horticulture, using e-platform for information exchange and management, not only for marketing but also for production system management and value chain management using various types of data driven platforms for decision making. It needs to be promoted.
11. Hydroponics/ Aeroponics is emerging as a technology to produce seeds and plants free from the diseases. This technology has been successfully applied in seed tuber production in potato, and can be adopted effectively in quality production of high value fruits and vegetables. The technology has its application in vertical gardening also. Therefore, there is a need for promoting hydroponics/ aeroponics to provide higher income per unit area of land and water, which can help farmers to achieve the enhanced income.
12. Investment and capital, access to technology and the initial learning curve to develop the required skills must find focused area. Private participation for innovation must be encouraged with reforms in rules and regulations. Policy must encourage farmers for producing more with less by adopting precision horticulture integrated with IT technology. A digital platform is needed at national level, state level, district level connected to block level where input supplier, technology provider, consumers and farmers can interact for the required product. Farmers can get inputs and technology and consumer can get their products. Value chain technologies may be promoted, utilising Blockchain technology and AI.



13. Water is critical resource for sustainable development, which is getting scarcer and meeting multifaceted uses will be a great challenge of the future. The long-lasting solution to water problem could be addressed through water governance and management paradigm. A new paradigm is encapsulated in integrated water resource management, which promotes land development and management of water and related resources, for maximising the related economic and social welfare without compromising the sustainability of vital system. Therefore, integrated system of water managements need to be promoted.
14. Micro-irrigation system of irrigation has benefitted farmers across the country. The potential of micro irrigation has been identified by Task Force on Micro irrigation to the tune of 69 million hectare. Through the programmes of the Government, only 13 million hectares have been covered. One of the hindrances in coverage of area is the policy. It would be essential to declare **micro irrigation as Infrastructure and Priority sector**; which will help farmers in adaption, as credit support will be adequately improved.
15. Impact analysis of micro irrigation revealed that farmers invariably introduced high value horticultural crops like grapes, banana, mango, cashew nut and coconut after installing the drip system, and achieved yield increment ranging between 41% (grapes) to 141% (Pomegranate) over the state average yield. Economic analysis of 695 beneficiary farmers and 76 non-beneficiary (who installed drip system without any Govt. subsidy) farmers indicated that the cost was recovered in a period of less than three seasons in majority of the cases. Therefore, this system must be promoted.
16. Smart Nutrient Management system recommends the nutrient requirement of crops on the basis of general nutrient uptake by the plant and further adjusts the dose on the basis of targeted yield and the level of nutrients already available in the soil, soil pH, bulk density, organic carbon content, *etc.* by analysing and interpreting the soil, water and tissue (leaf) analysis report of the farmer's field (Soil Health Card). It also takes the antagonistic and synergistic interaction among nutrients into consideration. The system economies the nutrient needs and gives optimum targeted yield. Therefore, more intensive research is needed to make the system adoptable by the farmers for efficient use of soil health card, and to maximise the income.
17. Integrated Nutrient Management (INM), improved planting stock, organic farming, trap crops, bio-control measures, high-tech nurseries and improved productivity has to be emphasised to boost the production in horticultural crops and also to mitigate the effects of climate change. Research on cropping schedule should be intensified to adapt to climate change. With advancement in technology, it has been possible to grow several crops out of the season. Therefore, there is a need to develop cultivars and production technologies, which can fit well for industrial production under controlled climate and light conditions.
18. Increasing the use of chemical fertilizers, while degrading the soil health at the same time has significantly contributed in the buildup of greenhouse gases. Use of bio-fertilizers can reduce the application of chemical fertilizers and increase crop productivity and help in reduction of the buildup of greenhouse gases. Organic farming could be very well adapted to climate smart agriculture which will provide a high degree of diversity in the ecosystem. Therefore, work on microbes and its application needs priority.



19. Improved planting stock through high-tech nurseries and use of hybrids in vegetable have to be emphasised to boost the production in horticultural crops. Tissue culture in banana and pomegranate has not only improved the production and productivity, but has multiplier effect on employment and assuring best quality plants Therefore, this technology must be promoted for other horticultural crops to assure high quality production mechanism.
20. Rootstock plays a significant role in mitigating soil related problems, both biotic and abiotic stress, beside appropriate plant architecture. Thus, the development of new root stock has to be a continuous practice. New rootstocks, besides mitigating soil related problem must provide plant architecture suitable for changing production system and management of mechanisation for efficiency of the orchards. Therefore, rootstock research and application have to be given a focused attention.
21. In recent years, use of root stock for managing soil borne diseases and problematic soil, for growing vegetables have been found successful. The rootstocks have been found useful in melons, brinjal, tomato for its growing in problematic soils. However, understanding of rootstock and scion interaction is limited. Therefore, intensified research is needed to identify appropriate rootstock in vegetables, ensuring freeness of scion from virus diseases for enhancing productivity. The rootstock research and development must be intensified to harness the potentiality in vegetable crops.
22. With advancement in technology, it has been possible to grow various crops out of season, by modification in weather variability through adoption of green house technologies. Green house protects from weather fluctuation and also provides better quality of produce. Poly tunnels are used to protect against low temperature for advancing harvest to catch to early market. However, there are limited cultivars suitable for the production system in green house. Therefore, there is a strong need to develop cultivars and production technologies, which can fit well for industrial production under controlled climate and light conditions.
23. Integrated approach towards the management of pathogens is needed. Practices such as crop rotation, application of micro-nutrients, soil pH management, exploitation of bio-agents, weather-based monitoring of plant diseases and rapid diagnostics are some of the important and emerging components of this holistic approach. Therefore, strategies must be developed for smart management of biotic stress, on the principle of observe, measure and respond to achieve maximum output and results. Improved plant health will improve water productivity.
24. Modified Integrated Pest Management (IPM) technology, incorporating all possible and available pest control techniques to keep pests below Economic Injury Level (EIL) is strongly needed in climate smart horticulture, having greater emphasis on weather data, crop phenology, physical and mechanical methods, agronomic techniques, use of trap and border crops, non-pesticides management, need based chemical management and economics. Intelligent Pest Management should, therefore, be incorporated in climate smart horticulture and agriculture for improving water productivity.
25. The plants respond to light conditions both in term of energy and illumination. Growth and reproductive phases have requirement of different spectrum. However, understanding of light requirement for different crops in phases of growth and development have been inadequate for adjustment to harness the potentiality. LED light has been adopted to some extent to enhance



productivity. But requires better understanding. Therefore, there is an urgent need for improving our understanding for light manipulation to maximise the output in relation to inputs. This calls for intensive research work on light in production of horticultural crops under modified atmosphere.

26. To achieve targeted growth there is a need for effective value chain, the activities starting from conceptualisation till it reaches to the consumers, involving all the stake holders in the chain of production to consumption. With enhanced efficiency of links in the chain there is enhanced output which improves profitability. The value chains could be further made effective through technological integration, logistic and policy support. It can help in maintaining inclusive ecosystem where farmers, entrepreneurs and all the stakeholders get benefitted by employment, income and quality produce to consumer. Therefore, value chain management has to be a priority.
27. Linking the farmer with markets is essential for remunerative returns from farm produce. There is a need for strengthening farmer producer organisation in terms of skills and investment. Choosing a right market and market development strategies are essential to scale up the operation through innovations in products and business models. Partnering with private sector for marketing and convergence with various ongoing programmes for backward linkage would provide a private sector taking care of forward linkages. Therefore, market research and development needs emphasis
28. As horticulture provides ample opportunity for skilled employment through multiplier effect in various activities from production to consumption having the links in planting material production, input production and supply, packaging, storage, branding and its promotion. Thus, horticulture be declared as priority sector having the mission mode approach for value chain management Therefore, skill development and mentoring should be a focused part of any scheme to support horticulture.
29. Cold Chain Management empowers the farmers to get better income and better price realization from their farm produce. The cold chain also improves the quality and extends the shelf-life of perishable fruits and vegetables, and it ensures that fresh produce reaches to the consumers with no negative impact. Therefore, cold chain management has to be promoted to enhance income of the farmers.
30. There is need for augmenting an extension system with back stocking of feedback extension strategies and working out technology options in different climatic situation. Institutional support system linked with public and private enterprises would be essential. A concerted effort with identified goal involving all the stakeholders, keeping the technology at driving seat and farmers as centre of attention, would definitely help in achieving faster and inclusive growth. The existing system has to be empowered with knowledge to serve the farmers better with not only technological changes but with new paradigm in marketing. Therefore, there is a need for reorienting extension system.
31. Market reform and value chain management system should be such, which provide access to market and better realisation of price for the produce. Developing markets and agricultural credit will be a key to ensuring that India's farmers have access to affordable institutional credit



for quality horticultural inputs, as well as access to adequate remuneration for the produce. This is essential to enhance farmers' income.

32. Nano-technology provides opportunities for the development of processes and product, which are impossible to achieve through conventional system. Therefore, use of nanotechnologies in agriculture has to be given emphasis through the appropriate investment on research and development. Diagnostic based on nanotechnology, nano- pheromon for insect, pests and nano sheets for packing needs have to be encouraged through appropriate investment.
33. There is a need to build a society of innovators, manufacturers and technology providers, as the development needs innovation on the driving seat for expected output. Therefore, it would be imperative to build atmosphere of policy framework where innovators and innovative companies make their investment in future technologies. Doubling of farmers income can only be achieved with new innovation and enabling policy for investment.
34. A concerted effort with identified goal involving all the stakeholders, keeping the technology at driving seat and farmers as centre of attention, would help in achieving faster and inclusive growth. The extension must, focus on producer aggregation at various levels and provide forward linkages. The existing system must be empowered with knowledge to serve the farmers better with not only technological changes but with new model in marketing. Therefore, there is a need for reorienting extension system
35. There is a need to plan strategies for Local to Global, as we have strength in agriculture with demographic deviants. For hygiene reasons, in future food items might be required to be pre-packaged. This can lead to labelling requirements and a change in-store or market arrangements. Redesigning of the food logistic centres with larger storage capacities and computerised systems that can respond to demand with less manpower and high efficiency is essential. The government may encourage consumers to support local products over imports.
36. There is a need for change in land aggregation policies. The Government of India has already prepared a model act for aggregation of land, which provides opportunity for investment even on leased land. This would also help in adopting technologies and investment on infrastructure. However, it has to be implemented by the states to legalize the land leasing for promoting agriculture efficiency and for achieving needed productivity improvement in agriculture. This would enable the use of technologies which may lead to improved water productivity
37. Honeybees are the pollinator, which enhances the crop yield, from 25 to 100 percent, more so in horticultural crops, and also provides honey and other products as additional income to the farmers. Therefore, bee keeping has to be promoted more effectively in farm sector by having end to end approach. This will include bee colony, management strategies, and value addition in honey. This would help farmers in realizing better income from unit area of farm. Therefore, bee keeping must be promoted in mission mode in the suitable area, identifying appropriate bees and support for colony and boxes coupled with skills up-gradation
38. Well planned strategies based on knowledge and technology could convert the threat into the opportunity, provided work is done in a mission mode, integrating all the efforts together, addressing the issues concurrently involving all the stakeholders. There is a need to analyse the impact locally and develop partnership in managing the climate change for resilience in production of horticultural crops.

1.2 Kisan Sangosthi on Precision Horticulture and its Management,

3rd September, 2022 AMRIT), Mahamda, Pusa, Samastipur Bihar



One-day Kisan Sangosthi organised by ASM Foundation, at AMRIT, on 3rd September was supported by the CHAI. The purpose of Sangosthi was to enrich the farmers with new knowledge about the precision horticulture and its management for improving the productivity of land and income of the farmers. The Sangotsthi was attended by 80 farmers from different districts. Besides, the farmers, the Sangosthi was participated by Dr. H.P. Singh, Former DDG (Horti) and Chairman, CHAI, New

Delhi, Dr. G. Trivedi, Former Vice Chancellor, RAU, Pusa, Dr. K.K. Kumar, Former Director, NRC on Litchi, Mushahari, Muzaffarpur, Dr. Vishal Nath, Director, NRC on Litchi, Dr. Shudhansu Kumar, Progressive farmer, Dr. S.D. Pandey, Director, NRCL, Muzaffarpur and Dr. Surendra Prasad Singh, IAS, (Director Operation), ASM Foundation. Dr. Krishna Kumar, Vice Chancellor, DRRPCAU was the Chief Guest of the function.

The Sangoshiti started with welcome to Chief Guest and Guests by Dr. Neeta Singh, Trustee ASM Foundation. The Chief Guest, Dr. Krishna Kumar, was honoured with the shawl by Dr. H.P. Singh. Welcome was extended to all the participating farmers. Dr. Neeta Singh, in her welcome address, welcomed all the guests and delegates for their participation and gracing the occasion. She said that ASM Foundation is committed to the development of patriotic society through economic development, knowledge empowerment, healthcare and social values. She said that



besides the annual conference organised by ASM foundation, region specific Kisan Sangosthi and knowledge sharing workshops, on specific issues are organised to bring about the focus and develop strategies to address the issues. She also said that theme of Kisan Sangosthi is precision

horticulture, which is essential to improve income of the farmers by application of precision inputs to get the maximum benefits. Finally, she extended the warm welcomed to all the guests and the farmers to the Sangosthi.

Dr. K.K. Kumar, Former Director, NRC on Litchi, appreciated the efforts of the Foundation to serve the community differently and to inculcate patriotism among youth. He also

explained about effective management of orchards to get the maximum output with precise application of inputs. He especially provided focus on management of insect, pest and diseases through integrated management. He also explained in detail, during the sangosthi, to the farmers and, said that technological adoption, use of quality seeds and planting material and innovative management are key to success for enhancing farmers' income.



Dr. G. Trivedi spoke about role played by ASM Foundation for improving quality of life in rural area, through the activities of organising conferences, Kisan Sangosthi, distribution of quality seeds and planting material, honouring innovative farmers, adopting poor students for their education and mentoring to keep further in touch with technological development in horticulture. He said that farmers are the key players to improve the productivity of land through the adoption of improved technologies and in this context ASM foundation has tried its best in improving the quality of life of the farmers.

Dr. Vishal Nath, Officer on Special Duty, IARI, Jharkhand, spoke on improved production and utilization of fruits with special reference on litchi and emphasised on nutrient and water management, pest management and also explained about a mechanism for better price realisation. He cited many examples in production system management of fruits to achieve better income. He also said that in the changing scenario, declining land and water are increasing pressure to produce more with less for growing population dynamics. There is a need for adoption of precision horticulture, which emphasises on precise use of inputs to get the maximum outputs. He explained in more detail about the fertigation of orchards, which saves both the water and nutrients and provides better income due to high



yield of quality fruits.

Dr. S.D. Pandey, Director, NRC on Litchi, Muzaffarpur, said that he had opportunity to participate in the conferences and sangosthi organised by ASM Foundation from time to time, which has been very effective in the dissemination of knowledge. He explained in detail about precision production of litchi, which included use of quality planting material, fertigation system, timely management of pests and diseases and harvesting. He said that the centre has succeeded in extending the self life of litchi fruits and said that many test samples have shown positive report. He thanked the organizer for giving him the opportunity.

Dr. Kundu, Director extension, DRPCAUI spoke about the extension activities of the university, while expressing his sincere thanks to the organizer for inviting him to this important function. He assured of all support to the activities of the Foundation. He further added that how the Krishi Vigyan Kendra of the university has played a key role in empowering the farmers with knowledge and dissemination of new technologies for effective adoption of technology to achieve technology-led development. He also spoke about the improved technology development by the university.



Dr. Krishan Kumar, Vice Chancellor, DRPCAUI, Pusa, thanked the organisers and said that the Foundation can take the advantage of the university for improving horticulture in the region and mentioned about the programmes of recognising innovative farmers and the faculty for dissemination of knowledge and innovations done by the students and scientists. Dr. Krishna Kumar, further assured that university shall join hands with ASM Foundation for larger adoption of precision horticulture. He also explained

about dissemination of knowledge on mushroom production, which has improved the quality of life of many people in the region.

Mr Sudhansu Kumar, Progressive farmers shared his experience about the management of banana and many other fruits, which has improved the land productivity and enhanced his income. He stressed upon use of new technologies and said that how the automation in banana and other fruit trees have provided protection which helped in nutrients and water saving and the cost of manpower for efficient utilization of inputs. He suggested to use precision sprayers for effective utilisation and management of pests and diseases. He also stressed on value chain management to improve the income of farmers.



Mr. Sonu Nigam, a young farmer from Machhi, Dholi, who is practicing the organic farming, explained his experience of managing his production through the use of manure and vermin compost. He also said that he gets extra price of his produce and is practicing without external inputs. He is in position to produce vegetables organically. Mr. Sonu is commercially producing vermin compost, which is used for his field and earning additional income by selling it.

On the occasion Mrs. Bimala Singh, Management Trustee of ASM Foundation, donated a computer to grand son of Dr. Bindeshwar Rai for his use in learning computer and attend classes online.



The question raised by the farmers during interaction were addressed by the experts. Dr H.P. Singh, especially thanked the farmers for their participation. He further advised them to keep in touch with the Foundation regarding any problem for the solution.



Dr. H.P. Singh also invited the interested farmers for their participation in Global Conference on Precision Horticulture for Improved Livelihood, Nutrition and Environmental Services, which is being held at JISL, Jalgaon, May 28-31, 2023. Dr. Singh also talked about digital

horticulture, which is becoming important for precision management of the farm to get maximum output and outcome. Finally, Dr. Singh thanked the chief guest, guests and farmers for their active participation. The sangosthi concluded with a networking lunch.

1.3. Support to Training on Organic Farming for Knowledge Empowerment of Farmers, (12th November, 2022, AMRIT), Mahamada, Pusa, Samastipur, Bihar



Organic Farming is adopted by many farmers in Bihar. Many of them have earned higher profits by reducing cost of production and selling their produce at higher price. However, it is observed that, practices adopted by the farmers are based on their experience, and lacks the scientific facilitation. An excellent work has been done by Indian Council of Agricultural Research through its various Institutes. They have developed scientific methods for vermin-composting, vermin-wash, composting, Nafed compost and preparation of organic mixtures for

management of pest and diseases. Besides, there is need to understand Natural farming, organic farming and cosmic farming to use the principle of Five Bhuta – Earth, Fire, Air, Sky and Water (Jal, Prithvi, Agni, Hawa and Akash). Considering the importance, awareness and empowerment become inevitable, through Training. Thus, this Training was organised by the ASM Foundation in collaboration with Confederation of Horticulture Associations of India (CHAI) to impart new knowledge on organic farming and also get the benefits of experience of farmers who are practicing organic farming.

The 1-day training programme to the above objectives at Amrit Memorial Rural Institute for Transformation (AMRIT) was organised. Dr. G. Trivedhi, Former Vice Chancellor, RAU, Pusa, was the Chief Guest. Dr H. P. Singh, Former DDG, ICAR and Chairman. Dr. Singh presided over the function. Dr Mirtunjaya Kumar, Registrar, DRPCA, Dr P S Pandey, Director, NRC on Litchi, Dr Ram Awadh Ram, PS, CIAH. Lucknow, Mr Surendra Prasad Singh (IAS, Retd.), were the guests of honour. The meeting started with the floral welcome of the Chief Guest and Guests and welcome address by Dr. Surendra Prasad Singh. While introducing the guests, he said that this programme has been





organized by Foundation and CHAI, for the benefit of farmers, as the expert has come from Lucknow to train farmers. He further added that this is an important training organized by the Foundation as the Govt. of India, has provided focused attention to organic and natural farming. Dr S.D. Pandey, Director, NRCL, shared his experience with the organic farming in litchi and said that institute has maintained the organic litchi for its comparison within in organic system. He added that in

experiments initially the organically grown litchi, plantation lagged behind in yield. However, after 12-15 years, organic system covered up in yield reaching to the 90 kg per plant. It was noted that the quality of fruits is superior under the organic cultivation. He also said that litchi leaf can be used for vermin composting. He further added that the Centre has developed a new earth worm, which can eat litchi leaves. He advised the farmers to practice organic farming systematically to get the maximum benefit.

Dr Ram Awadh Ram, Former PS, CISH, Lucknow and the experts for the training, explained in the brief about the organic farming and said that he will take the practical classes and teach, how to prepare vermin-compost, vermin wash, amrit jeeva and cow peat pet. Amrit jeeva has lot of advantages, which improves potentiality of nutrient. Similarly, the vermin compost, Vermi wash and cow peat pet is taken for pest management. Dr Mirtunjay Kumar shared his experience of organic farming in the university and said that the centre of organic farming is functional in the University. He further added that soil nutrient conditions including the PH of soil, determines the production and advised to the farmers to apply the





nutrients based on soil analysis. He also assured all the support of the University to the farmers. Dr. G. Trivedi in his inaugural address explained about the organic farming and its importance and said that the many farmers in his area, who have adopted the organic farming and are producing vermin-compost, vermin-wash and Amrit Jeeva for improving the production of fruits and vegetables through organic farming. He also expressed his happiness for the establishment of AMRIT. He further added that the university should demonstrate the benefit of organic farming in the different crops. Finally, he thanked the Amit Singh Memorial Foundation, who is always in the forefront to take up the issues of the farmers. Dr. H.P. Singh in his presidential address explained about the back ground and history of organic farming and said that it has been adopted through the crop rotation and natural nutrient management. However, need for production and productivity enhancement in organic nutrients has adopted to get the higher production to meet the requirement of food. Subsequently, there was a call for diversified agriculture and now for the sustainable production. In the sustainable production systems organic farming is in the front line. Organic cultivation if done systematically by maintaining nutrient in soil or plants through the use of organic matter and management of the pest and diseases through organic pesticides give comparable yield. In organic farming system even the seed has to be produced organically plant trees. He also said that India was fully organic until late sixties, got converted into inorganic with advent of high yielding varieties and need for meeting the food security. In the process, many soils have deteriorated their nutrient content due to the imbalance use, challenging the sustainability. In this context, organic farming is the one of the options. Thus, this programme has been organised for the farmers. They will get benefitted and practice the organic farming more appropriately to earn better income. The inaugural programme concluded by vote of thanks to chair and guests by Mr. Rajiv Kumar Singh.

Thereafter, a practical training was imparted by Mr. Ram Awadh Ram, under the guidance of Dr. H.P. Singh. The vermicompost was demonstrated wherein green and dry straw were mixed with cow dung and placed in especially constructed vermicompost unit and earth worm was distributed. A net was put on the top and water was sprinkler to all these activities were done by trainees.

Valedictory function- the trainees shall be evaluated for their knowledge gain. They were conferred the certificate of participation. Certificate of training and support was provided to Dr. Ram Awadh Ram, Dr. S. D. Pandey, Dr. Surindra Prasad Singh and Mr. Rajiv Kumar. Concluding the function Dr. S.D. Pandey said that the farmers have gained the knowledge and they should keep the continued practice. There are some problem and need the follow up training that will be organised by the foundation in February 2023. Training concluded with a photo session.

2.0 Organisation of Workshops and Symposia by the CHAI

2.1 National Workshop on Digital Horticulture for Resilience to Climate Change and Sustainability, 29th May 2022

A national workshop, designed to address the issues paradigms in Digital Horticulture-Options and Opportunities, organised by the Confederation of Horticulture Associations of India, on 29th May at CSAUAT, Kanpur was supported by **the ASM Foundation**. This workshop was chaired by Dr. H.P. Singh, Former DDG and Chairman, CHAI. Panelists chaired by Dr. Jai Singh Parihar, Former Director, ISRO, Ahmedabad; Dr. A. K. Srivastava, PS, CCRI, Nagpur, Maharashtra; Dr. H. Chaudhary, IARI, New Delhi; Dr. Vishal Nath, OSD, IARI and Dr. Murtaza Hasan, PS, ICAR- IARI, New Delhi. The convener of this session was Dr Awani Kumar Singh, CPCT, IARI, New Delhi. The workshop started with a plenary lectures delivered by **Dr. H.P. Singh**. He emphasised on advancement in horticulture coupled with digitalisation, use of sensors, ICT, remote servicing and robotics for different type of farming and horticulture business which is becoming important, referred to as Digital Horticulture. In the digital horticulture digital images and sensors are used and integrated, and robotics and machine learning are adopted. This aims to improve industrial metrics such as, yield, profit and sustainability and to transform the sector's commodity trading, purchase of inputs, and traceability of product. There is a growing interest on digital horticulture, using e-platform for information exchange and management, not only for marketing but also for production system and value chain management using various types of data driven platform for decision making. Therefore, Digital horticulture provides a lot of opportunities and also the challenges.

Dr. K. B. Hebbar spoke on Current and Future Climate Suitability prediction for Plantation Crops (Coconut and Arecanut) Using Maxent and Adaptation Strategies for Sustainable Production, said that prediction of suitable climate for the cultivation of perennial plantation crops, which is essential for their sustainable production under changing future climate. In north east, Assam where arecanut is predominantly cultivated under current climate may become less suitable, while suitability may shift to neighbouring Meghalaya and Tripura under future climate. This understanding helps in devising appropriate policies for its cultivation in newer areas and to devise adaptive strategies in vulnerable regions so as to have sustainable cultivation and production under future climate.

Dr. Jai Singh Parihar stated that Geomatics comprising remote sensing, geographic information system, positioning system in association with information and communication technology has emerged as powerful tool for integrated use of variety of data. Satellite images of earth surface and observations of earth atmosphere provide regular information about the earth resources and environment. Such information coupled with in-situ observations have been found useful in survey, monitoring and management planning in many fields. The success of CAPE resulted in need for regular and multiple in-season forecast of crop production, applications in horticulture development and management planning etc. The Technology Mission on Integrated Development of Horticulture in North-Eastern States including Sikkim, popularly known as technology mission led to major development of geomatics applications in horticulture. Applications for crop area estimation and production forecasting of horticulture crop, crop disease detection, site suitability analysis, planning



for post-harvest support infrastructure etc. have been addressed. With the expertise developed and availability of open access and free of cost satellite data there are immense possibilities for developing newer applications to meet the requirements of new normal. He gave a glimpse of procedure development implementation and operationalisation of geomatics applications in the country. **Dr. Murtaza Hasan** explained about protected structures which act as physical barrier and play a key role in minimising biotic and a biotic stress. In the paper entitled Geomatics Applications for Climate Resilience in Horticulture

A healthy discussion was held and all the participants to the workshop appreciated the efforts and came out with suggestions to peruse digital horticulture for precision production and marketing of produce. After in-depth discussion. The chairman concluded that:

1. Use of sensors, automation, ICT, remote sensing and robotics for different type of farming and horticulture business are in progress. This is referred as Digital Horticulture which is becoming important for precision production and marketing. Therefore, digital horticulture should be prioritised and strengthened in term of infrastructure.
2. In the digital horticulture digital images and sensors are used and integrated, and robotics and machine learning are adopted. This aims to improve industrial metrics such as, yield, profit and sustainability and to transform the sector's commodity trading, purchase of inputs, and traceability of product. Therefore, AI and use of block chain technology becomes important.
3. There is a growing interest on digital horticulture, using e-platform for information exchange and management. This interest is not only for marketing but also for production system and value chain management using various types of data driven platform for decision making. Therefore, Digital horticulture provides a lot of opportunities and also the challenges.

Considering the importance of digital horticulture there is a need for organising a global conference to have effective dialog and develop the mechanism for digital horticulture.

The workshop concluded with a vote of thanks to the chair.

2.2 National workshop on the management of cucumber mosaic virus (CMV) Disease of Banana, on 30th September, 2022 at Raver, Jalgaon, Maharashtra

Confederation Horticulture Associations of India (CHAI) in association with All India Banana Growers Associations organized one day National Workshop at Raver, Maharashtra to deliberate upon outbreak of CMV in banana and its management. The workshop was attended by more than 500 farmers. Dr. H.P. Singh, Chairman, CHAI was the Chief Guest of the conference, Mr. K.B. Patil, Vice President, Jain Irrigation Systems Limited, Dr. Selvarajan, Principal Scientist, NRC on Banana were the subject experts in the workshop. The workshop started with welcoming the Chief Guest and guests, and lighting of the lamp by the Chief Guest and other dignitaries including the president of All India Banana Growers Association, Jalgaon Mr. Bhagavat Patil.

Dr. Selvarajan presented in detailed information about the CMV and said that it is a single stranded RNA virus which spread very fast in July and August planted orchards probably through secondary spread by aphids. This virus can reside on many weed hosts present in and around banana orchards.

The disease has become devastating for the banana possibly due to change in weather and cropping pattern. He further added that management of the virus can be done by removing infected plants, as it will serve as the source of inoculum and reducing aphid population by insecticides sprays. Use of too much of pesticides in the field has to be avoided. He also suggested that growing of Jowar/sorghum as border crop around the banana plants may serve as a trap for viruliferous aphids

Thereafter, the questions and clarification were invited from the farmers'. Inevitably, most of the farmers expressed about the transmission of the virus and its devastating impact on the banana production. Some of the farmers also expressed their fear to cultivate banana, due to devastating appearance of CMV. They stressed upon the control of this disease to save the banana in the region. Some of the farmers shared their experience in managing this virus. Question of the farmers were answered. Dr. Selvarajan and Mr. K.B. Patil answered each and every queries. The fear of the some farmers about its transmission through the tissue culture banana was clarified by Dr. Selvarajan that tissue culture has been promoted for the production of quality disease free planting material, which has an effective protocol to ensure that banana plants are free from all kinds of diseases. The plants from Jain Irrigation Systems Limited is tested for viruses and only the plants, which are free from CMV are used for further multiplication in tissue culture laboratory, which was confirmed by Mr. K.B. Patil, JISL.

Mr. K.B. Patil shared his experience in managing the virus in banana and said that the villages in Taluka Yawal were effectively managed and the incidence of this virus has declined. The plants are free from virus. He cited the examples of many different talukas, where incidence of this disease has been managed through timely rouging and managing the vector through timely spray. He further added that Jain Irrigation Systems Limited has effective protocol for production of virus free quality planting material of banana. He explained that more than 5-7% CMV virus were reported earlier, way back in 1987-88. The first incident was also reported in the study conducted by the virology laboratory of Pune. He further added that increases of the diseases is possibly due to the climate change. All the farmers expressed their satisfaction to the answers, many of the farmers also expressed that they have successfully managed banana CMV disease in their field.

Dr. H.P. Singh in his concluding remarks traced the history of CMV in Jalgaon and said that the incidence of CMV has been noted way back in 1980 and its incidence has been regularly reported ranging from 3-9% depending upon areas and season. When Dr. Singh was Project Coordinator, he had collected data on the incidence of CMV in Maharashtra, with special reference to Jalgaon through the Centre of All India Coordinator Project on Tropical Fruits located at Yawal, now shifted to Jalgaon. He agreed with the statement of Dr. Selvarajan and Mr. Patil, and said that if tissue culture mother plants is properly tested and proper protocol is followed CMV can never be transmitted through plants. In matter of fact, through indexing system, coupled with report and testing of the virus ensures freeness of plants. He further said that there is a system followed at Jain Irrigation to maintain protocol strictly and also maintains the register, which clearly indicate that plants when supplied are free from the viruses. Thus, the incidence in the field mostly happen due to secondary infection. He further added that the climate change altering the weather condition,

change in the cropping pattern have made this disease more devastating, which was not noted earlier in terms of losses caused. The farmers were advised to replace the infected plants and protect the transmission by controlling Vector. He also said that as reported, CMV is more preventing in the month of July and August and advised the farmers not to plant in these areas, where incidence of disease is high during this month July-August, at least for few years. He also suggested to avoid growing of banana in the surrounding the maize and cotton plantation. Removal of diseased plants, control of vector may reduce incidence, Dr. Singh said. He also added that growing of Jowar or Sorghum plants around banana field may be taken up to reduce the transmission of CMV:

2.3 Knowledge Sharing Workshop on Banana and Potato- Farmers' Perspective, 2nd November 2022, Nayanagar, Rosra, Samastipur, Bihar

Recognising that, banana and Potato have emerged as the important crops in Bihar and its cultivation is providing high economic returns, compared to any other crops, there has been a lot of technological changes in both these crops. The farmers have shifted from tall cultivars to Grand Naine and have adopted tissue culture plants as well as fertigation. There has been changes in plant orientation, nutrient and water management, production system, and also towards bunch management. Similarly, potato production has seen many changes in production system management. Seed production has also shifted to aeroponics for quality production. However, in the process of development various issues have emerged including post harvest management and marketing. The Innovative farmers have adopted fertigation system with automation and have provided inspiration to many farmers. All these issues need to be discussed with the farmers in their field to provide technical guidance based on the feedback system.



Accordingly, the CHAI in collaborations with ASM Foundation, New Delhi, Progressive Farmer's Association, Nayanagar, and Jain Irrigation Systems Ltd. organised a 1-day **Knowledge Sharing Workshop on Banana and Potato -Farmers' Perspective**, on 2nd November, 2022 at Nayanagar, Rosra, Samastipur. The workshop was participated by more than 300 farmers, scientists and industry representatives. The farmers field was visited by chief guest, guests and delegates. Mr. Sudhansu Kumar, a progressive farmer explained, in details, about guava and banana and said that after three ratoons of banana he will take up potato for seed production. He also explained about automation in fertigation and added that it saves lot of cost on manual labours. He also explained about the diversification to horticulture



from a maize growing with the guidance of Dr H P Singh, a mentor for him. After field visit workshop started. The Inaugural session was followed by two technical sessions.

The inaugural session started with the floral welcome to Chief Guest and Guests on the dais by respectable persons of the village including Mukhiya, Sarpanch, Ward Members and others. Dr. H.P. Singh, Former DDG (Horti.) ICAR and Chairman, Confederation of Horticulture Associations of India (CHAI) was welcomed with floral bouquet and shawl, followed by Dr. P.S. Pandey, Vice Chancellor, DRPCA, Pusa. Thereafter, Dr. B.P. Singh, Former Director, CPRI, Shimla, Advisor JSIL, Jalgaon, Dr. K.B. Patil, Sr. Vice President, JISL, Jalgaon, Dr. Vishal Nath, OSD, IARI, Jharkhand, Dr Manoj Kumar, Joint Director, CPRI, Meerut, Dr. Feza Ahmed, ADR, BAU, Sabour, Dr. Kundu, Director Extension, DRPCA, Pusa with stand and banquet and was inaugurated by the C.M., Bihar Mr. Nitish Kumar Jee were welcomed. Mr. Sudhsadhu Kumar, Progressive Farmer, in his welcome address expressed his gratitude of Dr. H.P. Singh for his support in developing Farm, which is highly modernized. He extended his warm welcome to Dr. P.S. Pandey, Vice Chancellor, DRPCA, Pusa, the Chief Guest and expressed his gratitude to him for attending this workshop. He also extended a warm welcomed to Dr. B.P. Singh, Former Director, CPRI, Shimla and Advisor JSIL, Jalgaon, Dr. K.B. Patil, Sr. Vice President, JISL, Jalgaon, Dr. Vishal Nath, OSD, IARI, Jharkhand, Dr Manoj Kumar, Joint Director , CPRI, Meerut, Dr. Kundu, Director Extension, DRPCA, Pusa, Dr Manish D Ojha, NCoH, Noorsarai, Nalanda, Dr. Feza Ahmed, ADR, BAU, Sabour and also all the participants. Then, he briefly discussed about his activities for litchi production with drip irrigation and also sprinkler, which provides excellent size and colour of the fruits. He also explained about his auto system of fertigation in banana, guavava and other fruits and stressed on growing of strawberry, to earn high profit.

Dr. B.P. Singh, while speaking about the workshop said that potato is very important crop of Bihar, which provides good income to the farmers in the period of three months producing high yield with good seed and appropriate system productivity is also high in the fields of progressive farmers, in Bihar, although, state average is low. He also explained about the role of quality seeds in production of potato, and said that Jain Irrigation Systems Limited has ventured into production of quality seeds through adoption of Aeroponic System having the best facilities in the country. He also informed that they have also developed the varieties, which may be commercialized in a year or two.

Dr. P.S. Pandey, Vice Chancellor, DRPCA, Pusa and the Chief Guest of the function, spoke on the occasion and thanked Dr. H.P. Singh for bringing him to this very important place, which could be a learning spot for many in the production system of litchi, banana and guava. He also informed that he had seen this farm in group circulating the video, but today, he is in position to see it physically. He stressed upon adoption of the technologies developed and adopted by Mr. Sudhanshu Kumar to larger group of farmers. He also stressed upon bringing the students for learning at his farm and assured all the help and support to this farm. It was also agreed that Mr. Sudhanshu Kumar may be invited for sharing his experience to the students from time to time.



In the concluding remark, Dr. H.P. Singh, thanked the honourable Vice Chancellor for accepting his request and blessing the occasion, which has inspired all the farmers, who are attending this workshop. Dr. Singh said that horticulture has emerged as one of the options for enhancing the farmers' income, which has been appreciated and demonstrated by Mr. Sudhanshu Kumar, who shifted from crop production to horticulture. He also said that adoption of improved system like fertigation has not only improved the productivity of crops but also saved the crop from distress in the period when human resources were limited. He also requested honourable Vice Chancellor to see that the demonstration on improved technologies like fertigation system as established to help farmers and ensured all his support. After vote of thanks by Dr. K.B. Patil, Sr. VP, JISL, Jalgaon to chief guest and guests the technical started.

Technical session-1. New Paradigm in Production and Utilisation of Banana and Potato :The session was chaired by Dr. Vishal Nath, OSD, IARI, Jharkhand and was co-chaired by Dr Manoj Kumar, Joint Director, CPRI, Meerut, U.P. The Chairman briefly introduced the speaker before they spoke on the allotted subject and said that both the banana and potato are very important crops of the region and the farmers can be benefitted by deliberation of the experts.

Dr. K.B. Patil, Sr. VP, JISL, Jalgaon, spoke on the Technological changes in banana and said that, in last two decades there has been technological changes in production and utilization of banana. He further added that there have been a lot of technological changes, which has impacted the production of banana across the country. The farmers have shifted from suckers planting to use of tissue culture plants, from fertilizer to mat management, fertigation, fertilizer application and also bunch management to achieve quality production. The Grand Naine (G-9) has been largely adopted for improved production system, which provides quality fruits and yield upto 110 MT/ha. He also explained in details about the use of tissue plants and nutrients application through fertilization systems, timely management of pest and diseases and also management of the bunch, where in flower bracts are removed and polythene covering of bunch is done. Banana has to be harvested with care without touching. If figures or hand is touched, it turns black on ripening. Harvested bunch can be de-handled, washed and subjected to ethylene treatment to get the better price of the coloured fruits. The Chairman thanked Dr. Patil for excellent presentation and requested other speaker for their presentations.

Dr. Bir Pal Singh, Former Director, CPRI, Shimla and Advisor JSIL, Jalgaon spoke on production and utilization of potato with special reference to seed production. He said that seed is the most critical inputs in the potato production, as it determines the productivity and income of the farmers is also a seed is major portion of the inputs cost. He explained about the production system adopted for seed production of potato to ensure that the seeds are free from virus and added that after in advent of tissue culture, diseases free buds are selected multiplied in tissue culture and tuberlets are produced under the aeroponics system. Such tuberlets are grown for two to three generation before it is distributed to the farmers. In past, seeds production has largely been done in the government sector, but now there are many companies, which have come forward to produce the quality seeds of potato. He also informed that many of the farmers have come forward to take up potato seeds production under contract. This contract system of seed production shall be



extended to other willing farmers. Potato production in Bihar was further explained by Dr. Manoj Kumar, Joint Director, CPRI, Modipuram. He provided a detailed accounts of production systems management of potato and said that its start from the selection of sites, till it reaches to consumers. Thus, value chain management is essential. Potato should be grown in brown soil, fertilizer and weather should be appropriately managed. He also spoke about the crop rotation, pest and diseases management. Chairman, suggested that farmer can keep in touch with Dr. Manoj Kumar for further details, if required and his phone number was shared.

Dr. Kundu, Manager, Mother Dairy spoke on the issues and strategies in marketing of banana. He said that Mother Dairy is engaged in procuring and selling vegetable and fruits including banana. He explained how the Mother Dairy procure and how the farmers are linked to the market. He requested the farmers to come forward for contract system.

Dr. Manish D. Ojha spoke on production system management of onion. He said that onion suits very well in banana, potato cropping systems or potato cropping systems. In Bihar, Rabi onion is very common but limited area is available for rabi onion. He suggest growing of onion after potato for which seeding can be produced in advance. He also suggested rabi onion, where there is no problem of water stagnation. Since rabi onion can be grown, he stressed on its adoption.

Dr. Kundu, Director Extension, Pusa spoke on the extension system and the activities of Krishi Vighyan Kendra, especially seed production. He assured to the support through Krishi Vighyan Kendra and the University. The Chairperson concluding the session, thanked all the speakers for their excellent presentation and said that there is a need for providing all the support to farmer for achieving higher yield. He also appreciated the efforts of Mr. Sudhansu Kumar, Progressive Farmer, Nayanagar, in technology adoption and dissemination.

Session-2 :Panel Discussion: The panel discussion was chaired by Dr. H.P. Singh, Chairman, CHAI, New Delhi. Dr. M.D. Ojha, NCoH, Noorsarai and Dr. Feza Ahmed, ADR, BAU, Sabour co-chaired the panel discussion. Dr. H.P. Singh, Chairman, invited the farmers to raise their questions, which shall be replied by respective speakers. All the issues related to banana was answered by Dr. K.B. Patil, Sr. VP, JISL, Jalgaon, Dr. Bir Pal Singh and Dr. Manoj Kumar clarified all the issues related with potato production. Dr. Kundu, Director Extension replied to all the queries of farmers. Mr. Sudhansu Kumar also shared his experience with the farmers. Dr. H.P. Singh, concluded the session by saying that problem of the farmers is our top priority and University may take appropriate action and issues raised by the farmers regarding development shall be taken care by the department. Dr. H.P. Singh, also advised the farmers to establish with farm farmer producer company for effective marketing of produce and realization of better income. He also informed that central government has given priority of FPOs formation. Mr. Sudhansu Kumar, ensured that it will be done immediately. The workshop concluded with the vote of thanks by Mr. Sudhansu Kumar.

The following recommendation emanated from the discussions:-

- The DRPCAUI, formerly RAU, Pusa has been supporting the farmers for crop production but now there is a shift to horticulture livestock and fisheries. Accordingly, to enhance income of farmers University has to reorient its activities.

- Sudhansu Kumar, farmer, has become an excellent example of effective diversification to horticulture for enhanced income through technological changes. His expertise could be effectively utilized for motivating students as well as other farmers.
- Since, DRPCAUI is often visited by the farmers, there is a need to demonstrate best of the technologies in horticultural crops including agriculture, drone applications, value chain management etc. This is essential to motivate farmers.

The workshop has succeeded in enhancing access of information. Therefore, CHAI along with DRPCAUI may organize similar workshops across Bihar especially on horticultural crops.

3. Participation in Conference, Meetings and Visits to Farmers' Fields

3.1 EEPC INDIA – Engineering the Future, 51st Export Award National, 13th April, 2022

Dr. H.P. Singh, Independent Director, JISL and Chairman, CHAI along with Mr. Sanjay Sharma, Sr. Manager, JISL, Delhi office participated in the award function organized by EEPC India on 13th April, 2022 in the evening to receive the Export Excellent Award on behalf of Mr. Anil Jain, MD, JISL. Dr. Singh received the award and interacted with the participants. In the meeting export trend was highlighted and it was informed that the India has achieved new heights, in the export of various commodities.

3.2. Plenary and Keynote lectures delivered, 28th and 29th May, 2022 at CSAUA&T, Kanpur, U.P.

Dr. Singh delivered plenary and Keynote lectures on various theme area on 28th and 29th May, 2022 in the National Conference on Climate Resilient and Sustainable Development of Horticulture, organized by Lt Amit Singh Memorial Foundation in association with CSAUA&T, Kanpur, Uttar Pradesh. He also delivered a keynote lecture on Regenerative Agriculture including Horticulture for Resilience to Climate Change and Sustainability and also the Digital Horticulture.

Agriculture often referred to as culture has played a critical role in the Indian economy and society for thousands of years, as evident from sophisticated irrigation and water storage structures built in 3000 BC, during the Indus Valley Civilization. The Kallanai, an ancient dam built on the Kaveri River, around the first century AD, is considered to be the oldest in-use water regulating structure





in the world. In fact, agriculture is deeply ingrained in the Indian cultural ethos. Since medieval times, agriculture has remained the predominant occupation of the populace. It satisfied a village's food requirements, besides providing raw materials for industries like textile, food processing, and crafts. During the late Middle Ages, till the start of colonial rule, construction of water works and improvement in irrigation techniques brought about economic growth. The colonial era was not particularly good for agriculture as it saw frequent famines and growth rate of 0.1 percent in production during 1900 to 1947. The country gained Independence a few years after the Great Bengal Famine (1942 to 1943), The agricultural scenario, post-Independence, was quite challenging and agriculture continued to remain the mainstay of the economy. Despite many initiatives of the Government, growth in food production was inadequate to meet the requirements of the growing

population and food import became essential in India till the mid-1960s. India responded to the challenge by reorganising research and undertaking agricultural activities, creation of institutions and price support mechanism to the produce.

All these steps led to a quantum jump in the productivity of crops such as wheat and rice, a phenomenon christened the Green Revolution in 1968. The efforts continue to bear fruits today to put the progress since 1950 in perspective — food grain production has increased 6 times; horticulture 13 times, and oilseed and milk production is up six times. Organisational initiatives like Technology Missions were introduced, resulting in a rapid rise in horticulture production. Despite liberalisation, and the growth in services and manufacturing, the role of agriculture remains vital to the overall development and well-being of the nation accounting for a little over 13.5 percent of gross domestic product, and employing the largest proportion of the workforce (about 45.5 percent), agriculture remains a strong lever of growth for the Indian economy. Ensuring food and nutritional security becomes a challenging task, especially with





increased nutritional intake, greater urbanisation, and stagnant (or declining) cultivable area. With stagnating production and increasing demand, guaranteeing food and nutritional security will continue to be a challenge. This will further strain the already-under-stress urban infrastructure. Finally, the widening income disparity between the non-agrarian and agrarian segments could cause social unrest. Therefore, we have to envision the challenges and options for food and nutritional security along with better aggravating economy.

The past revolutions (green revolution, white revolution, yellow revolution and Golden revolution together the rainbow revolution) have been possible due to technological interventions, new cultivars and production technology, which are also evident from the fact that area has remained static to 142±2 million hectare for the last 40 years, but production has increased manifold, not only of cereals but of all the agricultural produce, from the same land area. Pressure on the cultivable land for agriculture continues to be high as Indian agriculture supports 17% of world population and 11% of livestock only from 2.4% of global land and 4.5 % of water. At global level also, meeting the food and nutritional needs of population, which will be about 10 billion in 2050 is a cause of concern and is being debated across the globe. Looking into population growth, declining land and water, coupled with challenges of climate change, has created much greater concern to feed the growing population. Thus, the challenge before us today is much greater than before, and has to be addressed with strategic approaches utilising innovations in science and technology. Efforts made through research and development have been a key driver for this development.

Regenerative Agriculture is a holistic approach of conservation and farm management practice that improves soil health by rebuilding soil organic matter and restoring degraded soil biodiversity, crop resilience and nutrient density. This results in increased biodiversity both above and below the soil surface, as well as increased water holding capacity and carbon sequestration at greater depths, lowering climate-damaging CO₂ levels in the atmosphere. Inoculating soils with compost or compost extracts to restore soil microbial community population, structure, and functionality, as well as restoring soil system energy (compounds as exudates) through full-time planting of multiple crop intercrop plantings, multispecies cover crops, and borders planted for bee habitat and other beneficial insects, are all important in increasing biological ecosystem diversity. Growing a diverse crop mix protects against pests and diseases, provides a diversified income stream and habitats for more pollinators, and improves soil health.

Perennial horticulture, which includes fruits trees, plantations, and some spices crops, does not require replanting each year as the crops have long root systems that can retain water, improve soil porosity, sequester more carbon, and improve soil health, thereby improving ecology, animal, and human health through improved micro-nutrients availability and better dietary balances. Planting native-to-a-region crops, plays an important role in improving biodiversity and are utilised as the main cash crop, incorporated into conservation buffers, or used as cover crops. Diversity and perennially are the essential components of regenerative agriculture, therefore, promoting perennial horticulture can help build healthy soils, restore clean surface and groundwater, and enhance the resilience of our food system. As a result, in order to counteract climate change, it is critical to

support an agriculture system that is both ecologically and economically viable. However, India's current economic and political structures are geared toward monocultural production, and for this type of perennial horticulture to prosper, appropriate socio-political and economic systems must be in place to support such system. In horticulture production system, there are various examples which states that with effective soil management, soil health can be improved and the crops can be grown with minimum inputs. The paper discusses this concept in detail.



Digital Horticulture: Exponential advancement in horticulture coupled with digitalization, use of sensors, ICT, remote servicing and robotics for different type of farming and horticulture business is becoming important, and referred to as Digital Horticulture. In the digital horticulture digital images and sensors are used and integrated, and robotics and machine learning are adopted. Digital horticulture aims to improve industrial metrics such as, yield, profit and sustainability and to transform the sector's commodity trading, purchase of inputs, and traceability of product. The technique used are Blockchain, IoT (Internet of things) and data information platform. The Blockchain is a type

of **distributed ledger** that is to be used to capture, organize, and validate data in almost every aspect of Digital Horticulture, which needs IoT based data collection. This also includes contract and certificates that can be executed. Blockchain makes complex transaction quicker and cheaper to execute, which benefits the stakeholders. This also offers accurate and early traceability of all the produce from the exact spot, where it was harvested to the retail outlet. Accurate accountability becomes quick and easy and appropriate action take place. IoT (Internet of Things) is the network of physical devices that collect, connect and exchange data. The devices measure variability of parameters at multiple places for effectively managing the crop. The crop management is tailored on information. Edge computing and machine learning capability are essential to improve data from IoT devices. The secure data storage can safely accommodate the large amount of data which is generated by the physical devices. A well architected Artificial Intelligence (AI) helps in achieving higher yields while optimizing resources efficiency, hence enabling farm to be more sustainable, viable and profitable. Next revolution of horticultural practices will be dominated by AI and human wisdom in future. However, AI has to be integrated with IA (Information Architecture). Digital marketing, referred as online marketing is a promotion of brands to connect with potential customers using the internet and other form of digital communication. This includes use of all the digital platforms. Digital marketing of horticultural activities could be a platform of content marketing, search engine optimization (SEO) Search Engine marketing (SE) and social media marketing. There is a growing interest on digital horticulture, using e-platform for information

exchange and management, not only for marketing but also for production system management and value chain management using various types of data driven platform for decision making. Therefore, Digital horticulture provides a lot of opportunities and also the challenges.

3.3 Participation in Global Conference and exhibition, 3-4 June, 2022



Dr. H.P. Singh, chairman, CHAI, participated in Global Conference, exhibition, networking meets and awards, connecting fresh business organised by Media Today at Welcome Hotel, Dwarka on 3rd-4th June, 2022. He participated in panel discussions and shared his experience on the development of horticulture, and said that there is ample opportunity for business in horticulture wherein networking becomes essential. He also

traced the historical development of horticulture and emphasised on mission approach to achieve the designated goal. He also visited exhibition and interacted with exhibitors on various issues.

Launching of Confederation of Agriculture Media, was inaugurated by Honourable Minister, Shri Parshottam Rupala, Union Cabinet Minister of Fisheries, Animal Husbandry and Dairying - Govt. of India, Member of Parliament (Rajya Sabha). Various speakers shared their experiences. Dr. Singh also spoke about the Confederation of agriculture media for effective coordination (Krishi Jagat). He emphasised on the role of media in effective dissemination and effective role of agri-media in technology led development.



3.4 Memorial Lecture, 29th June, 2022 at PJTSAU, Rajendra Nagar, Hyderabad

Dr Singh delivered a 2nd memorial lecture in the memory of Dr. L. Venkata Ratnam on 29th June, 2022 at University Auditorium, PJTSAU. The theme of the Memorial Lecture was **Climate Resilient and Sustainable Development of Horticulture – Challenges and Opportunities**. The meeting started in afternoon with welcome by Dr. A.V. Rao. A brief of Agri- Horticultural Society was provided by Mr. Anil Kumar V. Epur, Chairman Agri. – Horticultural Society. Life of Dr. L. Venkata Ratnam, was presented by Dr. K.V. Subramaniam, YSM (Retd.). Then the memorial lecture was delivered by Dr. Singh.



Dr. Singh said it is time to remember the contributions of Dr. Ratnam, who had a passion for the sustainable development of horticulture, which he persuaded both in India and abroad. He has been credited for developing varieties, technologies and its dissemination among the stakeholders. Dr. Ratnam continued to be remembered for laying foundation of horticulture development, which is now a growth engine for economic development in Telangana. Late Dr. L. Venkata Ratnam has been personally known to me, since, he was the chairperson of Agri-Horticultural Society, Hyderabad. He passionately implemented the scheme of Gardener’s training, which was launched by me as Horticulture Commissioner. The scheme succeeded in creating trained human resources and provided large scale employment to youth in Hyderabad. During the period, I had many interactions



with him both in Delhi and Hyderabad. He always talked about climate, trees and the role of horticulture for employment, nutritional security and accelerating economic development. Thus, befitting to the vision of Dr. L. Venkata Ratnam. I have been chosen the topic entitled “Climate Resilient and Sustainable Development of Horticulture – Challenges and Opportunities” for my deliberation. Sustainable Horticulture is a system manage-



ment which is able to meet the current needs of the community without compromising the ability of future generation to meet their own needs. At the same time, resilience is ability to recover from the stresses, adapt well to change, and perform appreciably in the face of adversity. Thus, the deliberation has much more significance in current context.

Climate change, a global phenomenon, is a concern for food and nutritional security of growing population, expected to be 9.6 billion at the end of 2050, and has attracted global, regional and national dialogues for mitigation and adoption strategies. The likely effects stipulated are occurrence of drought and floods, change in rainfall pattern and sudden change in temperatures, which will have impact on the growth pattern of plant, flowering, fruiting, yield and quality of produce, besides increasing vulnerabilities to pest and diseases. How to handle the challenges of climate change in terms of adaptation and mitigation strategies is a point of discussion in the programmes of the governments, globally. Adaptive mechanisms through the development of new crops, cultivars and technologies are also a priority research agenda for most of the research organizations. Since, impact of climate change will largely depend on current agro-climate conditions, cropping pattern and socio-economic conditions, solutions to the problems arising out of it, requires local analysis, planning and management.

With wide arrays of crops, horticulture may have differential responses: some may benefit from higher amount of carbon dioxide, while flowering and fruiting may not occur, some crops may extend in area due to less occurrence of frost, while some crops may shift from mild hills to upper hills. Therefore, understanding the impacts in a given crop under specific situation becomes inevitable in horticulture as most of the horticultural crops are long duration or perennial in nature. This necessitates a thorough analysis and understanding about climate change at regional levels in relation to both annual and perennial horticultural crops, which could be managed through innovation, technology evaluation and refinement to provide effective solutions. Methodologies for analysis in many crops are now available.

Horticulture, a pleasantry, before independence of the country, has moved from the rural confine to commercialization with the turn of the century, keeping a growth rate of 586 per cent with increasing demand, after 2000, referred to as **Golden Revolution**, and is projected to grow above 6 per cent, to achieve doubling of farmers' income, food and nutritional security, health care and environmental services. Telangana has significantly contributed to this development and will continue to add values in coming years for its commitment, identifying horticulture as a Growth Engine of development. The achievements in horticulture till date are attributed to infrastructure for the research, investment of government with a mission mode approach and enabling policy initiatives. With the projected growth, development is happening with innovative models of technology and its adoption, and the targeted production is achievable, but, not in usual mode of approach. The mission approach, which was envisaged to address all the issues in links of the chain from production to consumption in integrated manner, has proved to be most successful in achieving the goals.

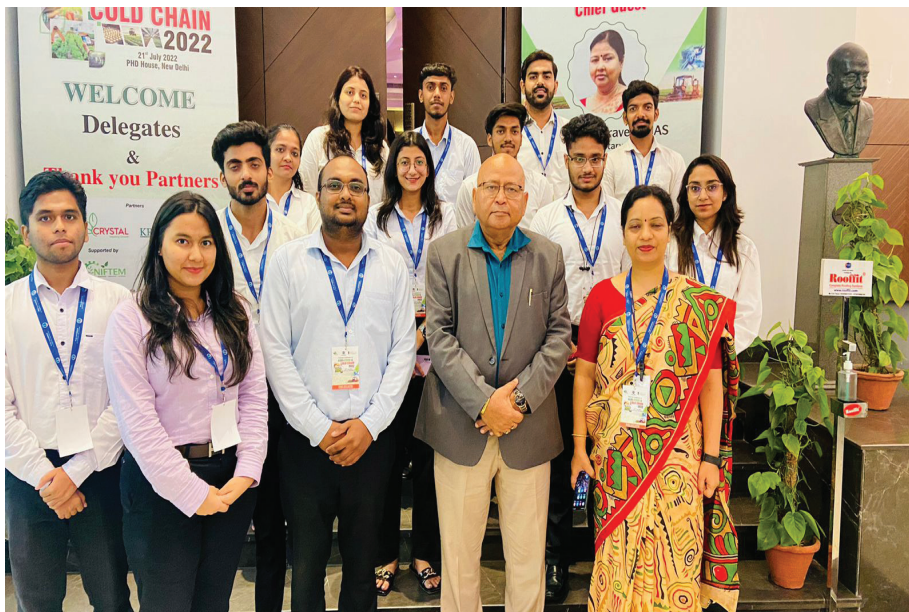
There are concerns about competitiveness, which calls for efficiency in all the activities, starting from conceptualisation to production, post harvest and cold chain management, transportation,

marketing and brand management till it reaches to the consumers. This calls for value chain development and management with enhanced water productivity to benefit all the players in the chain and provide the produce to the consumer as per their requirement. Therefore, it is imperative that horticulture be declared as priority sector for investment and mission for Smart Horticulture be launched with the focus on value chain development and management on priority, which will go in long way as a prime mover of economic growth providing employment, food and nutritional security and environmental services and above all availability of produce as per the needs, both for domestic and export market. In this context, Block Chain Technology of Management, Artificial intelligence and Environmental Controlled Technologies would be inevitable. Accordingly, skill development has to keep pace with the demand.

Dr Singh concluded with his thanks to honourable Vice Chancellor, PJTSAU, Telangana, Dr V Praveen Rao, for giving him an opportunity to share his thoughts among distinguished guests. Finally, he said that “Future belongs to those who believe in beauty of their Dream”. Let us pledge to leave the earth better than we got it, that would be a real sustainability and preparing to face the challenge is resilience.

3.5 National Conference on Agri Food Cold Chain

Conference on Diversity in agriculture and role of cold chain was participated to deliver a keynote lecture. Dr. Singh explained in detail that agri food cold chain is needed for diversification and



doubling the farmers’ income. He shared his experience about the diversity and said that the PHD Chamber can play a very significant role, wherein horticulture has emerged to be on driving seat for economic growth. Various facets of horticulture sectors have to develop through strategic approach. He said further that cold chain system has to play very significant role to reduce

the post harvest losses and assure the quality of the produce. Thereafter, he interacted with the participants.



3.6 Visit at Vindhya Agro, Mizapur on 13th July, 2022

Dr. H.P. Singh visited Vindhya Agro on 13th July, 2022 to see the plantation and provided technical advice. The Vindhya Agro, which has an area of 5000 acres, is trying to take up agriculture venture. But has not succeeded yet due to many issues. The matter was discussed in details and a frame work of development was strategised. He further added most important aspect is to create water resources through appropriate harvesting of rain water. They were also have hydrological survey to identify the water gradient for its effective utilisation

3.7 National Conference on Horticulture, 12-14 August, Noorsarai

Dr. Singh participated in National Conference on Climate Resilient Horticulture held at Noorsarai, Nalanda, Bihar, 14th August, 2022. He delivered his keynote lecture on development of horticulture, which has exhibited unprecedented growth and said that the development of horticulture has been in 5 phases. He explained the phase of growth and said that 5th phase of



growth is technology-led development. However, various issues of resilience to climate change and sustainability has emerged. He called for digital horticulture to address many issues. Subsequently in plenary session he distributed award to scientists for the best presentation. He also visited field and advised.

3.8 National Symposium, 29-30 August, 2022, TAAS

The Trust for Advancement of Agricultural Sciences (TAAS) organised a National Symposium on Food, Nutrition and Environmental Security, towards achieving SDGs, 29-30 August, 2022 at NASC Complex, New Delhi in collaboration with ICAR, NAAS, CIMMYT, International Rice Research Institute (IRRI) and CGIAR and also with Buyer. The conference had objectives to discuss on food, nutrition and environmental security that would transpose with slowdown of agriculture production, develop strategies for regenerative agriculture for long terms and harness of agricultural produce by strengthening partnership and diversify sustainable production system on eco-regional basis. The conference was participated by National and International experts.



The conference started with the welcome address by Dr. R.S. Paroda, followed by special remarks by Dr. Himanshu Pathak, Secretary, DARE DG, ICAR and concluded by Dr. T. Mohapatra, President, NAAS, Dr. Ramesh Chandra, Member, NITI Aayog, delivered an inaugural address and Dr. Bhag Mal gave a Vote of thanks. Technical session re-originating the crops, research, food and security was chaired by T Mohapatra, Former Secretary, DARE and DG, ICAR and meeting was conveyed Dr Umesh Srivastava, Former ADG. The plenary lectures were delivered by Dr. O.P. Yadav and Dr. A.K. Shasany. Dr. H.P. Singh delivered a plenary lecture entitled **Horticulture for Enhanced Nutritional Security - Challenges and Opportunities**. Dr. Singh said that development of horticulture has got focus nationally and internationally for meeting the nutritional needs, he further added that impacts of past approaches, focused on technology-led development and investment have been impressive in terms of production and productivity, which has achieved much higher levels. Earlier, policies, programme, technological changes and initiatives were designed and implemented for achieving higher production through improving productivity parameters, as it was important to achieve self-sufficiency in food, a primary concern than looking to the challenges of producing and helping the farmers in achieving improved farm income.

To achieve enhanced farm income and address malnutrition, effective planning for diversification to horticulture has been called for. With the initiative of mission approach horticulture has emerged

as best option for addressing many of concerns including nutritional security. Indian horticulture, a core sector of agriculture, represents a wide range of horticultural commodities, which includes fruits, vegetables, nuts, ornamental, plantation, tuber, spices, medicinal and aromatic crops and mushrooms. Collectively, these horticultural crops make a significant contribution to the Indian economy, in terms of rural employment generation and farmers income beside nutrition. Increase in demand for horticultural produce due to greater health awareness, rising income, export demands and increasing population poses the challenge for further increasing the production and productivity of horticultural crops.

The issue of climate change and climate variability has thrown up greater uncertainties and risks, further imposing constraints on production systems. The challenges ahead are to have sustainability and competitiveness, to achieve the targeted production to meet the growing demands in the environment of declining land, water and threat of climate change, which needs innovations and its adoption for improving production in challenged environment. The sustainable development of horticulture is inevitable to ensure nutritional security and improved farmers' income.

3.9 Visit to NRC on Litchi, 6th September, 2022

Dr. H.P. Singh, Former DDG (Horti.) and Chairman, CHAI visited National Research Centre on litchi on 6th Sept., 2022 and interacted with the scientists and discussed on various aspects of litchi. He expressed his satisfaction for the growth of the institute. However, he expressed his concern regarding the vacancies of scientists, Dr. Singh also visited different experiments including experiment on high density planting.



3.10 Visit to Jain Irrigation Systems Limited, 27th September, 2022



Dr. H.P. Singh visited Jain Irrigation Systems Limited on 27th September, 2022 and took note of progress made. He also visited the site of vertical gardening, nursery, seed production of potato, tissue culture laboratory and banana production in net house. He expressed his satisfaction regarding the progress and provided his inputs. He participated in AGM of the Company on 29th September, 2022.



3.11 Conference on banana at Buhrampur, 2nd October, 2022



Dr. H.P. Singh participated in conference organized at Bahrampur, on Mosaic Virus on Banana. The conference was attended by Shri Gyaneshwar Patil, Member of Parliament, Smt. Archana Chitnis, Shri Abhay Jain, Dr. H.P. Singh, Dr. Salvarajan, Dr. K.B. Patil and Dr. Dhamdham Patel. The conference discussed on various facets of Banana Mosaic Virus and developed the recommendations for its effective management. Dr. H.P. Singh said that it can be managed, by providing quality planting material and control of vector. He shared his experience of 50 years



working on banana and said that mosaic virus of banana is reported since last 50 years which become devastating if care is not taken. He explained that tissue culture plants are invariably virus free, initially but due to secondary host, vector and change in cropping system, it has become a serious problem in Rower and Bahrampur. He further suggested to follow the recommendations.

3.12 National Conference on Oil Palm, 23-25, November, 2022



National Conference on Oil Palm, 23-25, November, 2022 at Vijaywada, Rajasthan. Dr. H.P. Singh, Chairman, CHAI participated in 3rd National Conference on Oil Palm organized with a theme, Oil Palm-the Way forward for increasing the Vegetable Oil Pool through Aatma Nirbhar Bharat for doubling the income and providing



social security to farmers, organized by Society for Promotion of Oil Palm Research and Development (SOPOPRAD) at Vijaywada, November 23-25, 2022. At the outset, Dr. Singh thanked the organizer for giving him an opportunity to be here and interact with the farmers. He further added that, he participated in the



1st conference as Commissioner Horticulture, Govt. of India in 1998 and subsequently, the 2nd National Conference in 2008, as DDG (Horti.), ICAR and today he is attending the 3rd Conference as Former DDG (Hort), ICAR and Chairman, CHAI. He further shared his experience on Oil Palm and said that Society for Promotion of Oil Palm Research and Development, has moved forward and is riding to harness potential areas, identified by the experts which have been increasing.



While delivering Key note address, Dr. H. P. Singh said that Oil palm, the highest oil-yielding crop, has emerged as the most economic crop in the global vegetable oil scenario for food, industrial purposes as well as for biodiesel. In India, oil palm succeeded on commercial scale as small holders' crop under irrigated conditions and its yields are comparable to that of the crops grown under traditional environment in other countries. With the support provided by the government to



farmers, who are convinced of the profitability and active role played by entrepreneurs led to faster area expansion. Infrastructure for research has also been established as Indian Institute of Oil Palm Research (IIOPR), Pedavegi, Andhra Pradesh. He added that India shall emerge as one of the major producers of palm oil in the years to come by taking up oil palm in 2.8 million ha of potential area as irrigated crop, thereby producing 8-10

million tonnes of palm oil and 1.4–1.8 million tonnes of palm kernel oil, thus enabling reduction of the gap in vegetable oil production and demand. India should aim at bringing more area under oil palm with higher productivity to achieve self-sufficiency in vegetable oil production. He further pointed out about the Mission on Oil Palm launched by Government of India and expressed his concern about arranging huge number of seedlings of high yielding varieties. He then emphasised on



development of varieties and technologies including production of quality planting material.

Dr. H. P. Singh chaired the panel discussion on oil palm, wherein farmers expressed their concern. Many of the farmers emphasized on increasing cost of cultivation and difficulties in harvesting. They also expressed about the price and suggested for tax harmonization. The experts



told about various technological development and also policy issues and assured to take forward the discussion with the concerned authority. In the plenary session recommendations of the various technical sessions were presented, which emphasized on development of cultivars, hybrids and use of biotechnology for speed breeding. The technical sessions also emphasized on production of quality planting material, management of seeds gardening and enhancing production system management, including control of pest and diseases. The session also discussed and developed the recommendations for processing of palm oil, Waste management in industry was also discussed, as emphasized by various speakers in the plenary session. Dr. Singh delivered a plenary lecture and said that the gap between the demand and domestic supply of vegetable oil continues to increase, which was around 4.5 million tonnes in 2008, has become 13.5 million tonnes in the end of 2021, in spite of the fact, that production and productivity of vegetable oil seed crops have increased appreciably. This is contributed by increasing population and enhanced expandable income of people demanding more vegetable oil for consumption. Although, vegetable oil crop is cultivated in around 26 million hectares, but the production of oil per ha is less than 0.4 tonnes/hectare, compared to yield of 4 to 6 tonnes. Oil of the palm. Therefore, expansion of oil palm cultivation provides the opportunities to produce more oil per unit area. Recognising that the increasing gap between demand and supply can be managed with expanding the area under oil palm, the govt. of India has launched a National Mission on edible oil – oil palm (NMEOP), which aims to cover about 2.8 million hectares, with estimated cost of Rs. 11.40 crores. Under the mission oil palm cultivation and processing will be promoted. Use of quality planting material and effective management of pest and diseases has also been emphasized. However, from analysis of the past trend it is observed that during last 50 years a total area of 0.35 million hectare has only been brought under oil palm with more than 50% area in Andhra Pradesh. Therefore, question is that, whether covering such a huge area of oil palm within 7 years will be possible. The given target is not impossible, which can be achieved but there is need for the cautiousness about good quality material. This normally happens due to high demand, where there is a limited source of supply. To achieve the goal of mission, a dedicated team may be made, providing all the support and mandated with the responsibility to implement the programme in effective manner. Dr Singh also emphasized upon the research needs in respect of oil palm. He also talked about Information Technology based value chain management in oil palm and said that Digital production and management of oil palm may be adopted. He also talked about Blockchain Technology for traceability. While concluding thanked Dr. P. Rethinam and said that he has done a lot for plantation crops, especially oil palm. Dr. Singh also appreciated efforts and dedication of Dr. Rethinam to promote the oil palm and denoted him as Doyen of oil palm. He also thanked all the teams for facilitating his participation and interaction.

3.13 World Bio protection Summit held at Sharada University at Greater Noida, on 1st December, 2022

Sharada School of Agricultural Sciences, Sharada University in collaboration with The World Bio Protection Forum organized the World Bio Protection Summit- India, 2022 on 1st December, 2022.



The Summit was inaugurated by Dr. H.P. Singh, Chairman, CHAI. The conference provided an International Platform for collaboration, partnership and advancement of Industry and academia. The Summit was attended by industry, academia, researchers, inventors, regulators, policy mater, Government organization, NGO and IPM practitioners to discuss the needs to develop alternatives to chemicals for crop protection. Dr. H.P. Singh, Former DDG (Hort), ICAR, was the Guest of Honour. Dr. Minshad Ansari, was the Chairman of the Summit. Inaugural session was chaired by Mr. Bhubnesh Kumar, Dean, Research Sharada University. Professor H.S. Gaur and Prof. Dolly Watfal Dhow were the conveners. Dr. Uzma Manzoor was the organizing Secretary. Exhibition by more than 10 international industries was organized during the Summit. About 400 delegates and students attended the Summit. Deliberation was focused on bio pesticides for environmentally safer and sustainable management of pests and diseases. Registration process was discussed. Emphasis was on integrated pest management for reducing the use of chemical pesticides. Dr. Singh, in his speech traced back various stages of growth of bio pesticide and said that its use is growing with health-conscious population growth having more expendable income the focus will shift to natural products. Thus, there shall be more demand for bio pesticide. Accordingly, R&D has to focus on enhancing efficacy of biopesticides and emphasized on use of promoters. He also thanked the organisers for giving him the opportunity.

3.14 National Workshop on Banana Production and Export, Barwani, MP 16th December, 2022.

National Workshop on Banana Production and Export organized by Jain Irrigation Systems Limited to discuss the emerging issues in banana, at Barwani, M.P. was attended by Dr. Singh as a **Chief Guest**. The workshop had participation of about 200 farmers from across the states, who highlighted the issues and challenges during National Workshop on Banana. Dr. K.B. Patil gave a detailed presentation about banana production and utilization. The Chief Guest of function Dr. H.P. Singh, Former DDG, Chairman, CHAI delivered a concluding remark and said that Barwani has developed efficient use of water, as drip irrigation, was seen even in the plantations of Barpal Gram. He appreciated the banana field visited by him in the morning and said that it is one of the best field of banana, expected to yield to the level of 30-35 tons per acre. He also explained about facets of banana production, said that properly cultivated banana provides the highest profit, compared to any other crop. He also assured the helping the farmers to grow the best banana and requested the farmers to adopt modern practices for banana and papaya production and recommendation for the management of vectors.

3.15 Visit to Central Horticulture Experiment Station, Godhra, 18th December, 2022

Dr. H.P. Singh, Former DDG, Chairman, CHAI visited Horticulture Experiment Station, Godhra, along with the team of scientists from Jain Irrigation Systems Limited. Dr A K Singh, Principal Scientist and Head of the station briefed the visiting team about activities of the Centre.. The centre has maintained excellent collection of Bael, Jamun, pomegranate, tamarind, cluster bean, sword bean, and is producing planting material in large quality. The field of Station was also visited by Dr Singh. He suggested that these crops may be grown on commercial scale. He also visited orange cultivation block. He advised for commercialisation of varieties of bael and Jamun. He also suggested

for working on water conservation technique. He observed that sweet orange is coming up exceptionally well and need to be expanded for the benefits of the farmers.

3.16 Visit to Fresh Field of Banana, 19th December, 2022

Dr. Singh along with the team of officers from Jain Irrigation Systems Limited visited Fresh Field of banana at Dabhol, Vadhorra to see the export production of banana and discuss in detail. During the field visit, it was observed that banana plants are excellent and at the stage of flowering and fruiting. However, a decline was noted in production of second crop. The promoter was advised to grow one crop to avoid decline in subsequent cropping. He also discussed on various facets of management with owner of the company. The company maintains an excellent record of day-to-day operation and also the supply system. The promoter wished to expand the area, which is currently about 100 acre for supplying banana round the year. In the plantation no incidence of wilt disease was observed.

3.17 Visit to Banana Plantation, Kamrej Surat, 20th December, 2022

Dr H.P. Singh, Chairman, CHAI, visited Banana plantation in Kamrej, Surat. He visited various banana plantation in Kamrej and had meeting with Kamrej Banana Society on 20th Dec., 2022. The Society procures banana from farmers and links to farmers. During visit to the plantation of the banana, many declining plant with low yield was seen. Examination of wilting plants in the field could not be confirmed for tropical race 4. The Pr. Scientist of NRC Banana, Dr. Thangavelu, confirmed that the rotting is due to corm rot. However, Dr. Padmanaban expressed his opinion regarding the Fusarium wilt. Both the scientists were advised to visit and examine the plants to draw a logical conclusion. The matter was also discussed with the Director, NRCB, Trichy, to take appropriate action to address the issue. It was suggested to farmers to restrict the main crop plantation and ratoon should be avoided. There was no incidence of wilt in the plantation after Jawar compared to the banana planted after sugarcane. Thus, we can resolve the problem, through effective rotation systems with Jawar or paddy as a case may be. The farmers expressed their happiness on the visit of Dr. Singh and desired for frequent visits.

3.18 Visit to Hithkari Nursery, Bangalore, 27th January, 2023

Dr. Singh visited Hithkari Nursery, Bangalore, to see the development of Fruit Nursery and supporting activities. Hithkari Nursery has maintained an excellent collection of fruit crops. In mango they have collected almost all the popular varieties and largely multiplying Malika,



Alfanso and Jahangir. They have maintained an excellent collection of jackfruits. The performance of LalBagh selection is excellent. The cultivar Early Viesanan was also exhibiting good performance. They have planted Litchi and grafts of various varieties of Guava, Bael, Pomegranate and multiplying it as per the demand. They have also maintained collection of ornamental plants, which they supplying as per requirement. This nursery is good source of mango cultivar and also the fruit varieties. Plants maintained in the Nursery were appreciably good. The soil laboratory is also providing support to the farmers through guidance in nutrient management. They are not multiplying banana but have planned to go for large scale multiplication of bamboo cultivars.



3.19 Visit to Onion demonstration at JISL on 2th Feb., 2023

Dr. Singh accompanied by Dr Major Singh, Member, ASRB, Dr. Sudhakar Pandey, ADG, ICAR visited demonstrated plot of onion and garlic. Dr. Dhake explained about the various demonstrations and said that more 27 varieties from across the country alongwith varieties developed by Jain Irrigation Systems Limited, has been planted. The most of the varieties bulk in the States and there was distinction among the varieties for its growth in bulk development. Dr. H P Singh appreciated the effort made by Jain Irrigation Systems Limited and said that the result of developed varieties should be demonstrated to understand the regionally differentiated performance of onion. He said that if the trial is demonstrated in the form of documentation, it can be published in International Journal of Innovative Horticulture. He further visited the various equipment demonstrated, which is used in onion planting and harvesting. Dr. Singh also visited the demonstration of future horticulture including vertical garden being demonstrated.

3.20 National Symposium on technologies and trend scene on sustainable production and value chain management on onion, garlic and other allium species, 11-14th Feb., 2023

Dr. H. P. Singh, Chairman, CHAI participated in the above National Conference organized by Indian Society of Allium, Directorate of Onion Garlic Research, Rajguru Nagar, Pune and Jain Irrigation Systems Limited at Jain Hills as a guest of honour in inaugural session on 11th Feb., 2023. Dr. S. M. Puri, the Ex-VC was the Chief Guest and Mr. Anil Jain, JISL was the Guest of Honour. Dr Kisan E Lawande, vice-chancellor of Dr Balasaheb Sawant





Konkan Krishi Vidyapeeth, Dapoli, Dr Major Singh, Member, ASRB, Dr Vijay Mahajan, Directorate, DOGR and Dr Dhake were on the dias and the conference was attended by more than 300 delegates including farmers, industries and farmers. Mr. Dhake welcomed the guest and talked about the work done by Jain Irrigation in the development of varieties. Thereafter a talk was delivered by Dr Lawande, Dr Major Singh and Dr Mahajan. All of them have highlighted the production scenario and issues, which has emerged in onion and garlic. Dr Singh stressed on the onion and garlic research in India and said that the NRC on onion garlic was upgraded to directorate of onion garlic research with a network programme to develop locations specific cultivars and technologies. DOGR has done excellent research in development of new cultivars, which are in great demand but there is need to explore high figure in onion. He also talked about the various technologies and said the storage technologies developed by DOGR has to be commercialized to give the benefit to both consumer and farmer. He also said about the excellent work done by Jain Irrigation Systems Limited in developing high STSS cultivars. Awards were given to institute and the progressive farmers. Mr. Anil Jain talked about the processing of onion and need for developing cultivars and technologies. He also thanked organizer choose the JISL and organizing conference such an important event. The inauguration session concluded with votes of thank, thereafter deliberation and issues on various sessions. A recommendations were discussed and issues were raised in plenary sessions.

3.21 Kisan Mela organized by Dr. Rajendra Prasad Central Agricultural University on 24th Feb., 2023

Kisan Mela organized by Dr. Rajendra Prasad Central Agricultural University of Pusa was participated by Dr Singh, Chairman, CHAI, as a Guest of the function on 24th Feb, 2023. The various issues were discussed during the inauguration function and the farmers were addressed by Directorate of Research Dr A K Singh, Dean of Engineering college, Dean of Community Science and others. Dr. Singh, while appreciating the efforts of the DRPCAUI said that this University contribution is unparalleled, as it was stated that the 2nd Green Revolution in Agriculture brought by this University through revolution in Maize, Bajra continues to be highest production in crop. In Rabi, he also spoke about Summer Rice Cultivation technologies developed by this University, which has changed the life of many farmers in the states by providing better income. He stressed on development of horticulture. Regarding the natural farming, he said about his experience and said that the approach to be scientific validated other any decision in hurry, mainly lead to the question on food security. Natural farming can be done more successfully for drought tolerant and less nutrient cultivars. However, it may affect the production of land. He called on the scientist for scientific validation through integrated systems. While speaking on millet, he said that millet can be only commercialized in irrigated areas, if varieties and technologies are developed, which is economically competitive with existing crops. Millets are more common in dry area like Telangana, Rajasthan, Gujarat & Andhra Pradesh etc. especially in dry areas. There has been a lot of development of various varieties also especially Jwar, Bajra. However, Research may continue and development of varieties and production technologies of this millets. Since millets are very rich in micro nutrient, which is essential for good health. He also stressed upon development of products and said that in Dr Balasaheb

Sawant Konkan Krishi Vidyapeeth University has excellent done, which also can be seen after inauguration function and addressed. Dr Singh visited different stalls where technologies were demonstrated and was being explained by the scientist of the departments.

3.22 Visit to the Nursery at JISL, Jalgaon and interaction with the farmers, 14th March, 2023



Dr. H.P. Singh visited high tech nursery at Jain Irrigation Systems Limited, where they are producing above 10.0 crores of banana tissue culture plants, 2-5 lakh diseases free mango plants, 3-5 lakh oranges and other plants. The nursery is also producing other fruits and has large scale production of high yielding papaya. Currently, they are working on development of high yielding cultivars of papaya and have several breeding lines. During the visit Dr. Singh also interacted with the farmers who had come from different parts of Maharashtra to see the



facilities and improve their skills in horticulture. The farmers expressed their high level of satisfaction on their visit and said the technologies demonstrated at Jain Irrigation, Jalgaon will be adopted by



them for improving their productivity. Dr Singh also explained about the growth of horticulture and how income of farmers can be increased by adoption of improved horticulture techniques. He, further, explained about the drip irrigation, automation and fertigation and use of quality planting material of mango, banana, citrus etc. Dr Singh also visited the potato growing areas under the net-house conditions, where the potato has been successfully grown. The potato grown in net-house is G-1 for further multiplication, which is transported to UP for growing into G-2 & G-3. The success in production of high quality potato on large scale in the region is

highly appreciable and can be commercialised under net-house conditions. He interacted with the scientists and workers and gave them advice on the various aspects of horticulture especially production of quality plants.

3.23 Visit to Nirmal Seeds, 14th March, 2023

Dr Singh along with Mr K B Patil and Mr. Sudhir Bongle visited Nirmal Seeds Pvt., Ltd., Pachora to see the facilities. He visited the laboratory where a large scale mycorrhiza is produced. He was highly impressed with the facilities developed for the mycorrhiza, which is perhaps largest in the country. Mycorrhiza is produced on roots of carrot, which is multiplied by the tissue culture and finally made into the power. Dr Singh suggested to try for growing on Jawar root, where even under natural condition,



mycorrhiza get associated. He also suggested to get the culture of mycorrhiza from litchi, pines and citrus for testing on different crops. He also suggested for testing on various crops, wherein not only the uptake of phosphorous but nutrient and water balance should be checked so that benefit can be explained for its effective adoption. He also visited the facilities for the production of Trichoderma, Pseudomonas and nematodes. Nirmal

Seeds has become one of the best for bio-fertiliser and mycorrhiza production in the country besides its seed business.



3.24 Participated in meetings on 22nd March, 2023

Dr. H.P. Singh participated in a meeting to celebrate water day organised by Dhanuka Agritech Ltd at New Delhi on 22nd March, 2023. The meeting discussed the need for conservation and economic use of water. The meeting also launched a book on Former Prime Minister, honourable Lal Bahadur Shastriji and highlighted his contributions. The meeting was inaugurated by Union Minister of Agric. & FW. It was said that water is a prime natural resource, a basic human need and a core specious asset for sustainable development and human survival. The conservation and efficient use is called for saving water for the mankind.

3.25 National dialogues – unlocking the potential of Indian Agriculture: Key to release the thriving Economy organised by the Foundation for the Growth of New India on 24th March, 2023. The meeting was inaugurated by Dr. Himanshu Pathak, Secretary DARE and DG, ICAR. The the experts joined the panel discussion.

Dr. R.B. Singh highlighted the need for the Foundation to discuss and put forward the idea. Mr. R.G. Agarwal gave his idea to provide quality agro-chemicals. In technical session the experts made presentation and highlighted on providing



quality inputs and technologies to farmers for their enhanced income.

Dr. Singh chaired a technical session and spoke on need for diversification. He stressed on promotion of horticulture declaring it as priority sector to achieve enhanced income and effective land use. He talked about the impact of mission programme on horticulture implemented by him, which has been successful in in bringing golden revolution in the country. However, with growing population on urbanisation, the horticulture produce will be needed to the tune of 680 million tonnes from the current level of 342 million tonnes. He also emphasised on technological changes and adoption of censor based technology for enhanced efficiency of inputs. Digital horticulture including use of block chain technology was focused by him in his talk.

3.26 Lead Lecture in winter school at IARI, 28th March, 2023



Dr. H P Singh, Former DDG (Horti) and Chairman, CHAI, delivered a lead lecture in Winter School, Centre for Protected Cultivation, IARI, New Delhi. The title of the lecture was Horticulture for enhancing farmers' income and improved livelihood. In his lecture, he traced back the development of horticulture and said that from the production level of 25 million tonnes in 1950, the current production has released to 342 million tonnes, which is largely contributed by the mission mode approach of the development. Till 7th plan, the allocation for the development of horticulture was 74.5 crores, which was increased to 1000 crores in VIII plan and more than 2000 crores in IX plan and, subsequently to about 7000 crores. Investment in the horticulture has been highly productive in terms of production, productivity, employment generation and above all improving the income of the farmers. Horticulture has been considered to be the best option in the doubling farmers' income. He also stressed about technological changes, which has impacted the horticulture. Use of tissue culture plants, hybrid seeds of vegetable, fertigation systems, efficient management of pests & diseases and improved post-harvest have impacted the development and now the horticulture is moving towards digitalisation by use of sensors, artificial intelligence, IoT and block chain technology, besides E-marketing. These changes are expected to further add value in efficient value chain management. Although there has been institutional support for research, but with changing demand to address the challenges more support to technological development would be essential.

4.0 The 11th Annual General Council Meeting (AGCM) of CHAI

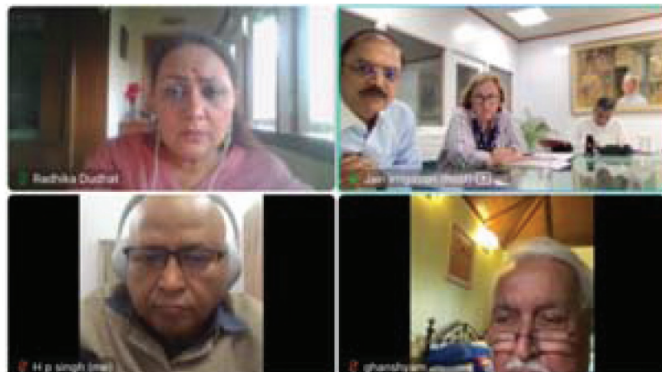
To review the technical and financial progress the Board of Directors meets as per the needs, at least, 4 times in a year. Annual General Council Meetings is held once in a year on 28th May, Eleventh Annual General Council Meeting (AGCM) of CHAI was held at 19.00 hrs. on 28th May, 2022 at CSAUA&T, Kanpur, Uttar Pradesh, to review the progress and develop future strategic plan of activities to full-fill the objectives stipulated for the furtherance of horticulture / Agriculture. Dr. A. K. Srivastava, CHAI Honoured Fellow, Chairman, ASRB, New Delhi was the Chief Guest in the



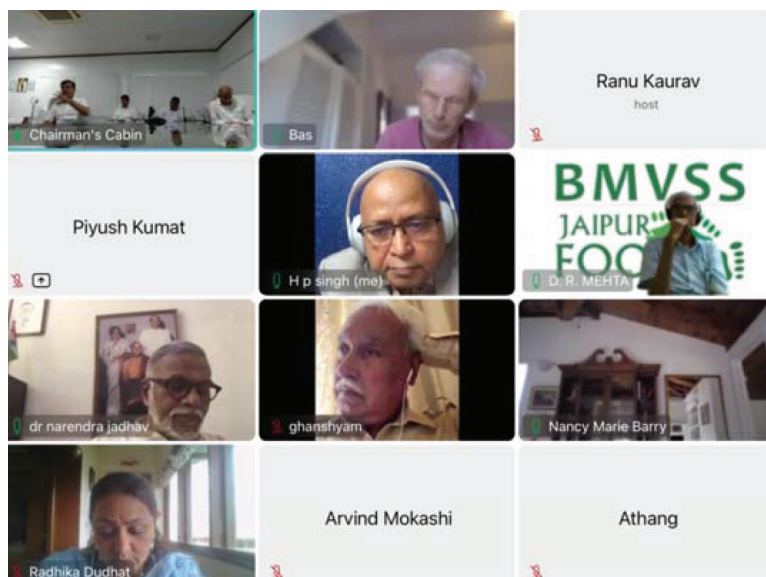
AGCM. The meeting started with the welcome of Chief Guest and distinguished Fellow by Dr. Vishal Nath, OSD, IARI, Hazaribagh, Jharkhand. General Secretary, CHAI Dr. H. Choudhary, PS, IARI, New Delhi. In the meeting Dr. H.P. Singh presented the activities of CHAI. Dr. H.P. Singh, spoke in details the activities of the CHAI during the year and also gave details of financial position, informing that the CHAI has FD of Rs 90 lakh. He also gave a brief account of proposed activities in the year 2022. Introductory remarks of the Chairman was followed by items on the agenda and suggestions from Fellows of CHAI. The progress made and financial position of the CHAI was well appreciated. Commendable activities done by the CHAI under the chairmanship Dr. Singh was placed on record with high appreciations. Many of the fellows, who had been elevated to the higher positions in their career were felicitated by offering shawl and a certificate of appreciation. Thereafter, various awards and Fellowships were conferred for the year 2022, to all the selected nominations. Dr. A. K. Srivastava, Chairman, ASRB, New Delhi and Chief Guest in his remarks congratulated all the Awardee and said that CHAI is doing excellent work under the chairmanship of Dr. H.P. Singh, who is committed and dedicated for the furtherance of horticulture and has created this organisation which has grown to stature of an international organisation. He said that activities and financial outlook of the CHAI is excellent. Thus the Fellows have imposed the faith in him and have endorsed the Chairman that, he may take the activities and take decision in the matter as he deems it fit. He also talked about plant health management in horticulture. In concluding remarks Dr. Singh thanked the Chief Guest for his benign presence and appreciating the activities of CHAI. He also thanked all the Fellows for their support and initiatives, He thanked Dr. H. Chowdhary and Dr. Vishal Nath. Briefly he brought the attention to the growth of horticulture and challenges and stressed on innovative technology to meet the challenges. Dr. Vishal Nath presented vote of thanks and declared the closure of AGCM.

5.0 Meetings of Board of Directors and Other Meetings

5.1 Meeting of Board of Directors of JISL



Dr. H.P. Singh attended Board Meeting of JISL on 29th May, 2022 through Video conferencing. Subsequently, he attended the Board meeting on 13th August and 30th August. He provided his inputs for developing recommendations. He also attended AGM physical and board meeting. He also attended board meeting physically on 11th February, 2023.



5.2 Review Meeting at JISL, Jalgaon, 11th December, 2023

Meeting of scientists and officers of Jain Irrigation Systems Limited was organised to discuss and review the progress in the production of planting materials and develop the strategies for the production, to meet the needs. Dr. B.K. Yadav explained about activities and production of nursery plants of citrus and mango, which was complimented by Dr. Dhake. Dr K.B. Patil explained about production of tissue culture plants of banana, pomegranate and other horticultural crops. Dr. B. Padmanaban explained about the strategies in production of bio-agents. Various issues are identified and target under each crop namely banana, citrus, pomegranate, coffee, coconut, black pepper was fixed. Dr. Nirmal Banu took the responsibility for ensuring the quality production of turmeric,

ginger seeds and also suggested for taking up tissue culture production of various horticultural crops including black pepper. Based on the discussion target for the production of quality planting material by 2027 was fixed and it was suggested that budget requirement and action plan in detail may be prepared and shared with management. On 12th December, 2022, in afternoon, visited Jain Irrigation Systems Limited Farm.

5.3 Meeting of Selection Committee organised, 8th May, 2022



Dr. H.P. Singh attended meeting at CPRI, Shimla and chaired the proceedings of the Promotion Committee constituted by ASRB for the promotion of scientist and scientist selection grade, at Shimla on 8th May, 2022. The screening was done along with other members and results were finalised and recommended. The scientists who became eligible for promotion based on scoring were recommended for promotion to next grade.

6.0. Conferment of Awards and Fellowships of CHAI- 2022

6.1 Conferment of Award to Dr. Vijay Kumar, IAS, Retd., 29th May, 2022

Dr. H.P. Singh conferred Honorary Fellow of CHAI Award to Dr. Vijay Kumar for his outstanding contribution to agriculture in general and horticulture in particular. The award contained a plaque of honour, certificate and citation.

Honoured Fellow, Honorary Fellow Award, Life Time Achievement Award and Life Time recognition Award were conferred during inaugural session by the Chief Guest. The Award of Confederation of Horticulture Associations of India (CHAI) was announced by Dr. Bir Pal Singh, Former Director, CPRI, Shimla, who also gave a brief outline of CHAI and said that the CHAI is committed to the furtherance of horticulture and agriculture through activities integrating scientists,





Institutions and farmers. It recognizes the contribution of individuals and organisations by conferring awards. He read citation of awardees and requested the Chief Guest to confer the awards to selected nomination. The Award was conferred by the Chief Guest, Chairman, CHAI and all the guests on dais.

CHAI-Honoured Fellow- 2022, recognises the contributions and leadership of par excellence, was conferred on **Dr. A.K. Srivastava**, Chairman, ASRB, DARE, MoA&FW, New Delhi by Dr. H.P. Singh, Chairman, CHAI. The award carried a citation, plaque of honour and certificates. This is the most prestigious award of CHAI. The **CHAI- Life Time Achievement Award-2022**, which recognises the outstanding contributions to horticulture was conferred on Dr. T. Janakiram, VC, Dr.YSRHU, Venkataramannagudem, A.P. CHAI-Life Time Recognition Award-2022 was conferred on and Dr. Anoop K. Srivastava, CCRI, Nagpur. CHAI-Honorary Fellow-2022, which recognises exceptionally outstanding contributions to horticulture. were conferred on Dr. B. Neeraja Prabhakar, VC, SKLTSHU, Mulugu, SiddipetDist; Dr. R.K. Singh, Former Director/VC, IVRI, Bareilly, U.P.; Dr. Narendra Kumar Gontia, VC, JAU, Junagadh, Gujarat and Prof. (Dr.) K.P. Singh, VC, MJPRU, Bareilly, U.P. for their contributions and providing leadership of par excellence. In the AGCM the following award were conferred to selected candidature as under:

- i. **CHAI- Donor Patron**
Jain Irrigation Systems Pvt, Jalgaon
- ii. **CHAI-Dr. R.S. Paroda Award**
Dr. Dilip Ghosh, Director, CCRI, Nagpur, Maharashtra
- iii. **CHAI-Dr. B.H. Jain Award**
Dr. Chandeshwar Tiwari, Director Extension, VCSGUUHF, Bharsar, Pauri, UA
Dr. Babita Singh, Project Manager, GEF, Rainforest Alliance, New Delhi
- iv. **CHAI-RamnandanBabu Award**
Dr. Kariyanna, Hitkari Horticulture Foundation, Bangalore
- v. **CHAI- Kautilya Lokniti Award-22**
Professor (Dr.) Rajiv Sharma (Absentia)
- vi. **CHAI Achievers' Award-2022**
Prof. Tusar Kanti Behera, Director, IIVR, Jakhini, Shahanshapur, Varanasi, U.P.
Dr. Prabhat Kumar, Horticulture Commissioner, Gol, MoA&FW, New Delhi (Absentia)
- vii. **CHAI-Appreciation Award**
Dr. Vijay Mahajan, DOGR, Rajgurunagar, Pune, Maharashtra
- viii. **CHAI-JISL Fellowship Award**
Dr. L. Pugalendhi, Dean, HC&RI, TNAU, Coimbatore



ix. CHAI Dr. Ray Best Dissertation Award-2022

Dr. Manish Kumar, IARI, PG Outreach Programme at IIHR, Bengaluru

For his dissertation entitled “**Incorporation of phytophthora root rot resistance genes into cytoplasmic and genic male sterile (cgms) line through marker assisted selection in chilli (*Capsicum annuum L.*)**”

x. CHAI- Dr. Kriti Singh Best Paper Award-2022

Narendra Chaudhary, S. S. Sindhu, Ramesh Kumar, T. N. Saha, D. V. S. Raju and Ajay

Arora, National Research Centre on Seed Spices, Tabiji, Ajmer. For scientific paper

Entitled “**Effect of 5-sulfosalicylic acid on antioxidant activity during senescence in Oriental lily**”, IJH, 10(2)

xi. CHAI-Institutional Fellow Award-2022

Sri Konda Laxman, Telangana State Horticultural University, VC, SKLTSHU, Siddipet, Telangana

Mahatma Jyotiba Phule Rohilkhand University, Vice Chancellor, Bareilly, U.P.

xii. Conferment of Fellow of CHAI-2022

Dr. R. G. Somkuwar, NRC for Grapes, Pune, Maharashtra

Dr. K. Suresh, PS, IIOPR, West Godavari, A.P.

Dr. A. Subbiah, Asst. Professor, GRS, Anaimalayanpatty, Theni District

Dr. Harikanth Porika, Scientist, FRS, Sangareddy, Israel's MASHAV Alumni

Dr. Ravi Kumar Mathur, IIOPR, West Godavari District, A.P.

Prof. Tusar Kanti Behera, Director, IIVR, Jakhini, Shahanshapur, Varanasi, U.P.

Dr. H. Usha Nandhini Devi, Assistant Professor, DVSHC&RI, Coimbatore

Dr. V. Suchitra, HRS, Adilabad, Telangana

xiii. CHAI-Associate Fellow

Dr. Popy Bora, Scientist, AAU, Jorhat, Assam

All the process for selection of nomination for conferment of various award has been gone through and published in the book CHAI- Award and Fellowship? We wish to congratulate all the Awardee of the year 2022.

7.0 Publications of CHAI

7.1 International Journal of Innovative Horticulture

Considering the needs for dissemination of science based knowledge among scientists for the furtherance of horticulture science and on the request of fellows from across the country and



abroad, it was felt essential to bring out a journal. Accordingly, an International Journal of Innovative Horticulture (IJIH) was announced, which has received overwhelming response. Peer reviewers are of national and international repute. The first issue of the journal was launched by His Excellency, Governor of Karnataka at Bangalore. The journal has an international look and considers original papers on multi-disciplinary aspects. The journal is published bi-annually, which will be converted into quarterly publication in the years to come. The types of papers include research, reviews, case studies, new cultivars and new technologies, commentaries and opinions, Policy issues, abstract of Ph.D. thesis, book review, features, colloquia and workshops. 10 volumes of the journal up to 2021 have been published and circulated. Publication of volume 11 is being processed. We hope to release the Journal volume 11, which is a special issue devoted to 75 years of Indian horticulture to commemorate 75 years of independence.

7.2 Year book of CHAI-2022

The year book of CHAI, which contains, a brief bio-data, mailing address of the fellows and awardees, information about the CHAI, guidelines for publication of an article in IJIH and nomination for awards of CHAI was published and circulated. The year book is also uploaded on the site of CHAI [www: confedhorti.org](http://www.confedhorti.org). The Year Book for 2022 is in the process of printing.

7.3 CHAI-Awards and Fellowships

This book contains citation of all the Awardees in different categories. Details of recipient of various awards in different categories, institutional fellow and fellow of CHAI are provided. Details of different awardees in previous years are also provided for reference. The book contains the details about the CHAI.

7.4 Annual Report of CHAI

The annual report for the year 2023 has been prepared. The report containing a word from the chair person, executive summary, about the CHAI, conference supported and organised, participation in conferences, directors meeting and other meetings, conferment of awards and fellowships, was also printed.

7.5 Proceeding of the Conferences and Workshops

Chairman, CHAI, finalised and helped in the publication of the proceedings of Global Conference held at CSAU&T, Kanpur, 28-31May. The proceedings have been printed and distributed.

8.0. Guidance and Advice for the Development of Horticulture

8.1 Dr. Singh, Chairman, CHAI, participated, as a chairperson in a workshop, conducted and explained about mission mode approach in horticulture, which has impacted horticulture development and suggested for the adoption of improved technologies. He also visited the field of research stations, which has achieved the excellence. Farmers' field was also visited.

**9. Balance Sheet of CHAI for Three Years**

CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA
249, SECTOR-18A, KARGIL COLONY, DWARKA, DELHI-110075
CIN No.U01403DL2010NPL211341
BALANCE SHEET AS ON 31-03-2022

Particulars	Note No.	Figures as at the end of current reporting period	Figures as at the end of previous reporting period Amount
1	2	3	4
I. EQUITY AND LIABILITIES			
(1) Shareholders' funds			
(a) Share capital	1	500,000.00	500,000.00
(b) Reserves and surplus	2	80,04,779.56	76.89,530.10
(c) Money received against share warrants		-	-
(2) Share application money pending allotment		-	-
(3) Non-current liabilities			
(a) Long-term borrowings		-	-
(b) Deferred tax liabilities (Net)		-	-
(c) Other Long term liabilities		-	-
(d) Long-term provisions		-	-
(4) Current liabilities			
(a) Short-term borrowings	3	-	-
(b) Trade payables	4	7,77,987.00	7,68,903.00
(c) Other current liabilities	5	9,62,869.57	9,54,417.57
(d) Short-term provisions		-	-
TOTAL		1,02,45,636.00	99,12,851.00
II. ASSETS			
(1) Non-current assets			
(a) Fixed assets			
(i) Property Plant & Equipment	6	1,71,869.03	2,35,652.01
(ii) Intangible assets		-	-
(iii) Capital work-in-progress		-	-
(iv) Intangible assets under development		-	-
(b) Non-current investments	7	90,00,000.00	87,00,565.00
(c) Deferred tax assets (net)	8	53,985.61	47,109.66
(d) Long-term loans and advances		-	-
(e) Other non-current assets		-	-
(2) Current assets			
(a) Current investments		-	-
(b) Inventories		-	-
(c) Trade receivables	9	4,40,600.00	4,89,600.00
(d) Cash and cash equivalents	10	52,1459.88	3,39,156.40
(e) Short-term loans and advances	11	57,721.00	1,00,768.00
(f) Other current assets		-	-
TOTAL		1,02,45,636.00	99,12,851.00

See accompanying notes to the Financial Statements. 12 - -

Notes

In terms of our report attached.

FOR Krishna Kumar & Associates

Chartered Accountants

FRN No.005586C

DHIRENDRA KUMAR

M.No.504516

Partner

HARISH CHAND PRASAD SINGH

DIRECTOR

(DIN NO.-06387125)

For and on behalf of the Board of Directors

AMITA CHANDRA

DIRECTOR

(DIN NO.-02525157)

Place:- NEW DELHI

Date: 01.09.2022

Place:- NEW DELHI

Date: 01.09.2022



CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA
249, SECTOR-18A, KARGIL COLONY, DWARKA, DELHI-110075
CIN No.U01403DL2010NPL211341
BALANCE SHEET AS ON 31-03-2021

Particulars	Note No.	Figures as at the end of current reporting period	Figures as at the end of previous reporting period Amount
1	2	3	4
1. EQUITY AND LIABILITIES			
(1) Shareholders' funds			
(a) Share capital	1	500,000.00	500,000.00
(b) Reserves and surplus	2	76,89,530.09	75,07,783.33
(c) Money received against share warrants			-
(2) Share application money pending allotment		-	-
(3) Non-current liabilities			
(a) Long-term borrowings		-	-
(b) Deferred tax liabilities (Net)		-	-
(c) Other Long term liabilities		-	-
(d) Long-term provisions		-	-
(4) Current liabilities			
(a) Short-term borrowings	3	-	-
(b) Trade payables	4	7,68,903.00	4,41,125.00
(c) Other current liabilities	5	9,54,417.57	7,53,674.00
(d) Short-term provisions		-	-
TOTAL		99,12,851.00	92,02,582.00
II. ASSETS			
(1) Non-current assets			
(a) Fixed assets			
(i) Tangible assets	6	2,35,652.00	3,29,107.89
(ii) Intangible assets		-	-
(iii) Capital work-in-progress		-	-
(iv) Intangible assets under development		-	-
(b) Non-current investments	7	87,00,565.00	77,00,565.00
(c) Deferred tax assets (net)	8	47,109.66	36,273.15
(d) Long-term loans and advances		-	-
(e) Other non-current assets		-	-
(2) Current assets			
(a) Current investments		-	-
(b) Inventories		-	-
(c) Trade receivables	9	4,89,600.00	4,89,600.00
(d) Cash and cash equivalents	10	3,39,156.40	5,66,649.69
(e) Short-term loans and advances	11	1,00,768.00	80,386.00
(f) Other current assets		-	-
TOTAL		99,12,851.00	92,02,582.00
See accompanying notes to the Financial Statements.	12	-	-

Notes

In terms of our report attached.

For and on behalf of the Board of Directors

FOR Krishna Kumar & Associates

Chartered Accountants

FRN No.005586C

DHIRENDRA KUMAR

M.No.504516

Partner

HARISH CHAND PRASAD SINGH**DIRECTOR****(DIN NO.-06387125)****AMITA CHANDRA****DIRECTOR****(DIN NO.-02525157)**

Place:- NEW DELHI

Date: 23.08.2021

Place:- NEW DELHI

Date: 23.06.2021



CHAI ANNUAL REPORT 2022-23

CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA
249, SECTOR-18A, KARGIL COLONY, DWARKA, DELHI-110075
CIN No.U01403DL2010NPL211341
BALANCE SHEET AS ON 31-03-2020

Particulars	Note No.	Figures as at the end of current reporting period	Figures as at the end of previous reporting period Amount
1	2	3	4
1. EQUITY AND LIABILITIES			
(1) Shareholders' funds			
(a) Share capital	1	5,00,000.00	500,000.00
(b) Reserves and surplus	2	75,07,783.33	7,313,598.47
(c) Money received against share warrants		-	-
(2) Share application money pending allotment		-	-
(3) Non-current liabilities			
(a) Long-term borrowings		-	-
(b) Deferred tax liabilities (Net)		-	-
(c) Other Long term liabilities		-	-
(d) Long-term provisions		-	-
(4) Current liabilities			
(a) Short-term borrowings	3	-	5,474.00
(b) Trade payables	4	4,41,125.00	72,039.00
(c) Other current liabilities	5	7,53,674.00	4,52,500.00
(d) Short-term provisions		-	-
TOTAL		92,02,582.00	83,43,611.00
II. ASSETS			
(1) Non-current assets			
(a) Fixed assets			
(i) Tangible assets	6	3,29,107.88	4,10,296.13
(ii) Intangible assets		-	-
(iii) Capital work-in-progress		-	-
(iv) Intangible assets under development		-	-
(b) Non-current investments	7	77,00,565.00	67,00,000.00
(c) Deferred tax assets (net)	8	36,273.15	18,642.75
(d) Long-term loans and advances		-	-
(e) Other non-current assets		-	-
(2) Current assets			
(a) Current investments		-	-
(b) Inventories		-	-
(c) Trade receivables	9	4,89,600.00	4,89,600.00
(d) Cash and cash equivalents	10	5,66,649.69	3,90,189.00
(e) Short-term loans and advances	11	80,386.00	3,34,883.00
(f) Other current assets		-	-
TOTAL		9,202,582.00	8,343,611.00
See accompanying notes to the Financial Statements.	12	-	-

Notes

In terms of our report attached.

For and on behalf of the Board of Directors

FOR Krishna Kumar & Associates

Chartered Accountants

FRN No.005586C

DHIRENDRA KUMAR

M.No.504516

Partner

Place:- NEW DELHI

Date: 10.12.2020

HARISH CHAND PRASAD SINGH

DIRECTOR

(DIN NO.-06387125)

Place:- NEW DELHI

Date: 10.12.2020

AMITA CHANDRA

DIRECTOR

(DIN NO.-02525157)

Confederation of Horticulture Associations of India, New Delhi (CHAI)
(An ISO 9001:8002 certified organisation)

FELLOWSHIP FORM

To

The Chairman
Confederation of Horticulture Associations of India (CHAI)
249, Kargil Colony, Dwarka, Delhi - 110078

Sir,

May I request you to kindly enrol me as a Donor Corporate Fellow Association/Institutional/ corporate/Individual Fellow of CHAI. I agree to abide by all rules and regulations of the Association. I am enclosing herewith a Cheque* / Demand Draft/e-transfer (drawn in favour of Confederation of Horticulture Associations of India, New Delhi) for Rs. _____ as my Subscription Fee. My particulars are given below:

1. Name (Block letters): _____
2. Address: _____
(for society/institute)
Postal Address: _____
3. Tele No. And Email : _____
4. Brief bio data (if not enough space please attach: _____

Signature with date

Nominated by. _____/

Signature

For any further correspondence you may contact to the Founder and Chairman, Confederation of Horticulture Associations of India, 249, Kargil Colony, Dwarka, Delhi – 110078, Phone: (Mobile 09871450730 or 9582898983, Email: confedhorti@gmail.com

Membership Fee: Donor Corporate Fellow- Rs. 5,00,000, Institutional Fellow- Rs. 2,50,000, Association Fellow- Rs. 2,50,000, Individual Fellow - Rs. 40,000.

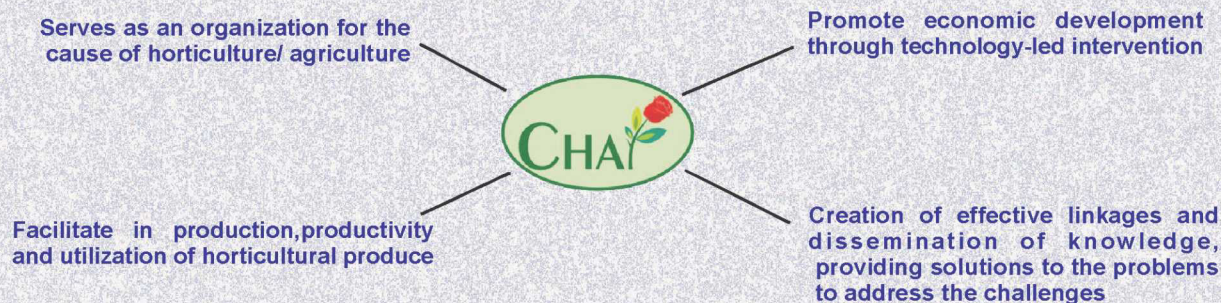
For electronic transfer by RTGS/NEFT/IMPS, **Account name:** Confederation of Horticulture Associations of India, **Account No.:** 169001000009616, **IFSC Code:** IOBA0001690, **Bank & branch:** Indian Overseas Bank, Sector 10, Dwarka, New Delhi, **MICR:** 110020054.



CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA (CHAI)

Let us join with CHAI for the furtherance of Horticulture

Mission: Bringing synergy among different institutions, associations, corporate sector, non profiting organisations, scientists, experts and entrepreneurs to encourage effective participation of all stakeholders for accelerating the economic growth through technological interventions and human resource development.



How to Become Member of CHAI

Membership of the Confederation is open to all who are committed for furtherance of horticulture and membership is available on application to the Confederation and payment of the membership fees. Payment can be made by cash/demand draft/multicity cheque in favor of **Confederation of Horticulture Associations of India** payable at par in New Delhi. The certificate of membership will be in the form of Fellow of CHAI, if approved by the Founder Chairman.

Classes of Membership and Rates

Patron Corporate Member: Rs. 5,00,000
Corporate/ Institutional Membership: Rs. 1,50,000
Association Membership: Rs. 1,50,000
Individual Member: Rs. 30,000
Foreign Member: US\$ 5000

Member shall be privileged to receive **International Journal of Innovative Horticulture** for 15 years free of cost. They shall be eligible to apply for awards of CHAI and also apply for financial assistance for attending international conferences.

Contact:

Founder Chairman
Confederation of Horticulture Associations of India
249, Vijay Veer Awas, Kargil Colony, Sector18-A, Dwarka
New Delhi - 110078, India
Tel : 28085749, Mob: 9871450730
Email: confedhorti@gmail.com
Website: www.chai.org.in



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