



HANSRAJ COLLEGE

University Of Delhi

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(2023-2024)



हंसराज कॉलेज
— दिल्ली विश्वविद्यालय —

Event Name:- Conference: Advances in Plant Biology (APB 2024)

Organized By:- MH-MMTTC and Department of Botany, Hansraj College

Date:- 10/02/2024

Duration:- 10 AM – 5PM

Organized by: Department of Botany, Hansraj College in collaboration with Mahatma Hansraj Malaviya Mission Teacher Training Centre (MH-MMTTC), BOTANIQUE - The Botanical Society of Hansraj College and Institution's Innovation Council.

Venue: Pt. Madan Mohan Malaviya Auditorium, Hansraj College

Date: Saturday, 10th February 2024

Patron: Prof. Rama, Principal, Hansraj College

Vice Principal & Teacher-in-Charge: Prof. Vijay Rani Rajpal

Convenors: Dr. Pooja Jha Maity and Dr. Savita

Co-convenors: Dr. Satyakam Guha and Dr. Sahil Mehta

Student Coordinators: Ms. Anudeepti Bajpai, Mr. Rajeev Rathore, Ms. Kartiki Bhatnagar & Mr. Anup



Viksit Bharat @2024



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COUNCIL



DEPARTMENT OF BOTANY, HANSRAJ COLLEGE,
in collaboration with
**MAHATMA HANSRAJ MALAVIYA MISSION
TEACHER TRAINING CENTRE (MH-MMTC)**
organizes

Annual National Conference
on

ADVANCES IN PLANT BIOLOGY (APB 2024):

Innovations & Strategies for
Sustainable Agricultural Productivity
for Viksit Bharat @2024



Saturday, February 10, 2024
10:00 AM to 05:00 PM



Pt. Madan Mohan Malaviya
Auditorium, Hansraj College



Prof. Pushendra Kumar Gupta

Honorary Emeritus Professor &
INSA Senior Scientist
Ch. Charan Singh University
Meerut, Uttar Pradesh, India



Prof. Sudhir Kumar Sopory

Former Vice-Chancellor, Jawaharlal
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Emeritus Senior Scientist, International
Centre for Genetic Engineering and
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Prof. Deepak Pental

SERB-National Science Chair
Former Professor of Genetics and
Former Vice-Chancellor, University of Delhi
Centre for Genetic Manipulation of Crop Plants
University of Delhi, New Delhi, India



Prof. Soom Nath Raina

Professor and Former Head, Department of
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Emeritus Professor
Amity Institute of Biotechnology, Noida, India



Dr. Ashok Kumar Singh

Director, ICAR-Indian Agricultural
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Principal Scientist, Division of
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SPEAKERS



Prof. Suman Lakhnpaul

Professor & Head,
Department of Botany,
University of Delhi,
New Delhi, India



Prof. Pratap Kumar Pati

Professor & Head,
Department of Biotechnology and
Head, Department of Agriculture,
Guru Nanak Dev University,
Amritsar, Punjab, India



Dr. Chellapilla Bhardwaj

Principal Scientist
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Objective: To weave an intricate tapestry of agricultural evolution and innovative ideas to be able to demonstrate the importance of agriculture, providing invaluable insights into the growth, development, and environmental responses of crops, as well as the genetic modifications for higher yields to meet the goal of Viksit Bharat@2024 and to

present a platform for fruitful discussions, exchange of ideas, networking opportunities, especially for encouraging young minds to formulate new solutions for the existing problems.

Number of Participants: Around 250 participants including teachers, students and research scholars from various educational institutions across India.

Inaugural session was hosted by Dr. Pooja Jha Maity. Prof. Vijay Rani Rajpal, Vice-principal and Teacher-in-Charge, gave welcome address and spoke about the conference. She welcomed all the guests and expressed her gratitude towards the eminent speakers for the event. The students of the music society, "*Swaranjli*" sang *Vandana* and DAV *gaan* to flag off the event on a musical note. Then all the invited speakers were felicitated with a shawl, a memento of Hansraj College "*Muskurate raho*", a gift mug, and as a token of sustainability a plant sapling. Abstract book of the conference was inaugurated by all the eminent guests on stage.

The first technical session was started with the plenary lecture of Prof. Pushpendra Kumar Gupta, an honorary emeritus professor and INSA senior scientist, Ch. Charan Singh University Meerut, Uttar Pradesh. He shed some light on "Recent Excitements in Biology". He elaborated on recent modern techniques like 3D chromatin (2 m DNA within 6 μ M), spatiotemporal -Omics, and CRISPR for long DNA segments. He mentioned 7 technologies to watch in 2024 including deep fake detection, brain- computer interface, and MINSTED nanoscopy. He also discussed about 3D nanomaterials and chromosomal territories. The explanation was detailed and the audiences were able to get the gist of the topic very well.

Thereafter, the second plenary lecture as given by Prof. Deepak Pental, Former Vice-Chancellor of the University of Delhi and emeritus senior scientist at the International Centre for Genetic Engineering and Biotechnology, New Delhi. His talk was focused on the past and future of agriculture, marking human migrations from Africa to Asia and plant domestication at the end of the glacial period. Further, he mentioned the history of big famines and development that have beaten Malthusian predictions, fertilizers, mechanisation, plant breeding, and management. He discussed rice breeding at IARI and advised the students that one should not be data-shy and learn the computer sciences. He further told the students about the breeding tree of *Indica* Rice *IR64*. The major pests of mustard and their glycol-resistance were elaborated and specifically, the genetic mapping in *B. juncea* biparental was marked. He concluded his talk with the editing of glucosinolate transporters (GTR) and the active use of GM mustard.

The third speaker of the 1st technical session was Prof. Ashok Kumar Singh, Director, ICAR. He discussed the history of 15 different varieties of basmati rice and the development of genetic male sterile lines. He took the audience on a journey of a high-yielding variety of rice. Starting from the breeding of basmati by M.S. Swaminathan, the dwarf gene, Pusa basmati 1 which can yield 20 quintals from a single sowing, Pusa 1121, Pusa 1509, and also Pusa 1718's bacterial guide. He in his talk explained the multiple gene pyramids and the rice root-knot nematode resistance with 35% methane emission. Lastly, he concluded that genome editing is a tool for future generations to help society and farmers maximize crop production and control crop failures.

To reaffirm the idea of Viksit Bharat@2047, the core initiative of the event, an audiovisual on Viksit Bharat was showcased that depicted the growth story of India. Moving forward, Prof. Vijay Rani Rajpal kicked off the panel discussion by asking individual speakers questions regarding the evolution of agriculture for Viksit Bharat, understanding simple breeding methods involved in advanced breeding technologies, technical partnership, NGS, bioinformatics, AI, and satellites to help plant breeding.

During the 1st technical session, a panel discussion was conducted in which 7 distinguished eminent speakers contributed their insights and expertise on the critical aspects of plant biology and sustainable agricultural productivity in the context of Viksit Bharat@2047.

Panelists for Panel Discussion:

- Prof. Pushpendra Kumar Gupta, Honorary Emeritus Professor & INSA Senior Scientist, Ch. Charan Singh University, Meerut, Uttar Pradesh, India
- Prof. Deepak Pental, SERB-National Science Chair, Former Professor of Genetics and Vice-Chancellor, University of Delhi, New Delhi, India
- Prof. Soom Nath Raina, Emeritus Professor, Amity Institute of Biotechnology, Noida, Uttar Pradesh, India
- Dr. Ashok Kumar Singh, Director, ICAR-IARI & Principal Scientist, Division of Genetics, ICAR-IARI, New Delhi, India
- Prof. Suman Lakhanpaul, Professor & Head, Department of Botany, University of Delhi, New Delhi, India
- Prof. Pratap Kumar Pati, Professor & Head, Department of Biotechnology and Head, Department of Agriculture, Guru Nanak Dev University, Amritsar, Punjab, India
- Dr. Chellapilla Bhardwaj, Principal Scientist, Division of Genetics, ICAR-IARI, New Delhi, India

Overall, the panel discussion provided a platform for diverse perspectives and interdisciplinary dialogue on the theme of the conference. The first question was for Prof. P.K. Gupta which was aimed at asking about the direction of agriculture if we can meet zero hunger by 2030, and also meet the goals of Viksit Bharat@2047. To which Dr. Gupta promptly responded and took the discussion in a very meaningful direction. He answered all the questions such as whether should there be too much focus on agriculture in botany or should botany and agriculture courses be combined. He also highlighted the various important areas in botany other than agriculture that should receive equal attention. He proposed that a new syllabus of botany should take over. He emphasized that Cytogenetics, Nanotechnology, and Digitalization are all very important fields other than agriculture as they can play a major role in higher productivity. Botany students must generate more interest in other branches of science rather than just agriculture.

The second panelist was Dr. A.K. Singh. He answered several questions such as does rice development in India only focus on one variety of rice? Why not other varieties? Why do red, black, and purple varieties have poor yields? Why are we not focusing on millet for taste enhancement and higher yield? To which he very eloquently responded, that there are 10 thousand landraces of rice, he has a project on all the varieties which includes around 200 landraces, for example, kala zeera, kala namak, black rice of Manipur, and many more. He conveyed that his Ph.D. student has sequenced the genome of the black rice and improvement program on disease resistance and productivity is going on at the Indian Millet Research Institute (IMR) in Hyderabad. He also enlightened the audience about the 114 biofortified varieties of millets that he and his group have curated.

Prof. Deepak Pental was asked the following questions, i.e., Cotton is a GM crop in India. The first GM mustard was developed by his team but GM crops aren't used in India yet. Why and what should be done to promote them? He responded by forwarding the information that the Genetic Engineering Appraisal Committee (GEAC), even after conducting 10 years of different biosafety tests, India is not allowing GM crops to be introduced to the fields. Because of a lack of information and the persistence of biosafety threats, India is opposing GM. The question that is often asked of them is if GM mustard would reduce the cost of oil production. He said that the answer to this is a straight no but it will help in meeting the global shortage. He further, hypothesized that many hybrids of mustard are possible. China has more patents than India, but India has created boundaries and we are pushing ourselves to remain in it. People require a startup culture to push for changes. People from botany and agriculture must collaborate to come up with modern solutions to age-old problems of food shortages and implement new-age scientific techniques.

After him, Prof. Somnath Raina, emeritus professor at Amity Institute of Biotechnology was asked a very pertinent question on cytogenetics. Cytogenetic research is glamorous these days. How has conventional cytogenetics helped in the development of agricultural sciences and plant sciences? He gave a very thorough explanation mentioning various important factors. He mentioned that it is most important that one should know the cytogenetics of a species that is under study. Some important parameters to study and consider under cytogenetics are the zygotic chromosome number, gametic number, and basic number, as every species has a definite chromosome number and shape. One must also know whether it's advanced or primitive. Cytogenetics is very important and haploid breeding is nowhere in India, implementing that would be a boon for cropping, especially rice and legumes. We should be on a mission to develop a haploid legume breed.

Post this, Prof. Suman Lakhanpaul was asked the following questions: As a teacher, what role does an academician play in reaching the goal of Viksit Bharat@2047? Can cues be taken from nature? Does it play a guiding role for all of us? In response, Prof. Lakhanpaul quickly pointed out the important loopholes of the curriculum and the scope of scientific advances in furthering education system. Firstly, talking about teaching and curriculum, she mentioned that the syllabus needs drastic improvements. Even the NEP syllabus needs review to include a better balance between traditional subjects such as cytology and biosystematics with modern technologies such as artificial intelligence (AI), and nanotechnology, etc. Students are the future of this country and, it's a huge responsibility of all educators to inculcate the best practices of science and knowledge in them. Moving forward, learning from nature is endless, nature taught us many things such as collaboration and resilience. Pollination of plants and insects shows positive collaboration and plants are the humble ones. They offer a lot, they hold more than 100 chemicals and benefit the perfumery industry. So, we must learn from plants and nature.

Following this, a question was asked from Prof. Pratap Kumar Pati, Head, Department of Biotechnology, Guru Nanak Dev University, Amritsar. The question was whether feeding 10 billion people by 2047 is a challenge and whether the quality of resources will be retained. The Green Revolution caused stress on resources like the water reserve and chemical engravement which are increasingly raising concerns. What are the strategies to combat such problems, especially in the state of Punjab, part of the food bowl of India? Prof. P.K. Pati replied that the mantra is farsightedness and innovation with digitalization. Necessity is the mother of all inventions. Critical thinking among students has been decreasing and they have stopped asking the right questions. There are challenges, especially for marginal land farmers, farming is not profitable, crop diversification is nil and restorative agriculture is on board. Due to MSP, only wheat and rice are grown all across and as a result, water resources are depleting. Hence, it is important that the whole system is restructured and the load of the uneducated farmers needs to be relieved, researchers should come on board and teach the farmers about crop diversification and the use of technology for making ends meet. Students and volunteers can help bridge the gap between the researcher and the farmer.

Lastly, a question was asked of Dr. Chellapilla Bharadwaj of IARI, "To kindly comment on the genomic research of India and its role in education? He replied that Genomic 1 and Genomic 2 evaluation always required a fixed approach and a better selection of germplasm and breeding methodologies. India lacks good bioinformaticians, and the quality of education must be improved and should be made more practical than theoretical.

In the end, a few questions were taken from the audience. It was thereafter concluded by Prof. Vijay Rani Rajpal that a robust and resilient farming system, sustainable crop management, and genetic manipulations will pave the way ahead for future improvements in the agricultural system. Through collaborative efforts and innovative solutions, the speakers underscored the potential to address key challenges and realize the vision of a prosperous and resilient agricultural sector.

The second technical session commenced with a talk by Prof. Suman Lakhanpaul being introduced by Prof. Monica Koul. She gave a very invigorating talk on the Phytoplasma of the plants that cause the "Hijack Phenomenon". She discussed how due to the presence of phytoplasma, an indeterminate growth was occurring within the plant converting it into a "zombie". She told that Phytoplasma is a gram-negative bacterium and goes by the scientific name of *Candidatus* phytoplasma. The nomenclature of this bacteria is still uncertain. She further discussed the very unique characteristics of phytoplasma, such as it being a wall-less bacterium that has a uniquely small genome and a highly repetitive DNA. This bacterium contains extremely low G+C content and is also unculturable. This small organism has the unchecked power to cause diseases in 200 economically important plants such as coconut which leads to the farmers suffering great economic losses. Prof. Suman ended her talk by sharing a more hopeful insight into how the same disease-causing organism can also contribute to increasing the ornamental value of various plants.

Prof. Pratap Kumar Pati gave a talk on "Biotechnology in the Pursuit of Healthy Society". He specifically highlighted herbal medicines and the history of medicinal plants. He shared his opinion on how the cons of modern medicine have given us the room and space to welcome herbal medicines with open arms. He informed the audience about the different parts of plants being used as the source of medicine. He kept the discussion not only fascinating but also real by talking about the challenges that would be faced in this journey. For instance, to keep in check the indiscriminate exploitation of plant species is a very vital step. He shared how tissue culture is also being used in medicine synthesis. One of the specific plant species he talked about was *Withania somnifera*, commonly known as *Ashwagandha*, which is a well-known medicinal plant and is also being thoroughly researched. Talking about food and nutritional security, he gave the classic example of the "Purple Tomato", which is anticipated to be a health booster. He also informed the students about scientists working on tearless onions. Towards the end, he even encouraged the audience to eat healthy and good food.

The stage was then graced with the presence of the last speaker Dr. C. Bharadwaj who introduced the audience to the concept of deployment of stress resistance genes to develop climate-resilient chickpea varieties. He talked about how the various botanists and scientists are working on creating varieties resistant to abiotic stresses. One particular stress he talked about was drought and how it affects the growth and production of chickpeas. This crop is mainly dependent on residual soil moisture and experiences drought at the end of the season. Despite the importance of the crop and its responsiveness to supplemental irrigation, many of the farmers still grow it in marginal lands as a rainfed crop. Thus, he explained how next-generation genomic approaches are very useful for developing climate change-ready crops and how for any given crop, there is a need to develop genomic resources, genetic maps, genome sequence assemblies, etc. Germplasm collection/breeding population can be phenotyped for traits of interest related to climate change and can be genotyped with high-throughput genotype technologies. GWAS, linkage mapping and QTL-Seq/BSA-Seq approaches can be used to identify diagnostic markers, and candidate genes that can be used through functional validation. Lastly, he emphasized that genomic breeding techniques such as MAS, MABC, MARS, GS, FB, and HBB can be used to develop superior varieties of crops.

All three speakers left the audience enlightened and introduced new-age approaches to solve age-old problems. They sparked curiosity that would help create the fire of sustainability in our world.

The poster presentations took place near the old seminar room, where students presented their posters to the judges (Prof. Arun Jagannath, Prof. R.C. Verma and Prof. Keshavacharyulu). Meanwhile, the oral presentations took place at the Pt. Madan Mohan Malaviya Auditorium adjudicated by (Prof. Vishnu Bhat, Prof. Shailendra Goel and Prof. Rama Rao). After the highly interactive session with all the participants and an informal open mic session, the results were announced by Dr. Ridhi Khurana with the judges for the sessions.

The results of the poster presentation were announced and the winners were Dr. Priyanka Pandey in the faculty category. In the Ph.D. student category, the first prize was awarded to Baljinder Singh, the second to Aayushi Jaiswal, and the consolation prize was given to Kajal Taneja. In the student category, 1st prize was awarded to Krish Sood, 2nd to Harshit Singh, and 3rd to Vaishnavi Thakur. In the Oral Presentations, Dr. Madhu Raina won the faculty bestpresentation award. Nabajit Kumar Borah won the Ph.D. scholar best presentation award. Amongst the students, Anchal won 1st prize and Anudeepti Bajpayee, the consolation award. Dr. Savita gave valedictory remarks and Dr. Sahil Mehta delivered the vote of thanks.

Videos available:

<https://www.youtube.com/watch?v=BRKebThqRDk>

<https://www.youtube.com/watch?v=A63f9M8CdXs>

<https://www.youtube.com/watch?v=-DNjeNhAQ6I>

<https://www.youtube.com/watch?v=tYnxQz3t1dU>


<https://www.youtube.com/watch?v=douBtEXa7rl>

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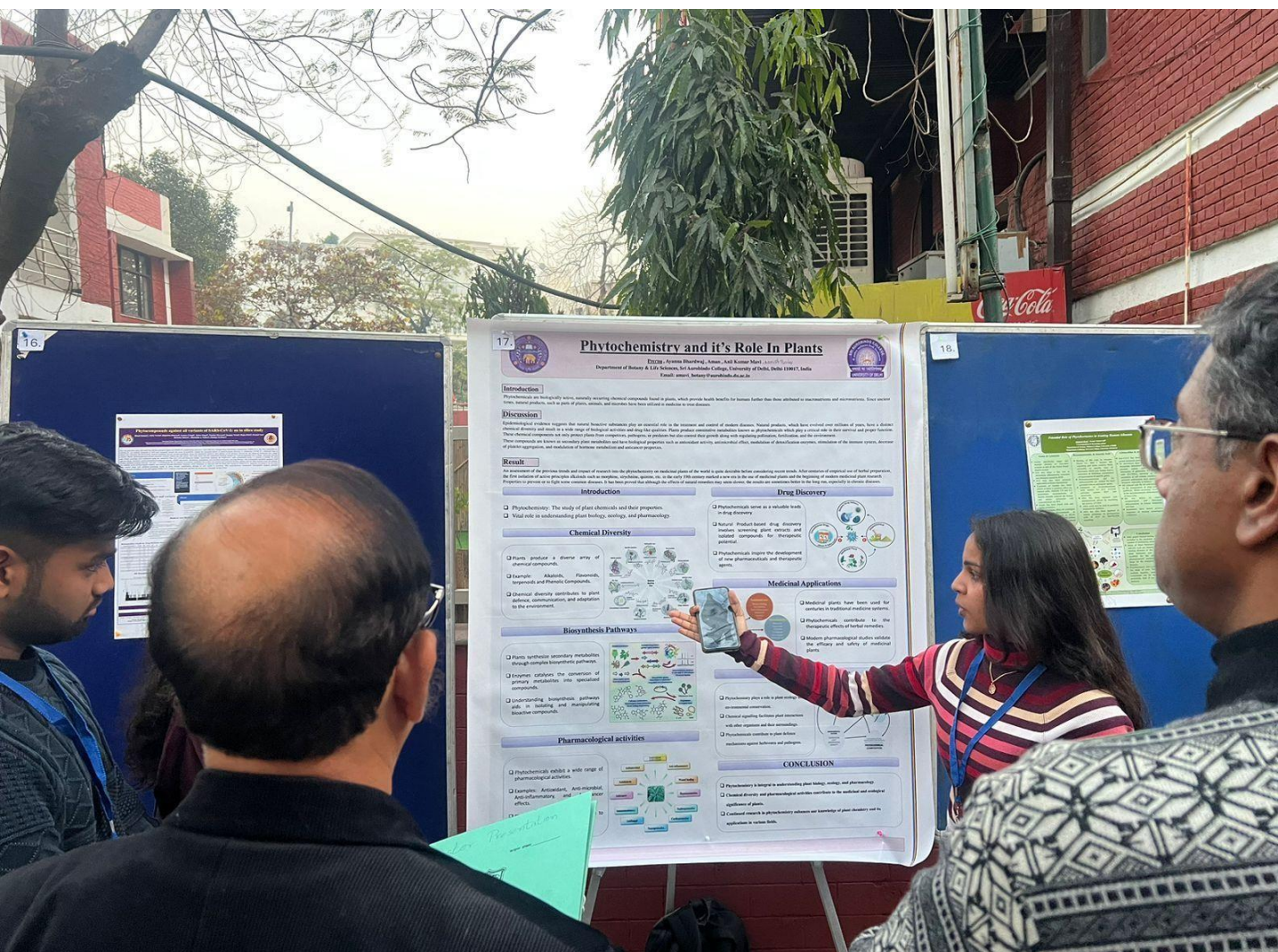
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