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NESA NEWSLETTER

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

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A Report
on
33rd Annual Function of NESA 2020
&
National Virtual Conference
on
TECHNO-SCIENTIFIC CHALLENGES AND SUSTAINABLE SOLUTIONS FOR LIVING BEINGS DURING CHANGING ENVIRONMENT (TCSE-2021)
29-30, January, 2021

Group photograph with the NESA Awardees 2020, the Chief guest and guest of honour.

The Inaugural Session of the conference was organized on 29th January 2021 at 11:30 AM in the Daroga Singh Auditorium of ICAR-IASRI. The programme was organized in physical mode with its web cast mode available on You-Tube, NESA and ICAR-IASRI websites.

Dr. Rajender Parsad, Director, ICAR-IASRI, greeted the chief guest, Prof. Asim Ali Khan, DG, Central Council of Research in Unani Medicine, guest of honour Dr. R.C. Aggarwal, DDG (Ag. Education) and National Director (NAHEP) and Prof. Javed Ahmad, President, NESA with plant saplings.

The conference was formally declared open by **Dr. R.C Aggarwal**, Director, ICAR-IASRI who emphasized on the contributions of the esteemed institute at global level mentioning the Crop Cutting Experiment for Yield estimation and Livestock estimation surveys during his opening remarks.

Prof. Javed Ahmad introduced the National Environment Science Academy and announced the names of awardees of four categories. The NESA Fellowship Awards were given to **Dr. R C Aggarwal**, **Dr. Prabhat Kumar** and **Dr. B Rupini**. The NESA Honorary Fellowship awards were given to **Prof. R.K Sharma** and

Dr. Asim Ali Khan, DG CCRUM giving NESA Fellowship Award 2020 to **Dr. RC Aggarwal**, DDG (Education) ICAR, New Delhi

Dr. Asim Ali Khan, DG CCRUM giving NESA Fellowship Award 2020 to **Dr. Prabhat Kumar**, National Coordinator (NAHEP), ICAR, Pusa, New Delhi

Dr. Asim Ali Khan, DG CCRUM giving NESA Fellowship Award 2020 to **Prof. Boyina Rupini,** SOITS, IGNOU, New Delhi

Dr. Asim Ali Khan, DG CCRUM giving NESA Hony. Fellowship Award 2020 to **Prof. A.K. Singh,** Vice President, NAAS, Pusa, New Delhi

Dr. Asim Ali Khan, DG CCRUM giving NESA Hony. Fellowship Award 2020 to **Prof. R.K. Sharma,** Dept. of Chemistry, University of Delhi, Delhi

Dr. Asim Ali Khan, DG CCRUM giving NESA Scientist of the year Award 2020 to **Dr. Amit Kumar Rai,** Scientist C, MRDIBSD Sikkim Centre, Tadong, Sikkim

Prof. Anil Kumar Singh. NESA Scientist of the Year Award was given to **Dr. Amit Kumar Rai**. All the awardees were welcomed by the organizers. ***Annexure I.***

Inaugural talk was delivered by the chief guest Prof. Asim Ali Khan, who emphasized on maintaining good health and immunity in the present scenario using Yoga and using Unani medicines.

A special address was delivered by **Dr. R C Aggarwal**, who emphasized on new and innovative ways of agriculture and how people are getting inclined towards growing plants and gardens in their homes after knowing their advantages specifically during the pandemic period. He also emphasised on how agricultural education can be used in spreading the agricultural knowledge to people who actually need it using various ICT tools and techniques.

Dr. Alka Rani gave her organization's introduction under RAS-BIO, Moradabad, U.P., She also gave her keynote address on "*Active Constituents of Plants and their Preparations*".

The formal vote of thanks was given by **Dr. Sushil Kumar Singh**, General Secretary of NESA.

During the conference 6 Technical sessions were held along with one Key Note session. All the sessions were organized in both offline and online modes. Most of the presentations were made by participants through ZOOM meeting with some IASRI faculty members, organizers and NESA organizers, attending the conference from the Daroga Singh Auditorium, ICAR-IASRI, New Delhi.

The present programme was co-organised by **Jamia Hamdard, New Delhi, Al-Falah University, Faridabad, Asian Biological Research Foundation, Prayagraj, U.P., RAS-BIO, Moradabad, U.P., Jai Narain Vayas University, Jodhpur, Rajastjhan and Progressive Horticulture, Dehradun, Uttarakhand**.

Sessions held on 29th January'2021

The first session immediately started after the inaugural function. It was a Keynote session whose Chairperson was Dr. Kshipra Misra and the Co-ordinator was Dr. Amit Kumar Rai, Scientist C, Microbial Resource Division, Institute of Bioresources and Sustainable Development, Sikkim Centre, Sikkim. One keynote talk was presented on "***Environment, Society and Culture: Interdisciplinary Perspective***" by **Prof. Boyina Rupini**, School of Interdisciplinary and Trans-Disciplinary Studies, Indira Gandhi National Open University, New Delhi.

In the second technical session, the Chairperson was **Dr. Suresh D. Ekabote**, Professor of Plant Pathology and Head, Dept. of Horticulture Crop Protection and, Dept. of Crop Improvement and Bio-technology, College of Horticulture, Hiriyur, Karnataka and the Co-ordinator was Dr. Namita Das Saha, Scientist (Environmental Sciences) Centre for Environment Science and Climate Resilient Agriculture (CESCRA), Indian Agricultural Research Institute, Pusa, New Delhi 110012, INDIA.

In the third technical session, the Chairperson was **Prof. Javed Ahmad**, President, National Environmental Science Academy, 206, Raj Tower-I, Alaknanda Community Centre, New Delhi & Former Dean, Faculty of Science, Jamia Hamdard, New Delhi and the coordinator was Dr. Mohd. Tasleem, Research Scholar, Lab No # 33, ICAR-NIPB, Pusa Campus, New Delhi.
In the fourth technical session the Chairperson was Dr. Rajender

Parsad, Director, IASRI, Library Avenue, Pusa, New Delhi. In the session, key note talk, invited talks and contributory talks were delivered.

Sessions held on 30th January, 2021

The theme of the Fifth Technical Session was **"Statistics and Informatics for Sustainable Solutions during Environment Change".** It was held during 10:30 AM to 12:30 PM under the chairmanship of Dr. P.S Pandey, ADG (EP &HS), Agricultural Education Division, ICAR, New Delhi.

Dr. Rajender Parsad, Director, ICAR-IASRI welcomed the chairperson and thanked him for being the chairperson of this session in spite of his busy schedule. Dr. Shashi Dahiya introduced the chairperson, about the session and the talks to be delivered in the session. In this session, 8 talks were delivered, 2 being the keynote talks and 6 being the invited talks by the scientists of ICAR-IASRI working in the area related to the theme.

All the papers presented in this session were the hallmark of the two days conference. **Prof. Sudeep Marwaha, Dr. Tauqeer Ahmad, Dr. Ramasubramanian V., Dr. Alka Arora, Dr. Shashi Dahiya, Dr. Soumen Pal, Dr. Ranjit Kumar Paul** and **Dr. S.N. Islam** were the prominent speakers in the session-v from IASRI.

The sixth technical session was held during 12:30 to 1:50 PM. The Chairperson being Dr. Sushil Kumar Singh, Convener, TCSE-2021, General Secretary, National Environmental Science Academy, Delhi and Scientist "F", Solid State Physics Lab. Lucknow Road, Timarpur, Delhi and the co-ordinator being Dr. Pradeep Kumar, Assistant Professor, Department of Zoology, S.G.N. Govt. P.G. College, Muhammadabad Gohana, Mau (Uttar Pradesh).

Three Invited talks were presented in this session in addition with oral/poster presentation.

The seventh technical session was held during 2:00 pm to 3:30 pm. The chairperson was Dr. Chitralekha Nag Dasgupta, Research Cell, Amity University Lucknow, Malhaur Railway Station Road, Gomti Nagar, Lucknow-226028, Uttar Pradesh and the Co-ordinator being Dr. Manisha Mishra, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi – 110067.

Three invited talks were presented in addition with oral/poster presentations.

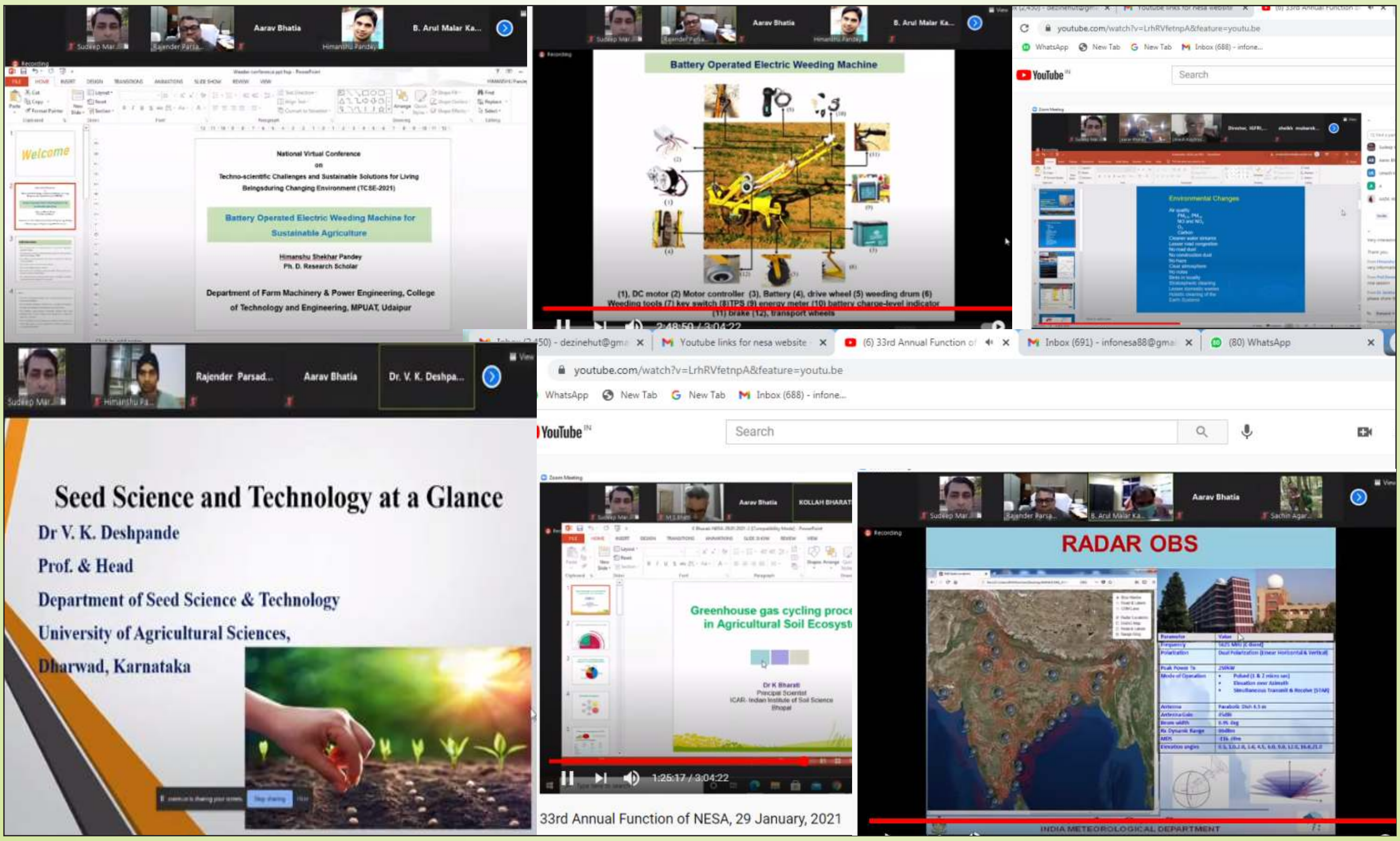
During all 7 sessions, 10 Keynote Talks, 14 Invited Talks and around 15 Contributory talks were delivered by scientific community and students. Details of Keynote Talks, Invited Talks and contributed talks are as follows:

KEYNOTES TALKS

Prof. Boyina Rupini, School of Interdisciplinary and Trans-Disciplinary Studies, Indira Gandhi National Open University, New Delhi. "Environment, Society and Culture: Interdisciplinary Perspective"

Dr. Alka Rani, Convener, President RAS BIO, Associate Professor & DSW, Department of Chemistry, Hindu College, Moradabad U.P. "Bio-profiling and Searching of Active Constituents of Plants and their Preparations"

Dr. Pawan K. Kasera, Laboratory of Plant Ecology, Department of Botany, Jai Narain Vyas University, Jodhpur Rajasthan, India. "Agro-Techniques and Conservation of some important Medicinal Plants of Indian Thar Desert"



Dr. Vijay Kumar Yadav, Ph.D. (Genetics & Plant Breeding), FISHA, Principal Scientist (Plant Breeding) & Head, Seed Technology Division, ICAR- Indian Grassland & Fodder Research Institute, Near Pahuj Dam, Gwalior Road, Jhansi-284 003 U.P. India. " Innovations in fodder production and utilization technologies for sustainable livestock production"

Prof. Umesh Kulshrestha, School of Environmental Sciences, JNU, New Delhi. " Environmental Impact on Air Quality"

Dr. Kollah Bharati, Principal Scientist, Division of Soil Biology, ICAR-Indian Institute of Soil Science, Berasia Road, Nabibagh, Bhopal, Madhya Pradesh. "Greenhouse gas cycling processes in Agricultural Soil Ecosystem"

Dr. V. K. Deshpande, Professor and Head, Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad, Karnataka. "Seed Science and Technology"

Dr. Tauqueer Ahmad, HOD (Division of Sample Survey, ICAR-IASRI, New Delhi). Contribution of ICAR-IASRI to the Sustainable Development Goal (SDG)-12.3 at international level in strengthening India's role towards SDGs"

Dr. Sudeep Marwaha, HOD (Division of Computer Applications, ICAR-IASRI, New Delhi). "IT Initiatives in Agriculture by ICAR-IASRI"

INVITED TALKS

Dr. M S Bhatti, Water quality issues of treated wastewater in Agriculture.

Dr. Ramasubramanian V., Multi-Dimensional Scaling (Mds) Based Solutions For Prioritizing Technological Challenges In Plant Breeding and Genetics.

Dr. Alka Arora, KVK Portal & Mobile App: ICT Tools for Knowledge Dissemination towards Farming Community by Krishi Vigyan Kendras across India.

Dr. Shashi Dahiya, AI for Combating Climate Change in Agriculture.

Dr. Soumen Pal, Visualization and Analysis of Landscape Diagnostic Survey Data under Cereal Systems Initiative for South Asia.

Dr. S N Islam, Expert System Shell for developing Multi Crop Expert Systems on Cereals.

Dr. Ranjit Kumar Paul, Forecasting Sub-Divisional Rainfall in India using Wavelets and Machine Learning Approach

Dr. Raghavendra S Kulkarni, *"Environmental & Endocrine Influences on Fish Reproduction"*

Dr. Sanjeeb Kumar Das, Biodiversity: understanding values, threats and conservation.

Dr. Anita Jain, Role of traditional medicine in the management of Covid-19

Dr. Amrit Kumar Rai, Fermented foods of North East India as a potential source of bioactive peptides – production and functionality.

Dr. Jaspal Singh Chauhan, Investigation of microplastics in the fishes of river Alaknanda.

Dr. Madhu Thapliyal, Socio Economic Challenges During Pandemic Era an Approach toward Employment Generation through Damask Rose in High Altitude Regions (Garhwal Himalaya) of Uttarakhand.

Dr. G.V. Srinivasa Reddy, Rooftop Rainwater Harvesting For Drinking Water Supply – A Case Study

Dr. Shailendra S. Gaurav, PhD (IARI, New Delhi) , Dean, Faculty of Agriculture, Professor & Head, Dept. of Genetics & Plant Breeding, Ch. Charan Singh University Campus, Meerut-250004 (UP) India. " Protection of farmers and Breeders Rights in India"

The valedictory session of the conference was held on 30th of January'2021 at 3:30 PM in Daroga Singh Auditorium. The chief guest of the function was **Dr. R.C Agrarwal**, DDG (Agricultural Education) and National Director (NAHEP).

Professor Javed Ahmed presented the detailed report of the conference. He further discussed recommendations of the conference. He further announced the names of awardees of five categories. ***(Annexure II)***

Some NESA awards were also delivered by the Chief Guest to eminent researchers for their contributions in the society during the session. The NESA Environmentalist of the Year award was delivered to **Dr. Namita Das Saha**. Two NESA Green Technology awards were given to **Dr. Abhishek Sharma** and **Dr. Meena**. Three, NESA young scientist awards were given to **Dr. Gaurav Saxena**, **Dr. Subhash Babu** and **Dr. Pavan Kumar**. Three NESA Junior Scientist awards were given to **Ms. Manisha Mishra**, **Dr. Pawan Kumar Poonia** and **Dr. Nitesh Kumar**. All the awardees were welcomed and greeted.

The Chief Guest, **Dr. R.C Agrawal** delivered his special address and emphasized on how good work can be done in collaboration. He also suggested the NESA and ICAR-IASRI to collaborate for research and development towards the good cause of safe Environment and combating climate change.

The conference ended with the formal vote of thanks presented by the Organizing Secretary, **Dr. Prabhat Kumar**.

RECOMMENDATIONS OF THE CONFERENCE

1. Use of Waste Water Management techniques for the benefit of Agriculture
2. Use of Remote sensing and GIS based technologies for monitoring of Locus swarms movement.
3. Collaboration should be developed between major international universities & Indian Universities/ Institution & NGO's to develop research eco-system for combating climate change.
4. Thrust on Sustainability of the environment by adopting green and innovative technologies.
5. Sports complex should be developed in agricultural universities.
6. Endowment fund for the conservation of medicinal plants diversity i.e. *Cinchona, Taxus & Aquilaria*
7. Statistical and Analytical models need to be developed for prediction and forecasting of various weather related events.
8. Artificial Intelligence and Machine Learning algorithms should be used for combating climate change in Agriculture.
9. Upgradation of health care systems for better quality of life.
10. Use of plastic should be shunned and open burning of plastic must be banned in NCR.

Annexure I

01. NESA FELLOWSHIP OF THE YEAR 2020

1. **Dr. K. Subrahmaniyan**
Professor of Agronomy, Agricultural College and Research Institute, Echangkottai, Thanjavur, Tamil Nadu
2. **Dr. Partha Pratim Chakravorty**
Associate Professor & Head
Post Graduate Department of Zoology
Raja Narendra Lal Khan Women's College (Autonomous), Midnapore, Paschim Medinipur, W.B.
3. **Prof. Boyina Rupini**
School of Interdisciplinary and Trans-Disciplinary Studies, Indira Gandhi National Open University, New Delhi
4. **Dr. Sumit Saxena**
Associate Professor, Dept of Metallurgical Engineering and Materials Science, IIT Bombay, Powai, Mumbai
5. **Dr. Syed Mohammad Khursheed Naqvi**
Principal Scientist
Department of Agricultural Research and Education
Indian Council of Agricultural Research
ICAR-Central Sheep and Wool Research Institute
Avikanagar via Jaipur, Rajasthan
6. **Dr. Ganti R. K. Sharma**
Professor and University Head, Dept. of Veterinary & Animal Husbandry Extension Education, College of Veterinary Science, Tirupati, Sri Venkateswara Veterinary University, Andhra Pradesh
7. **Dr. Raghavendra S. Kulkarni**
Emeritus Professor of Zoology, Department of Studies in Zoology, Gulbarga University, Kalaburagi, Gulbarga, Karnataka
8. **Dr. Farooq Ahmad Khan**
Professor (Plant Physiology) and Ex-Head
Division of Basic Sciences and Humanities
Faculty of Horticulture, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir (SKUAST-Kashmir)
9. **Dr. Soumendranath Chatterjee**
Professor of Zoology, Parasitology and Microbiology Research Laboratory, Department of Zoology, The University of Burdwan, Burdwan, West Bengal
10. **Dr. Ravindranath H. Aladakatti**
Principal Research Scientist
Central Animal Facility, RSO In-charge, Division of Biological Sciences, Indian Institute of Science, Bengaluru, Karnataka
11. **Dr. M S Bhatti,** Professor, Department of Botanical & Environmental Sciences, Guru Nanak Dev University, Amritsar, Punjab
12. **Dr. Rakesh Chandra Agrawal**
Deputy Director General (Agricultural Education)
National Director, NAHEP (ICAR-WB), Division of Agriculture Education, ICAR, New Delhi
13. **Dr. Prabhat Kumar**
National Coordinator (NAHEP) Principal Scientist
Division of Floriculture and Landscaping
Indian Council of Agricultural Research, New Delhi
14. **Prof. Meena Vangalapati**
Dept. of Chemical Engg, AUCE(A)
Andhra University, Visakhapatnam, Andhra Pradesh
15. **Prof. B . Sudhakar Reddy**
Department of Physics
SKR & SKR Government College for Women(A)
Kadapa, Andhra Pradesh
16. **Dr. Ramesh S. Hooda**
Product Director, Rolta India Ltd.
Rolta Technology Park, MIDC-Marol
Andheri East, Mumbai
17. **Dr. Suresh D. Ekabote**
Professor of Plant Pathology and Head
Dept. of Horticulture Crop Protection and
Dept. of Crop Improvement and Bio-technology
College of Horticulture, Hiriyur, Karnataka
18. **Dr. V. K. Deshpande**
Professor and Head, Department of Seed Science and Technology, University of Agricultural Sciences, Dharwad, Karnataka
19. **Dr. D.S. Uppar**
Professor and University Head
Seed Science and Technology, UAS, Dharwad, Karnataka
20. **Dr. Kollah Bharati**
Principal Scientist, Division of Soil Biology
ICAR-Indian Institute of Soil Science
Berasia Road, Nabibagh, Bhopal, Madhya Pradesh

2. NESA EMINENT SCIENTIST OF THE YEAR 2020

1. **Prof. R. Usha**
Department of Biotechnology
Sri Padmavati Mahila Visvavidyalayam (Women's University) Titupathi, Andhra Pradesh
2. **Prof. M. Venkata Basaveswara Rao**
Professor, Department of Chemistry
Chairman, BOS, Chemistry & AMP; Pharmacy
Krishna University, Machilipatnam
Krishna Dist., Andhra Pradesh
3. **Dr. K.S. Anantha Raju**
Professor & HOD, Department of Chemistry Dayananda Sagar College of Engineering, Shavige Malleshwara Hills, Kumaraswamy Layout, Bengaluru Bangalore, Karnataka

03. NESA SCIENTIST OF THE YEAR AWARD 2020

1. **Dr. Anita Jain**
   Head, Department of Botany
   Vidhya Bhawan Rural Institute, Udaipur (Rajasthan)
2. **Dr. Suresh I.M.**
   Maize Pathology Lead - Sub Saharan Africa
   Global Maize Program, International Maize and Wheat Improvement Center (CIMMYT)
   ICRAF House, United Nations Avenue
   Gigiri | P.O. Box 1041-00621; Nairobi, Kenya
3. **Dr. Debnirmalya Gangopadhyay**
   Head/Coordinator,
   Assistant Professor,Department of Sericulture,
   Raiganj University, Raiganj-733134,
   Uttar Dinajpur, West Bengal
4. **Dr. Jyothi T.V.**
   Scientist (Soil Science)
   ICAR- Krishi Vigyan Kendra, Hiriyur, Chitradurga,
   KARNATAKA
5. **Dr. Ngangkham Umakanta**
   Scientist (Agricultural Biotechnology)Division of Biotechnology, ICAR Research Complex for NEH Region
   Umiam, Meghalaya
6. **Dr. Amit Kumar Rai**
   Scientist C, Microbial Resource Division
   Institute of Bioresources and Sustainable Development
   Sikkim Centre, Near Metro Point, Tadong, Sikkim
7. **Prof. Dr. Devendra Shantilal Jain**
   Head UG & AMP; PG Research
   Department of Botany, Gangamai Education Trust's, Arts, Commerce and Science College Nagaon,
   Dist. Dhule, Maharashtra
8. **Prof. Piyush Malaviya**
   Professor, Department of Environmental Sciences,
   University of Jammu, Jammu-180 006 (J&K) INDIA
9. **Dr. Raviraja Shetty G.**
   Assistant Professor and Head
   Dept. of Plantation, Spices, Medicinal & Aromatic Crops
   College of Horticulture (University of Agricultural and Horticultural Sciences, Shivamogga) Mudigere,
   Chikmagalur (Dist.) Karnataka
10. **Prof. Kumara O.**
    Department of Agronomy
    University Of Agricultural And Horticultural Sciences
    Shivamogga, Karnataka
11. **Dr. Prasanna D. Shivaramu**
    Assistant Professor
    Department of Nanotechnology
    Visvesvaraya Technological University (VTU)
    Jnana Sangama, VTU Main Road, Visvesvaraya Technological University, Machhe, Belgaum, Karnataka
12. **Dr. Chinmay Pradhan**
    Head of the Department and Course Coordinator
    M.Sc Environmental Science, Department of Botany
    Utkal University, Vani Vihar, Bhubaneswar, Odisha

NESA HONORARY FELLOWSHIP 2020

1. **Prof. Balaram Pani**
   Principal
   Bhaskaracharya College of Applied Sciences,
   Dwarka, Delhi University, Delhi
   Director, Campus of Open Learning (Additional Charge), Delhi University, Delhi, Dean of Colleges, Delhi University, Delhi
2. **Prof. Arvind Kumar**
   Vice-Chancellor
   Rani Lakshmi Bai Central Agricultural University
   Jhansi, Uttar Pradesh
3. **Prof. R.K. Sharma**
   Coordinator of Green Chemistry Network Centre
   Department of Chemistry, University of Delhi, Delhi
4. **Prof. A.K. Singh**
   Secretary, National Academy of Agricultural Sciences
   NASC Complex, DPS Marg, Pusa, New Delhi
5. **Dr. S. Manjappa**
   Director Research and Consultancy
   Sahyadri College of Engineering and Management
   Adyar, Mangalore (Karnataka)
6. **Prof. Vijay Singh Tomar**
   Founder Vice Chancellor, RVSKVV, Gwalior (M.P.)
   Former Vice Chancellor, JNKVV, Jabalpur (M.P.)

Annexure II

04 - NESA ENVIRONMENTALIST OF THE YEAR AWARD 2020

1. **Dr. Chandrashekara Y.P.**
   Assistant Professor
   Department of Studies and Research in Geography
   Karnataka State Open University, Mysure
2. **Dr. Namita Das Saha**
   Scientist (Environmental Sciences)
   Centre for Environment Science and Climate Resilient Agriculture (CESCRA) ICAR, Pusa, New Delhi
3. **Dr. Jaspal Singh Chauhan**
   Department of Himalayan Aquatic Biodiversity
   HNB Garhwal University (A Central University)
   Srinagar, Uttarakhand
4. **Dr. Gomathi Velu**
   Professor and Head
   Department of Agricultural Microbiology
   Tamil Nadu Agricultural University, Coimbatore, TN
5. **Dr. J.S. Chandrashekar**
   Assistant Professor, Department of Studies and Research in Environmental Science, Karnataka State Open University, Mysore
6. **Dr. Zahid Hameed Siddiqui**
   Assistant Professor
   Department of Biology
   Faculty of Science, University of Tabuk, Saudi Arabia
7. **Dr. Parashuram Chandravanshi**
   Associate Professor of Soil Science and Agricultural Chemistry, College of Horticulture, Hiriyur, Babbur Farm, Hiriyur-577598, University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka
8. **Dr. Sanjeeb Kumar Das**
   Assistant Professor, Department of Botany
   Regional Institute of Education, Bhubaneswar, Odisha
9. **Dr. Banu Deshpande**
   Associate Professor, Department of (Food Science & AMP; Nutrition) Farmers' Training Institute, UAS, Bangalore

10. **Dr. Rajinder Kaur Gill**
Associate Professor in Environmental Sciences
Department of Botanical & Environmental Sciences
Guru Nanak Dev University, Amritsar, Punjab, India.
11. **Dr. P. Veeramani**
Assistant Professor (Agronomy)
Krishi Vigyan Kendra, TNAU
Virinjipuram, Vellore Dt, Tamil Nadu
12. **Dr. G.V. Srinivasa Reddy**
Assistant Professor, Department of Irrigation and Drainage Engineering, College of Agricultural Engineering, Raichur, Karnataka
13. **Dr. Niranjan Raj S.**
Department of Studies and Research in Microbiology
Karnataka State Open University, Mukthagangotri, Mysuru
14. **Dr. Mukhtar Ahmed G. Ghodesawar**
Associate Professor, Head, Department of Zoology
Anjuman Arts, Science & Commerce College & P.G.in English, Vijayapura, Karnataka
15. **Dr. Pradeep Kumar**
Assistant Professor, Department of Zoology, S.G.N. Govt. P.G. College Muhammadabad Gohana, Mau(Uttar Pradesh)
16. **Dr. B. Kishori**
Assistant Professor
Department of Biotechnology
Sri Padmavati Mahila Visvavidyalayam
Tirupati-517502, Andhra Pradesh

05 – NESA GREEN TECHNOLOGY INNOVATIVE AWARD 2020

1. **Dr. Dinesh Singh**
Principal Scientist (Plant Pathology)
Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi
2. **Dr. Shaik Thahir Basha**
S.V. Agricultural College,
Acharya NG Ranga Agricultural University, Tirupati
3. **Dr. K.M. Sellamuthu**
Associate Professor (SS&AC)
Department of Natural Resource Management
Horticultural College and Research Institute
Periyakulam, Tamil Nadu Agricultural University, TN
4. **Dr. Balasubramanian P.**
Assistant Professor, Department of Biotechnology & Medical Engineering, National Institute of Technology Rourkela, Odisha
5. **Dr. Vaishali Mishra**
Lecturer In Chemistry
ITL Public School, Dwarka Sector 9, New Delhi
6. **Dr. Suneetha Mekala**
Assistant Professor, Department of Chemistry
Rajiv Gandhi University of Knowledge Technologies
Andhra Pradesh
7. **Dr. S.L. Meena**
Ceramic Laboratory, Department of Physics
Jai Narain Vyas University, Jodhpur, Rajasthan
8. **Dr. Chitralekha Nag Dasgupta**
Assistant Professor
Research Cell, Amity University (Lucknow Campus)
Lucknow, Uattar Pradesh
9. **Dr. Ranjita Panda**
Associate Professor, Department of Environmental Science, Sambalpur University, Jyoti Vihar, Burla, Odisha
10. **Dr. Abhishek Sharma**
Research Scientist-cum Assistant Professor
Amity Food and Agriculture Foundation
Amity University, Noida, Uttar Pradesh

06 – NESA YOUNG SCIENTISTS OF THE YEAR AWARD 2020

1. **Dr. Rajib Deb**
Animal Health Division
ICAR-National Research Center on Pig
Rani, Guwahati, Assam-781131
2. **Dr. Shanmugam Bhasha**
Academic Consultant, Department of Zoology
Sri Venkateswara University, Tirupati
3. **Dr. Valarmathi Pandian**
Scientist (Plant Pathology)
ICAR-Central Institute for Cotton Research (CICR), Regional Station, Coimbatore-641 003
4. **Dr. Shantamma**
Department of Plant Pathology
UAS GKVK Bangalore-560 065, Karnataka
5. **Dr. P. Ramakrishnan, Ph.D.,**
Assistant Professor (GPB)
Department of Plant Breeding and Genetics
Dhanalakshmi Srinivasan Agriculture College (Affiliated to Tamil Nadu Agricultural University, Coimbatore) Perambalur, Tamil Nadu
6. **Dr. Chandrasekhar Perumalla**
Assistant Professor, Department of Electrical Sciences
Indian Institute of Technology, Bhubaneswar, Odisha
7. **Dr. Suresh B.**
Assistant Professor, Department of Civil Engineering
Visvesvaraya Technological University
Jnana Sangama, VTU Main Roadd, Visvesvaraya Technological University, Machhe, Belgaum, Karnataka
8. **Dr. Barikara Umesh**
Scientist (Soil and Water Engineering)
ICAR-KVK, University of Agricultural Science, Raichur, Karnataka
9. **Dr. Subhash Babu**
Scientist, Division of Agronomy
ICAR-Indian Agricultural Research Institute, New Delhi
10. **Dr. Syed Talia Mushtaq**
Division of Fisheries Resource Management
Faculty of Fisheries, SKUAST Kashmir, Jammu & Kashmir
11. **Dr. Lavanya Yaidikar**
Professor and HOD, Department of Pharmacology
Seven Hills College of Pharmacy, Tirupati
12. **Ms. Hanieh Atrchian**
Science in Agricultural Entomology
Vali-e-Asr University of Rafsanjan, Kerman, Iran
13. **Dr. Sankha Chakrabortty, Ph.D**
Assistant Professor, Kalinga School of Biotechnology/Chemical Technology
Kalinga Institute of Industrial Technology (Deemed to be University) Bhubaneswar, Odisha, India
14. **Dr. Rakesh Choudhary**
Scientist (Genetics and Plant Breeding)
Rani Lakshmi Bai Central Agricultural University
Jhansi, Uttar Pradesh

A view of valedictory function and distribution of NESA Awards 2020

15. **Dr. Himanshu Dubey**
Scientist-B, Seri-Biotech Research Laboratory
Central Silk Board, Bangalore
16. **Dr. M. Suguna Devakumari**
Assistant Professor, Department of Agriculture
Karunya Institute of Technology and Sciences
Coimbatore
17. **Dr. K. Senthilkumar**
Assistant Professor (PBG), Kumaraguru Institute of Agriculture, Sakthinagar, Erode District, Sakthi Nagar, TN
18. **Krishna Kumar G.**
Asst Professor, Plant Physiology, NMIMS-School of Agricultural Sciences & Technology, Shirpur, Maharashtra
19. **Dr. Md Aminul Islam**
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Assistant Professor, School of Biotechnology
Faculty of Applied Sciences and Biotechnology
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22. **Dr. R. S. Ajin**
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Vikas Bhavan, P.O, Observatory Hills, Opposite
Kanakakkunnu Palace, Nanthancodu,
Thiruvananthapuram, Kerala

07 – NESA JUNIOR SCIENTISTS OF THE YEAR AWARD 2020

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Post-Doctoral Researcher
School of Materials Science and Engineering
Harbin Institute of Technology, Shenzhen, China
2. **Mr. Mohd Ali**
Research Scholar, Department of Zoology
Aligarh Muslim University, Aligarh, Uttar Pradesh
3. **Mr. Bilal Ahmad Rather**
PhD Student, Department of Botany
Aligarh Muslim University, Aligarh, Uttar Pradesh
4. **Dr. Pawan Kumar Poonia**
Assistant Professor (Forestry)
Department of Forestry, College of Agriculture, Hisar
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5. **Ms. Ankita Katoch**
Ph.D. Fellow, School of Environmental Sciences
Jawaharlal Nehru University, New Delhi

6. **Ms. Manisha Mishra**
   Ph.D. Fellow, School of Environmental Sciences
   Jawaharlal Nehru University, New Delhi
7. **Dr. Prabha Singh**
   Scientist, Department of Seed Technology, ICAR-Indian Grassland & Fodder Research Institute, Jhansi, U.P.
8. **Ms. J. Lydia Pramitha**
   Ph.D Scholar, Genetics & Plant Breeding,
   Tamil Nadu Agricultural University, P N Pudur, TN
9. **Mr. Faisal Rasheed**
   Plant Physiology and Biochemistry
   Department of Botany, Aligarh Muslim University
   Aligarh, Uttar Pradesh
10. **Mr. Maroof Hamid**
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12. **Ms. Arambam Asha Devi**
   Research Scholar, Div. of Microbiology, IARI, New Delhi
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   Research Scholar, Indira Gandhi National Tribal University, Amarkantak, Madhya Pradesh
14. **Dr. Siva Kumar Reddy N.**
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   Indian Grassland & Fodder Research Institute, Gwalior Road, Near Pahuj Dam. Jhansi-284003, Uttar Pradesh

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Dr. Nafees Ahmad Khan, Professor in the Department of Botany, Aligarh Muslim University, Aligarh and Vice President, NESA has received TWO international recognition for his exceptional contribution in the area of Plant Science.

FIRST: He was included in the list of **Top 2% Indian Scientists** globally in a subject-wise ranking based on an independent study done by Stanford University (USA) scientists. He was placed at **746 rank** in this world-wide top **2% Scientists**, and he is among **10 Indian Scientists** in the subject category Plant Biology and Botany.

SECOND: He was placed at a coveted spot in the prestigious 'Highly Cited Researchers' list by Web of Science Group of Clariviate Analytics. He is among the most influential researchers from India as determined by their peers among the globe- those who have consistently won recognition in the form of high citation counts over a decade.

The research focus of **Prof. Nafees Khan** is mainly on understanding the mechanisms of hormonal and nutritional regulation of plant growth and development with special emphasis on abiotic stress vis-a-vis photosynthetic and nutrient efficiency, and abiotic stress tolerance in plants.

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MANGROVE FLORISTICS - CURRENT STATUS IN INDIA

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Introduction

Mangrovesare defined as a tropical or subtropical community of highly adapted shrubs, trees, or plant species growing in the estuarine area, intertidal zone and sheltered marine areas. They eventuate in soil having moderate oxygen at which point slow moving water helps in the accumulation of fine sediments. They act as a physical barrier to mitigate the effects of coastal calamities like floods, cyclones, tsunami, hurricanes and waves. Growing in the intertidal areas and estuary mouths between land and sea, mangroves provide critical habitat for a diverse marine and terrestrial flora and fauna. Mangrove habitat also attracts rich epifloral and faunal communities including bacteria, fungi, invertebrates and seaweeds(Sundararaman*et al.*, 2007). Prevailing among coastlines in tropical and subtropical areas, mangroves are a bridge between terrestrial and marine environments wherein there occurs a transfer of energy and organic matter from the land to the sea, forming the base to many marine food webs. Healthy mangrove forests are a key to healthy marine ecology and known to fix more carbon dioxide per unit area than phytoplankton in tropical oceans. However, these forests are considered to be one of the world's most threatened tropical ecosystems with major threats to their habitat being due tooverfishing, pollution,over harvesting and climate change.

Worldwide status of mangrove cover

Globally the total mangrove area is estimated to be 14.79 million hectares (ha), accounting to 1% of the tropical forests of the world. Mangroves are distributed in more than 113 countries with Indonesia (19%), Brazil (9%), Nigeria (7%) and Mexico (6%) accounting for >40% of the world's mangrove area (FAO, 2020). Among continents, the highest recorded mangrove area is reported in Asia (5.55 million ha), followed by Africa (3.24 million ha), North and Central America (2.57 million ha), South America (2.13 million ha) and Oceania (1.30 million ha).

Status of mangroves in India

In 1987, a survey based on remote sensing and Geographical Information System(GIS) bythe Forest Survey of India (FSI) had estimated the mangrove cover in India, to be spread over an area of 4975 km^2 accounting to about 3% of the total mangrove area in South Asia and 0.15% of the total geographical area of the country. Sundarbansin West Bengal adjudges for nearly half of the total area under mangrove in India. As per the FSI, the mangrove cover of the country has shown consistent increment in the last 32 years which has increased from 4046 km^2 in 1987 to 4975 km^2 in 2019 showing a growth rate of 22.96%. Of the total 4975 km^2 of mangrove area, 2020 km^{2}accounts foropen mangroves, 1479 km^2 by moderately dense mangrove and 1476 km^{2}byvery dense mangroves. Although a congruous growth has been recorded in the open mangrove areas since the last 16 years (2003-2019), there has been a sharp decline in the moderately dense mangrove area of the country.

Changes in contribution of different mangrove ecosystem in last 16 years

Year	Changes in contribution of different mangrove ecosystem in last 16 years		
	Very Dense Mangrove	Moderately Dense Mangrove	Open Mangrove
2003	1162	1657	1642
2005	1147	1629	1669
2009	1405	1659	1575
2011	1403	1658.12	1601.44
2013	1351	1457	1819
2015	1472	1391	1877
2017	1481	1480	1960
2019	1476	1479	2020

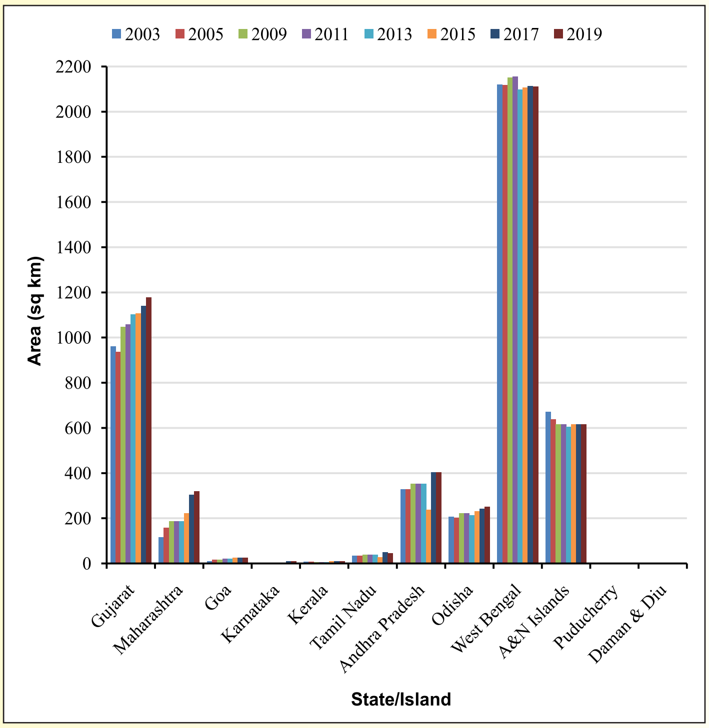
(***Source: ISFR, 2019***)

The mangrove distribution among maritime states and islands in 2019 differs quite extensively. The total mangrove area in the country is located along the country's eastern coast adjoining the Bay of Bengal with 56.56%, along the western coast adjoining the Arabian Sea with 31.06%, while the remaining 12.38% is found in the Andaman and Nicobar Islands. The highest area under mangrove is accounted by West Bengal (2112 km^2),Gujarat (1177 km^2) and Andaman and Nicobar Islands (616 km^2)followed by Andhra Pradesh (404 km^2), Maharashtra (320 km^2), Odisha (251 km^2), Tamil Nadu (45 km^2), Goa (26 km^2), Karnataka (10 km^2), Kerala (9 km^2), Daman & Diu (3 km^2) and Puducherry (2 km^2) (ISFR, 2019). The mangroves of West Bengal are present in the Sundarban areas, the large deltaic complex of the river Ganges. In Gujarat, mangrove forests are present in the Gulf of Kachchh, South Gujarat and Gulf of Khambhat. While in Andaman and Nicobar Islands, majority of mangroves are found in the North Andaman and South Andaman districts. The mangroves of Maharashtra are distributed along the Mumbai, Raigarh, Ratnagiri, Sindhudurg and Thane districts. In Odisha mangroves are distributed in the Mahanadi,Brahmani and Baitarani deltas

Nicobar Islands have declined. There are forty six true mangrove species reported from the Indian coast encompassing 14 families and 22 genera (Ragavan*et al.* 2016). The key species being *Avicenniamarina, A. officinalis, A. alba, Rhizophoramucronata, Sonneratia alba, Bruguieracylindrica, Heritieralittoralis, Ceriopstagal, Phoenix paludosa and Morindacitrifolia.*

Importance

Mangroves form an ecosystem for large number of crustaceans, fishes, molluscs, birds, insects, reptiles, and monkeys that thrive along the coastline margin between land and sea in tropical and subtropical areas. They are considered to be one of the most productive, diverse, and crucial bio-resource in the coastal environment. They have tremendous ecological and socio-economic value as they provide goods and services to human societies, coastal and marine species(Youdon, 2020).They serve as a breeding ground and nurseries for various commercially



State/island wise distribution of mangrove area in India during last 16 years (*Source: ISFR, 2019*)

important fishes and crustaceans' mainly shrimps and crabs. Economically mangrove ecosystem also provides income from the collection of the different ornamental shells of mollusks, crustaceans, and fish that inhabit these ecosystems. Mangroves serve as a potential site for recreational activities like fishing, boating, sight-seeing, bird watching, and photography which contribute significantly to the tourism potential in the country. They provide local communities with fuelwood, charcoal, timber, and wood chips which helps to stabilize coastlines. They maneuver as a filter for land runoffs and green walls for soil erosion, thus key in stabilizing the loose soil from high wind velocity, tidal surges, and cyclonic storms. Other services include the protection of coastal areas against erosion and various climate change events like storms and cyclones. They also help in sequestering large amounts of carbon as compared to other forest types thereby playing an important role in mitigating impacts of climate change.

Challenges

More than 35% of the world's mangroves have been lost with figures reaching as high as 50% in countries such as India, Vietnam, Philippines and Americas. Studies have found that the mangrove forests have been impacted by varied and complex anthropogenic phenomenon and natural disturbances. This includes clearing of mangrove forests for agricultural land, human settlements and infrastructure (such as harbours), tourist development, shrimp aquaculture, salt farms, and industrial areas. Deforestation is the single largest threat to the diversified mangrove ecosystem. Other major threats include the land-based pond aquaculture and overexploitation of fish and shellfish resources. The combustion of fossil fuels along with deforestation and other forms of land clearing are leading to aninevitable rise in atmospheric CO_2 concentrations and surrounding temperatures. The temperature rise may result in expanded latitudinal limits for some species, alteration of community composition and marginal increases in photosynthesis, respiration, microbial decomposition, floral and faunal diversity, growth and reproduction, but reduced rates of sediment accretion(Alongi, 2002). In general, impacts of climate change on mangrove use and exploitation are predicted to result in increased risks off looding and erosion in low lying coasts, intrusion of salt wedge and storm surges and collateral damage. Thus it is crucial to conserve them from further depletion and adopt measures to prevent area loss. Although, many legislative and non-legislative measures have been already setup in the early 1980s to conserve and regenerate them but proper regulation of these laws and measures is not successful due to various reasons. The keep going policies for mangrove utilization and conservation are cryptic and inconsistent as undetermined land ownership and rules governing are access to the mangrove areas. The guidelines made are too complicated and ambiguous to follow. Implementation of coastal land use and development plans by the Government and institution for effective management of coastal mangrove are ineffective(Mridula and Rajesh, 2007).

Further action: Conservation and Management

Mangroves provides huge beneficial products to human beings and are rich in biodiversity. Conservation and management of such an ecosystem is unavoidable due to the significant facts that mangroves provides nursery grounds for different aquatic organisms, suitable for aquaculture practices, possess medicinal properties, and income generation due to tourism. Sustainable use of the mangrove ecosystem requires a far more inclusive framework for understanding, predicting, and managing interactions between climate change, human activities, and coastal ecosystems which needs to be formulated. At the most basic level, efforts must be made to create awareness about the importance of mangroves and their utility in the local people is required through the dissemination of knowledge regarding mangroves among stakeholders. Recently efforts from NGOs, and local communities in India, have played an important role in sustaining and restoring mangrove forests. Some important techniques adopted for restoration of degraded mangrove habitats are large-scale plantation, development of new mangrove habitats at suitable areas such as fishbone channel plantation, and capacity-building of managers and staff. The forest departments in various states have formed eco-development committees for joint implementation of projects in mangrove areas. Regular trainings are also being conducted not only for sustainable mangrove conservation but also to help protect and preserve these mangroves areas which are a religious and sentimental value to the local communities. The Kagekanu forest patch, which is dominated by species such as *Rhizophoramucronata*, *Avicennia officinalis* and *Kandeliacandel,* off Karwar coast in Karnataka, is an example of traditional conservation through sacred groves at suitable areas such as fishbone channel plantation, and capacity-building of managers and staff. The forest departments in various states have formed eco-development committees for joint implementation of projects in mangrove areas. Regular trainings are also being conducted not only for sustainable mangrove conservation but also to help protect and preserve these mangroves areas which are a religious and sentimental value to the local communities. The Kagekanu forest patch, which is dominated by species such as *Rhizophoramucronata*, *Avicennia officinalis* and *Kandeliacandel,* off Karwar coast in Karnataka, is an example of traditional conservation through sacred groves (Sahu *et al.*2015).The forest department of Andaman and Nicobar islands has started the mangrove regeneration program by growing nurseries of mangrove saplings and planting them in appropriate areas. Participation of the local community in the conservation and prevention of illegal clearing and encroachment of mangrove areas is crucial. Hence, national and international collaboration is required to reach a commendable level. Strict implementation and enforcement of relevant legal measures are essential. The success lies in the basic understanding that mangroves are the source of significant and tangible socio-economic benefits to the community.

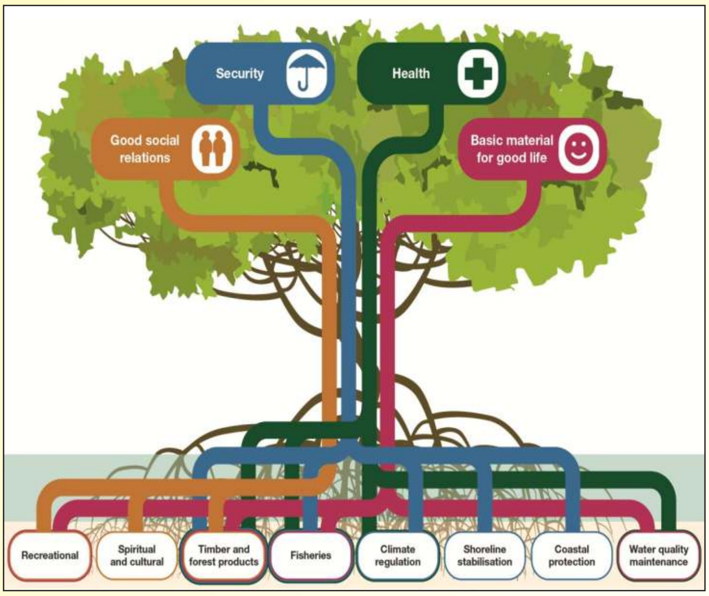
Mangroves of Sundarbans area, West Bengal ***(Source:https:// sundarbanmangroves.wordpress.com/2016/03/13/soils-of-sundarban-mangroves)***

Rhizophoramucronata ***(Source: https:// alchetron.com/ Rhizophora-mucronata)***

Mangroves of Maharashtra ***(Source:https:// mangroves. maharashtra.gov.in/Site/ViewPhoto?album=1013&type=1)***

Avicennia marina **(Source: Senthu herbals BlogSpot)**

Bruguieracylindrica **(Source: Sabah Wetlands Conservation Society)**



Mangrove ecosystem services ***(Source: https://www.unep-wcmc.org/resources-and-data/the-importance-of-mangroves-to-people--a-call-to-action)***

Mangrove crab ***(Source: https://footage.framepool.com/en/shot/654163426-mangrove-crab-zambezi-delta-sandy-soil-burrow-hole)***

Conclusion

The status of mangrove cover in India has increased since last three decades. West Bengal and Gujarat are the top most states accounting more than 66% of the mangrove cover of the country. However, recently the Indian mangroves have been affected byvarious anthropogenic and natural disturbances. Thus it is essential to conserve and nurture them from further depletion. Mangroves serve as a social, ecological, and subsistence benefits to the humans as well as to the associated organisms. They protect the shoreline from various climatic events and erosion control, thus playing an important role in the conservation of biodiversity. Hence, governmental and collaborative efforts are required for the sustainable utilization of mangrove ecosystem.

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ADOPTION OF INTEGRATED PEST MANAGEMENT PRACTICES IN BASMATI RICE IN WESTERN U.P.

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Rice, Oryzasativa L., is the important cereal crop which is grown in 117 countries and is a staple food for people in 39 countries, which includes 2.70 billion people in Asia alone (Sardesai et al. 2001). Its productivity is severely affected by numerous biotic and abiotic factors. About 52% of the total global production of rice is lost annually owing to the damage caused by biotic factors, of which nearly 21% is attributed to the attack of insect pests (Brookes and Barfoot 2003). Basmati Rice is a long-grain aromatic rice grown in several States of India and Pakistan. India is the leading exporter of the Basmati rice to the global market and cultivated in about 2.0 million hectares. Basmati rice crop suffers severely due to attack of various insect pests, which reduces its yield and quality. In general, yield loss due to insect pest of rice has been estimated at about 25% in different rice ecosystem. Findings of conducted surveys revealed excessive and injudicious use of chemical pesticides and fertilizers by farmers that aggravated the pest menace, secondary pest outbreaks, residue problems in grains, soil and water, environmental degradation and rejection of many export consignments. To achieve sustainable quality production of Basmati rice, it is important to manage the damage and yield loss by rice pests and options for the appropriate pest management practices. Hence, IPM should be treated as a yardstick for the productivity of a crop.

Rice is the major food grain crop in India. There is significant development in researching new varieties and other package of practices in relation to nutrient management, water management, weed management, pest & disease management, farm mechanization etc. No doubt, all these technologies really brought out significant increase in productivity in rice. Each technology developed by the scientists in this area had its own contribution as sole and also in combination with different technologies. Of all technologies, special focus on Integrated Pest Management (IPM) is required as it is the central role for all the technological developments. Hence, IPM should be treated as a yardstick for the productivity of a crop.

Insect pests associated with basmati rice in western plain zone of Uttar Pradesh were studied during Kharif 2014 at Crop Research Centre, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut (U.P.), India.

Basmati rice is cultivated in about 2.0 million hectares. In 2014-15, out of the total production of 8.70 mt of Basmati rice from 2.10 million hectares, 3.7 mt worth INR ` 275.979 billion was exported. The states namely Punjab,Haryana and Western UP account for about more than 70 per cent of total Basmati grown in India. The yield potential of commonly grown Basmati cultivars viz., Pusa Basmati 1, Taraori Basmati and Dehraduni Basmati is severely hampered by biotic stresses as there is no inbuilt resistance in them to any of the pests.

Findings of conducted surveys revealed excessive and injudicious use of chemical pesticides and fertilizers by farmers that aggravated the pest menace, secondary pest outbreaks, residue problems in grains, soil and water, environmental degradation and rejection of many export consignments.

An inter-disciplinary and inter-institutional team took up the challenge at NRCIPM to address these problems through holistic IPM tactics.IPM strategies were synthesized and validated at village level in Basmati growing areas of Uttar Pradesh, Haryana and Uttarakhand.

IPM validation was initiated at Baraut (Dist. Baghpat, UP) during 1997-98 in an area of 10 ha with cv. Pusa Basmati 1. The baseline information collected from the farmers, which had shown indiscriminate use of chemical pesticides (phorate, endosulfanetc) to an extent of 4-6 sprays for suppression of insect-pests and diseases.

After the success of IPM validation at Shikohpur in Pusa Basmati1, the technology was taken up in ChhajpurKhurd (Panipat) village, Haryana with Taraori local Basmati variety. At Chhajpur a total of 28, 80 and 140 ha area was under IPM during kharif 2002, 2003 and 2004, respectively. Gradually the technology by its own spread to 25 adjoining villages.

During 2005 to 2010 the technology was validated in Uttarakhand State at Tilwari and Doodhali villages (Dehradun) in 40 and 25 ha, respectively, with Dehraduni Basmati (Type 3) and Kasturi.

During 2005 the high yielding variety of Basmati cv. Pusa 1121 introduced by ICAR-IARI became very popular among farmers. Presently, this variety has spread to over 84% of the total Basmati area in Punjab, 78% in Western Uttar Pradesh, 68% in Haryana, 30% in Uttarakhand, 8% in Jammu and Kashmir and is grown over 1000 ha area in hill state of Himachal Pradesh.

The IPM module developed by the Centre for pest management in rice was found to be very effective for reducing the incidence of pests and diseases in the village Bambawad which adopted IPM programme. Some of the farmers of the area were very happy for IPM programme.

There is immense scope for proven Basmati Rice IPM technologies in India to sustainable pest management, quality production, reduction of chemical consumption and enhancing farmers' income and empowerment.

Besides these it has social impacts as it takes care about workers health, safety and welfare. The adoption of IPM technologies is always a great challenge to the researches and scientists. Adoption of IPM is very complex in nature and influenced by the socio-economic, cultural, marketing, access of IPM information availability of IPM information and advisory services, training and timely availability of critical inputs, extension support services and availability of proven IPM technologies and policy support.

IPM is also knowledge intensive need specific extension approaches and intensive training. The adoption of IPM depends on the coordination of all the IPM stakeholders. The involvement of local community for in IPM also very important because of IPM is community approach because IPM will not impact in isolation like other technologies. Therefore the involvement of farming community, school, social institution for environmental awareness and moving towards community pest management instead of individual pest management.

The involvement consumer who is the end user of IPM produce and King should take care choice and preference of consumers and also make aware the attributes of IPM produce in comparison of non-IPM produce. Government Policy also influence the adoption of IPM in large scale it is urgent need to institutionalize the IPM commodity associations for mounting pressure on government for to getting premium prices of IPM produces and subsidy on IPM inputs.

Therefore, an inter-disciplinary and inter-institutional team took up the challenge at NCIPM to address these problems through holistic IPM tactics. IPM strategies were synthesized and validated at village level in Basmati growing areas of Uttar Pradesh, Haryana and Uttarakhand. IPM validation was initiated at Baraut (Dist. Baghpat, UP) during 1997-98.The IPM module developed by the Centre for pest management in Basmati rice was found to be very effective for reducing the incidence of pests and diseases in the village Bambawad which adopted IPM programme. Some of the farmers of the area were very happy for IPM programme. There is immense scope for proven Basmati Rice IPM technologies in India to sustainable pest management, quality production, reduction of chemical consumption and enhancing farmers' income and empowerment. Besides these it has social impacts as it takes care about workers' health, safety and welfare. The adoption of IPM technologies is always a great challenge to the researches and scientists. Adoption of IPM is very complex in nature and influenced by the socio-economic, cultural, marketing, access of IPM information availability of IPM information and advisory services, training and timely availability of critical inputs, extension support services and availability of proven IPM technologies and policy support.

Integrated Pest Management (IPM) is an approach that can help lower production costs, reduce exposure to pesticides, and improve long-term sustainability of the agricultural system. The NCIPM national primer IPM research institution in India has developed and promoted IPM technologies to manage pests in Basmati Rice in the villages of Uttar Pradesh, Uttrakhand, Haryana, Punjab through participatory approach. Despite of several advantages of these technologies the adoption at the farmer level is not very encouraging. Besides, the use of innovative extension approaches including farmer field schools (FFSs), field days, exposure to other farmers, and written media (e.g. pamphlets) for wide area approach of IPM adoption. Basmati Rice production is associated with heavy use of chemical pesticides to manage pests and optimize profits. Commercial pressures on farmers to use pesticides, and the idea that pesticides companies disrupt IPM research and implementation activities could be important in specific cases. Concerns have emerged about the adverse consequences of pesticide over use. These consequences include short and long-term health hazards and environmental degradation.

Conclusion

So, it is of utmost necessity for the scientific community to analyze the field level constraints (as perceived by the farmers) in the adoption of IPM technologies especially in the Rice cultivation in the third world countries where excessive and indiscriminate use of the pesticides were reported by various researchers. Therefore, it is very pertinent to identify the barriers and constraints directly relate to the low adoption of IPM technologies in vegetable crops. The study can help promote better technology transfer and adoption of IPM, in so doing, effectively help sustain Basmati Rice production.

TURMERIC-THE GOLDEN SPICE

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From the prehistoric period plant products derived from nature have been used for various purposes by humans. Billions of years ago natural products are being derived from various plants which produce secondary metabolites that possess defense mechanism against diseases and the infections. Many of these products have got unique properties that are being used right from the medicine to health care, culinary and are employed till last breath of man. Medicines obtained from the plant are valued irrespective of the era and is still into limelight in the upcoming decades as they play a crucial role in the health care.

"Ayurveda" – The Indian system of holistic medicine which uses mainly plant-based drugs or formulations to treat various ailments from cough, cold to deadly cancer. The total number of the small molecule account to 11408 (drugbank.com). Of these, nearly 35% of medicines have originated from natural products. With the passage of time and advancement in the field of medicine, the so called synthetic medicines came forth, but with the fact that these counterparts have lethal side affects and also natural medicines being less expensive with least or no side effects they are gaining importance.

One of the plants having longest history of medical use, known to all, used by all and used for all is Turmeric. Its usage dates back to nearly 4000 years to Vedic culture in India, where it was used as a culinary spice and had some religious significance. In Southeast Asia, turmeric is used not only as a principal spice but also as a component in religious festivals. It is also called Indian saffron owing to its brilliant yellow color. Realizing its importance and dynamic healing effects chemists are switching their fields from synthetic to natural by exploring nature more and more.

Being Native to tropical South Asia, turmeric reached China in 700 AD, East Africa in 800AD, West Africa in 1200 AD, and Jamaica in the eighteenth century. In 1280, Marco Polo described the spice, amazed at the vegetable that showed such qualities as in saffron. Susruta's Ayurvedic Compendium, dating to 250 BC, recommends oil containing turmeric to soothe the effects of toxic food.

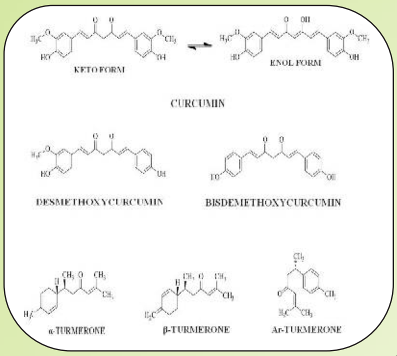
Currently, turmeric is widely cultivated in the tropics and goes by different names in different cultures and countries. In the Northern parts of the country, turmeric is commonly called "haldi,", whereas in the south it is called "manjal," The name is said to be derived from the Latin word terra merita (meritorious earth), referring to the color of ground turmeric, which resembles a mineral pigment. It is called terre merite in French and simply as "yellow root" in many languages. In many cultures, its name is based on the Latin word curcuma. In Sanskrit, it has at least 53 different names.

Turmeric is a product obtained from Curcuma *longa*, which is a rhizome and is herbaceous perennial plant belonging to the ginger family Zingiberaceae. As many as 133 species of Curcuma have been identified worldwide. The turmeric plant growing to an height of about 1m has long oblong leaves, It needs temperatures between 20°C and 30°C and a considerable amount of annual rainfall to thrive. Plants are gathered annually for their rhizomes, and are reseeded from some of those rhizomes in the following season. The dried rhizome is grounded to a yellow powder with a bitter, slightly acrid, yet sweet, taste.

India produces nearly all of the world's turmeric crop and consumes 80% of it. Indian turmeric is considered to be the best in the world because of its inherent qualities and high content of curcumin, which is the bioactive compound. Erode, a city in the South Indian state of Tamil Nadu, is the world's largest producer and the most important trading center for turmeric. It is also known as "Yellow City," or "Turmeric City" Sangli, a city of Maharashtra, is second only to Erode in size and importance as a production and trading site for turmeric.

NUTRITIONAL COMPOSITION

Turmeric is a good source of the ω-3 fatty acid and α-linolenic acid. Nutritional analysis showed that 100 g of turmeric contains



390 kcal, 10 g total fat, 3 g saturated fat, 0 mg cholesterol, 0.2 g calcium, 0.26 g phosphorous, 10 mg sodium, 2500 mg potassium, 47.5 mg iron, 0.9 mg thiamine, 0.19 mg riboflavin, 4.8 mg niacin, 50 mg ascorbic acid, 69.9 g total carbohydrates, 21 g dietary fiber, g sugars, and 8 g protein.

COMPONENTS

Turmeric contains more than 100 components. The main component of the root is a volatile oil, containing turmerone, and there are other coloring agents called curcuminoids in turmeric. Curcuminoids consist of curcumin demethoxycurcumin, 5'-methoxycurcumin, and dihydrocurcumin, which are found to be natural antioxidants.

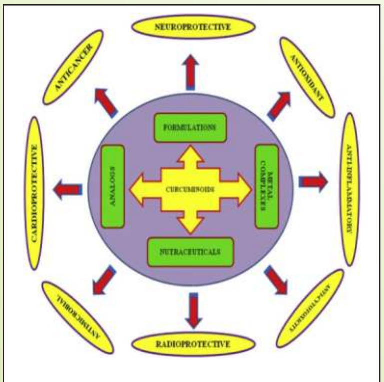
Uses

As a wonder ingredients turmeric is a staple in all Indian cooking and a key ingredient in many Asian cuisine, imparting a mustard-like, earthy aroma and pungent, It also adds a slight bitter flavor to food with a numbing punch of pepper.

It has versatile uses as a foodstuff, cosmetic, and medicine. It lends curry its distinctive yellow color and flavor. It is used as a coloring agent in cheese, butter, and other foods. As a result of Indian influence, turmeric has made its way into Ethiopian cuisine. Turmeric is also used in manufactured food products such as canned beverages, dairy products, baked products, ice cream, yellow cakes, yogurt, orange juice, biscuits, popcorn, sweets, cake icings, cereals, sauces, and gelatins. It is a significant ingredient in most commercial curry powders. With its numerous uses its also used in savory and sweet dishes, and is widely used in Eastern specialties such as fresh turmeric pickle. It is reported that consumption of turmeric in Asian countries in humans is in the range of 200– 1000 mg/day. Apart from its use in culinary it is also employed in the treatment of various diseases.

Medicinal uses

Turmeric is used as an herbal medicine for various skin disorders and digestive problems. It is used to cure rheumatoid arthritis, chronic anterior uveitis, conjunctivitis, skin cancer, small pox, chicken pox, wound healing, urinary tract infections, and liver ailments .It is also used for digestive disorders; to reduce flatus, jaundice, menstrual difficulties, and colic; for abdominal pain and distension and for dyspeptic conditions including loss of appetite, postprandial feelings of fullness, and liver and gallbladder complaints. It has anti-inflammatory, choleretic, antimicrobial, and carminative actions . The main clinical targets of turmeric are the digestive organs: in the intestine, for treatment of diseases such as familial adenomatous polyposis in the bowels, for treatment of inflammatory bowel disease; and in the colon, for treatment of colon cancer. For arthritis, dosages of 8–60 g of fresh turmeric root three times daily have been recommended. For dyspepsia, 1.3–3.0 g of turmeric root is recommended.



Biological activity of curcuminoides

Hay fever

The compound curcumin seems to reduce hay fever symptoms such as sneezing, itching, runny nose, and congestion.

Depression

Curcumin reduces depression symptoms in people. Turmeric seems to lower levels of blood fats called triglycerides. However the effects of turmeric on cholesterol levels are conflicting.

Osteoarthritis

Turmeric can reduce the pain and improve function in people with knee osteoarthritis when it is taken alone or in combination with other herbal ingriedients. It is said that, turmeric worked about as well as ibuprofen for reducing osteoarthritispain.

Itching

Taking turmeric by mouth three times daily for 8 weeks reduces itching in people with long-term kidney disease. Taking a specific combination product (C3 Complex, Sami Labs LTD) containing curcumin plus black pepper daily for 4 weeks reduces itching severity and improves quality of life in people with chronic itching caused by mustard gas.

Antioxidant Effect

It is due to polyphenols. Curcuminoids are natural phenolic compounds with potent antioxidant properties.

Antiviral, Antimicrobial, and Antiparasitic Activities

Curumin is belived to possess these properties.

Anti-inflammatory properties

It is suggested to take turmeric capsules of 400 to 600 milligrams (mg) up to three times per day for inflammation relief.

Pain relief

Turmeric is thought of as a pain reliever. The spice is reputed to relieve arthritis pain as well. Studies seem to support turmeric for pain relief, with one study noting that it seemed to work as well as ibuprofen (Advil) in people with arthritis in their knees. Though dosing recommendations seem to vary, those who participated in the study took 800 mg of turmeric in capsule form each day.

Improving liver function

Turmeric has been getting attention recently because of its antioxidant abilities. The antioxidant effect of turmeric appears to be so powerful that it may stop your liver from being damaged by toxins. This could be good news for people who take strong drugs for diabetes or other health conditions that might hurt their liver with long-term use.

Possibly reducing the risk of cancer

Curcumin shows promise as a cancer treatment. Studies suggest it has protective effects against pancreatic cancer, prostate cancer, and multiple myeloma.

Digestion

Turmeric can help digestion. Turmeric adds flavor to food, which explains its presence in curry powder. However, turmeric can also play an important role in digesting that food. The spice can contribute to healthy digestion as a result of its antioxidant and anti-inflammatory properties. Turmeric is used in Ayurvedic medicine as a digestive healing agent. Western medicine has now begun to study how turmeric can help with gut inflammation and gut permeability, two measures of digestive efficiency.

The spice is even being explored as a treatment for irritable bowel syndrome (IBS).

Antioxidant activity

The curcumin is capable of scavenging oxygen free radicals such as superoxide anions and hydroxyl radicals, which are important to inhibit the lipid peroxidation (Selvem *et al* 1995, Sreejayan and Rao 1994, 1996, 1997, Stano et al 2000). Curcumin was found to inhibit the proliferation of human breast cancer cells in vitro models (Azuin and Bhide 1994, Kuo et al 1996, Soudamini and Kuttan 1988, Zhang *et al* 2007).

Radioprotective activity

Curcumin was effective in inhibiting radiation-induced protein kinase C (PKC) activity and was potentially useful as a chemo preventive agent. Activation of PKC is reported to be the means of conferring radio resistance on a tumor cell. Therefore suppression of PKC by curcumin may be means of preventing the development of radio resistance following radiotherapy

Lipid lowering activity

The effects of diet supplemented curcuminoids (commercial grade curcumin: a mixture of curcumin (73.4%), demethoxycurcumin (16.1%) and bisd emethoxycurcumin (10.5%)) showed encouraging effects on triacylglycerol and cholesterol concentrations with lipid-lowering potency (Asai and Miyasawa 2001, Shalini and Srinivas 1987).

Antimutagenic potential

Curcumin has antigenotoxic potential against cyclophosphamide induced chromosomal mutations

Conclusion

The beneficial effects of turmeric are traditionally found in food consumption, or at lower rates, over a longer period of time. Direct understanding of what dosage, safety, and method of action are required for the reasonable use of turmeric in medical attention towards human ailments.

"Each spice has a special day to it. For turmeric it is Sunday, when light drips fat and butter-colored into the bins to be soaked up glowing, when you pray to the nine planets for love and luck."

'HIDDEN HUNGER' IN HUMANS: CAN PLANT SCIENCE HELP?

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Micronutrient deficiency is highly prevalent in developing countries especially in Asia and Africa because of the agricultural systems that produce food insufficient in vitamins and minerals, widely consumed by low-income and middle-income families. This is one of the leading contributors to the global burden of diseases. This global crisis in nutritional health is the result of dysfunctional food systems that do not consistently supply enough of these essential nutrients to meet the nutritional requirements of high-risk groups. Different interventions and approaches such as supplementation, food fortification, dietary diversification and nutritional education have been pursued to fight against the micronutrient malnutrition. Moreover, nano-chelating technology can decrease the need for chemical fertilizers; additionally, this technology has the capability to bio-fortify crops with vital micronutrients. Biofortification, the breeding of crops to increase its nutritional value has been added as another approach over the last few years. This improved nutrient status of vitamins and minerals would help in improving the overall health of human.

Keywords: Biofortification, micronutrient, deficiency, vitamins, minerals

Introduction

World's one-sixth population is facing a major challenge related to hunger due to malnutrition which has created a dangerous situation in front of human civilization. This critical situation is known as "hidden hunger" and the problem has affected many poor and developing countries. Nearly 30 vitamins and minerals that the human body cannot manufacture in sufficient amounts on its own are essential and people should ideally try to meet their vitamin and mineral needs through their diet rather than supplements. People may appear to be consuming an adequate amount of food but the calories of staple crops disguise an invisible hunger that affects the growth and development of people. Worldwide, two billion people are already affected by micronutrient deficiency. The consequences are severe and long-lasting, sometimes moving from generation to generation. Pregnant women and children under 5 years with micronutrient deficiency are at highest risk of having negative health impacts. Micronutrient deficiencies can often cause mortality and morbidity that can cause immense health burden. This health burden also can cause significant economic costs in the developing world. However, there are also more targeted micronutrient interventions that are being implemented, including food supplementation, industrial fortification, and nutrition education programs. Lately, a plant science-based approach has been proposed as a strategy for breeding, genetically modified staple food crops for higher micronutrient contents. This plant science-based nutrition enhancements approach has been termed biofortification. It has potentially positive effects if micronutrient rich staple crops are widely grown and consumed by the poor. This can improve their nutritional status, which could lead to significant health advantages and economic benefits. The potential positive effects of biofortification are obvious. However, plant scientists are working on the development of biofortified crop varieties since years and hardly any of these varieties has yet been released, so the actual impacts are still to come. In this article, we will analyse the status of bio-fortification in India and in various developing countries and will also discuss plant science-based aspects of biofortification.

Overview of biofortification

Biofortification is an intervention strategy under development with the goal of increasing the content of select micronutrients in the edible portion of staple food crops by agricultural, agronomic, or genetic means. Mainstreaming biofortified traits into plant breeding programs and determine whether biofortified crops can make a valuable contribution, in concert with other interventions is a challenge. It can be achieved through conventional breeding, by selecting for genotypes with the highest micronutrient content, gene insertion or induced mutations, application of fertilizers. At present, the potential for biofortification with zinc, iron and provitamin A carotenoids is primarily being evaluated or explored in some of the most important staple food crops for the poor, including rice, wheat, maize, beans, sweet potato.

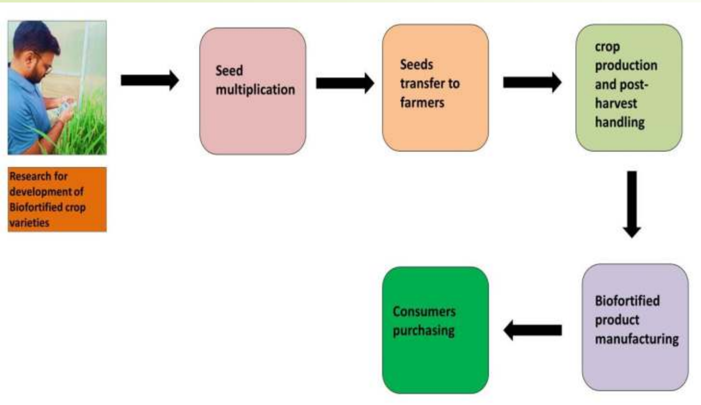

Fig. 1: Diagrammatic representation of the biofortification developments stages.

Advantages of Biofortification

- Since minerals help plants to have better agronomic characteristics like greater yields, resistance to pests, tolerance to stress, etc. Consequently, biofortified crops can contribute to higher yields even on mineral deficient soils.
- Higher nutritional concentration like beta-carotene, zinc, iron, vitamin D, tryptophan and lysine.
- Once developed and disseminated biofortified crops can be grown and consumed year after year and provide a continuous benefit stream.
- Biofortified seeds cost the farmers the same as the usual varieties and thus is a cost-effective intervention.
- Biofortification uses the very staples that the poor are already eating. Therefore, biofortified foods are more easily integrated into the livelihood and diets of the poor and thus may reduce poverty.
- A biofortified crop reaches the country's most vulnerable people, living in remote areas.

Plant science-based approach for biofortification

(1) Conventional plant breeding approach:

Through conventional plant breeding method, screening of germplasm is done which is rich in nutrient content having a higher production rate. During plant breeding process, breeders ensure that biofortified breeding crops are resistant to adverse environmental conditions that may affect the production and quality of biofortified crops. Another major challenge that breeders have to face is genetic instability while improving crop varieties i.e., crop might lose its trait value within one or two generations after cultivation. The best examples of conventional plant breeding biofortified products are Quality Protein Maize(QPM),orange sweet potato, maize having less amount of essential amino acids like tryptophan and lysine etc.In late 1990s, Surinder Vasal and Evangelina Villegas at the International Maize and Wheat Improvement Centre (CIMMYT) were developing the Quality Protein Maize(QPM) that have a higher amount of essential amino acids (tryptophan and lysine) for which, they won 2000 Food Prize.

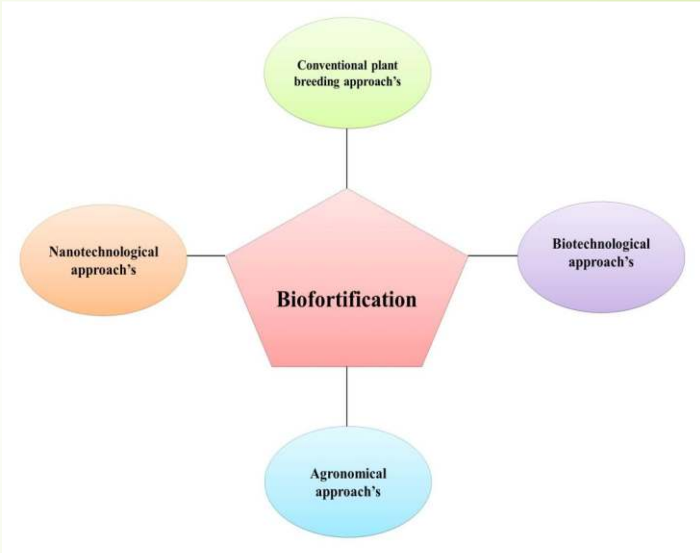

Fig-2: Diagrammatic representation of the type of biofortification strategies.

(2) Biotechnological approach:

Biofortified crops can be developed by conventional plant breeding process but in some staple crops like rice, traditional breeding strategies are not able to develop some complex nutrients such as vitamin A. Mostly all plants synthesize pro-vitamin A in green parts of plants but not in the starch-storing part of the seed. In vegetatively propagated varieties like cassava and potatoes,defining genetically breeding lines is very difficult. Due to all these difficulties, advanced technology is required to fill the solution gap to this problem and biotechnology tool is the best alternate. Biotechnological strategies are very valuable, for developing more nutritious crops. Few examples of biotechnological biofortified crops are:

(1) Protein rich biofortified crops:

ASP1 gene which encodes the essential amino acids is introduced into rice and cassava, to enhance the production of proteins in these transgenic plants. Some other genes like Sporamin A into sweet potato and seed albumin AmA1 protein into Prince's Feather (Amaranthus hypochondriacus) are also used for development of biofortified transgenic crops.

(2) Vitamin rich biofortified transgenic crops:
Golden rice is the best example of transgenic cropshaving provitamin A,in which two genes PSY and CRTI were introduced by genetic engineering. Two genes namely, PSY gene isolated from daffodil which encodes phytoene synthase and CRTI gene from the bacterium Erwinia uredovora which encodes phytoene desaturase are expressed only in the rice seed.But nowadays, plant scientists are modifying the golden rice and introducing golden rice-2 that contains β-*carotene* by 23 times.73g of golden rice-2 is sufficient to fulfil the requirement of vitamin A for 1-3 years old children.

(3) Iron-rich biofortified transgenic Crops:
Isolating an iron storage protein ferritin gene from French bean and soybean and introducing it into rice endosperm results in 3-fold increase of iron in rice seeds. Recently over-expression of a cysteine-rich protein that transports metals in rice is also being implemented.

(3) Agronomical approach:
In agronomical based biofortification, strategies require fertilizers that increase micronutrient content of cultivated crops such as cereals and legumes. The agronomical base biofortification methods are more beneficial in poor and developing countries.

(4) Nanotechnological approach:
In 21st century, nanotechnology has become a revolutionary technology in agriculture. Nanotechnology has enough potential to solve every problem related to agriculture and food security, especially problems related to malnutrition. In the nanotechnological biofortification, nano fertilizers are used. Nano fertilizer has a high surface area to volume ratio which makes nano fertilizermore efficient than the conventional fertilizers. Nano fertilizers are not accumulated in soil because it is rapidly absorbed by plants and the resulting enhancement of nutritional value in plant biofortified products. Nano fertilizers may be zinc oxide nanoparticles (ZnONPs), silica, iron and titanium dioxide, ZnS/ZnCdSe core-shell quantum dots (QDs), InP/ZnS core-shell QDs, Mn/ZnSe QDs, gold nanorods, Al2O3, TiO2, CeO2, and FeO which play a multi-nutrient tonic role for plants. Successful use of nanomaterials as fertilizersdependupon their size, concentration, composition, chemical properties of nanomaterials and plant species. Extensive knowledge of biology, biotechnology, material science, engineering and combination of all these fieldscan develop new technological aspects that may help in nano-agriculture for efficient crop production.

Table 1: 17 new varieties of different crops dedicated to the nation on National Food Day 2020.

S. No.	Crop	Varieties (17)
1.	Rice	CR Dhan 315
2.	Wheat	HI 1633; HD3298; DBW 303; DDW 48; MACS 4058
3.	Maize	LQMH-1; LQMH-2; LQMH-3
4.	Finger Millet	CFMV-1; CFMV-2
5.	Little Millet	CLMV-1
6.	Mustard	PM-32
7.	Groundnut	Girnar-5
8.	YamDa	340; SreeNeelima

Conclusion
Increase in global population and greenhouse effect with decrease in the quality of crops negatively affects various factors such as protein or nutrient content. Therefore, there is a serious need for a solution that can simultaneously increase quality and quantity of crops and supply food for all humans worldwide. In view of this, biofortified crops, either by conventional breeding methods or by modern biotechnological tools like nanotechnology which have no hazardous effects on human health can be produced. The ultimate aim in global nutrition remains a sufficient and diverse diet for the world's population.

NANOTECHNOLOGY: PLAYING AN IMPORTANT ROLE IN AGRICULTURE

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INTRODUCTION
As2020 started with a global pandemic COVID-19 leading the world to shutdown, many major economies facing depression. Agriculture on the other hand as the backbone of many developing countries is still contributing in providing livelihood and food security to millions in these developing countries. Where 2020 has turned time to an era of uncertainty, agriculture and allied sectors have a long way to go.Nanotechnology is the branch of technology that deals with dimensions of less than 100 nanometres, especially the manipulation of individual atoms and molecules can be the new aid to agriculture in upcoming years. Nanotechnology is being used in various fields such as electronics, optical engineering and communication, biomedical and drug delivery, cosmetics and paints, textile including biotechnology and agriculture and food. Nanotechnology is highly suitable for application in agriculture production because it increase the quality and quantity of yields. India has to practice intensive agriculture to meet the food requirements of growing population, but this intensificationis detoriating the quality of the soil and the produce. Nanotechnology can provide a sustainable approach by

reducing soil, water and air pollution by agrochemicals. It has the potential to revolutionize the agricultural and food security with new tools of molecular treatment, disease, rapid disease detection, enhancing the ability of plants to absorb nutrients etc. Smart sensors and smart delivery system will help the agricultural industry viruses and other crop pathogen. Nanotechnology can increase agricultural production, in many ways including nanoformulations of agrochemicals for applying pesticides and fertilizers for crop improvement (Nanofertilizers), the application of nanosensors in crop protection for the identification of diseases and residues of agrochemicals, nanodevices applicable for the genetic engineering of plants, plant disease diagnostics, animal health, animal breeding, poultry production; and post harvest management. Recently, Usman *et al.*, (2020) described and critically evaluateddifferent uses ofnanomaterials (NMs) in agriculture, such as nanofertilizers,nanopesticides, nanobiosensors and NMs for soil remediation via biotic and abiotic pathways. Some of the important aspects and applications of nanotechnology in agriculture are being described here.

USES OF NANOTECHNOLOGY IN AGRICULTURE

Nanotechnology is being used in agriculture by various means, some of them listed below:

- Use of Nanohydrogel to make agricultural production more sustainable and optimize use of water. It is able to absorb and release water and nutrients in cycles leading to more efficient use of water. A study on silver coated hydrogel showed that soils to which this hydrogel is added can hold 7.5% more water than soils without. Hydrogel can store between 130 to 190 times its own weigh of rainwater or irrigation water. Bio- degradable hydrogels are especially promising since it decreases the amount of contaminants. Nanotechnology can be especially useful in dry areas as drought is considered the largest environmental risk for crop production.
- Nanomaterial coated seeds can germinates faster and steadier while increasing their resistance to environmental stress. Nano Technology also increases seedling strength, growth and seed longevity.A laboratory study showed that crops grown from seeds coated with nanomaterials like Nano-silver recorded increased water absorption. Another study on seeds treated with Nanoparticles found a 73% increase in vegetables dry weight. Three time higher vitamins content in seeds which increases crop yield. 16.5% increases in seed longevity during storage was recorded. These advantages contribute to increase quality and quantity of yields and climate resistance. Carbon nano tubes (CNTs) exposed seeds germinated up to two times faster than control seeds. The seedlings weighed more than twice as much as the untreated plants.CNTs could effectively penetrate seed coat, thereby influencing the seed germination and plant growth.It was reported that the seeds incubated in CNTs for two days possessed a moisture content of 57.6 % compared to the value of 38.9 % for the control. This is due to generation of new pores generated during penetration of seed coat by CNTs which aided better water permeation. CNTs induces increased biomass, rapid germination and growth rates will in turn yield agriculture production in a short duration.
- Pollutants, pests and plant diseases cause severe damage to crops. For instance, insect pests cause 25% loss in rice yields and 50% for cotton. Nanoscale devices could be used to make agricultural systems "Smart". Devices could be used to identify plant health issues before these become visible to the farmers. Bio-sensors, consisting of an organic-based detection mechanism, such as enzymes, are able to detect these specific threats. Nano-biosensors show an increase in accuracy, detection limits, sensitivity, selectivity, temporal response and reproducibility, compared to conventional biosensors. Nano-biosensors provide a very precise tool that can be used to prevent pest out- breaks. Smart nanosensors may be capable of responding to different situations by taking appropriate remedial actions, can monitor soil quality, which enhances quality and quantity of yields.
- Up to 70% of conventional fertilizers do not reach their target because they are unstable in the environment, Nano-based smart delivery systems have the ability to provide more efficient and targeted delivery to specific plant cells due to their size-related properties. They show enhanced stability in the environment, which improves the availability of nutrients. The effect of pesticides was found to be twice as strong with half the dose applied. Enhanced delivery of nutrients improves the resistance of crops towards threats like droughts, pests and pollution. It improves the quality and quantity of yields. Nano-biosensors can enhance this process even further by enabling smart delivery systems to precisely release nutrients in response to environmental triggers and biological demands, this provides opportunities for real-time monitoring and control.
- Nano Technology in agricultural production has the potential to reduce pollution resulting from fertilizers and remediate soils polluted with heavy metals. Up to 90% of agrochemicals (in)directly run-off in the environment due to their uncontrolled application. Increased efficiency, smart delivery systems also decrease pollution and subsequently environmental and health risks. Soils polluted with heavy metals can be remediated using Nano Technology making them productive again. Nano Technology based soil remediation techniques are proclaimed to be effective, of low cost and environmentally friendly. A case study using iron nanoparticles for remediation shows a 99% reduction of Trichloroethane (a solvent in pesticides) within a few days.
- An Indian agro-scientist has innovated Nanofertilizer using biosynthesis for the first time in world. The newly developed Nanofertilizer will bring down the use of chemical fertilizer by 80-100 times, thus saving considerable foreign exchange in import of fertilizer. Nanoparticles have extensive surface and are capable of holding abundance of nutrients and release it slowly and steadily. Nano-fertilizers are nutrient carriers that are being developed using substrates with Nano dimensions of 1 – 100 nm. Natural zeolites in the world has aroused considerable commercial interest on developing zeolite based nanofertilizer. In a study, a patented nano-composite consists of N, P, K and micronutrients and mannose and amino acids have been shown to increase the uptake and utilization of nutrients by grain crops. Nano-fertilizers are more beneficial as compared to chemical fertilizers :

  (i) Three times increase in Nutrient Use Efficiency (NUE).

  (ii) 80-100 times less requirement to chemical fertilizers.

(iii) 10 times more stress tolerant by the crops.
(iv) Complete bio-source, so eco-friendly.
(v) 30% more nutrient mobilization by the plants.
(vi) 17-54 % improvement in the crop yield.

Types of nano fertilizers are:

1. Nano porous Zeolite
2. Zinc Nano Fertilizer
3. Nano Herbicide
4. Nano Pesticide
5. Carbon Nano tube
6. Nano Aptamers
7. Boron Nano fertilizers

Nanofertilizers improve crop yield and quality with higher nutrient use efficiencywhile reducing the cost of production and thus, contribute towards agricultural sustainability.

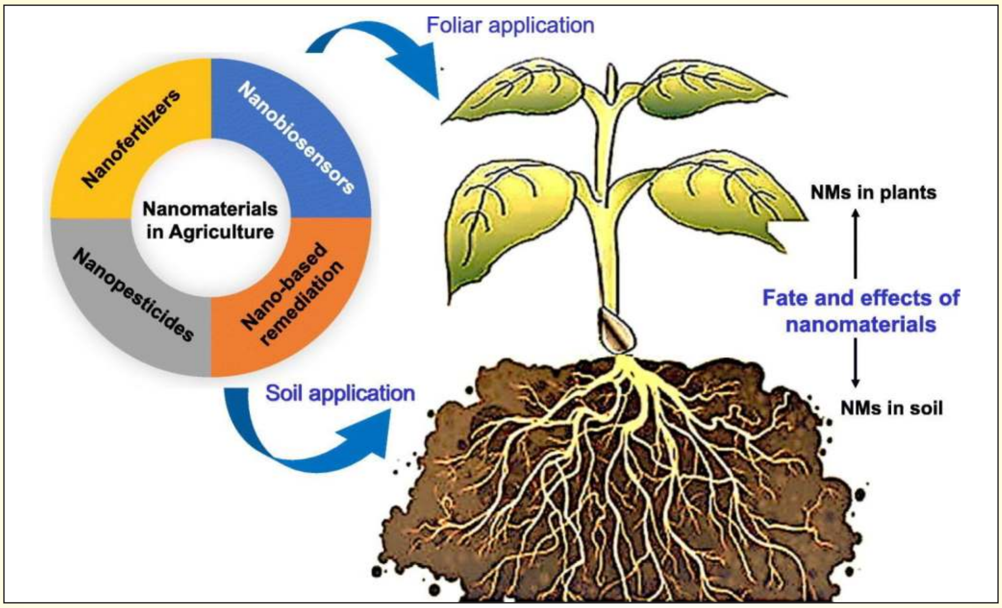

Fig. Overview of Nanotechnology applications in agricultural aspects (Adopted from Usman *etal.*, 2020).

CONCLUSION AND FUTURE PROSPECTS

The potential uses and benefits of nanotechnology are enormous. These include agricultural productivity enhancement involving Nanoporous zeolites for slow release and efficient dosage of water and fertilizer. Nanoparticles for herbicide delivery and vector and pest management and detection by Nanosensors. Nanoparticles helps to produce new pesticides, insecticides and insect-repellents. It is the high time that leading companies focuses on formulation of Nano scale pesticide for delivery into the target host tissue through Nano encapsulation as it is currently the most against insect pests. Nanotechnology will revolutionize agriculture including pest management in the near future.

WOMEN EMPOWERMENT: MODERN SOCIO-ECONOMIC EVOLUTION

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There are lot of emphasis given to empower the women from government as well as non-governmental organisations. In this process of women empowerment, I think men left far behind. The results of which we can see around us in the society where most of men failed in relationship with empowered women. Of course the reason lies in the status quo of patriarchal mind set of most of us in our society. Men are not able to afford free and self-dependent women. They always look at women as dependent either on brother or father before marriage and husband or son after marriage. Now in the present time, educated and skilled women are self-dependent and free from economic and social dependency on their male counterparts. But this is not acceptable to most of the males in our society and that is the primary reason for so many violent divorces and break-ups in relationships in present society.

Earlier male were completely dominant and females were completely dependent. And males were taking benefits of female's dependency on them. This can be better illustrated through thousands of our historical stories from ancient to modern times. Rarely it is found in stories that any woman have more than one husband at a time but it's very common that man have more than one wife at the same time. Then with passing time, first it's understood as tradition which later became inheritable tradition. With more socio-economic evolution, people connected it to the religion and rituals and became an acceptable tradition in human society, doesn't matter how much exploitative it is in its nature. I know many people become ready to argue here that what is wrong in having more than one wife at a time when female themselves are not objecting this tradition. Think once more, what kind of female you are talking about. I think still you are thinking about those women whowerehelpless and dependent economically too, that's why they need someone to give them food, cloth, shelter and of course fulfil sexual desires. But there were nowhere foundations of mutual love, care and respect at all. Love can be happen and grown only with mutual respect and freedom otherwise it's just an exploitation of one being by another one as can be seen in most of the cases. Human societal traditions gave it a beautiful name i.e. Marriage. Traditions of marriage for royal family were just a political alliance, which can be seen throughout the history on all the continents. Hardly had you found examples of females in history who were given love and respect otherwise most of the females were exploited by males through orthodox socio-religious traditions.

Now, females are educated, skilled and doing work in almost every sector where men are working. This gave these empowered women their real identity of human being rather than just as subordinate to the male counterparts. This also gave freedom and personal choices to women. Now the women have the choices for how they want to live their life. It's their choice to get marry or live in relationship with any man of her choice. And I feel this loving relationship of man and woman can only be happen in freedom with mutual respect and trust. But if a woman start to do the thing which the men were doing since immemorial history then it becomes unacceptable to most of the males. I think you get my point what I want to convey. Actually, it's not a fault of any individual man but societal norms and traditions make up our mind in this way. Here, females too need to understand that it's not the fault of individual man but the family, society and formal educational institutions which fabricated his mentality about women.Society needs to understand now that women have equal rights, choices and freedom as the men have and need to accept everything as much as accepting men's actions. Derogatory and abusive words such as characterless and many more people use in Hindi for women must not be acceptable in the civilized society any more if we really want to see empowered women in our life as well as in society. For this to be happen, men needs to be mentally empowered more to accept their women counterparts as equal to them in all respects. But till now, mostly we as men failed to accept our empowered women as equal to us. Still it's time to empower our men's mind set towards empowered women otherwise it will be too late to prevent the human society from collapsing.

पॉपुलर की खेती कर किसान बढ़ाएं अपनी आमदनी

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बुंदेलखंड क्षेत्र मध्य भारत की सबसे पिछड़ा क्षेत्र है यहां औसत वर्षा 800 से 900 मिलीमीटर के मध्य होती है। वर्षा की कमी के कारण यहां की फसल नष्ट हो जाती है इससे बचाने के लिए किसान फसल के साथ वृक्ष लगाएं ताकि उन्हें कुछ आमदनी हो सके किसान भाई के वृक्ष को कृषि वानिकी तथा अपने मेड़ पर भी लगा सकते हैं। कृषि वानिकी में इन वृक्षों को विशेष महत्व है क्योंकि सर्दियों में इनके पत्ते गिर जाने से रबी की फसल को कम नुकसान होता है, पॉपुलर का वृक्ष सीधा बढ़ता है इसलिए इसकी छाया खरीफ फसलों को भी कम ही नुकसान देती है। पहले 2 वर्ष में पॉपुलर के साथ रबी व खरीफ की दोनों फसलें उगाई जा सकती हैं तीसरे साल के बाद छाया सहने वाले फसलों जैसे हल्दी अदरक लाभदायक रहती है। पॉपुलर के लिए गहरी और उपजाऊ भूमि अच्छी रहती है, किसान भाई इसे नहर के पास वाली भूमि पर लगाएं ताकि सिंचाई की व्यवस्था हो, अगर इसे सूखे भूभाग में लगाते हैं तो इसकी वनस्पतिक वृद्धि सामान्य से कम होगी। किसान पॉपुलर के पौधे स्वंय भी तैयार कर सकते हैं इसके लिए वह पूर्व में लगे 1 साल पुराने पौधे से कलम निकाल सकते हैं तीन–चार आंखों वाली 20 से 25 सेंटीमीटर लंबी कलमों को 15 जनवरी से 15 फरवरी तक लगा दें। कलम लगाते समय 2/3 भाग भूमि के अन्दर तथा 1/3 भाग बाहर रखें। इसके बाद क्यारियों में नमी बनाए रखने के लिए सिंचाई करते रहें। 6 महीने बाद यह खेत में रोपण करने के लिए तैयार हो जाता है, किसान इसे जनवरी से फरवरी में या जून से अगस्त में अपने खेत में कृषि वानिकी के अंतर्गत 5ग4 मीटर में व खेत की मेड के पास 2 या 3 मीटर का फासला रखें। इसके लिए 1 मीटर का गड्ढा खोदे तथा उस मिट्टी में 3 किलो खाद 100 ग्राम सिंगल सुपर फास्फेट तथा 250 ग्राम नीम की छाल मिलादें। शुरू के 2 वर्ष में 15 दिनों के अंतराल में सिंचाई दें तथा उसके बाद सूखे मौसम में जब आवश्यक हो तभी सिंचाई करें। 100 ग्राम यूरिया प्रति पौधे की दर से प्रति वर्ष दे तथा इसके डालने से पूर्व सिंचाई जरूर करें। किसान भाई 6 से 8 वर्ष के बाद इसे काट सकते हैं वर्तमान में पॉपुलर के एक वृक्ष की कीमत 5000 रुपए के लगभग है, इसकी लकड़ी का उपयोग माचिस, प्लाईवुड, पैकिंग के लिए बॉक्स, खेल का सामान आदि बनाने के लिए काम आती है। कृषि फसलों से मिलने वाली आमदनी इसके अलावा होती है इससे किसान अपनी आमदनी में वृद्धि कर सकते हैं।

छायाचित्रः रानी लक्ष्मी बाई केंद्रीय कृषि विश्वविद्यालय में पॉपुलर का पौधा

छायाचित्रः किसान द्वारा पॉपुलर की ब्लॉक रोपण

ESTABLISHMENT OF HEALTHY SUCKER NURSERIES IN THE TRIBAL FARMER'S FIELD OF NORTH AND EAST SIKKIM: A SUCCESSFUL EFFORT

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Each nursery envisages adoption of good Agricultural practices (GAP) under organic lines using indigenous techniques, new inputs, post-harvest management, modern and innovative cultivation practices acts as a catalyst in enhancing the growth and vigour of crops leading to an increased yield with minimal loss or damage and thereby enhancing farm income. Cultivation of Spice crops and mostly nursery management provides a scope forimproved generation of farm income with implementation of better organic and innovative techniques at the farm level. Demonstrations on INM, GAP, and PHM at model farmers plot or garden will motivate the neighbouring farmers to adopt betternursery management practices for better yield and price realization giving an impetus to their socio-economic conditions.

Large cardamom, *Amomum sabulatum Roxb.*amember of the family, Zingiberaceae under the order Scitaminae. It is an economically valuable high value cash crop and one of main source of income for farmers in Sikkim and also some parts of Darjeeling district in West Bengal of India. Large cardamom cultivation along with marketing of the produce has been a lifeline for livelihood sustenance for the vast majority of the urban and rural population of the state of Sikkim.

It grows wild in forest ecosystem and also domesticated in the sub-Himalayan region, at altitudes ranging from 1000 to 2200 m above mean sea level. The crop is ecologically adaptive, and agro-climatically suitable perennial crop always prefer to grown under tree shade. It has a pleasant aromatic odour it is extensively used as flavouring agent and also used as one of essential ingredient in mixed spices.

At present India, produces 37 percent of world production, is second to Nepal, which produces 53% and the larger exporter of this. Amongst all the state of India, Sikkim contributes up to 88 percent of total production of large cardamom. This crop is first domesticated by local tribes of Sikkim, Lepcha, followed by Bhutias and Nepalis of the same state and with passage of time neighbouring state west Bengal district Darjeeling farmers of India.

It is imperative to make available quality planting material viz. seedlings and suckers of location specific varieties of large cardamom viz. Ramsey, Golsey, Sawney, Seremna, Varlangey, etc. and the high yielding varieties released by ICRI viz , Sikkim1,Sikkim-2 in the farmer's field for taking up replanting. The plant population is 4000 plants per ha. It is necessary that farmers maintain their own sucker nursery in their fields.

The objective of the scheme is to promote the growers to produce disease free quality planting materials through integrated nutrient and pest /disease management by raising certified sucker nursery in their own fields for taking up replanting with the extension support of spices board and Horticulture and cash crop development Department of Government of Sikkim.

The suckers from these nurseries was ready for distribution during May-June 2018. Each nursery had produced a minimum of 10,000 standard suckers making a total numbers of 60,000. The farmers had utilized these suckers in their main field for replantation at the rate of 4000 suckers per hectare. Thus 10,000 numbers will be sufficient to plant in 2.50 ha, making a total of 15 ha. The 15 ha was planted & yielding after 3 years will result in a production of 7500 kgs of cardamom @ 500 kgs/ha valued at Rs 45 lakhs per year for 7-10 years. The project will be spending Rs 7, 45, 516 which includes cost of mother suckers planted in each nursery and inputs such as organic manure, irrigation tank & hose pipes, shade net, bio pesticides etc.Women farmers in the neighborhood also are being trained under this programme along with other farmers. The project had resulted in the socioeconomic development of Tribal cardamom farmers of Sikkim.

All the readers are requested to share articles related to global, nature, environment, renewable and non-renewable resources, biodiversity and other inter-related topics to publish in the NESA newsletter. The suggestions for the betterment of the society can be shared with others. Our academy is very old and has more than 2200 life members. We hope that members will contribute more articles and send their suggestions/comments in future.

Editor, NESA Newsletter

नीबू के बागानों के प्रबंधन में सूचना और संचार प्रौद्योगिकी का अनुप्रयोग

मुकेश सहगल[1], सिखा डेका[2], मीनाक्षी मलिक[1], आर सी ककोटी[2], एसी बरबोरा[2], नीलम मेहता[1] एवं सुभाश चंद्र[1]

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[2]नीबू अनुसंधान केंद्र तिनसुकिया असम कृषि विश्वविद्यालय असम

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असम भारत के कृषि राज्यों में से एक है,इस राज्य के 70: से अधिकलोग ग्रामीण क्षेत्रों में रहते हैं और कृषि की भूमिका बहुत महत्वपूर्ण है।असम की ग्रामीण अर्थव्यवस्था वनस्पतियों का भंडार है, हालांकि, प्राकृतिक रूप से पूर्णतया संपन्न होने के बावजूद संसाधन वितरण व्यवस्था अप्रयुक्त है। असम में नीबुवर्गीय फल प्रचूर मात्रा में पाए जाते हैं। राज्य में सबसे अधिक पाया जाने वाला फल–असम लेमन है जिसे क्षेत्रीय रूप से काजी नेमु,गोल नेमु, काजी नेमु व असमिया में नेमु टेंगा के नाम से जाना जाता है।भारत के असम राज्य में इसकी खेती की जाती है ये नींबू असमिया भोजन का एक महत्वपूर्ण हिस्सा हैं। गोल नेमू भारत में पाए जाने वाले अन्य नींबू के समान है। यह गोल और बड़ा होता है। यह अन्य नींबू और काजी नेमू की तुलना में मीठा होता है। जब नींबू पकता है, तो उसका रंग बदलकर पीला हो जाता है और वह मीठा हो जाता है

असम लेमन का राज्य में सबसे अधिक उत्पादन किया जाता है,बिना किसी आधुनिक मशीन व तकनीक का उपयोग न होने के कारण इस का उत्पादन कम है। संसाधित उपज का हिस्सा बहुत कम है। अधिकांश फल और सब्जियां ज्यादातर स्थानीय बाजारों में कच्ची बेची जाती हैं, इसके अलावा, अधिकतरंस्वदेशी लोग या पहली पीढ़ी के लोग नए उद्यम में निवेश का जोखिम लेने को तैयार नही होते है व उपयुक्त संसाधनों और उद्यमशीलता की कमी के कारणउत्पादन में कमी देखी जाती है।अधिकांश कृषि भूमि गंभीर रूप से बाढ़ प्रभावित हैं।

असम नींबू, नींबूवर्गीय फलों की बहुत महत्वपूर्ण किस्म हैजो केवल चुनिंदा क्षेत्रों में उगाया जाता है। असम में इस का उत्पादनअधिकतम है यह लगभग हर घर के पिछवाड़े में उगाया जाता है। राज्य के हर जिले में हर घर में बहुत महत्वपूर्ण उत्पादक उपायों के लिए लिया गया। इस हिसाब से यह सबसे ज्यादा उगाया जाता है

राज्य में कुल खेती में नींबूवर्गीय फलका वार्शिक उत्पादन 823 हेक्टेयर में 47233 मीट्रिक टन है, दूसरे शब्दों में,प्रतिवर्ष उपज का औसत उत्पादन 5426 किग्रा/हेक्टेयर है। असम नींबू आम तौर पर आकार में अंडाकार, हरे रंग का होता है और इसका वजन 85 ग्राम से 125 ग्राम तक होता है। यह नींबूवर्गीय फलों के साथ पूरे वर्ष उगाया जाता है,परन्तु उपयुक्त मौसम अप्रैल से नवंबर तक होता है।

एक वृक्ष कीऔसत जीवन अवधि15 से 25 साल व एक वर्श में लगभग 1200 से 2000 नींबू की पैदावार होती है। नींबू के प्रति फल में रस की मात्रा 36: से 44:होती है व ट्रंक बोरर और बार्क इसके मुख्य कीट हैं।

आज के डिजिटल युग में, आईसीटी एक आवश्यक उपकरण के रूप में उभर रहा है। मानव सभ्यता के वैश्विक आर्थिक विकास के लिए इसे एक शक्तिशाली अविष्कार के रूप में अपनाया जा रहा है।कृषि क्षेत्र में हो रहे नए प्रतिमानों से निरंतर ही ग्रामीणों व किसानों की आजीविका में सुधार हो रहा है।

अन्य कृषि राज्यों की तुलना में असम के किसान औसत आर्थिक रूप से बहुत कमजोर हैं और आधुनिक तकनीकी कौशल और उपकरणों को प्रभावी रूप से प्रयोग करने में असमर्थ हैं।सरकार द्वारा कार्यान्वित आईसीटी आधारित जानकारी यहाँ नहीं पहुंचती है। अधिकांश मोबाइल एप्लिकेशन व वेबसाईट पर असम की क्षेत्रीय भाषा में जानकारी उपलब्ध नहीं है जिस के कारण यहॉ के लोग महत्वपूर्ण सूचनाओं व जानकारी से वंचित रह जाते हैं।

विशेष रूप से सूचना और संचार प्रौद्योगिकी की भूमिका के साथ किसानों को समय पर उनकी आवश्यक जानकारी के साथ जोड़ने के लिए पिछले दशक में बहुत अधिक ध्यान दिया गया है। मोबाइल और क्लाउड कंप्यूटिंग प्रौद्योगिकियों का उपयोग करके उर्वरक, बीज और पानी का अनुकूल उपयोग भी किया जा सकता है। यह खपत को कम करते हुए किसानों को पैसे बचाने में मदद करता है। ये एप्लिकेशन दुनिया भर के कृषि उत्पादकों से कनेक्ट करते हैं और भावी पीढ़ियों के लिए अपने संसाधनों की सुरक्षा

करते हुए उन्हें अपनी भूमि की उत्पादकता को अधिकतम करने के तरीके के बारे में साझा ज्ञान प्रदान करते हैं।कृषि मोबाइल ऐप किसानो के लिए क्षेत्रीय भाषा में बनाये जाते हैं जो साक्षरता मिटाने के लिए और जानकारी को सबसे आसान तरीके से वितरित करने के लिए डिजाइन किए जाते हैं। मोबाइल लैस फील्ड एजेंटों की मदद से सूचना प्रौद्योगिकी उपग्रह डेटा और खेती संबंधी डेटा का आकलन करने में मदद करता है जिससे जलवायु संवेदनशील कीटों और बीमारियों से खतरों का अनुमान लगाया जा सकता है। छोटे–छोटे व्यवसाय वाले किसान लाभ कमाने के लिए नही बल्कि अपने परिवार को खिलाने के लिए खेती करता है, वो जलवायु परिवर्तन और अन्य कृषि के जोखिम से बहुत अधिक प्रभावित होता है ऐसे किसानो को कम लागत वाली बेहतर रणनीतियों की आवश्यकता है। इंटरनेट और सेल फोन प्रौद्योगिकी (आईसीटी) में होने वाली प्रगति ने अनावश्यक खर्चो और पारम्परिक खेती में प्रोद्योकियो का उपयोग करने में काफी सहायता की है। असम के किसान प्रभावी रूप से कृषि मोबाइल ऐप को अपनाकर राज्य के आर्थिक विकास मेंयोगदान दे सकते हैं।

कृषि मोबाइल ऐप का मुख्य उद्देश्य असम की ग्रामीण अर्थव्यवस्था को बढ़ाना है। इसके अतिरिक्त, यह विविध कृषि गतिविधियों और ग्रामीण क्षेत्रों में विशेष रूप से भूमिहीन, छोटे और सीमांत महिलाकिसानो के लिए रोजगार उत्पन्न करना है।

मोबाइल एप्लिकेशन (जैसे किसान सुविधा, पूसा कृषि,किसानों के लिए फसल बीमा, फसल बीमा पोर्टल कृषि–बाजार) असम की क्षेत्रीय भाषा में उपलब्ध है। परन्तु असम की कृषि संबंधी समस्याओं को दूर करने और राज्य के ग्रामीण आर्थिक विकास के लिए भी ऐसा मोबाइल ऐप विकसित किया जाना चाहिए जो नीबूवर्गीय बागानों संबंधित सभी नवीनतम व आवश्यक जानकारी क्षेत्रीय भाषा में उपलब्ध करवाये जैसे कि:

- बीज की गुणवत्ता, उर्वरकों और कीटनाशकों की सही जानकारी व उनका चुनाव
- मिट्टी के आधार पर उपयुक्त किस्मों का चयन
- मौसम की स्थिति जैसे वर्षा की मात्रा, तापमान,नमी आदि की जानकारी की उपलब्धता ताकि किसान बीज और फसलों की बेहतर सुरक्षा के लिए समय पर उपाय कर सकें
- प्रारंभिक चेतावनी से रोगों और कीटों का प्रबंधन व सही समय पर सही निर्णय लेने मे सहायता
- अच्छी कृषि पद्धतियों की जानकारी
- नवीनतम कृषि प्रौद्योगिकी और तकनीकों के बारे में अद्यतन जानकारी

अंत में, ऐप विशेष रूप से सस्ती और आसानी से उपलब्ध होनी चाहिए जिससे अधिक से अधिक गरीब किसान इसका प्रयोग कर सकें।

सुझाव:

हालांकि किसानों में नई सीखने की तीव्र इच्छा है परंतु उनका शिक्षा स्तर प्रौद्योगिकियां से ज्ञान प्राप्त करने में अवरोध पैदा करता है। किसानों को शिक्षा के कुछ स्तरों को प्राप्त करने की आवश्यकता है जो विशेशतया उनकी खेती की गतिविधियों से जुड़े हैं। इस तरह के लक्ष्य को प्राप्त करने के लिए सरलशिक्षा प्रणाली सहायक और प्रभावी हो सकती है। इसके अतिरिक्त, जागरूकता, प्रशिक्षण और परिचित कार्यक्रम आयोजित किए जाने व समय–समय पर कुशल विशेषज्ञों द्वारा मार्गदर्शन करने की आवश्यकता है।

From the Editor's desk,

Dear Readers,

February has 28 days in common and 29 days in leap years. **World Wetlands Day** is celebrated internationally on 2nd February. This day marks the date of the adoption of the Convention on Wetlands on 2 February, 1971, in Ramsar, Iran. It was first celebrated in 1997. The theme for 2019 was "Wetlands and Climate Change", theme for 2020 "Wetlands and Biodiversity" and theme for 2021 is "Wetlands and Water". **National Science Day** is celebrated every year in India on 28 February to mark the discovery of the Raman Effect by the Indian physicist Sir Chandrasekhara Venkata Raman. He discovered the Raman Effect on 28 February, 1928 and for this discovery, he was honoured by the Nobel Prize in Physics subject in 1930.

In February issue, we recount the various projects and popular articles. I express sincere and huge thank to all the persons who shared articles, without which there wouldn't have been this newsletter issue. Please continue sharing such articles and share with your friends also.

I would like to thank President and General Secretary, NESA, New Delhi, and the Editorial team including Print, Designer and Publication committee for their nonstop support and efforts throughout this edition.

Hope this edition makes an interesting read. Please feel free to offer any suggestions for improvement.

Dr. R. S. Tomar
Editor-in-Chief

Dr. Sushma Tiwari
Associate Editor

To,

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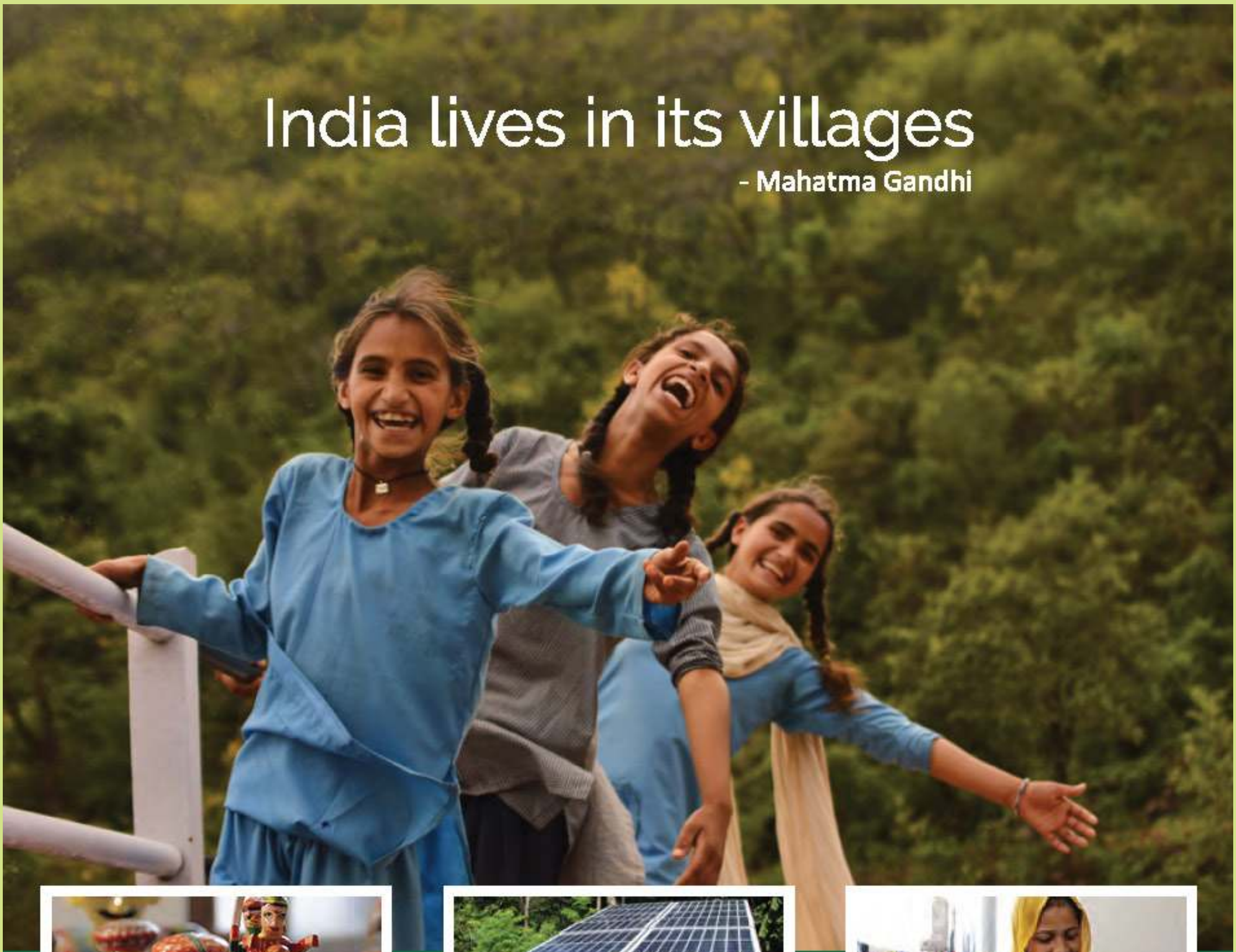

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