



Annual Report 2017-18

FOR OFFICIAL USE

Publishing Partner





CHAI

Annual Report

2017-18



CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA

(An ISO 9001:2008 Certified Organisation)

249, Vijayee Veer Awas, Kargil Apartments, Sector 18A

Dwarka, New Delhi – 110078

Email: confedhorti@gmail.com

Web: www.confedhorti.org

Published by

Confederation of Horticulture Associations of India
249, Vijayee Veer Awas, Kargil Apartments, Sector-18A, Dwarka, New Delhi – 110078
Tel: 011-28085749, Mob: 9871450730
Email: confedhorti@gmail.com
Web: www.confedhorti.org

Compiled and Edited by

Babita Singh
Binod Anand
Rajeev Kumar Singh

Citation

Annual Report 2017-18
Confederation of Horticulture Associations of India
New Delhi

Disclaimer: All rights are reserved. No part of this Annual Report shall be reproduced or transmitted in any form, print, microfilm or any other means without written permission of the Confederation of Horticulture Associations of India, New Delhi. Briefs mentioned about the associations, corporates, non profiting organizations and individual members are based on the information given by them. The compilers of the Confederations are nowhere responsible for the mentioned facts.

© CHAI

All rights reserved, No part Annual Report may be reproduce, stored in a retrieval system or transmitted, by any means, electronic, mechanical, photocopying, recording, or otherwise, without written permission from the CHAI.

Publication Partner

Westville Publishing House
47, B-5, Paschim Vihar, New Delhi - 110063
Tel: 011- 25284742, 0-9868124228 Email: westville_2002@yahoo.co.in
www.westvillepublishing.com

From the Desk of the Founder and Chairman



The **Confederation of Horticulture Associations of India (CHAI)**, was established in the year 2010, with commitment for the furtherance of horticulture/ agriculture research, education and development. The CHAI has brought organisations and individuals on a forum to work together for achieving its goal of technology-led development. The CHAI is addressing a concern of food and nutritional security, through knowledge sharing, dissemination of knowledge and appreciating the work of individual through award and rewards. Since, its inception, the Confederation has partnered and supported the organisation of national and international conferences and has also organised many workshops and conferences on topical issues. The International Journal of Innovative Horticulture, was launched in 2012, and is continued. Till date, 6 Volume (1&2 issues) have been published. Besides, publication of Journal, the CHAI publishes, CHAI-Yearbook, CHAI-Awards and Fellowships, Gyan Manthan, policy papers and Proceedings.

The confederation has instituted various awards to recognise the services of individuals, which includes, **CHAI-Honored Fellow**, for exceptionally outstanding contributions, which made difference and brought revolution, **CHAI-Lifetime Achievement Award**, conferred for the leader of par excellence in research and development, the **CHAI-Honorary Fellow**, recognises excellence in horticulture/agriculture research and development, **CHAI-R.S. Paroda Award**, is given for excellence in horticulture science, **CHAI-B.H. Jain Award**, for excellence in teaching or dissemination of technologies. **CHAI- Ramnandan Babu Award** is for excellence in farming, **CHAI-JSIL Fellowships** is given for visit abroad to attend conference and training. **CHAI-Life Time Recognition Award** recognises outstanding contributions and providing leadership in specific crop commodity. **CHAI-Appreciation Award**, is given for distinguished contributions and excellence in the field of specialisation. The **CHAI-Dr. Ray Best Dissertation Award** is given for excellence in postgraduate research. The **CHAI-Best Paper Award** is conferred for publication of paper in IJIH. CHAI Fellowship is provided in different category to individuals and institutions. During the year, CHAI-Honoured Fellow Award was conferred on Dr RB Singh, Chancellor, CAU, Imphal and Dr Trilochan Mohapatra, Secretary DARE and DG, ICAR. Recipient of Honourary Fellows of CHAI were Dr N S Rathore, DDG, ICAR, Dr K.V. Peter, Former VC, KAU, Kerala, Dr N. N Singh, Former VC, BAU, Ranchi, Dr J .S Parihar, Former Dy Director, ISRO and Dr. V. V Sadamate, Former Advisor, NITI Ayog. The CHAI - life Time Achievements Award was conferred on Dr. K.V Peter, CHAI-R.S Paroda award on Dr. Anil B Patil, VP, JISL CHAI- B .H Jain Award on Dr Ashok Mishra, JISL and CHAI- Ramnandan Babu Award on Mr Bhagwat V Patil. Dr. R.C. Srivatava, VC, DRPCAUI, Pusa, Bihar, received JISL Fellowship and CHAI life Time Recognition Award was conferred on Dr. N.N. Singh, Former VC, BAU, Ranchi and Dr. H.S. Gupta, Former Director, IARI.

(iv)

Fellow of CHAI was conferred on selected nominations from across the country. During the year 10 CHAI-JSIL Fellowship has been announced to facilitate the participation of CHAI Fellows in International Horticulture Congress being organised by International Society of Horticultural Sciences which is headquartered in Belgium at Istanbul, the financial capital of Turkey, from 12-16 August, 2018.

During my visits to farmers' fields, it has been fascinating to see the adoption of technologies for production enhancement and thirst of farmers for new knowledge. Accordingly, the CHAI took an initiative to organise **Knowledge Sharing Workshops** at various locations on topical issues involving instructions, industry, the farmers and other stakeholders. The Workshop is designed to provide opportunity to all the stakeholders, for sharing the knowledge and its dissemination for the formulation of policy, which become a guiding principles for achieving goal and objectives of smart horticulture. Deliberation in workshop is held on the issues in the thematic areas providing more time for discussions to arrive at logical conclusion. In past, 10 workshops have been organised, besides, supporting conferences, symposia and Sangosthi, at different locations with various themes to catalyse the efforts of farmers and have succeeded in empowering farmers and providing policy frame work.

During the year, CHAI supported and partnered in **National Conference on Technological Changes and Innovations in Agriculture for Enhancing Farmers' Income**, organised by **ASM Foundation**, New Delhi at JAU, Junagadh, Gujarat, which was a great success in terms of participation, technical contents and outcome. Kisan Sangosthi at Pusa held on 3rd September was also supported. Workshop on pomegranate and potato at Disa, Gujarat and a conference on litchi, at Muzaffarpur were organised. A Knowledge Sharing Workshop on Tropical fruits-Banana and pomegranate, organised at Anantpuram on 5th November, 2017 was 11th in series. The workshop had overwhelming response from scientific institutions, the Government, industry and the farmers. The Workshop had effective interaction and discussions, which was highly fruitful in the terms of output, outcome and impact. A conference on Organic Agriculture-Advantage India organised by ASSOCHAM, on 21st March, was also partnered by CHAI. The CHAI is partnering a **National Conference on Intensification and Diversification in Agriculture for Livelihood and Rural Development** being organised at DRPCA U Pusa, Bihar, 28-31, May 2018, by ASM Foundation, New Delhi. The Chairman, as the Chairperson of ASSOCHAM Council on Agriculture and Food Security organised many meetings and conferences and chaired many meetings, where CHAI was highlighted for its contributions.

Recognising the role of CHAI in transforming horticulture/agriculture, there has been an overwhelming responses and the fellowships have reached to 290, including Institutional and Corporate Fellows. The CHAI has also signed a MoU with Centre for Innovations in Public Systems (CIPS), Hyderabad, the Government Institution, set up over the recommendations of 13th Finance Commission for working together. The growing interest of joining hands with CHAI from corporate, institutions, societies and individuals has buildup confidence to serve the community for achieving the mandate of confederation.

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 express my heartiest thanks to all the fellows for their effective cooperation. Few of our fellows have left us to heavenly adobe. I place on record their contributions and pray to God for their eternal peace and easy passage to heaven for the departed soul. I thank all, who helped in bringing out this CHAI Award and Fellowships. I am sure for the continued support of all the Fellows. I have pleasure in presenting the Annual report of CHAI 2017-18, with all the details. Finally, I look forward for making the Confederation global, second to none, in the service to mankind with focus on horticulture.

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 individual to work together and achieve the goal of technology-led development and provide strategic solutions to the problems. National/International conferences and workshops are organised to share knowledge and develop policy papers, The CHAI recognises the services of scientists, students, farmers, extension workers through the awards. The CHAI also publishes journal, books and strategic papers for innovation in horticulture.

The year, 2017-18 has been an eventful in terms of activities. During the year one conference on Litchi was organized at Musari, Muzaffarpur, which deliberated on the issues in litchi production and utilisation and developed strategic papers and recommendations. Dr Vishal Nath, Director, NRCL and Mr Sudhansu, a progressive grower were conferred CHAI-Appreciation Award for their contributions to litchi Production and utilization. Recognising the importance of pomegranate and potato in Gujarat, a knowledge sharing workshop was organised, on 6th October, 2017, which deliberated on the various issues on potato and pomegranate and brought out the recommendations to address the issues being confronted by the farmers. CHAI organised a knowledge sharing workshop on banana and pomegranate at Anapurnma in collaboration with DRYSR Horticulture University on 5th, November, 2017. The workshop was attended by large number of farmers and deliberated on various issues in pomegranate and banana and pomegranate. Recommendations of the workshop were communicated to the different agencies. During the year the CHAI also developed policy papers with respect to quality planting material and communicated to the stakeholders and impressed upon the ministry to ask the states to take only tissue culture plants.

The CHAI partnered in National Conference on **Technological Challenges and Innovations in Agriculture for Enhancing Farmers' Income**, organised by ASM Foundation, New Delhi, in association with JAU, Junagadh, at JAU, Junagadh, Gujarat, from 28th to 31st May, 2017, and provided Technical support. The Conference was inaugurated by Padma Bhushan Dr. R.B. Singh, Chancellor, CAU, Imphal and Former President, NAAS, and was presided over by Dr. A.R. Pathak, Vice Chancellor, JAU, Junagadh. Guest of honour in inaugural function of the conference were Dr. A.K. Srivastava, Member, ASRB; Dr. S.K. Malhotra, Agriculture Commissioner; Dr. G. Trivedi, Former VC, RAU; Dr. H.P. Singh, Former DDG and VC, RAU; Dr. Kamal Taori (IAS) retd., Dr G. Trivedi, Chairman ASM Foundation and former VC, RAU and Dr. R.G. Agarwal, Dhanuka Agritech. Dr. H.P. Singh delivered a keynote address on the theme area of the conference. After the three days deliberation, discussion in various technical sessions, the following recommendations emanated through the dialogue and knowledge sharing:

A Kisan Sangosthi -2018: organised by ASM Foundation at Mahamda, Pusa on 3rd September, 2018 was supported by CHAI to facilitate the participation of scientist for providing new Knowledge, The CHAI was a knowledge partner was in a National Conference on **Organic World – Advantage India and Awards Function** organised on 21st March 2018, at Hotel Le Meridien, New Delhi, by the ASSOCHAM in association with Ministry of Agriculture and Farmers' Welfare, APEDA and Ministry of Food Processing Industry. The recommendations of the conference has been circulated.

(vi)

To facilitate the participation of talented scientist in International Horticulture Congress being organized by International Society of Horticultural Sciences, Istanbul, Turkey, from 12-16 August, 2018; the CHAI has announced 10 CHAI-JISL Fellowship to provide travel grant to selected nominations. Ten nomination of the scientists have been approved and they have been intimated to travel for the participation in horticulture congress and present their papers. On completion of journey, travel grant of airfare limited to 59,000 will reimbursed.

During the year, CHAI-Honoured Fellow Award was conferred on Dr RB Singh, Chancellor, CAU, Imphal and Dr Trilochan Mohapatra, Secretary DARE and DG, ICAR. Recipient of Honorary Fellows of CHAI were Dr N S Rathore, DDG, ICAR, Dr K V Peter, Former VC, KAU, Kerala, Dr N. N Singh, Former VC, BAU, Ranchi, Dr J .S Parihar, Former Dy Director, ISRO and Dr. V. V Sadamate, Former Advisor, NITI Ayog. The CHAI - life Time Achievements Award was conferred on Dr. K.V Peter, CHAI-R.S Paroda award on Dr. Anil B Patil, VP, JISL; CHAI- B .H Jain Award on Dr Ashok Mishra, JISL and CHAI- Ramnandan Babu Award on Mr Bhagwat V Patil. Dr. R.C. Srivatava, VC, DRPCAU, Pusa, Bihar, received JISL Fellowship and CHAI life Time Recognition Award was conferred on Dr. N. N Singh, Former VC, BAU, Ranchi and Dr. H .S Gupta, Former Director, IARI. Fellow of CHAI was conferred on selected nominations from across the country.

The CHAI continued to publish International Journal of Innovative Horticulture, Volume 6 has been published and circulated, and Volume -7 has been processed for publication, besides Shodh Chintan was published by CHAI. Award and Fellowships, Year Book and Annual Report were also published. During the year the CHAI Awards nomination for the CHAI awards has been finalized which will be conferred to selected nominations.

Recognising the progress of CHAI and its achievement, many organisation and individuals have joined us our Fellow, number have risen to 296. Important institution which joined this year are DRYSRHU, AP, MPHU, Karnal, CCSHAU, Hisar, Department of Horticulture, Panchkula, MPKV, Rahuri and PJTSAU, Hyderabad. AGCM was conducted and the meeting of the Board of Directors was held in every quarter. He chairman inaugurate many events and was part of important meetings and delivered many keynote lecture and plenary lectures in national and international conferences. The balance sheet of CHAI is improving and has corpus fund of 72 lakh.

ABOUT THE CHAI

Confederation of Horticulture Associations of India (CHAI), an ISO-9001:2008 certified non-profit 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 and facilitating the converging policies at the grass root level nationally and internationally for sustain integrated development is emerging as a think-tank as well as a consultative body at the national and international level. 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 innovation in facilitating development of rural economy and promote development of rural India in the global context in all its dimensions by facilitating capacity building at all levels. The CHAI 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 various 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, review articles and case studies is brought out six monthly. To promote innovative ideas, the CHAI has instituted many awards which inspires individuals and team for the innovations and excellence. The CHAI offers various categories of subscription i.e organization, associations, corporate, NPO 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

CHAI is committed for the development of agriculture/horticulture by providing solutions to the problems, utilizing the services of talented experts in the field of agriculture/ horticulture, and disseminate the knowledge.

Vision

The vision of the CHAI is to 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

The goal of CHAI is to play a catalytic role, in addressing the concerns of food and nutritional security, through interventions of technology-led agriculture / horticulture development.

(viii)

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 and Governmental and Non-Governmental organizations.
- To establish education and training institutions for human resource development and skills up gradation 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 capitalize 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 are instituted to recognise the contributions of scientists and other stakeholders in the research and development in the country and also abroad. The Confederation has instituted various awards, which includes Honoured Fellowship for leadership of par excellence, Life Time Achievement Award for distinguished life time contributions in horticulture, Honorary Fellowship for noticeable contributions and commitment to furtherance of horticulture, Dr. R.S. Paroda Award for Excellence in research and academics. Dr. B.H. Jain Award for excellence in transfer and diffusion of technology, and Ram Nandan Babu Award for excellence in farming. CHAI-Life Time Recognition Award has been instituted to recognise outstanding contribution and providing leadership in specific crop commodity. CHAI-Appreciation Award is given for distinguished contributions and excellence in the field of specialisation. To encourage the students, the CHAI has instituted Dr. D.P. Ray Best Dissertation Award in recognition of significant post graduate research work. Best Paper Award is given for scientific article published in IJIH, are also awarded. CHAI Fellowship is conferred to subscribers for their commitment in furtherance of agriculture / horticulture. CHAI-JISL Fellowship is provided for training abroad to meritorious members. Considering the needs for dissemination of science based knowledge among scientists for the furtherance of agriculture/ horticulture science, an International Journal of Innovative Horticulture (IJIH) is also published besides newsletter, books, annual report, CHAI Year Book and Gyan Manthan, which has 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 seed and planting material production and above all coordination, planning and execution of project and education.
- More than 295 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 Bangalore and also in Dubai to attend to all the types of work for business solution options.
- The CHAI is also a non-profit company, and has established network with institutions, academy, corporate, business house, NGOs and also International organizations.
- 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.
- Many institutions including state Agricultural Universities are Fellow CHAI.

ACTIVITIES OF CHAI

National and International Conferences Supported as Synergy and Knowledge Partner

The Confederation has catalyzed the development of horticulture through partnering in activities of conference organized by various organizations 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 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**, organised by **ASM Foundation**, New Delhi and **MGCGV**, Chitrakoot, Satna, Madhya Pradesh, from 28-31st May, 2015. 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 organized on Pomegranate, at JISL, Jalgaon during April, 2016. CHAI partnered a Global

(x)

Conference on **Challenges and Options in Agriculture** organized by **ASM Foundation**, New Delhi and **Jain Irrigation Systems Limited**, Jalgaon, at Jain Hills, Jalgaon, Maharashtra, on 28-31st May, 2016, which was great success in terms of participation, technical contents & outcome. The conference was inaugurated by Shri S.K. Pattanayak, Secretary, Agriculture, Govt. of India, and was presided over by Padam Bhushan Dr. R.S. Paroda, Former Secretary, DARE & DG (ICAR). The CHAI supported the organisation of two days conference on pomegranate organized, at Jain Hills Jalgaon, on 16-17, April, 2016, which was inaugurated by Honduras former union Minister of Agriculture, Sarad Pawarji. In the conference issues of farmers were resolved and strategies for improving production and productivity was developed. The CHAI also facilitated the organisation of Kisan Sangosthi, on 3rd September at Mahmada and 1st November at Dholi, Muzaffarpur. During the year, CHAI supported and partnered in **National Conference on Technological Changes and Innovations in Agriculture for Enhancing Farmers' Income**, organised by ASM Foundation, New Delhi at JAU, Junagadh, Gujarat, which was a great success in terms of participation, technical contents and outcome. The CHAI is partnering a **National Conference on Intensification and Diversification in Agriculture for Livelihood and Rural Development** being organised at DRPCAUI Pusa, Bihar, 28-31, May 2018 by ASM Foundation, New Delhi. 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.

Conferences/Workshops Organized

The CHAI has been organizing workshop on the topical issues. First workshop organized by The CHAI was on **Urban and Peri-Urban Horticulture in Bangaluru**, on 2nd March, 2013 with the theme – Greening the cities, utilizing the waste, meeting the needs and servicing the environment. The workshop deliberated issues in four technical sessions and concluded with adaptation of recommendations and Bangalore Declaration for catalyzing the Urban and Peri-Urban Horticulture. In the year 2014 on 1-2nd March, CHAI organized a knowledge sharing workshop on Tropical Fruits with a Value Chain Management for Enhancing Farm Profitability. The workshop was attended by 200 participants, largely, the farmers, who were infused with new knowledge, especially on banana, mango and pomegranate. The workshop became a unique approach for addressing the issues in tropical fruits. During the year, 2014-15, CHAI organized 02 International Conferences and 01 National conference, supported 01 global and many national conference and workshops. An International Conference on Floriculture and Landscape Gardening –Challenges and Opportunities was organised at Pune on 27th February, 2016 in collaboration with Media Today. The CHAI organised a National Workshop on Quality Production of Banana for Export and Domestic Market on 29th May 2016 at Jain Hills Jalgaon, which brought farmers, professionals and entrepreneurs together to discuss quality assurance in banana, to be competitive in export and domestic market. A workshop on **Dynamics of Challenges and Options in Integrated Aquaculture**, was organized on 2nd November, 2016 at Patna which provided an options to discuss aquaculture for improving the income of the farmers through integration with horticulture, and was participated by over 100 farmers and entrepreneurs, besides senior level experts, and representatives of various organizations. The workshop also analysed past trend in technological changes in fish production and value chain management to develop a policy guidelines. One day National Workshop on **Technological Changes and Innovations in Pomegranate Production and Utilization for Enhancing Farmers' Income** was organized by the CHAI, on 26th September, 2016, at JAU, Junagadh, Gujarat, in collaboration with Junagadh Agricultural University (JAU) and Jain Irrigation Systems Limited, Jalgaon and ASM Foundation, New Delhi. Focus of the workshop was to discuss the technological changes, which have modernised the production and value chain management in pomegranate, and empowered the farmers with new knowledge, so that they can enhance their profits and reduce the risks. With the similar objectives and theme, one day workshop was also organised at Agriculture University, Jodhpur, Rajasthan, India on 10th December, 2016, for the benefit of Rajasthan farmers, which provided an options to discuss pomegranate for improving

the income of the farmers through technological interventions. More than 200 farmers and entrepreneurs besides senior level experts, and representatives of various organisations participated and provided their inputs for developing strategic recombination and policy. In the month of March, the CHAI organised a two days National Conference on **Perspective of Challenges and Options in Maize Production and Utilization**, in collaboration with DRPCA, Pusa, TAAS, New Delhi, JISL, Jalgaon and the ASM Foundation, Mahmada, Pusa, from 3-4th March 2017 at DRPCA, Pusa, Samastipur, Bihar. The conference analysed the current situation and developed strategies for doubling production and income of farmers in 6-7 years time frame, after discussion with over 300 delegates representing farmers, expert professionals, entrepreneurs and representatives of Industries. Workshop on pomegranate and potato at Disa, Gujarat and a conference on litchi, at Muzaffarpur were organised. A Knowledge Sharing Workshop on Tropical fruits-Banana and pomegranate, organised at Anantpuram on 5th November, 2017 was 11th in series. The workshop had overwhelming response from scientific institutions, the Government, industry and the farmers. The Workshop had effective interaction and discussions, which was highly fruitful in the terms of output, outcome and impact. A conference Organic Agriculture- Advantage India organised by ASSOCHAM, on 21st March, was also partnered by CHAI.

Meetings of Board of Director and General Council Meeting

To review the technical and financial progress, the Board of Directors meets as per the needs, are hold meetings, at least, 4 times in a year. General Council meets once in a year on 28th or 29th May. First Executive Council and General Council meetings were held on 29th and 30th May, 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. In the meeting, Dr. A.R. Pathak was invitee and the meeting was attended by over 60 fellow. The Council authorized 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 fellowship was conferred to all the members, who joined CHAI in 2013-14, and progress was reviewed. Activities were well appreciated. 4th Annual General Council Meeting was held at MGCGV, Chitrakoot, Satna, Madhya Pradesh on 29th May 2015, where in fellowship was conferred to all the members, who joined CHAI in 2014-15, and progress was reviewed. Activities were well appreciated. The meeting also elected Dr. R.K. Tyagi, Head, Genetic Conservation Division, NBPG as General Secretary to assist the Chairman. 5th AGCM of CHAI was held at JISL, Jalgaon where in Dr. R.S. Paroda, Chief Patron chaired the meeting. The Chairman welcomed the chief patron and gave a brief account of progress report and financial update. The progress and corpus fund of CHAI was well appreciated. The Chief patron and fellows complimented the Chairman, Dr. H.P. Singh for such achievement. A book on CHAI Awards and Fellowships and CHAI Brochure were released. Thereafter, the fellows, who were upgraded to higher positions were felicitated by conferring shawl and certificate of appreciation. Thereafter, Honorary Fellowship of CHAI and CHAI - Fellows were conferred to selected nominee. The Chief Patron congratulated all the awardees and complimented all the fellows and the Chairman for achieving such a growth of CHAI. The 6th AGCM of the CHAI was held at JAU Junagadh to review the progress and provide direction to the secretariat to achieve aims and objectives. Dr. R.B. Singh, Chancellor, was the chief guests. The progress was well appreciated and all fellow reposed the responsibility on chairman, to take decision as he it deem it fit in the best interest of CHAI. The chief Guest and chairman conferred fellowship and awards on selected individual and institution.

Participation in Exhibitions

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

Institution of Awards and Fellowships

To recognise the contribution of scientists and other stakeholders in the research and development of horticulture/agriculture in the country and also abroad, the Confederation has instituted various 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 **CHAI-Honoured Fellow**. **CHAI-Life Time Achievement Award** is given for outstanding contributions, in research and development of horticulture. The distinguished members are also honoured with **CHAI- Honorary Fellow**, for their excellence and commitment to furtherance of horticulture. **CHAI-Dr. R.S. Paroda Award** is given for excellence in science and technology, **CHAI-Dr. B H Jain Award** recognises an excellence in knowledge empowerment and dissemination, **CHAI-Ram Nandan Babu Award** is given to innovative farmers for their excellence in farming, **CHAI-JISL Fellowship** is given for visit abroad to attend conferences and training. **CHAI-Life Time Recognition Award** is given for outstanding contribution and providing leadership in specific crop commodity, **CHAI-Appreciation Award**, is given for distinguished contributions and excellence in the field of specialisation. **CHAI-Dr. D.P. Ray Dissertation Award** is given for Best Dissertation at Master's level and **CHAI-Best Paper Award** is given for best scientific article published in IJH. The distinguished members including institution with the commitment to the furtherance of horticulture are conferred with Fellow of CHAI in different categories.

PUBLICATIONS

International Journal of Innovative Horticulture

Considering the needs for dissemination of science based knowledge among scientists for the furtherance of horticulture science: 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 (IJH)** 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 Research, Reviews, Case studies, New cultivars and technologies, Commentaries and opinions, Policy issues, Abstract of Ph.D. thesis, Book Reviews, Features, Colloquia and Workshops. The 6 volumes have been published and the NAAS also enlisted the Journal. 7th volume (2016) of the Journal has been published and Volume 7(1), 2018 is in process of publication.

Membership Benefits of CHAI

The CHAI team consists of different categories of membership i.e. Institutional, Corporate, Association, Non-profit Organization (NPO) and Individual Members. Membership of the Confederation is open to individuals/ firms, organizations and societies/associations subscribing to the objectives of the CHAI by donation ranging from Rs. 25,000 to Rs 100,000. 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 membership, 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.

(xiii)

- 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 award 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/ The Founder and Chairman. Only one or two fellowships for visit abroad will be available in a year.

Contents

<i>From the Desk of the Founder and Chairman</i>	iii
<i>Executive Summary</i>	v
<i>About the CHAI</i>	vii
ACTIVITIES OF THE CHAI FOR THE YEAR 2017-18	1
1. Organization of the Conferences and Workshops	1
1.1 National Conference on Challenges and Options in Litchi Production and Utilisation	1
1.2 National Workshop on Technological Changes and Innovations in Potato and Pomegranate	6
1.3 Knowledge Sharing Workshop on Tropical Fruits-banana and pomegranate	11
2. Support to Conferences and Workshops as Partner	26
2.1 National Conference on Technological Changes and Innovations in Agriculture for Enhancing Farmers' Income	26
2.2 National Conference on Organic Farming-Advantage India	33
2.3 Kisan Sangosthi, 2018 -Risk related to weather and it's Management	36
3. Participation in International/Conferences/Congress and Delivery of Keynote Lectures	38
4. AGCM Meetings	42
The 7 th Annual General Council Meeting of Confederation of Horticulture Associations of India	
5. Meetings of the Board of Directors and Other Meetings	43
6. Conferment of Awards and Fellowships	43
7. Publications	47
7.1 International Journal of Innovative Horticulture	47
7.2 CHAI Year Book-2015	47
7.3 Proceedings of the conference	47
7.4 Gyanmanthan	47
8. Advisory Services	47
9. Balance Sheet of CHAI	50

Activities of the CHAI for the Year 2017-18

1. Organization of the Conferences and Workshops

During the year, CHAI organised one conference on litchi at Muzaffarpur, two workshops one at Disa covering pomegranate and potato and other at Anantpur, covering banana and pomegranate. These workshops has succeeded in catalysing farmers for adoption of innovative technologies.

1.1. National Conference on Challenges and Options in Litchi Production and Utilisation, 6-7th June, 2017, Muzaffarpur

Litchi, a gift of China, has got domesticated in indo-Gangetic plains of India, largely in Bihar and Bengal. Now area and production is increasing in UP and Uttaranchal, especially for extending time of harvest. In recent past, due to change in time of harvesting and availability of fruits out of season, litchi area is also expanding in Southern part of the country. There has been a lot of advancement in development of cultivars and production system management, which has helped the farmers to get better returns from litchi cultivation. But, in the process of development, many issues have emerged, which needs a national dialogue. Therefore, to deliberate on emerging issues for developing strategies of research and development a **National Conference on Perspectives of Challenges and Options in Litchi Production and Utilisation**, was organised, jointly by Confederation of Horticulture Associations of India (CHAI), Pusa Unit and ICAR-NRC on Litchi, Muzaffarpur, Bihar, from 6-7 June, 2017 at ICAR-NRC, Musahari, Muzaffarpur, in collaboration with ASM Foundation, New Delhi, JISL, Jalgaon, and TAAS, New Delhi. The purpose of the conference was to address the challenges and develop strategies for enhancing income of the litchi growers.

The Conference was attended by 150 delegates from across the country, representing researchers,





policy planners, industry and farmers. The deliberation in the conference was organised in 6 technical sessions; ie 1) Litchi improvement utilising modern tools and techniques, 2) New paradigm in Litchi production and value chain management, 3) New paradigm in production system management for improved profitability including fertigation, 4) Plant canopy architecture, regulation of bearing and harvesting system, 5) Diagnostics for pest and disease management- A strategies for smart protection system, 6) Industrial utilization, value chain management, branding and marketing for better farmer's income, besides, inaugural and plenary sessions. The conference identified new technologies, challenges and options for improving farm profitability.

The inaugural session was presided over by Dr. H.P. Singh, Former DDG (Hort.), ICAR and Chairman, CHAI, New Delhi, and was inaugurated by Dr. G. Trivedi, Ex. V.C. RAU, Pusa and Samastipur and Chairman; ASM Foundation, New Delhi, as the Chief Guest. Dr. R.C. Srivastava, VC, DRPCA, Pusa, Samastipur was the Guest of Honour. The inaugural function

started with welcome to the guests and delegates by Dr. Vishal Nath, Director, ICAR-NRC Litchi, Muzaffarpur. Dr. Vishal Nath, while welcoming the guests briefly outlined the technological changes, which have modernised the litchi production and value chain management, and highlighted the contribution of NRCL. There after, CHAI- Appreciation award 2017-18 was announced and conferred on Dr Vishal Nath, Director, NRCL, Muzaffarpur and Sudhansu Kumar, Progressive Grower, Nayanagar, Samastipur, for their appreciable contributions in litchi production and utilisation. SodhManthan, covering articles from the experts in the field of litchi was released by all the guests on the Dias. Other publication was also released on the occasion

Dr. Trivedi, in his inaugural address shared his experience as litchi grower and said that adoption of new technology for production and value chain management in litchi can help in enhancing farmers' income.. He appreciated the efforts of the organisers in holding this conference at Muzaffarpur, well known for litchi across the globe. Organisation of this conference is timely to take stock of new technologies and plan strategies for addressing the emerging challenges of climate change, to make litchi production more profitable for the farmers. He wished for the fruitful deliberation and discussions and complimented the Director Dr Vishal Nath, for the excellent work done at NRCL.

Dr. H.P. Singh, in his presidential address, briefly outlined the contribution of CHAI in taking up topical issues to provide strategic solutions to the problems, through deliberations and discussion. He shared his long experience of litchi, and said that it has narrow genetic base. Although several named varieties exist, but cultivation is confined to few cultivars. He emphasised on utilisation of climatic variability for extending harvest of litchi. Dr Singh gave a greater emphasis on nutrient and water management to achieve targeted production and said that much more research has to be done for value chain management to achieve better returns to the farmers. He also said that the outcomes of the conference should have an improved understanding of trend, gaps and future challenges in litchi production and utilisation, to strategically address the issues. Envisioning the technological changes and innovations, he said that it could be a tool for achieving the goals ensuring enhanced income to the farmers. Identification of technologies and training needs for addressing the challenges to improve the productivity of resources for improving profitability was also emphasised. He hoped that the conference will improve understanding in value chain management to develop future road map for litchi in the country. The inaugural session concluded with a vote of thanks to Guests and delegates by organising secretary Dr Pande.

The recommendation which emanated from celebrations and discussions were discussed in plenary session chaired by Dr H P Singh. Dr Singh delivered a plenary session wherein he said that we are more wiser now than the day we started this conference. In his lecture, Dr Singh covered on all the facet of litchi production and emphasised on precision production and value chain management of litchi for enhancing farmers income. The best oral papers and poster papers award, adjudged by the committee, were conferred on the selected scientists by the chief Guest. The recommendations which emerged from 2 days deliberation and adopted are:

The salient recommendations are:

- Litchi is one of the very important fruit crops grown across Bihar, as it provides assures income to farmers. However, long gestation only ensures income after 7-8 years. Therefore there is a need for working economic intercropping and also a mechanism for reducing the gestation period to ensure early returns. Various model of integrated farming system have be developed, which need refinement, keeping the resource availability with farmers.

- Considering that, litchi has narrow genetic base, concerted efforts are needed for widening the genetic base by creating variability. Raising of seedlings from known cultivar, hybridisation among existing cultivar provides opportunity for creating variability in addition to introduction of cultivars from different AGR-climatic zones globally. Recognising, the impact of climate change varieties have to be identified from the variability to perform under warmer conditions. Genome sequencing of genotypes may be done to understand genetic make up.
- The cultivars developed by ICAR-NRC Litchi and BAU Sabour need to be taken to the farmers field through KVKs. There is need for large scale demonstration of these variety in relation to currently cultivated cultivars. The consumer acceptance for enhancing demand of these cultivars has to be demonstrated.
- Litchi responds to training and pruning. Creation of plant architect for maximum light interception and its management becomes essential. Y shaped tallish for giving a plant architecture has been found good. Open system of fame work with backward and forward pruning is effective in assuring regular yield. Girdling is found to ensure flowering. Therefore integrating all the practices become essential. Research efforts have to be made for integrating all the practices, canopy, nutrient and water management and plant architectural management for regulated flowering and fruiting to achieve higher yields of quality fruits.
- Canopy management targeting development of strong frame work, shaping the canopy for maximizing light penetration and distribution and increased development of fruiting area must be practiced from very beginning. The pictorial extension folder should be prepared and provided to planters and nursery owner.
- Girdling of shoots has been found effective at various location and need upscaling through existing extension mechanism. In addition, the effect of girdling on change in phenology and nutritional adequacy for better production is needed to be understood.
- Rejuvenation technique, perfected by ICAR-NRCL, has been practiced by many farmers. This technology has been included in package of practices, but needs further refinement, in relation to number of branches, architecture and time, in relation to soil moisture and temperature. ICAR-NRCL may be considered as nodal agency to support training programme on rejuvenation techniques.
- Nutrient management is a critical inputs in litchi production and quality assurance. The nutrient application recommended based on field experiments has its limitations, considering wide variability in soil, where litchi is grown. Leaf nutrient based application has been developed but its use is limited. Therefore, it is essential to develop soil and leaf nutrient based nutrient recommendation, to ensure targeted production and quality of litchi. Development of STFR, DRIS and sensor based nutrient application in litchi should be given priority in research.
- Microhyzzalassociation have been identified for traditional litchi growing area which have proved beneficial in terms of growth, yield and quality of fruits. This aspect need intensive research to understand the mechanism of action. To popularise its use, there is need for its commercialisation. The product developed by ICAR-NRCL may be demonstrated for its beneficial effect to have start ups for large scale production.
- Organic production of litchi is in demand. If leaves are recycled, it can meet larger needs of nutrition. Systematic information is not available on various practices including vermi composting

and Mycorrhizal association. Therefore, there is a need to develop package of practices for organic production of litchi, integrating all the efforts together including disease and pests managements.

- Litchi needs pollinators for improving yield and quality of fruits. Invariably, 50-100 per cent yield enhancement is reported, depending on the cultivar. Honey bees are the best pollinator which not only enhances pollination but provides best quality honey, resulting in additional income to the farmers. Therefore, bee keeping has to be encouraged by giving training and providing bee colonies, 12-15 bee boxes can be kept in a hectare of orchard.
- Water is a most critical inputs in litchi production. Excess soil moisture or stress, both are detrimental to the production and quality of fruits. Imbalance of plant water also results in cracking of fruits. Drip irrigation coupled with fertigation brings earliness in fruiting due to faster growth and improves yield and quality of fruits. Overhead sprinkler system during fruit development and maturity are reported to increase fruit size and colour of fruits. Therefore, this system of water management require to be promoted. Drip irrigation and fertigation need to be promoted for quality production of litchi. Under Fertigation, no application of N after September is recommended to ensure flowering in coming season.
- One of the problems in litchi production is cracking of fruits, which leads to complete loss of crop. Most important factor associated are moisture imbalance at various stages of fruit growth, besides availability of calcium and boron. Old orchard and heavy soil promote cracking. Therefore, rejuvenation of old orchards, selection of appropriate soil, application of Ca and Bo, timely irrigation and mulching are recommended to avoid cracking. However, there is a need for intensification in studies to check cracking in litchi.
- Litchi fruit borer continue to be dominant pest of Litchi. The efforts made in past have succeeded in containing the pest but, still continues to be serious problem. This need concerted approach to manage pest to reduce losses caused to production and income of the farmers. Thus, management of the same during on and off season treatment should be given great attention. Considering the changing pest scenario, a dynamic and smart management strategy needs to be considered.
- Integrated system of farming has been practiced by few farmers as per their needs. However, there is no scientific approach. Model being practiced for integrated farming developed at NRCL, has promising results, Therefore, different models have be worked out for efficient situation of land and water resources to provide better income to farmers. The system should recycle waste and convert it to wealth by practice like vermi composting. Honey bees could be pollinator and provide enhanced income from product of honey. Livestock can provide additional income and also inputs for production of litchi.
- Owing to wide gap between the technology generated and technology adopted, more efforts are needed in promoting the adoption of the developed technologies for improved income of the farmers. A concept of technology park may be developed at ICAR-NRCL as live demonstration unit and at least 2 leading farmers in each litchi district may be promoted in adopting advance technology, which can also serve as demonstration site.
- Technology developed by ICAR-NRC Litchi and BARC, Mumbai for improving shelf life should be popularised and the automated setup of treatment developed at NRCL must be utilised to the full extent. However, for reaping full benefit, there is need to develop attached storage facili-

ties, pack house and transport up to the end user.

- Sincere efforts should be made to utilize litchi by-products including seed and peel. Potential of seed to be converted as fish or poultry meal should be explored through nutrients analysis. Innovative marketing strategy using IT, as done by Mr. Sudhanshu Kumar, in which a buyer could track his litchi from tree to the delivery, has potential to fetch higher price and need to be replicated. In this line the initiatives of TCS and NABARD can be utilised and groups can be put forwards.
- As litchi is spreading to new and non traditional areas. Attempt should be made to develop mobile apps regarding different management practices and recommendations for litchi, in collaboration with leading IT company like TCS in order to facilitate farmers, from the research organisations to take advantages of developing technology for efficient management, to get better income.
- The Indian litchi needs to be specifically figured at various platforms, for which the policy support for development of special litchi production zone, with modern facility is the need of the hour. The policies for crop insurance, skill development in various areas of litchi production and post- harvest management will help to improve the litchi scenario in the country. The government at central as well as state, with international scientific fraternity, to come out with the policy for promotion of litchi in the respective areas.

1.2 National Workshop on Technological Changes and Innovations in Potato and Pomegranate-Production & Utilization for Enhancing Farmers' Income, at Deesa, Banaskantha, Gujarat, October 06, 2017

A national Workshop was organised to share new knowledge in potato and pomegranate production and value chain management. The workshop was attended by over 300 farmers, and deliberations were held in three technical sessions besides, introductory and plenary sessions. Ashok Mishra, Sr Agronomist welcomed the guests and briefly outlined the problems associated with growing and marketing of potato and pomegranate. Theme of the conference was introduced by Dr. Birpal Singh, ex Director, CPRI, Shimla. He mentioned that the productivity of Potato in Banaskantha is highest, not only in the country but in the world. There is further scope of improvement. Pomegranate cultivation has not only started here but area is increasing every year. Research, extension and technological interventions are the needed to sustain the production and productivity.

Delivering Inaugural Address, Dr. H.P. Singh, Ex DDG (Hort.), ICAR, New Delhi welcomed the farmers, and said that their participation in a large number indicates their interest in new technologies. Farmers of India in general, Gujarat farmers in particular, have been quick to adopt new technologies for increasing the production of various crops, may be cereals, pulses, oilseeds, fruits or vegetables. He shared his knowledge on various aspect of horticulture including policies and programmes of the Government. His effort in formulating technology mission and its implementation has impacted the development, as horticulture production has crossed the cereal production. He has been an active player in formulating the policies and reorienting programmes at ICAR and Govt. level. Development of horticulture helped in food ensuring nutritional security, because fruits and vegetables are highly nutritious. He highlighted the joint efforts of farmers coupled with release of new varieties and production technologies by scientists and support of Govt. providing enabling policy and investment. Micro-irrigation

system has been a most successful technology to increase production and profitability besides saving water and fertilizers. He expressed his happiness in observing that Banaskantha district has adopted micro-irrigation and the district received award from Hon'ble Prime Minister. He congratulated the farmers for the honour. Dr. Singh felicitated Shri Genabhai Patel, a Padmashri Awardee divyang farmer for introducing and spreading the cultivation of pomegranate in his village and taluka. He is a living example for others to emulate that, vision, setting and chasing the goal can fetch one of the highest civilian award of Govt. of India. He requested the scientists, extension workers and those involved in transfer of technology in private sector to always think about the farmers' welfare, develop and transfer cost effective technologies. He mentioned that all the farmers may not be highly educated, but have learnt agriculture through the experiential sharing and have plenty of traditional knowledge, which could be blended with new technologies for increasing their livelihood and income.

A leading farmer and Padmshri Awardee Shri Genabhai Patel said that the farmers have adopted cultivation of pomegranate in a big way but marketing is a problem. Further he mentioned that earlier he used gooty but later on he shifted tissue culture Pomegranate plants, as it became available. After seeing the performance of tissue pomegranate he is now advocating to the farmers of the area for the use only tissue cultured plants with drip irrigation system.

Dr. Sangita Ladha, Business Head (Gujarat), Jain Irrigation proposed a vote of thanks to Dr. H.P. Singh, for inaugurating the important workshop, Dr. B P Singh for introducing the theme, Dr. Mathura Rai, Dr. N. Kumar, Dr. B. D. Sharma, Dr. KB Patil, Dr. Anil Patil, Dr. Sankhla, Dr. JR Jat, Padmashri Genabhai Patel, Yogesh patel, Dr. Prakash Yadav, farmers and staff of Jain Irrigation Systems Ltd. for their kind presence and gracing the occasion.

Technical Session 1: Dynamics of Potato Research & Development: Farmers Perspective

The session was chaired by Dr. Mathura Rai – Ex Director, IIVR, Varanasi.

Dr. Birpal Singh, ex Director, CPRI, Shimla, Dr. Ashok Mishra, Chief Agronomist, JISL, Vadodara, Dr. A. B. Patil, Vice President, JISL, Jalgaon, Dr. R. N. Patel, Research, Scientist, SDAU, Deesa, Dr. J. R. Jat, Scientist, SDAU, Dantiwad, Shri Genabhai Patel (Padmashri Awardee farmer) and Shri Bhurabhai Patel (Potato farmer).

Lead Presentation

In his Keynote present on presentation, Dr. Birpal Singh-Ex Director, CPRI, Shimla highlighted the progress of Research on Potato in India and said that the country is gradually becoming the largest producer. It is a very popular vegetable, eaten by poor as well rich and many processed products like wafers, chips are now easily available at village level across the country. The consumption has increased, and therefore, there is a need of concerted efforts to increase the productivity per unit area, as the area under agriculture is shrinking due to development of industry and infrastructure. Deesa area is blessed with sandy loam soil and good climate, highly favourable for high yield. The day and night temperatures during development of tubers is in the range of 25-30 and 15-20°C which is very favourable. There is a scope to further increase the productivity by the use of new varieties, proper nutrient management and integrated pest and disease management. Several diseases are spread through seed tubers, therefore, there is an urgent need to produce disease free seed preferably by tissue culture technology. Many a time's availability of quality seed becomes a problem which needs to be addressed.

Dr. Mishra explained that early blight, black scurf, bacterial wilt and viruses cause heavy losses. However late blight is not a major problem in this area. Normally the seed tubers are brought from Punjab and tuber borne pathogens come from there. Black scurf has become now a major concern. Therefore, as suggested by Dr. B.P. Singh there is an urgent need to provide disease free tubers, which will reduce the losses caused by diseases.

Dr. A.B. Patil, detailed the vision of Jain Irrigation Systems Ltd. in developing protocols and commercialisation of tissue culture of banana, pomegranate and strawberry. On the same lines protocols for potato has been standardised, which will be commercialised, soon. It will help the farmers in a big way. However some field testing is needed in this region to have the feel and impact of the system. Dr. R.N. Patel, explained the technologies recommended for this region under All India Coordinated Project at Potato Research Station, Deesa. Farmers have benefitted from these recommendations on cultivation practices. Dr. R.G. Jat mentioned that seed production may be strengthened in Gujarat for easy availability of seed tubers.

Shri Genabhai Patel and Shri Bhurabhai Patel urged that not many processing unit are there in the region and marketing is a problem for farmers. The fertigation schedule is not adopted by farmers. There is need to create greater awareness for balanced and timely use of fertilizers. To realize the best price proper marketing and processing needs strengthening in this area otherwise area under potato will reduce. This year farmers got very low price, much lower than cost of production. It needs to be redressed.

Session Chairman Dr. Mathura Rai explained, as to how the new varieties and production technology of vegetables has helped in increasing the productivity, livelihood and income of farmers across the country, in general, and Gujarat in particular. Deesa (Banaskantha) has earned name in production and productivity of potato, however, there is scope for further improvement as farmers here are progressive and have adopted new varieties and micro-irrigation in a big way coupled with large no. of cold storage facilities at Deesa. The deliberations here will definitely chart the path of further progress in this area.

Technical Session- 2 Strategic Approaches for Production and Value Chain Management of Pomegranate

The session was chairman by Dr. N. Kumar, Ex Dean (Hort), TNAU, Coimbatore, Shri. K.B. Patil, Vice President, JISL, Jalgaon, Dr. B.D. Sharma, I/C Director CIAH, Bikaner, Mr. Yogesh Patel, TC Agronomist, Dr. R.R. Shankhela, Research Scientist, SDAU, Dantiwada Ajmalbhai Patel, progressive farmers and Ishvarbhai Patel, Progressive Farmers were the expert panel in session.

Dr. K.B. Patil, in his Keynote presentation introduced the subject and explained in great detail about pomegranate cultivation practices, advantages of tissue cultured disease and pest free plantlets, fertigation, canopy management and integrated management of pest and diseases. He explained as to how the gooty from Maharashtra has led to the spread of Telia (bacterial blight) across India. He not only cautioned but explained as to how the bacterial blight infected orchard can be rescued by intelligent management practices. He dwelt in detail about all the aspects of cultivation, sanitation of orchard, post - harvest management and how to produce export quality pomegranate, use of grading and packing. Dr. K.B. Patil, also said that pomegranate is fruit for good health as well as remunerative to the growers. Gujarat is coming up in a big way in producing good quality pomegranate and majority of

orchards are free from bacterial blight (telia).

Farmer panelists expressed that private pomegranate consultants do not have sufficient knowledge and many a times mislead the farmers about tissue plants. they recommend gooty plants. Their knowledge about canopy and pest management is also not up to the mark Arrangements may kindly be made for proper training and guidance. Prices crashed this year and there is no processing unit in Gujarat.

Plenary session

Session Was chaired by Dr. H.P. Singh. Dr. B.P. Singh, Ex Director, CPRI, Shimla, Dr. Mathura Rai, Ex Director, IIVR Varanasi. Dr. N. Kumar, Ex Dean (Hort), TNAU, Coimbatore, Mr. K.B. Patil, Vice President, JISL, Jalgaon. Dr. Anil Patil, Vice President, JISL, Jalgaon and Dr. Ashok Mishra, Chief Agronomist, (Gujarat), JISL, Vadodara were the panelists. The session Chairmen presented their report and after in-depth discussions recommendation were adopted. In plenary lecture Dr. Singh thanked the farmers for their keen interest in learning new technologies. He also thanked JISL for hosting the conference. The speakers, chairmen and panelists were thanked for their active participation and providing their valuable inputs for improving potato and pomegranate productions. He outlined various mechanism to ensure that farmers income is enhanced. The points which emanated from the workshop is as under.

Potato production and utilisation

- Since, farmers are not aware about the performance of recently and continue with older varieties. Therefore, field trials, at farmer's field may be conducted to demonstrate the yield gain due to newer varieties. Action will be taken by Mr. Anil B. Patil and Dr. Bir Pal Singh.
- The farmers have adopted fertigation in potato, but it is not based on scientific assessment . Since nutrient requirement also depend on variety and soil, the benefit of fertigation is not fully realise by the farmers. Therefore Proper fertigation schedule as recommended has to be demonstrated at farmers field.
- The farmers continue the depend on the seed supplied from Punjab, The zone is also free from vector making it a potential for producing seeds. Utilising tissue culture and aeroponic system quality seeds may be produced. JISL now working hRd to produce quality seeds of performing varieties. This can be done fast so that disease free quality seed of high yielding varieties are available.
- Govt. and Private Sector may venture into processing of potato in this region as plenty of raw materials are available, transport cost will also be saved. This will help farmers realize better price. Since Deesa produces best processing quality of potato processing unit will have much benefit. The processing units may go for contract farming by providing seeds of desired varieties and agronomic guidance. It will be a win-win situation.

Pomegranate production and value chain management

- Increased interest in phyto-nutrients in pomegranate and its impact on health has increased the demand, both in domestic market as well as export. At the same time, well managed plantation has proved to be highly remunerative. Resultantly, area is expanding under pomegranate and new area are emerging in non traditional regions. Therefore, to sustain and increase interest in pomegranate, it is essential to continue innovations and provide policy support and also financial support for infrastructure.

- Pomegranate has been propagated by cuttings or air layer. Recently, tissue culture has been found successful and has been adopted by farmers from across the country, as tissue culture plants are precocious in bearing, produces higher yield of quality fruits, and plants are free from diseases. This technique require to be promoted seriously, not only to increase yields, but to check the disease spread. As a policy, new area should not take air layered plants, which are a major source of disease, but only tissue cultured plant, a clean material, should be taken as planting material
- Plant architecture and it's management is essential to harness the optimum solar energy and avoid diseases to improve the production and quality of fruits. Various architecture and management practices are followed by different farmers, depending upon location, soil type and cultivars. Very little scientific work has been done with respect to light interception to optimise the production. Therefore, there is an urgency to compare different models in the farmers fields for developing strategies for plant architecture and its management and advocate in regionally differentiated manner.
- Pomegranate needs optimum nutrients and water. Reduction in supply of one or other nutrients become detrimental to yield and quality, and susceptibility to diseases gets aggravated in absence of balanced nutrition. Similarly, water management is critical to achieve higher productivity of quality fruits. Differential management of water is needed at different stages, vegetative phage, reproductive phage and maturity stage, to harness the maximum potential. Therefore, fertigation should be followed which may be refined to suit to different conditions depending on soil and crop load.
- Area with potential infestation of bacterial blight should avoid mrigbahar crop at least for few years in disease prone areas with heavy summer rains. To reduce the inoculum build up, orchard sanitation like removing fallen plant debris, drenching with bleaching powder in the basin of tree are recommended to contain the disease. Prophylactic sprays of Bordeaux mixture (1%) altered a broad spectrum fungicide at 20-25 days interval, depending on disease present in the orchard or neighboring orchards, should be followed.
- Harvesting, handling, storage and marketing are some important aspects which require better understanding to make pomegranate sustainable. This needs appropriate infrastructure for handling of pomegranate. Establishment of pack houses at centers with required infrastructure may be done. Farmers may start growers' associations, to facilitate Value Chain Management for improved profitability through shared knowledge and infrastructure.
- Utilisation of plant biomass for production of value added products from pomegranate is the major challenge ahead. The competitive market economy, not only depends on improvement in production technology, but also to development of post harvest management system to enhance shelf-life, retain quality of the fruit and reduce post-harvest losses. An integrated system, considering both crop and post-harvest management needs to be evolved and adopted.
- There is a potential for increasing the pomegranate export to different countries, besides meeting the domestic demands. India has advantage to ensure the supply to international market throughout the year, due to multiple sessions of bahar (Ambia, mrig & hasth bahar). In India, the peak production season is during December – March and it continues up to June-July. Thus, India can export pomegranate from February to July when there is less competition from other countries. To enhance export, increasing production of exportable quality fruits and pro-

viding post harvest handling facilities are required to be a priority areas. Quality standards for international market have to be improved to step up the export of the fruit.

1.3 Knowledge Sharing Workshop on Tropical Fruits-banana and pomegranate at Hotel Masineni Grand, Anantapuramu, A.P., on 5th November, 2017

Horticulture development in the country is remarkable, in terms of production, which has reached to 300 million tonnes from estimated area of 23.89 million hectares. This production is largely contributed by tropical fruits, which are grown, both in tropics and subtropics. Banana contributes about 3.2 percent to the AGDP of the country. In last decade pomegranate has moved from rural confine to commercial production, exhibiting its potentiality in many dry topics, with high returns to farmers. Advancement in these tropical fruits have been possible due to many innovations in value chain management, wherein many links in production to consumption have been addressed. In this process many issues have emerged varying from region to region, and at times, from farmers to farmers. The technologies which are becoming important are value chain management, plant health management, bunch and fruit management and plant architectural management to achieve higher land productivity, in the scenario of climate change. Sharing of knowledge is, therefore, inevitable to get the targeted production for meeting consumers needs and increased farm profitability, and also address the challenge of producing more with less. Integration of shared knowledge of science and technology in consonance with socio economics could be an approach to refine region specific technology adaptable at farm level, complimented with value chain management, utilizing the power of information technology. In this background, the workshop will examine the production and utilization scenario of banana and pomegranate, having inputs from the stake holders, especially the farmers, to develop the strategies for value chain management and farm profitability enhancement, a way forward for doubling the income of the farmers.





Introductory session

Focus of the workshop was to discuss the technological changes in banana and pomegranate, which have modernised the production and value chain management and empower the farmers with new knowledge, so that they can enhance their profits and reduce the risks. The workshop started with a welcome to, Dr. H.P. Singh, Former DDG (Horti.), ICAR and Chairman, CHAI, New Delhi and Sri. Chiranjiv Choudhary, IFS, the Hon'ble Vice-Chancellor, Dr. YSRHU & Commissioner of Horticulture and Sericulture,

Accordingly, **Confederation of Confederation of Horticulture Associations of India (CHAI)** organized one day **Knowledge Sharing Workshop on Tropical Fruits-banana and pomegranate**, in collaboration with **Dr. YSR Horticultural University**, Venkataramannagudem, Tadepalligudem, West Godavari, AP, Jain Irrigation Systems Ltd, Jalgaon and **ASM Foundation**, New Delhi, at **Hotel Masineni Grand**, Anantapuramu, A.P., on 5th November, 2017. The workshop deliberated on the issues in the thematic areas across of 2 technical sessions, besides introductory and valedictory sessions. Each session had panel of experts representing scientists, farmers, policy planners, industries and field functionaries. Subject in each session was introduced by identified experts and discussions were moderated to arrive at logical conclusion. The workshop was participated by experts to deliver expert advice and 260 farmers from Rayalaseema districts (Kadapa, Kurnool, Chittoor & Anantapuramu) of A.P, Telangana and Karnataka states. Scientists from Indian Institute of Horticulture Research, Bengaluru, Karnataka, National Research Centre on Banana, Trichy, Tamil Nadu and Dr YSR Horticultural University, besides District officers and field officers of Department of Horticulture and A.P Micro Irrigation Project (APMIP), subject matter specialists and field functionaries of JISL and Gromore fertilizers, teaching faculty & students of Sri. Krishna Devaraya College of Horticultural Sciences (SKDCHS), Anantapuram, attended the workshop.



Government of A.P, the Chief Guest of the functions, and delegates to the workshop by Dr. J. Dilip Babu, Director of Research, Dr. YSRHU. He also extended a warm welcome to Sri G. Veerapandiyan, District Collector & Magistrate, Anantapuramu, Dr. K. B. Patil, Senior Vice President, JISL, Jalgoan & National Organizing Secretary, Dr. Prakash Patil, Project Co-ordinator (Fruits), Dr. K. Purusotham, Former Director of Research, Dr. M.L.N.



Reddy, Dean of Horticulture, Dr. K. Gopal, Comptroller of Examinations, Dr. YSRHU, Dr V Kumar, principal Scientist, NRCB, Trichy, Sri. M. Venkateswarlu, Project Director, APMIP, Anantapuramu, Sri. B.S. Subbarayudu, Deputy Director of Horticulture, Anantapuramu, Sri. Narasimhappa and Sri. N. Ram Mohan Choudhary, progressive farmers. A heartily warm welcome was extended to farmers from across the state and other states. Dr Dilip Babu, briefly mentioned about the initiatives taken by the University to produce seeds and plants of improved cultivars and technologies, which has improved the farmers profitability. Banana has been important in the state, and the University is working at Kovvur centre, but now pomegranate has been expanding in this region and research is done at Anantapuramu. In the process of development many issues have emerged which is confronting the production, especially diseases and production system management. Therefore, this workshop is timely to discuss and provide new knowledge to the farmers. This calls for the technology not only for production but knowledge on suitability of land for planting and understanding of weather for flower regulation in pomegranate, and it is hoped that farmers will be highly benefited through interaction in this workshop.

After prayer and lighting of lamp, Dr. K. B. Patil explained the importance of conducting workshop on Banana & Pomegranate in Anantapuramu, a fruit bowl of Andhra Pradesh. He also explained, how the past workshops conducted by the CHAI has empowered the farmers with new knowledge, leading to diffusing and adoption of technologies for improving production and profitability. He emphasised on the use of disease free quality planting material, efficient system of nutrients and water management, plant and soil health and shared his experiences from India and abroad. He also explained about technological changes which have improved the productivity and profitability of farmers. Mr Patil further emphasised on use of tissue culture plants in pomegranate to contain the disease spread. JISL is committed to serve the farmers by providing new technology, inputs and services, he said. Finally, Mr Patil thanked the honourable Vice chancellor for hosting such an important workshop for the benefit of the farmers and expressed his gratitude to CHAI.

Sri G. Veerapandiyan, while explaining the activities of horticulture development in the district, advised the farmers to use organic fertilizers instead of chemical fertilizers, as organically produced products fetch premium price for horticulture produce in the market. He also stated the importance of farm ponds in dry land horticulture system and the measures to prevent evaporation losses from farm ponds by citing examples of a successful farmer in Anantapuramu district. He requested the organisers

of the workshop to conduct more of such events in future for the benefit of farming community in the district.

Sri Chiranjiv Choudhary, Chief Guest, in his inaugural address, thanked the chairman, CHAI for organising knowledge sharing workshop on these two important commercial fruit crops in Anantapuramu. The district is identified as Horticulture Hub of Andhra Pradesh. Both the Central and the State Governments are providing all the necessary help to the farmers. Focus has been given for improving infrastructural facilities and up-gradation of farm facilities and also farms' knowledge with new skills. He further added that the farmers are enterprising and innovative in the district and, explained about his visit to farmers field, where integrated approach for production and value addition has been adopted. He also gave a brief account of work being done by the Department of Horticulture and also the University and said that all the efforts are being made to enhance the income of farmers. He further said that banana is an important crop of the state and pomegranate is becoming a commercial crop due to higher returns, which have to be sustained and new gains have to come through technology, wherein such workshops are inevitable. He urged the organisers and scientists to bestow more attention on farmer field problems, so that the some meaningful and useful conclusions can be drawn out of the deliberations.

Dr. H.P. Singh, in his presidential address expressed happiness in organising the workshop on tropical fruits- pomegranate and banana, at Anantapuramu, the district with great scope for the development of horticulture. He said that India is in the midst of a horticultural revolution, referred to as **Golden Revolution**, evident from quantum jump in production, productivity, export and availability of horticultural produce. While India has crossed the hump relating to food security, and has achieved higher production of horticultural crops, over the years, but under employment and disguised unemployment besides the challenge of nutritional security and farmers' distress continues. Earlier, policy, programme, technological changes and initiatives were designed and implemented for achieving higher production through improving productivity parameters, as it was important to achieve prime concern of self- sufficiency in food, a primary concern than looking to the challenges of producing and helping the farmers in achieving improved farm income. Government is now committed to the doubling of farmers' income in coming next six years. In this context, this workshop assumes greater significance. Efforts made through research and development and innovations of the farmers in horticulture have been a



key driver for this development, where in more than 6 percent of growth rate, annually, has been achieved. However, challenges are to produce over 360 million tonnes of horticultural produce by 2020, with declining land, water and threat of climate change, having commitment to doubling the farmers' income. This calls for utmost attention. Banana and Pomegranate are important fruit crops contributing to growth of horticulture and income of the farmers. Due to technological intervention and mission mode programs of development there has been a quantum jump in production and profitability. But, still, continues a gap between potential and realisation. Therefore, CHAI has been taking an initiative to reduce the gap through sharing of knowledge. In one of the workshops, conducted at Coimbatore in the year 2014, a farmer, Mr Ram Mohan, expressed a need for holding workshop in Anantpur. I had ap-



proached, the then Vice chancellor, Dr B M Reddy, but it could not happen. I must appreciate and thank honourable vice-chancellor Mr. Chiranjiv Chaudhary, for taking hosting this important workshop for the benefit of farmers. His benign presence is inspiring for all of us and is a testimony for his commitments to the horticulture.

As I know, Horticulture is a priority of the state, con-



sidering its role in development, a lot of initiatives have been taken, yet potentiality exists and we can achieve much more under visionary chief minister and dynamic commissioner. APMIP and effective implementation of mission are few examples of the work being done. However, we may have to revisit the programme to meet a dynamically changing scenario. AP can also initiate a programmes and project in micro Irrigation, as is being done in Karnataka. There is also need for implementing land aggregation law, as done by few of the states, based on model act announced by NITI Ayog. Time has come to act as a facilitator by bringing needed reforms in horticulture including policy, and continue to provide a leadership role.

India is a largest producer of banana and AP contributes significantly in production. There has been dramatic changes in production technologies which needs large scale adoption. Use of tissue culture plants, bunch management and mat management are important to get marketable quality banana, both for domestic and export market. This, we will discuss in the technical session. Although pomegranate is a Mediterranean fruit but dynamics of technological changes has made it possible to grow this crop successfully in tropics and, the country has emerged as a largest producer and exporter, and it provides very high economic returns, if cultivation is done systematically. Dr Singh described, in details, the practices including flower regulation and value chain management. He further emphasised on differential management of pomegranate, depending upon soil and weather conditions. **He stressed on use of tissue culture plants, which is cost effective and highly remunerative compared to air layered plants, because it is true to type, gives commercial yield in only two years, fruit quality is superior and above all incidence of disease is negligible.** Fertigation, with balanced nutritional schedule is a best option and a solution to improve pomegranate yield and quality. He also described about insect pests and diseases affecting production and quality and emphasized on integrated management. Dr. Singh, while concluded his presidential address expressed his optimism about the outcome of the workshop and thanked honourable Vice chancellor and his dedicated team for hosting this workshop. He expressed his confidence that farmers will gain new knowledge to enhance farm income.

The inaugural session concluded with a felicitation to the chief guest and chairman and invited guests The inaugural session concluded with the vote of thanks by Dr. B. Srinivasulu, Local Organizing Secretary of the Workshop. He proposed a vote of thanks to the chair, chief guest, delegates, scientist and farmers and appreciated the efforts of CHAI in organising such an important workshop for the benefits of the farmers.

TECHNICAL SESSIONS

Technical Session- 1- New paradigms in Banana production and Value chain Management

This session was chaired by **Dr. J. Dilip Babu**, Director of Research, Dr.YSRHU, Venkataramannagudem and was co-chaired by **Dr. Prakash Patil**, Project Coordinator (Fruits), IIHR, Bengaluru. and Dr. K.B. Patil, JISL, Jalgaon. **Dr. Soman**, Senior Vice President & Chief Agronomist, JISL, Jalgaon, **Dr. K.T. Venkata Ramana**, Zonal Research Head, CRS, Tirupati, **Sri. B.S. Subbarayudu**, Deputy Director of Horticulture, Anantapuramu and **Mr. Ram Mohan Choudhary**, Progressive Farmer, were the expert on panel to share their experiences. The conveners were **Dr. K. Bhagwan**, Principal Scientist & Head, HRS, Kovvur and **Sri. Ravi Chandra Reddy**, Agronomist, JISL, Nandyal.

The session started with a brief introduction by the chair and co-chair, thereafter experts presented their keynote papers using .In this session, 5 keynote presentations were made by eminent scientists.

Panelist expressed their views on presentation and provided their opinion and suggestions in the theme area. Dr. V. Kumar, Principal Scientist from NRC on Banana, Trichy, Tamil Nadu, in his presentation, Technological changes in production and value chain management of Banana explained the importance of disease free quality plant material and informed about certification system and also about the standards developed for certification. He stated that, accreditation system for tissue culture plants and standards for tissue culture industries have been developed for implementation through accredited agencies. He stressed on adoption of modified high density planting (MHDP) which resulted in 30% more plant population and 30-40% enhanced yield. The micronutrient mixture (Iron, Zinc, Copper, Manganese and Boron), formulation for banana, developed by NRCB is available in the name of Banana Shakti, which improves yield by 15-20 per cent. If the soil pH is more than 8.5, foliar spray of 2% (2 kilograms/100 litre of water) Banana Shakti with proper wetting agent at 4, 5 and 6 months after planting is advisable. If the soil pH is less than 8.5, soil application of 10g Banana Shakti per plant at 3 months after planting is beneficial. Fertilizer adjustment equations were developed (STCR approach) in banana to boost up yield. He also stated the importance of weed control and suggested that the crop should be free from weeds till 6 months after planting. For nematode management, he advised farmers to grow marigold as intercrop. The importance of bunch trimming, demanding, peduncle wrapping, bunch feeding and removal of male bud in improving the yield in banana was also explained. He stressed on use of tissue culture plants, high density planting, fertigation and bunch management to maximize the quality production of banana.

Dr. M. Loganathan, Scientist NRC on Banana, Trichy in his presentation – **Disease management in banana**, explained the symptoms of four viral diseases viz., *Banana bunchy top virus* (BBTV), *Banana Bract Mosaic Virus* (BBrMV), *Banana Streak Virus* (BSV) and Infectious chlorosis (*Cucumber mosaic virus*) that affects banana crop. Use of clean planting material from reliable sources, sanitation and checks on vectors are option to manage the virus diseases. He also suggested to remove infected plants to contain the disease. Dr. D. V. Sudhakar Rao, Principal Scientist (PHT), IIHR, Bengaluru in his presentation – **Post Harvest Management of Banana** highlighted the importance of post-harvest management and suggested that the fruit bunches should be harvested carefully without causing any damage and fruit hands should not be stacked up while transporting. Proper cushioning between the hands should be provided. The fruit hands should be cut and washed carefully under running water to get rid of latex and dust. For transport of hands, plastic crates should be used. Dr. P. Soman, Chief Agronomist, JISL, Jalgoan in his presentation – **Fertigation in Fruit Crops** stressed the importance of fertigation. He discussed on jar test, based on which farmer can take a decision, whether fertilizer can be used for fertigation or not. He said fertigation schedule has been developed for banana and is effective. Invariably, fertigation gives a saving of 40-50 % in fertilizer, besides saving water. Water soluble fertilizer is more effective for quality production.

Dr. K.B. Patil, vice-president, JISL, Jalgoan shared his experiences on Banana production and value chain management from In-



dia and abroad, as he has seen banana value chain management in more than 15 countries. He emphasised on Virus indexing to get virus free planting material through tissue culture and said that JISL has effective system of indexing, where no plants goes out without ensuring its freeness from viruses. He stated that March, April and May are the main planting months in Anantapuramu and Kadapa districts, where the high temperatures during these planting periods result in mortality of plants because of crop microclimate which favours the incidence of bacterial (Erwinia) soft rot and others. This needs protection from heat through creation of microclimate. He suggested for the placement of lateral of drip at 50 cm distance, so that productivity can be increased. He discussed the importance of fertigation for increased production. He also highlighted bud injection after 50 % bunch emergence for thrips control. Bunch spray should be done after removing florets. He also suggested the use of ethylene absorbent while fruit packing so that ripening can be delayed. He answered all the queries of the farmers.

Dr Prakash Patil, co-chairman, explained about the work being done in coordinating system and said that, due to technological adoption, lot of changes have happened, but to produce export quality banana, much is needed to be done, as pre-harvest factors influence post harvest quality of fruits. He urged the farmers to adopt technologies which gives high yield of quality fruits as quality consciousness is increasing. Thereafter, panelist expressed their views. Interactions were held, which was moderated by Dr K Bhagwan in local language. He also shared his experience in banana. While concluding the chairman, Dr. J. Dilip Babu, thanked the experts for their presentations, Co-chair, panelists, convener for their expert views and the delegates for interacting to make the session lively and fruitful. He further added that banana has been grown traditionally in the state, but with the introduction of G-9 tissue culture plants, fertigation and management strategies, it has become more profitable. Further more income can be generated by adoption of new technologies for quality production. He suggested to adopt pack-house concept for value chain management. The chairman CHAI presented a certificate of appreciation to chairman, co-chairman, speakers, panelists and the conveners and thanked them for their efforts.

Technical Session-2- New paradigms in Pomegranate production and Value chain management

This session was chaired by **Dr. Ashok Mishra**, Former Dean, JAU, Junagadh & Senior Agronomist, JISL, Jalgaon. **Dr. K. Puroshotham**, Former Director of Research, Dr. YSRHU and **Dr. M.L.N. Reddy**, Dean of Horticulture, Dr. YSRHU co-chaired the session. **Dr. Anuradha Sane**, Principal Scientist, IIHR, Bengaluru, **Dr. S. Sriram**, Principal Scientist, IIHR, Bengaluru, **Dr. P.V.R. Reddy**, Principal Scientist, IIHR,



Bengaluru, **Dr. B. Srinivasulu**, Senior Scientist (Horti.) & Head, HRS, Anantapuramu, **Dr. G. Manjunath**, Senior Scientist, UHS, Bhagalkot **Mr. M. Venkateswarlu**, Project Director, APMIP, Anantapuramu, were on the panel of expert in the session. The conveners in the session were **Dr. K. Subramanyam**, Principal Scientist & Head, HRS, Mahanandi and **Dr. K. Chandrasekhar**, Assistant Project Director, APMIP, Anantapuramu.

This session started with a brief introduction by the chair and co-chairs, thereafter experts presented their keynote papers using. In this session, 4 keynote presentations were made by eminent scientists. Panelist expressed their views on presentation and also shared their experience. Effective interaction were held, which was moderated in local language.

Dr. K. B. Patil, JISL, Jalgoan discussed on “**Dynamics of technological changes in production of pomegranate**” and suggested that June to March months are good for planting. Planting during summer months results in shock for plants. Raised beds planting and mulching prevent water loss. He also highlighted that honey bee population should be maintained in orchards for good pollination. Water shoots should be removed immediately. Butter paper covering of fruits helps to prevent sun-scald and fruit sucking moth problems. He also suggested the removal of thorns on branches to prevent damage to fruits. He also described about the spread of disease due to aird layered plant, which carries the disease and suggested for the use of only tissue culture plant which are true to type and free from diseases, He also shared his experiences from Spain and said that they produce excellent quality fruits by practices like balanced use of nutrition, training and pruning, thinning of flowers to maintain only the number, as per available leaf area and bagging the fruits.

Dr. G. Manjunath, Senior scientist, UHS, Bhagalkot, in his presentation, **Disease Management in**



Pomegranate, described various diseases causing damage to pomegranate and said that bacterial blight has become a cause of concern in most of pomegranate area, which is spreading due to use of infested planting material and is becoming devastating, if condition are favourable for inoculate built up and there is a nutritional imbalance. He described in details the symptoms of wilt and blight and said that with raised bed planting, balanced nutrition, crop load management, disinfection of orchards and timely spray with Bordeaux Mixture, alternated with broad spectrum fungicide can contain the infection. He suggested to repeat the spray if it rains within

6 hrs after spray. He discouraged the use of gibberilic acid during fruiting stage as it makes fruit more susceptible to the diseases. He also suggested the use of IHR consortia to control the diseases. He advised pomegranate growers to go for hasta bahar crop as it is free from bacterial blight incidence. He also answered the queries of the farmers. Dr B. Srinivasulu, in his presentation, **Emerging issues in Production & Value Change Management of Pomegranate-Retrospect and Prospect**; gave a details on pomegranate production in the state and said that the university is engaged in pomegranate research through All India Coordinate Project on Arid Fruits. He said that Bhagawa among several varieties tested the performed the best although it takes little longer time. He also suggested for the use of tissue culture plants, raised bed planting, canopy management and protection against the pest and diseases. He suggested to go for lager size fruits through flower thinning and management of nutrition including micronutrients.

Dr. Ashok Mishra, the chairman of the session, presented his experiences in disease management and said that in Gujarat and Rajasthan, wherever tissue culture plant has been used by the farmers, disease is not a serious constraint. But the farmer who have used air layered plants had problems of both disease and nematodes. Therefore, fresh planting should only be done with tissue culture plant from reliable source, as performance varies with the source of planting material. Raised bed planting, orchard sanitation, balanced use of fertilizer and proper stressing of plants during flower regulation should be practiced. He provided details on disease and nematode management and stressed on pruning of severely infested plants to reduce inoculum load. Thereafter co-chair and panelists expressed their views and the farmers interacted with experts. While concluding the chairman, Dr Ashok Mishra, thanked the experts for their presentations, Co-chair, panelists, convener for their expert views and the delegates for interacting to make the session lively and fruitful. He further added that pomegranate has become high income generating fruit crop and is a boon in arid area but, avoidance of any operation leads to loss of crop and orchard become unremunerative. He advised for use of tissue culture plants from reliable source, planting on raised bed, creation of good frame work of plant for better light penetration, timely operation, use double laterals for fertigation, flowering and fruiting regulation and pack-house concept of value chain management, At the end the chairman CHAI thanked the sessions' chairman, co-chairman, speakers, panelists and the conveners and presented a certificate of appreciation for their efforts.

Plenary and Concluding Session

The plenary session was chaired by **Dr. H.P. Singh**, Former DDG (Horti.), ICAR and Chairman, CHAI, New Delhi and co-chaired by **Sri. Chiranjiv Chaudhary**, IFS & VC, Dr. YSRHU & Commissioner, Department of Horticulture, A.P., **Dr. J. Dilip Babu**, Director of Research, Dr.YSRHU, **Dr. K.B. Patil**, Senior Vice President, JISL, Jalgaon, **Mr. M. S. Prasad**, Senior Agronomist, Hyderabad., and **Dr. Ashok Mishra**, Senior Agronomist, JISL, Baroda were on expert panels. Convener in the session were **Chetan Gulave**, Agronomist, JISL, Jalgaon and **Dr. P. Deepthi**, Scientist (Plant Pathology), HRS.

Dr. K.B. Patil extended a warm welcome to chair, co-chair; expert panels, scientists and farmers and briefly presented the outcome of the deliberations and discussion, held in two technical sessions. He said that there has been lot of technological adoption by the farmers, yet there are gaps which can be addressed through timely training and creation of infrastructural facilities, Dr. K.B. Patil stressed the need for the supply of quality planting material in both the crops and also the need for production of quality fruits. He also thanked Sri. Chiranjiv Choudhary for providing whole hearted support for the successful conduct of programme. After detailed discussion and interaction with panellists and farm-



ers, recommendations were adopted for implementation.

Sri. Chiranjiv Choudhary in his remarks thanked the organizers for conducting workshop on banana and pomegranate in Anantapuramu, to share the experiences between growers and scientists. He informed the farmers regarding subsidies on farm-ponds and pack houses provided by the government and advised them to avail these facilities and practice all suitable technologies for improving yield and quality of produce. He requested the organizers to bring out a publications on these two crops by covering the topics and lectures delivered by the scientists.

Dr. H. P. Singh, in his plenary lecture, briefly enumerated the needs for linking and synergising some of the issues which are constraints in value chain management of pomegranate and banana. He stressed on establishment of pack house for cool chain management of produce and suggested that Farmers may be sent for training at JISL, Jalgaon. He also suggested to have Knowledge Sharing Workshop on other important commodity at different locations. Need for advanced research to match the emerging scenario was also emphasised. Finally, he thanked the honourable vice chancellor, director of research, scientists and representative of the Department, JISL, and all the farmers in making this workshop a success and developing useful recommendations.

Dr. B. Srinivasulu, Local Organising Secretary of the workshop profusely thanked the Dr. H.P. Singh, who is an architect to conceive and organise this workshop at Anantapuramu,. He thanked the Chief Guest, Guest of Honour, Scientists of IIHR, NRC on Banana and Dr.YSRHU. Officials from Department of Horticulture and Jain Irrigation Systems Limited, Progressive farmers from Andhra Pradesh, Telangana and Karnataka, representatives from inputs agencies, students and staff of SKDCHS, Anantapuramu were extended a vote of thanks. Print and Electronic media was also thanked by him.

Brief outcome of the workshop and recommendations

- **General recommendation**
- There are many issues, which needs attention immediately to sustain the production. There-

fore, knowledge sharing interactive workshop is inevitable and need to be held at different location in a regular intervals.

- There is a need for continuous up-gradation of farmers knowledge through training and visit to make them comparative. The Department can consider for sending the farmers for training at JISL Jalgaon, as they have started export of banana.
- University should refine each of the emerging technologies for its adoption by the farmers in varying agro-climatic conditions and provide technology support. Since Anantpur has emerged as hub of Horticulture, HRS may be upgraded to take up needed research and development. This would need man power strengthening and better infrastructure for modern Horticulture
- The Government may think of implementing micro-irrigation in project mode, as being done in few district of Karnataka, especially in rain deficient districts. This would help in enhancing water productivity and farmers' income.
- Since, at many farms, cultivation as done by farmers taking land as lease, but they are unable to avail support of the Government. Therefore, there is a need for reform in land tenancy law . NITI Ayog has come out with model law. This may be adopted in the state.

b. Banana production and value chain management

- Production system managements including bunch management are important. Pre-harvest quality and efficient post-harvest management ultimately determine the quality assurance for consumer. Admittedly, pre-harvest practices have major role to play for quality of banana. In pre-harvest practices, besides the cultivar, plant architectural management, balanced use of nutrients including micro-nutrients, water quantity and quality, protection from diseases and physiological disorder, bunch management for appropriate size and colour of fruit and time of harvest are some of the factors which determine the quality. Work has been done on these aspects, which may require to be implemented with refinement, depending upon agro-climatic conditions and cultivar.
- Tissue culture plants have been successful in improving the production, reducing the soil borne diseases and nematode and above all, bringing uniform stand and earliness in harvesting. The success of tissue culture plants have been guided by effective monitoring of quality, in terms of its freeness from viral diseases through self-certification system utilising the facilities of accredited laboratories. Therefore, it should be mandatory for the farmers to take plants from the sources, which have been certified for freeness from diseases and have fidelity tests performed. .
- Key issues that need to be addressed to sustain banana production facing are, water availability, salinity, extreme temperatures and nutrient use efficiency. Banana crop can withstand a moderate level of abiotic stress. But there is a definite trade off for stress and yield. Instead of losing major yield it can be reduced through earlier correction of abiotic stress. Therefore planning is very important before unfavourable conditions. Taking plantation in areas where abiotic stresses are real concern should be avoided. Continuous research on various aspects of abiotic stresses in the present climate changing scenario to sustain the productivity should be taken up .
- Mulching with HDP and fertigation system have proved highly beneficial and require to be promoted. Therefore, invariably banana should be grown under fertigation and mulching to

save water, nutrients and losses due to disease. A systems approach to reduce the cost of production offers considerable scope and need to be addressed.

- Soil health management is yet another area of importance, requiring augmentation to enhance health status of the plant, which in turn improves resistance to biotic and abiotic stresses. Soil health is most important for optimising the production. Soil pH and level of organic carbon have to be maintained through suitable amendments. A clear analysis of the dynamics of the existing systems in the area of soil health, soil moisture, microflora, their antagonistic and synergistic interactions, fate of applied nutrients, solar radiation profile etc. would open up. Micro level manipulation in water harvesting, soil conservation, organic matter generation, recycling, supplementing with favourable microflora is expected to enhance the production and productivity of banana substantially.
- Proper mat/clump as well as bunch management is very much essential in order to harness higher yields of quality fruits and also for enhancing input use efficiency. Maintenance of optimum source-sink relationship is an important pre-requisite for any commercial banana plantation as it not only determines higher fruit yield but also ensures higher returns to the banana growers and better quality fruits to the consumers
- Banana is invaded by large number of insect and pests. Some insects are vector for the transmission of diseases, while, some insects like thrips spoil the quality. Pests like, weevil causes direct effect on plant health causing the loss of plants and production. These insects must be managed by integrated pest management including biological control. To promote technique of bio intensive pest management, training support for large scale production of biological material would be essential.
- Fungal and bacterial diseases cause serious losses to banana. Leaf spot diseases, Ervinia rot, and fusarium wilt are notable. Management practices developed for this disease need to be tested and demonstrated for large scale adoption by the farmers.
- Fusarium wilt tropical race 4, having is reported in India also. But situation is not alarming. Therefore, all the caution must be taken while resourcing planting material. Single crop cycle will be avoidance practice for this disease. Thus it be adopted.
- Promoting pack houses and incentivising banana based processing industries would help in price stabilization by taking out excess sup-



plies from markets during glut periods. The industry, which will, additionally provide employment opportunities and improve the livelihood and standard of living. These products have to be popularized, through large scale demonstration, appropriate marketing strategies and support to the entrepreneurs.

- To reduce the losses and provide standard quality of fruits for marketing, both for domestic and export market, pack houses have to be established, with all the facilities for grading, packaging, ripening and storage. The technologies for pre harvest and post-harvest management should be demonstrated for its adaption.
- Since pre-harvest factors determine the post-harvest quality, which has to be determined based on consuming market. Banana production and post-harvest management has to be exhibited as an integrated approach, in the form of value chain management, adding value in chain of production till it reaches to consumers.
- Pseudostem waste in banana plantation could be effectively utilised for banana fibre and many other products. The pseudo-stem liquid could be used as nutrients and fortified pseudo-stem liquid has potential to increase yield in many crops. The vermi-compost made after extraction of the fibre from pseudo stem has high level of potassium. These technologies should be popularised.

Pomegranate production and value chain management

- Increased interest in phytonutrients in pomegranate and its impact on health has increased the demand, both in domestic market as well as export. At the same time, well managed plantation has proved to be highly remunerative. Resultantly, area is expanding under pomegranate and new area are emerging in non traditional regions. Therefore, to sustain and increase interest in pomegranate, it is essential to continue innovations and provide policy support and also financial support for infrastructure.
- The preference of consumers for cultivars with less acid or softer seeds is also compelling consideration of more diverse cultivars, which should broaden consumer interest. These wonderful properties have to be combined with a food and food supplement for health label to sustain the demand so that farmers can get better returns. Therefore, innovation must continue to develop newer cultivar to sustain the interest in pomegranate.
- Pomegranate has been propagated by cuttings or air layer. Recently, tissue culture has been found successful and has been adopted by farmers from across the country, as tissue culture plants are precocious in bearing, produces higher yield of quality fruits, and plants are free from diseases. This technique require to be promoted vigorously not only to increase yields, but to check the disease spread. As a policy, new area should not take air layered plants, which are a major source of disease, but only tissue cultured plant, a clean material, should be taken as planting material
- Plant architecture and it's management is essential to harness the optimum solar energy and avoid diseases to improve the production and quality of fruits. Various architecture and management practices are followed by different farmers, depending upon location, soil type and cultivars. Very little scientific work has been done with respect to light interception to optimise the production. Therefore, there is an urgency to compare different models in the farmers fields for developing strategies for plant architecture and its management and advocate in

regionally differentiated manner.

- Pomegranate needs optimum nutrients and water. Reduction in supply of one or other nutrients become detrimental to yield and quality, and susceptibility to diseases gets aggravated in absence of balanced nutrition. Similarly, water management is critical to achieve higher productivity of quality fruits. Differential management of water is needed at different stages, vegetative phase, reproductive phase and maturity stage, to harness the maximum potential. Therefore, fertigation should be followed which may be refined to suit to different conditions depending on soil and crop load.
- Area with potential infestation of bacterial blight should avoid mrigbahar crop at least for few years in disease prone areas with heavy summer rains. To reduce the inoculum build up, orchard sanitation like removing fallen plant debris, drenching with bleaching powder in the basin of tree are recommended to contain the disease. Prophylactic sprays of Bordeaux mixture (1%) altered a broad spectrum fungicide at 20-25 days interval, depending on disease present in the orchard or neighboring orchards, should be followed.
- Harvesting, handling, storage and marketing are some important aspects which require better understanding to make pomegranate sustainable. This needs appropriate infrastructure for handling of pomegranate. Establishment of pack houses at centers with required infrastructure may be done. Farmers may start growers' associations, to facilitate Value Chain Management for improved profitability through shared knowledge and infrastructure.
- Utilisation of plant biomass for production of value added products from pomegranate is the major challenge ahead. The competitive market economy, not only depends on improvement in production technology, but also to development of post harvest management system to enhance shelf-life, retain quality of the fruit and reduce post-harvest losses. An integrated system, considering both crop and post-harvest management needs to be evolved and adopted.
- There is a potential for increasing the pomegranate export to different countries, besides meeting the domestic demands. India has advantage to ensure the supply to international market throughout the year, due to multiple sessions of bahar (Ambia, mrig & hasth bahar). In India, the peak production season is during December – March and it continues up to June-July. Thus, India can export pomegranate from February to July when there is less competition from other countries. To enhance export, increasing production of exportable quality fruits and providing post harvest handling facilities



are required to be a priority areas. Quality standards for international market have to be improved to step up the export of the fruit.

2. Support to Conference / Workshop as Knowledge Partner

During the year, 2017-18, CHAI partner in organisation of two conferences namely National conference, Junagadh, 28-31st, May, 2017 and Organic farming at Delhi. CHAI also partnered a Kisan Sangosthi-2017. Organised by ASM Foundation, Pusa on 3rd September.

2.1 The CHAI partnered in National Conference on **Technological Challenges and Innovations in Agriculture for Enhancing Farmers' Income**, organised by ASM Foundation, New Delhi, in association with JAU, Junagadh, at JAU, Junagadh, Gujarat, from 28th to 31st May, 2017. The conference had a collaboration of JISL, Jalgaon; CHAI, New Delhi and TAAS, New Delhi. The Conference was inaugurated by Padma Bhusan Dr. R.B. Singh, Chancellor, CAU, Imphal and Former President, NAAS, and was presided over by Dr. A.R. Pathak, Vice Chancellor, JAU, Junagadh. Guest of honour in inaugural function of the conference were Dr. A.K. Srivastava, Member, ASRB; Dr. S.K. Malhotra, Agriculture Commissioner; Dr. G. Trivedi, Former VC, RAU; Dr. H.P. Singh, Former DDG and VC, RAU; Mr. Kamal Taori, IAS, Dr G. Trivedi, Chairman ASM Foundation and former VC, RAU and Dr. R.G. Agarwal, Dhanuka Agritech. Dr. H.P. Singh delivered a keynote address on the theme area of the conference. During the conference various





awards of ASM Foundation as well as CHAI were conferred on selected individuals and organisations - Amit Krishi Rishi Award was conferred on Dr. Punjab Singh, President, NAAS (Absentia); Amit Padam Jagriti Award on Thirth Agro Limited (Shaktimaan); Amit Prabudh Manishi Award on Dr. A.K. Srivastava and Dr. R.B. Lal (Absentia) and Mehta Foundation Award was conferred on Shri G. Karunakaran, Sr. Scientist, IIHR. The CHAI Awards conferred were CHAI Honoured Fellow on Dr. R.B. Singh and Dr. Trilochan Mohapatra (Absentia); Honorary Fellow of CHAI on Dr. N.S. Rathore (Absentia), Dr. J.S. Parihar, Dr. N.N. Singh (Absentia), Dr. K.V. Peter and Dr. V.V. Sadamate. CHAI-Life Time Achievement award was conferred on Dr. K.V. Peter. CHAI- Ramnandanbabu Award was conferred on Shri Dharmay Prasad Singh, Progressive grower; Padma Bhusan R.S. Paroda Award of excellence on Dr. Anil B. Patil; Padmasri B.H. Jain Award on Dr. Ashok Mishra; JISL Fellowship on Dr. R.C. Srivastava (Absentia).

During the inaugural function publications of ASM Foundation and CHAI were also released which included **Shodh Chintan Vol.9 (2017)**, **Book of Abstract (2017)**, **Annual Report of ASM Foundation (2017)**, **Proceedings of Conferences-2016, Award and Awardees**, and **Year Book of CHAI and CHAI-Award and Fellowships**. A soft copy of all the publications were also released and distributed. During award and valedictory function Shri Purushotam Rupala, Chief Guest, delivered a valedictory address and conferred Amit Udyan Ratna Award on selected farmers from across the country. He also honoured the parents of Lt. Amit Singh for their contributions in building the nation through various activities of the Foundation. The conference was appreciably successful in terms of participation, technical contents and outcome. More than 450 delegates including farmers and students participated from across the country. The conference was attended by many Vice-chancellors, Directors, Deans and government officials, who shared their knowledge to develop recommendations.

The deliberations were organized in twelve technical sessions, besides inaugural and plenary sessions. The plenary lectures were delivered by Dr. H.P. Singh, Dr. A.K. Srivastava, Dr. A.R. Pathak. Keynote lecture were delivered by Dr. Parihar, Dr. N.C. Patel, Dr. K.V. Peter, Dr. A R Pathak, Dr. V. V. Sadamate and many other directors, experts in their respective fields. A workshop was also organised on strategic approaches in use of agrochemicals for enhancing farmers' income, which deliberated on the safe use of pesticides for efficient management of pest and diseases. After the three days deliberation, discussion in various technical sessions, the following recommendations emanated through the dialogue and knowledge sharing:

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 in rural areas of people. Agriculture based allied sector has potentiality to play a significant role in economic development of the people.
2. Agriculture is vital for socio-economic development of the country, as it provides livelihood to half of the population supplies raw materials to industries and ensures food and nutritional security to the nation. There has been an appreciable development in agriculture through various revolutions but, challenges to enhance the income of the farmers continue to be a cause of concern. In this context, there is a need to transit from production based approach to income based approach.
3. The Hon'ble Prime Minister has emphasised on the farmers income and has set the goal for the country to double the income of farmers by year 2022. This is a great challenge, to double the income of farmers, in coming five years. However, through the commitment, it is achievable to enhance the income of farmers. Approaches needed could be to reduce the cost of production and increase margin of profit to achieve enhanced income. Efficient System of technology management, inputs, value chain management, marketing, infrastructure and above all, the policy reform could be required.
4. Approaches for doubling farmers' income would revolve around reducing cost of production through technological changes, innovations and well planned market strategies to improve margin of profit, insulating against risk by insurance and landless allied activities to compliment the farmers income. Diversification, ancillary activities and approach to aggregation of land for better operation are also needed to increase the farmer income.
5. Diversification to horticulture has resulted in unprecedented development in last decades, as the production has reached to 300 million tonnes, keeping the annual 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 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.
6. Agricultural diversification through horticulture is one of the ways to provide food, nutrition, healthcare, environmental services and is also an option for livelihood and improved income of the farmers. There is a need for diffusion of technologies with commiserating investment.

Many horticultural crops especially perennial fruit trees, spices and plantation crops have a major role to play in carbon sequestration, containing Green House Gas (GHG) and mitigating climate change. Therefore, promoting horticulture would be an option to address the challenges in agriculture.

7. Livestock and Dairy and allied activities in farming is essential for doubling the income of farmers. Well managed livestock provides much needed regular income to the farmers. Therefore, there is need for promoting the appropriate breed and management strategies including dairying to get the maximum output. Integration of dairy, aquaculture, and horticulture would be a better pathway for enhancing farmers' income, as can be seen in many parts of the country. Accordingly, efforts are needed for integrated system of management for enhancing farmers' income.
8. 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.
9. Water is critical resource in sustainable development, which is getting scarcer and meeting multifaceted uses is 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 source management, which promotes land development and management of water and related resources, for maximizing the related economic and social welfare without compromising the sustainability of vital system. Therefore, integrated system of water managements require to be promoted.
10. Water and nutrients are most critical inputs and account for major share in cost of production. With protective irrigation and balanced use of nutrients, production cost gets reduced. Therefore, micro-irrigation, fertigation and renewable energy will require more attention. Use of micro- irrigation and fertigation has to be facilitated for small and marginal farmers.
11. 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 maximize the income.
12. Integrated Nutrient Management (INM), improved planting stock, organic farming, trap crops, bio-control measures, high-tech nurseries and improved productivity has to be emphasized 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 various crops out of 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.

13. 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 have to be developed for smart management of biotic stress, on the principle of observe, measure and respond to achieve maximum output and results.
14. 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 agriculture, 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.
15. 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.
16. 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 much adapted to climate smart agriculture which will provide a high degree of diversity in the ecosystem. Therefore, work on microbes and its application in soil as well as for management of soil health have to be intensified.
17. The Govt. of India is operating, Prime Minister Krishi Sinchai Yojna (PMKSY), to achieve the convergence of investment at field level, as to enhance the productivity of water through water saving technologies more crop per drop. However, investment to the micro-irrigation is not in commensuration with the needs, as only 9 million hectares has been covered against recommended coverage of 69 million hectare. Therefore, there is need for covering more areas under micro irrigation and fertigation system to enhance the income of the farmers.
18. The science of biotechnology has scope for developing crop varieties resistant to biotic and abiotic stress, utilising marker assisted selection technique and GMO. While the benefits are clear about GMO but the policy concerned about GMO, is not allowing taking the benefit of this technology. Therefore, based on scientific information, a policy guideline is needed for GMO to harness the benefits for achieving sustainability.
19. 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, nanopheromon for insect, pests and nano sheets for packing needs have to be encouraged through appropriate investment.
20. In the scenario of climate change, there is need for new technologies to produce more with less

land and water. Aeroponics is emerging as a technology to produce seeds and plants free from the diseases. This technology is also effective 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 aeroponics to provide higher income per unit area of land and water, which can help the farmer to achieve the enhanced income.

21. Factor productivity of farm labour is declining, as cost of labour is increasing, and output in terms of precision is appreciably low. Machines and tools are known to provide precision and better output leading to reduced cost of production. Therefore, mechanisation beyond tractor has to be given more emphasis to reduce the cost of production and improve the margin of profits. This will need not only initial expenditure for farm machine and tools but a service centre also to provide required assistance to farmers. Custom hiring is becoming an important tool to provide services to the farmers. Therefore, this system has to be encouraged in terms of policy, investment and skill up-gradation to promote technology adoption by the farmers.
22. Agriculture is an integration of science and technology and its integration with information technology in consonance with socio-economics can mitigate and adapt to changes for maximum output. These integrated approaches, with philosophy of observe, measure and respond, is a smart system of management. The dynamics of smart agriculture is a measure of changes in technologies needed to address the challenges. Therefore, there is need for adoption of smart system of management in agriculture for enhancing farmers' income.
23. 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.
24. Traceability in the food is becoming an essential part for marketing of farm produce to ensure food quality and food safety. The food quality and safety assurance build the consumers' confidence in the product as well as brand. Therefore, there is need to create awareness about food safety and traceability of the farm produce.
25. Linking the farmer with markets is essential for better realization for farm produce. Various models have been practiced. However, understanding the value chain and its dynamics from a small producer perspective is limited. Having the integration with farmers' producer organization is lacking. Therefore, there is a need for strengthening farmer producer organization 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 developments needs emphasis.
26. There is need for change in land aggregation policies. The Govt. 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 for achieving needed productivity improvement in agriculture. Therefore, states must have to adopt model act of land leasing, which would help in enhancing Farmers' income

through adoption of newer technologies.

27. Farm wastes are presently not being utilized appropriately, although, there are scope to convert the farm waste into energy and many other product. Therefore, there is a need for the development of strategies, so that farm-waste could be converted into the wealth. In this context, assessment and aggregation of farm waste would be needed to attract attention of corporate sectors for investment as business. Thus, the farmers can get better price of their farm waste adding to their income.
28. 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 extension must, also focus on producer aggregation at various levels and provide forward linkages. 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.
29. 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.
30. Use of innovation and technology will help in reducing the environmental hazards and will have safety concerns of crop protection chemicals and fertilizers and also improve fertilizer use efficiency. Improved technology will help farmers in knowing when and how much fertilizer is to be used, as farmers will have critical data. This would be a way forward for climate resilient agriculture.
31. 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 agriculture 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.
32. Market reforms through electronic platforms, will eliminate middlemen by connecting farmers directly to the consumers/markets, thereby letting farmers decide the right price of their produce. This is a complex issue needing deliberation to ensure its effective functioning by addressing issues of trading rights, storage, enabling finance and also taxation having harmonized regulatory environment. Market reform and value chain management system should be such, which provide access to market and better realization 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 agricultural inputs, as well as access to adequate remuneration for the produce. This is essential to enhance farmers' income.
33. Skill empowerment of the farmers: Undoubtedly, adoption of new technology and efficient management require skills. Therefore, skill up gradation of farmers has to be done from time to time besides use of ICT for technology transfer and knowledge management.



2.2 National Conference on Organic Farming-Advantage India

Organic farming is expanding, and the market is growing, which has been helpful to both the consumers and farmers. Consumers are increasingly becoming health conscious demanding safe food for their better health. The organic food has become a viable alternative in health management of the growing population. Government of India has taken several initiatives to support the expansion of





organic farming by the farmers, through various policies and financial assistance. This has impacted the growth, leading to increasing area in organic farming systems. However, many issues are emerging in the process of development. Therefore, 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, APEDA and Ministry of Food Processing Industry. The CHAI partnered in successful conduct of the conference. Dr. H.P. Singh, Chairman, was the on chair

in technical session, and also addressed the delegates in inaugural function. The conference was inaugurated by Hon'ble Union Minister, Ministry of Agriculture and Farmers' Welfare, Shri Radha Mohan Singh. The conference was attended by more than 200 delegates, representing, farmers, scientists, industries and policy planners.

The conference started with welcome to the chief guest and dignitaries, by Mr Sandeep Jajodia, President ASSOCHAM and CMD. Monnet Group. He also extended a welcome to all the delegates, and said that ASSOCHAM is committed to agriculture through taking up issues for policy initiatives. This



conference is also one of the initiatives to create a forum for discussions on the organic farming. Organic food is a choice for healthy life. The consumers get an assurance that his food do not contain toxic pesticides, synthetic fertiliser and genetically modified organisms (GMO). The farmers also get benefitted by organic farming as it ensures improved production and better income. The conference aims to develop a perspective of organic farming, as opportunities are increasing due to increasing market. Mr. Amit Vatsyayan, Partner, Advisory Services, Ernst and Young, India, spoke on the theme

of the conference and highlighted about emerging market and said that organic market is growing at the rate of more 20%. Thus it provides opportunities for the farmers to expand the areas and harness better income from the production of produce. He also talked about the report on Indian organic market- a New Paradigm in Agriculture, and said that detailed analysis of organic farming including its potentiality in India has been presented with detailed analysis of the trend and future growth. Dr. H.P. Singh, Chairman, National Council on Agriculture and Food Security, ASSOCHAM and Chairman, CHAI, briefly outlined the initiatives taken by Ministry of Agriculture and Farmers' Welfare and Ministry of Commerce & Industry in developing standards and promoting organic farming in India. He said that organic farming takes care of human health, animal health, soil health and environmental health and provides benefit to the farmers by remunerative price for their produce. Since the market for organic produce is increasing at higher speed, as consumers have become conscious of their food. Ever increasing trend in growth in the market of organic produce and expanding area under organic farming provides opportunities, not only for the farmers but also for the industries. Activities relating with organic farming may be organic seeds, organic manure, bio chemical, labelling, branding and marketing. Mr. Tarun Bajaj, General Manager, APEDA, Govt. of India, briefly outlined the initiative taken by the APEDA in export promotion of organic produce. He told about various kind of support being provided for the export of the organically produced commodities.

A report on Indian Organic Market – A New Paradigm in Agriculture for organic farming jointly prepared by EY and ASSCHOM, was released by the Chief Guest. Thereafter, excellence award instituted by Organic India was presented to the selected farmers, entrepreneurs and industries by the Chief Guest. While speaking on the occasion Smt Neeraja Adidam, Joint Secretary, Department of Agriculture, Cooperation & Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Govt. of India, briefly outlined the various schemes of the Ministry, and said that Ministry is committed for the promotion of organic farming and she ensured about all the support to the farmers and enterprises for the promotion of organic farming.

In the inaugural address, Hon'ble Union Minister for Agriculture, Ministry of Agriculture and Farmers Welfare, Govt. of India, Shri Radha Mohan Singh, said that Hon'ble Prime Minister has been keenly interested in organic farming. Therefore, many schemes have been launched by his Govt. to promote



the organic agriculture. He also cited the examples of many farmers who have been succeeded in organic agriculture and are getting better economic returns. The Minister said that, by organic farming the farmers get better income and ensure better soil health. He suggested to discuss all the issues concerned with organic farming. To create awareness across the country, that the organic farming can help both consumers and farmers, there is a need to organise such conference in different part of the country. He desired that the ASSOCHAM may take such initiative. The inaugural Session concluded with vote of thanks to chair and delegates by Shri D.S. Rawat, Secretary General, ASSOCHAM.

The Technical Session was chaired by Dr. H.P. Singh, Chairman, National Council on Agriculture and Food Security, ASSOCHAM & Chairman, CHAI. There were six keynote presentations, describing various aspects of organic farming and raising issues for their redressal. Dr. Vandana Shiva, Founder & Managing Trustee, Navdanya Trust, talked passionately for the promotion of organic farming in reference to book written by Edward Howard in the 40s. She also presented the data where the soil health was better in the organic production system and income of the farmers was increased. Dr. Saswati Bose, Deputy General Manager, APEDA, Govt. of India, talked about the certification system in organic farming and said that APEDA is committed to ensure that certification for organic farming is available to the farmers, which ensures the quality of produce. She also indicated that organic farming certification is not a product certification but a process certification. Shri Amit Bajaj, Manager Business Advisory Services, EMST and Young India, highlighted the emerging market in organic, and said that this has to be appropriately harnessed. Shri Pankaj Agarwal, Managing Director, Treta Agro Pvt. Ltd. said about his initiatives taken to promote organic farming. Dr. Diwaker Hegde, Deputy General Manager & Faculty Member, Bankers Institute of Rural Development (BIRD), NABARD, Lucknow, described in detail about the initiatives of NABARD in promotion of organic farming and gave examples of the farmers, who have improved their soil health and are getting better income. Shri G.M. Kejriwal, Bee care India Pvt Ltd., described about his initiatives in the organic farming. Thereafter, discussion was held. Questions of delegates were answered by respective speakers.

The chairman concluded the session, stating that organic farming is an option for improving human health, animal health, soil health and environmental health. Therefore, it has to be practiced, but care has to be taken that food and nutritional security is not compromised. It was pointed out that, in sixteen, it was difficult to feed 40 crore, when India was organic. But today India is feeding 130crores people having buffer stock. Degradation of soil is largely due to imbalanced use of fertilizers and over use of chemical may affect human health. He advocated for modern organic based on science. He further added that, for the success in organic farming. concept of organic village has to be promoted, wherein the inputs could be generated in the village, so that there is minimum use of the external inputs. Emphasising on growing of the tress, raring of animals and converting the waste into wealth, he said that recycling of water, organic into organic manure by utilising vermi composting system would be essential. Finally he thanked the organiser for this initiative which will go in a long way for the promotion of organic farming capturing on emerging market.

2.3 Kisan Sangosthi, 2018 -Risk related to weather and it's Management, Mahamda, Pusa, Samastipur, Bihar, 3rd September, 2018

A one day Kishan Sangosthi of farmers was organized by ASM Foundation, in collaboration with Confederation of Horticulture Associations of India, New Delhi, and Skymet, New Delhi, at Mahamada (Pusa, Samastipur) on 3rd September 2017. The purpose of the Sangosthi was to enrich the farmers with

the new knowledge about the risk related to weather and its management for improving the productivity of land. The sangosthi was attended by more than 300 farmers from different districts, namely Muzaffarpur, Samastipur, Darbhanga and Patna. More than 50 students, from the Tirhut College of Agriculture, Dholi (B. Sc (Ag.) and Agri Business Management, Pusa, DRPCA, Pusa also participated in the Sangosthi, and were the part the programme of Sangosthi.

Besides the farmers and students the Sangosthi was participated by Dr. H. P. Singh, Former DDG (Hort.), ICAR, and Chairman, CHAI, New Delhi; Dr. Gopal Ji Trivedi, Chairman, ASM Foundation and Former VC, RAU, Pusa, **Mr Kamal Taori**, IAS, Former, Secretary to Government of India, Dr. R. C Srivastava, Vice Chancellor, Dr. Rajendra Prasad Central Agricultural University, Pusa; Dr. Vishal Nath, Director, NRC-Litichi, Muzaffarpur; Dr. K.K. Kumar, Former Director NRC Litchi, Muzaffarpur, Sri Surendra Pd. Singh, , IAS, Director, Operation, ASM Foundation; Mr. Nalin Rawal, Managing Director, Skymet; Dr. G B Raturi, Former Director; CIAH, Bikaner, Sri Raghupati Singh, Social Worker, Patna; Sri K B Patil, Vice President, and Banana Expert, Jain Irrigation System Limited, Jalgaon, Mr. Vinod Anand, CEO, CHAI, New Delhi; Sri Sudhanshu Kumar, Farmer cum entrepreneur, Nayanagar and many other scientists of ICAR, and RPCAU, Pusa. Farmers from different districts were beneficiary. The occasion was also graced by Mrs. Bimala Singh, Managing Trustee, ASM Foundation, Mrs. Neeta Singh and Dr. Babita Singh, Trustee, ASM Foundation. The Sangosthi had presentation from students on patriotism. Tissue culture plant of banana, pomegranate and quality plants of litchi, Jamun and Bael were distributed.

The Sangosthi started with prayer, lighting of wisdom lamp and floral welcome of the guests. All the guests on Dias were honoured with shawl of love and affection by Dr H p Singh. Surendra Prasad Singh, while formally welcoming the guests and delegates, highlighted the concerns in agriculture and explained about activities of ASM Foundation. He also said that the Foundation continue to distribute quality seeds and planting materials for the benefits of the farmers.

Dr. Kamal Taori, IAS Former Secretary to Government of India emphasised on the role of rural entrepreneurs to create social enterprise in backward part of the country. In his address, he appreciated the efforts of the Foundation, to serve the society differently and to inculcate patriotism among youths. He also explained about mentoring of rural enterprise to boost the rural development. While addressing the farmers **Shri Raghupati Singh**, a wellknown social activities, appreciated the role of ASM foundation in connecting the farmers with the scientific organisations and the scientists to achieve technology-led development. He also shared his experience of working with CNRI, an organization of 7,000 NGOs, committed for the incubation of civil society. He said that technological adoption, use of quality seeds and planting material and innovative management are a key to success for enhancing farmers income,

Dr. Gopal Ji Trivedi, spoke about the role played by ASM Foundation for improving a quality of life in rural areas through the activities of organising the conferences, distribution of quality seeds and planting materials, honouring the innovative farmers, adopting poor students for their education and mentoring. He further emphasised on technology led development of horticulture. Mr. K.B. Patil, Vice President, JISL, Jalgaon presented in details, the current situation of banana production and utilization and described the role of quality tissue plants and fertigation, and effective bunch management to achieve the higher price of produce. **Shri Sudhansu Kumar**, progressive farmer and entrepreneurs shared his experiences in growing and marketing of litchi and explained about his initiatives of e-marking. He said that if the farmers adopt the technology appropriately, they can earn better profit. **Mr. Dinesh Kumar**, Dholi, Muzaffarpur, explained his long association with ASM Foundation and expressed his

gratefulness to the foundation for giving him opportunity to interact with the various farmers across the country, which has enabled him, to adopt new technologies for better production. He also explained about improved production system management. He thanked Mrs. Bimala Singh for providing tissue culture banana plants which has given him very high yield compared to plant he obtained from other resources.

Dr. Vishal Nath, Director, NRC Litchi, spoke on fruits production and utilisation, with a special reference to Litchi. He emphasized on nutrient, water and pest management and also explained about handling to get better price realisation. Mrs. Bimala Singh Spoke about the activities of ASM Foundation and blessed the all the students for their activities and wished them a great successes.

The questions of the farmers were answered by the experts. **Dr. H P Singh** was also requested to address the farmers. On the request, he spoke on the current development of horticulture. which has changed the life of the farmers across the country. He also shared his experiences from India and abroad, and stressed upon adoption of technology for achieving better productivity. He also urged that farmers to come forward in taking decision with planning and monitoring of his crop acquiring new knowledge.

Dr. R. C. Srivastava, VC, DRPCA, Pusa, addressed the gathering. He mentioned about various activities of DRPCA and said that the foundation can take the advantages from the University for improving the agriculture in the region. He also mentioned about programme of recognising innovative farmers, who become the faculty for dissemination of their knowledge and innovations among the students and scientists.

Thereafter, **question answer sessions** by the farmers and interactions were organized and various questions on Litchi, Mango Banana were addressed by the experts. **Dr. H.P. Singh**, Chief Advisor ASM Foundation and Former DDG (Hort.) addressed the questions of the farmers and replied to them with all their satisfactions. He also advised them to keep in touch with the foundation regarding any problems for the solutions.

3. Participation in International/Conferences/Congress and Delivery of Keynote Lectures

- 3.1. Dr. Singh, Chairman visited Dubai on 29th to 30th and participated in round table meeting organized to discuss various options for ensuring food and nutritional security. He said that the strategy has to be differently made, depending on agro-climatic situation. In arid zone he suggested to adopt the technology which requires less water. He also emphasized on green house technology, aeroponic and vertical gardening.
- 3.2. Dr. Singh visited GB Pant University to



discuss the potentially of drip irrigation in cereals on 7th May, and had discussions with the scientists regarding drip irrigation in paddy and wheat. It was reported that yield enhancement of 30-40% can be achieved through mirco irrigation and fertigation. A problem of iron efficiency in initial period was also reported which can be addressed by giving enough water for litching.

- 3.3 Dr. H.P. Singh, Chairman, CHAI participated in a conference on Indian-Israel cooperation at Indian Habitate Centre on 8th May, 2017 organized by FICCI to review 25 years of working together. He actively participation and pointed out issues which requires to be taken up immediately. The establishment of centre of excellence was also discussed. He referred to the proposal worked out for collaboration and requested that it may be re-vised.



- 3.4 Dr. Singh as a Chairman, visited Bikaner and interacted with the scientists, especially on issues related with expansion of date palm. It was noted that date palm is potential crop and currently plants are imported. He suggested for initiating breeding work and selection of new types from existing variability and creating of variability through hybridization.



- 3.5 Dr. H.P. Singh visited RAU Pusa and had a discussions on various assests on horticulture development, he also visited integrated farming system. The Integrated farming system, then established by him is doing well, which became an attraction for all who visits, RAU.



3.6 Dr. H.P. Singh was invited as guest in AP Agritech, organized by the Government of Andhra Pradesh, at Vishakhapatnam on 15-16, November, 2017. He chaired a Technical session, which discussed opportunities in horticulture. Dr. Singh, in his concluding remarks said that horticulture has to be on driving seat for development of the state as there is immense potentiality. He also pointed on the activities to be taken including precision horticulture.

3.7 on 28th August, 2017, Dr. Singh visited TCA, Doli interacted with students and delivered a plenary lecture for motivating the students. He also presented all the books written by him to the principal, for library. The students were happy, motivated by his talk and asked many relevant questions, including opportunities.

3.8 on 5th September, Dr. Singh delivered a keynote lecture on Precision horticulture in International a conference organized by IIHR, Bangalore. He said to enhance the income of farmers, precision horticulture is an option. This includes, observe, measure and respond to optimize and enhance the efficiency of inputs.

3.9 On 6th September, 2017, Dr. Singh visited the College of Horticulture to see the various activities and also a bio-diversity park. He appreciated the work of development done in college of Horticulture and complimented the principal of college. He also explained Dr. Dandil for his work on establishing bio-diversity work.

3.10 On 15th September, 2017, Dr. Singh delivered a plenary lecture in summer Institute on National Institute of Abiotic Stress Management, Baramati. Precision Agriculture and also visited the field to see the cultivation of dragon fruits. He also participated in concluding Hindi Divas.

3.11 Dr. Singh Participated in national seminar on floriculture organized in Sikkim on 16-17th February, 2018 and delivered a keynote lecture and also chaired a technical session as well as plenary session. The conference was well organized which discussed various facets.

3.12 Dr. H.P. Singh, participated in national conference-Agriculture 2022 doubling the farmers income, organized by Ministry of Agriculture which was addressed by Hon'ble Prime Minister to discuss to various issues.





He participated in discussion and said that in diversification horticulture is an option in doubling farmers income. He also said about various steps needed to achieve the goal.

3.13 Dr. Singh, as a Chairman of RAC, CPCRI, Kasagad, chaired the meeting and provided guidance. He reviewed the work done and guided the scientists on various research projects.

3.14 Dr. Singh visited Central Temperate Horticulture CISH on 14th March, 2018 and interactive meeting with scientist and provided him inputs. He suggested for high density planting in walnut and wider adoption of high density planting in apple, which is highly promising.

3.15 He also visited Sher-E-Kashmir, Horticulture University on 15th March, 2018. The University has provided high priority on demonstration of high density planting of apple and bear to achieve higher production. He also de-



livered a plenary lecture for the benefits of faculties and students. The meeting was well attended and highly interactive.



7th AGCM of CHAI

4. The 7th Annual General Council Meeting of Confederation of Horticulture of India

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 or 29 May, 2017. 56th Annual General Council Meeting of CHAI was held at 6.30 P.M. on 28th May, 2017 in the conference hall at JAU, at JISL, Jain Hills, Jalgaon, to review the progress and develop future strategic plan of activities to full-fill the objectives stipulated for the furtherance of Horticulture / Agriculture. Padma Bhusan Dr. R.B., Former President, NAAS and Chancellor, CAU, Manipur, Honored Fellow CHAI was the Chief Guest of the AGCM. The meeting started with the welcome of Chief Guest and distinguished Fellow by CEO CHAI, Mr Vinod Anand. 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 the details of financial position, informing that the CHAI has FD of Rs 65 lakh. He also gave a brief account of proposed activities in the year 2017-18. Introductory remarks of the Chairman was followed by items on the Agenda and suggestions from the various CHAI Fellows. 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 felicitous by offering shawl and a certificate of appreciation. Thereafter, the fellows of CHAI was conferred for the year 2017, to all the selected nomination. The

chairman, CHAI conferred Fellowships to selected nominees. Dr. R.B. Singh, in his remarks congratulated all the Awardee and appreciated the achievement of CHAI and assured of his assistance for the furtherance of CHAI, which is emerging as one of the important organisations for the dissemination of knowledge and portion innovative and smart horticulture. The Fellow unanimously authorised to take all the decision as he deem it fit in the best interest of the CHAI. The meeting ended with a vote of thanks Chair and aim the fellows.

5. MEETINGS OF BOARD OF DIRECTORS AND OTHER MEETINGS

5.1 Board Meetings: During the year 4 meetings of the Board of the directors were held which approved the activities, balance sheets, future plans and also the decisions taken by the Chairman in the best interest of CHAI. Since Dr. H.P. Singh is the independent Director in the Board of Director of JISL, attended all the meetings. Being Executive member of ASSOCHAM and CII, he attended the meetings from time to time. He chaired the quarterly meetings of ASSOCHAM National Council on Agriculture and Food Security. He also attended meetings in ICAR, SAU and meetings of the associations. Dr Singh also chaired Kisan Sangosthi organised ASM Foundation, During the year he also joined the Board of Vidyachal Agro as independent Director and attended Board meeting. He also attended Board Meeting of SKUAT, Srinagar as their board member and chaired many meetings in ICAR participated in J&K.

6. CONFERMENT OF AWARDS AND FELLOWSHIPS

To recognize the contribution of scientists and other stakeholders in the research and development of horticulture/agriculture in the country and also abroad, the Confederation has instituted various awards to recognize the services of individuals, which includes **CHAI-Honoured Fellow Award** which recognizes a distinguished leadership of par excellence for the development of agriculture; **Life Time Achievement Award and Honorary Fellowships** recognizes the contribution for excellence and leadership in horticulture/agriculture; **Padam Bhushan Dr. R.S. Paroda Award for Excellence**, recognizes the achievements in research and academics; **Padma Shri Dr. B.H. Jain Award** for excellence, recognizes the contribution in transfer and diffusion of knowledge and also technology-led development; **CHAI-Shri Ram Nandan Babu Award**, recognizes the contribution to excellence in farming **Fellowship of CHAI** recognizes a commitment for the furtherance of research and development. **JISL fellowship** is for training and participation in conference for meritorious members.

During the year Honored Fellow





of CHAI was conferred on Dr. R.S. Paroda, Former Secretary, DARE & DG-ICAR and Chairman TAAS and on Dr. S.K. Pattanayak, Secretary Agriculture, Ministry of Agriculture and Farmers Welfare, Govt. of India. Mr. Ajit Jain, joint MD, JISL and President CHAI Jalgaon Unit presented the award and the citations were read by Dr. H.P. Singh. The **Life Time Achievement Award**, was conferred on Dr. S.M. Paul Khurana, Former Vice Chancellor, RD Univeristy, Jabalpur by the Chief Guest. **CHAI-**

Dr. R.S. Paroda Award, conferred on Dr. D.R. Singh, Director, National Research Centre on Orchids, Sikkim by Dr. H.P. Singh. **CHAI -Dr. B.H. Jain Award**, was conferred on Dr. A.K. Srivastava, Principal Scientist, National Research Centre on Citrus, Nagpur, in absentia by Shri Ashok B. Jain, Chairman, JISL. **CHAI-Shri Ram Nandan Babu Award**, was conferred on Shri Dharmari Narain Prasad Singh, Progressive Farmer,

Varanasi by the Chief Guest. **Honorary Fellow of CHAI-2016**, was conferred on Dr. A.K. Srivastava, Director & Vice Chancellor, National Dairy Research Institute, Karnal and on Dr. Balraj Singh, Vice Chancellor, Agriculture University, Jodhpur. **JISL Fellowship for the visit abroad** was conferred on Dr. Manoj Kumar, Head, CPRS, Patna, in absentia on 6th June, 2017. Dr. H.P. Singh, Chairman, CHAI, presented CHAI-Appreciation Award Dr. Visal Nath and Mr. Sudhansu Kumar Support for participation in the congress (Istanbul).

CHAI JISL-FELLOWSHIP for participation in International Horti. Congress being organized by ISHS at Istanbul, Turkey from 12-16 August, 2018 announced

The nomination received were examined and nominations were selected for the conferment of Fellowships. Since limited application were received the criteria of acceptance of paper in the conference was waved off for some meritorious candidates, who are awardees of the Fellow and associated with the CHAI activities. This was done because there was no application for rejection. Based on the above nomination selected are as following:



1. GOPAL LAL (CF-256)

Address: Director, ICAR-National Research Centre On Seed Spices, Beawar Road, Tabiji, Ajmer 305206, Rajasthan India,

Tel: 0145- 2684401, 2684402(O) 91-145-2684417; (Fax)

E-mail: nrcss.director@gmail.com, glal67@yahoo.co.in Mobile 09414609649

Website: www.nrcss.res.in, Res.: B-87, Chandarvardai Nagar, Ajmer (Rajasthan)



2. DR. (MRS.) NEELIMA GARG (CF-0011)

Address: Head, Division of Postharvest Management, CISH, Rehmankhera, P.O.Kakori, Lucknow-227107,

Mob: 09415786633, Tel: 0522-2841023, Extn.2152 (Office),

Email: neelimagargg@rediffmail.com.

Member Executive Council-2018



3. DR. BABITA SINGH (CF-0017)

Address: Consultant, NITI Ayog, GOI & Former Professor of Horticulture and Horti-Business, Amity University, Noida, Uttar Pradesh,

Mob: 07042241985

Email: drbabita9@yahoo.com.

Secretary of CHAI



In Board of Directors-2014, Joint Secretary, 2016 to till date

4. DR. T.B.S. RAJPUT (CF-225)

Address: Emeritus Scientist, Water Technology Centre, Indian Agricultural Research Institute, Pusa, New Delhi 110012 Tele No 011 2584 8703 Mobile No 09810673101 Fax: _011 2584 8703

E-mail : tbsraj@iari.res.in and tbsraj@yahoo.com



5. Dr. B. SRINIVASULU (CF-268)

Address : B. Srinivasulu, Senior Scientist (Horticulture) & Head, Horticultural Research Station, DCMS Buildings, Kamalanagar, Anantapuramu – 515 001; Mobile: 9849732861;

Office: 08554-201388; Email ID: srinivasulubvr@gmail.com; headhrs_anantapur@drysru.edu.in



6. MR. BINOD ANAND (CF-158)

Address: A-273, Sangam Apartments, D/C-2, Chhatrapur Enclave Phase-2, New Delhi-74

Ph: 09767561212,

Email: binod.anand@gmail.com



7. DR. M.S. SARASWATHI (CF-280)

Address: M.S.Saraswathi, Principal Scientist (Hort.), National Research Centre for Banana, Thogamalai Road, Thayanur Post, Tiruchirappalli, Tamil Nadu, India; Phone: (0431)-2618125; Fax: (0431)-2618126;

Email: saraswathimse@gmail.com



8. DR. SUNIL PAREEK

Address: Associate Professor (PHT), Department of Agriculture & Environmental Sciences, National Institute of Food Technology Entrepreneurship and Management (NIFTEM), (Deemed University under Ministry of Food Processing Industries), Plot No. 97, Sector 56, HSIIDC Industrial Estate, Kundli 131028, Sonapat, Haryana, India, Phone: (Phone:0130-2281201; +919414821483(M); +917056721483,

E-mail; spareekhort@gmail.com;sunilpareek.niftem@gmail.com

7. PUBLICATIONS

- 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 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 shall consider 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. Three volumes of the journal up to 2017.
- 7.2 **Year book of CHAI-2017:**The year book of CHAI, which contains, a brief bio-data, mailing address of the fellows and awardees and also information about the CHAI and 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 annual report was also printed and distributed. CHAI award and Fellowships was also published.
- 7.3 **Proceeding:** The Chairman, CHAI, finalised and helped in the publication of the proceedings of Global conference held at Jain Hills, Jalgaon, 2016. The proceedings has been printed and distributed. The proceeding of the maize conferences, workshops have also been finalised and circulated.
- 7.4 **Gyanmanthan:** Gyanmanthan vol 6 was published and released during Litchi conference, held at NRCL, Musahari, Muzaffarpur, on 6thJune,3017, which contains articles on litchi from experts of litchi.

8. ADVISORY SERVICE

- 8.1 Dr. Singh visited villages in states and advised on the different aspects of horticultural crops.He also visited banana, pomegranate, sapota, date palm plantations and guided the farmers. Dr. H.P. Singh, Chairman, CHAI visited the farmers' fields in Patna, Munger, Jalgaon, to study the situation and



advised the farmers for adoption of high tech production systems, The Chairman also visited the farmers field in Maharashtra, He continued to advise the farmer and organization on technology and policy framework.

8.2 In May, 2017, Dr Singh visited to Jungadh farm of the University and advised the scientists on the various aspects of crop production and management. Dr Singh, also visited experimental farmer of Jain Irrigation System to interact for needed refinement in technology. He advised on future agriculture and green house production system.

8.3 Dr Singh visited centre of excellence for mango at Dalada to see work, which has been established in collaboration of Isreal. He interacted with the officers and advised on rejuvenation of mango and told them about improved propagation technologies.

8.4 Team of experts headed by Dr. H.P. Singh, visited the farmers' field to see performance of banana tissue culture plants, distributed by ASM Foundation. The plants are grown in the village of Bajarmara, Block of Sakara, District Muzaffarpur. In the field visit, performance of Banana G-9, supplied by ASM foundation was found to be highly satisfactory compared to plants supplied by the other sources. Average bunch was in 35 to 40 kg, while even flowering was not seen in other source of plants. The farmers were advised about different operation to be taken. It was interesting to note that plants from Jain Irrigation provided by ASM Foundation had uniformity in flowering and fruiting, while plant supplied by the Government had yet to flower. This clearly indicated the impact of source of tissue culture plants. Similar situation was noted in all the 7 farmers who had grown banana.

8.5 As Chairman of QRT for AICRP Fruits, Dr. Singh, along with many experts visited fields of farmers in different parts of country, namely Uttar Pradesh, Rajasthan, Tamil Nadu, Karnataka,



ANNUAL REPORT 2017-18

Andhra Pradesh and Gujarat and advised the farmers on various crops, namely date palm, pomegranate, custard apple, amla, mango and banana.

- 8.6 Dr Singh visited an ornamental farm in Chikmanglore. He complimented Mr. Gutgutia for his excellence in systematically maintaining the plants and said that scientists and student could be invited to learn, how to maintain the plants. The farm has an excellent collection. He provided his advised on various aspects of management.

9. Balance Sheet of CHAI**CONFEDERATION OF HORTICULTURE ASSOCIATION OF INDIA**

249, KARGIL COLONY, DWARKA, DELHI-110075

Balance Sheet for the Year Ended 31-3-2015

LIABILITIES	AMOUNT	ASSETS	AMOUNT
SHARE CAPITAL	500,000.00	FIXED ASSETS	
RESERVES AND SURPLUS	6,092,163.86	COMPUTER AND ACCESSORIES	35,725.62
		FURNITURE AND FIXTURES	7,548.44
		MICROWAVE	12044.60
CURRENT LIABILITIES		INVESTMENTS	
AUDIT FEE PAYABLE	17,100.00	FIXED DEPOSIT	5,500,000.00
		CURRENT ASSETS	
		CASH IN HAND	721,675.00
		CASH AT BANK	161,889.50
		SHORT-TERM LOANS & ADVANCES	102,141.00
		PRELIMINARY EXPENSES	15,000.00
		DEFERRED TAX ASSETS (NET)	21,543.19
		INTEREST ACCRUED	31,697.00
TOTAL	Rs 6,609,264.00	TOTAL	Rs 6,609,264.00

CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA**Date:****Place:** New Delhi

CONFEDERATION OF HORTICULTURE ASSOCIATION OF INDIA

249, KARGIL COLONY, DWARKA, DELHI-110075

Balance Sheet for the Year Ended 31-3-2016

LIABILITIES	AMOUNT	ASSETS	AMOUNT
SHARE CAPITAL	500,000.00	FIXED ASSETS	
RESERVES AND SURPLUS	6,400,527.31	COMPUTER AND ACCESSORIES	16,583.01
		FURNITURE AND FIXTURES	152,182.51
		MICROWAVE	8,665.73
CURRENT LIABILITIES		INVESTMENTS	
AUDIT FEE PAYABLE	17,250.00	FIXED DEPOSIT	5,800,000.00
		CURRENT ASSETS	
		CASH IN HAND	625,669.00
		CASH AT BANK	144,294.21
		SHORT-TERM LOANS & ADVANCES	121,544.00
		INTEREST ACCRUED ON INVESTMENT	31,697.00
		INTEREST ACCRUED ON INVESTMENT F.Y. 15-16	6,267.00
		DEFERRED TAX ASSETS (NET)	10,874.25
TOTAL	Rs 6,917,777.00	TOTAL	Rs 6,917,777.00

CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA**Date:****Place:** New Delhi

CONFEDERATION OF HORTICULTURE ASSOCIATION OF INDIA

249, KARGIL COLONY, DWARKA, DELHI-110075

Balance Sheet for the Year Ended 31-3-2017

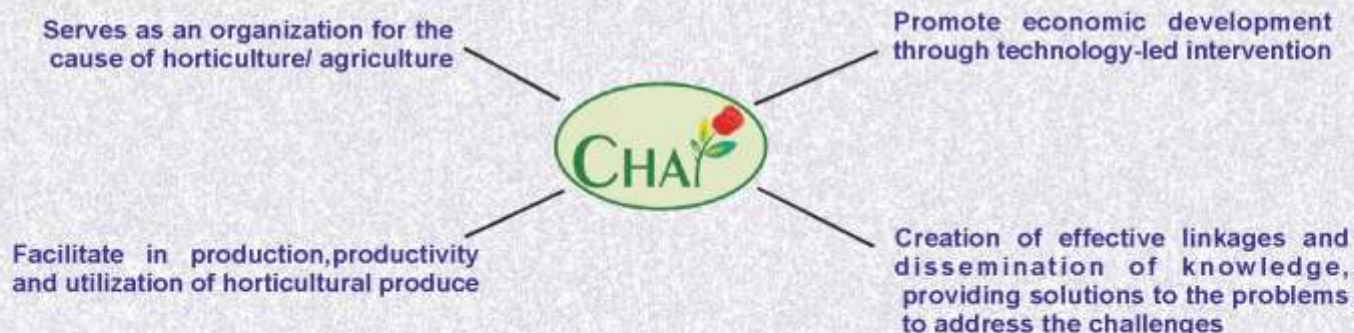
LIABILITIES	AMOUNT	ASSETS	AMOUNT
SHARE CAPITAL	500,000.00	FIXED ASSETS	
RESERVES AND SURPLUS	66,87,108.00	COMPUTER AND ACCESSORIES	1,01,411.39
		FURNITURE AND FIXTURES	1,22,404.86
		MICROWAVE	6,249.48
CURRENT LIABILITIES			
AUDIT FEE PAYABLE	29,500.00	INVESTMENTS	
TRADE PAYABLE	1,84,748.00	FIXED DEPOSIT	65,00,000.00
		CURRENT ASSETS	
		CASH IN HAND	36,758.00
		CASH AT BANK	3,81,242.53
		SHORT-TERM LOANS & ADVANCES	1,54,842.00
		TRADE RECEIVABLE	98,000.00
		DEFERRED TAX ASSETS (NET)	448.75
TOTAL	Rs 74,01,358.00	TOTAL	Rs 74,01,358.00

CONFEDERATION OF HORTICULTURE ASSOCIATIONS OF INDIA**Date:****Place:** New Delhi

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

Corporate Member :	Rs 1,00,000
Institutional Member:	Rs 1,00,000
Association Member :	Rs 60,000
Individual Member :	Rs 25,000
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



Subscription for Libraries

For one year	: Rs 5,000
For three years	: Rs 13,500
For five years	: RS 21,500

