

Science Setu Webinars by NIPGR
FEEDING THE 10 BILLION: A GENOMICS PERSPECTIVE

Press- Note

Date: 09-04-2021, Friday

Resource person: Dr. Manoj Prasad, Scientist VII, NIPGR

The Department of Biotechnology, Government of India, has planned “Science Setu” as a virtual platform to connect research Institutes with undergraduate students. Under this, our college has been assigned to National Institute of Plant Genome Research (NIPGR), New Delhi. NIPGR is an autonomous institution aided by the Department of Biotechnology. Research at NIPGR focuses on functional, structural, evolutionary and applied genomics of plants, including crop plants. Through the Science Setu program, our students and faculty virtually connect with NIPGR, New Delhi and got to know about the multifarious kinds of plant based research. It is a unique opportunity for science students at undergraduate and postgraduate level to get an exposure to high-level research.

Dr. Pinky Aggarwal, Scientist, NIPGR gave welcome note on this event. **Resource person: Dr. Manoj Prasad, Scientist VII, NIPGR** started his lecture by enlightened our knowledge on importance of food and decreasing number of food crop species. He discussed about the gap between the population and the number of crop species available to feed the population. He told that it’s high time to focus on mainstreaming underutilization crops for food and nutrition security and using next-gen genomics tools for trait improvement in these crops. He stressed on the genomic history and ecology of the geographic spread of millets. He focused on the molecular breeding and genetic manipulation as the two most potent technologies of crop improvement. He concluded his lecture discussing about functional and comparative genomics have provided the platform for gene discovery and their functional characterization. The key gene or genes regulating a molecular pathway are being genetically edited or engineered to developed phenotypically improved crop lines. He discussed about his research work on sHSP27 and its working. Faculty of Science and total 50 science students attended the event. Dr. Pinky Agarwal and Dr. Amarjeet Singh, Scientists, NIPGR attended the questions of the participants and gave vote of thanks. It was an intellectual and exciting experience for all the participants.

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Sarushi Dhiman Me Pinky Agarwal Abhilash Jear George Akanksha

Feeding the 10 billion: A genomics perspective

Manoj Prasad, PhD, FNA
Senior Scientist | JC Bose National Fellow
National Institute of Plant Genome Research
New Delhi

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Q & A

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Sarushi Dhiman Me Pinky Agarwal MANOJ PRASAD Aashish Ranjan

Food – a distant dream!

821 million are hungry
(one in ten among us)

Every 10 seconds, **a child dies from hunger** related causes

One in four of the world's children **suffer from malnutrition**

UN-FAO 2019; WHO Report 2019

Food

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Sarushi Dhiman Ms MANOJ PRASAD Pinky Agarwal

It's high time to focus on

- 1 Mainstreaming underutilized crops for food and nutrition security
- 2 Using next-gen genomics tools for trait improvement in these crops

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Speaking: MANOJ PRASAD Ashutosh Pandey Ashwerya Laxmi Dr. Neetu Chopra KMV Jal Dr. sandeep Kaur

Agrobacterium-mediated gene transfer

This can be any gene from any source!

Put the plasmid into *Agrobacterium tumefaciens*

The diagram illustrates the process of Agrobacterium-mediated gene transfer in three stages:

- Leaf discs removed and placed in culture medium:** A plant leaf is cut into discs and placed on a petri dish containing a culture medium.
- Leaf discs infected with Agrobacterium containing recombinant plasmid:** The leaf discs are submerged in a solution containing *Agrobacterium tumefaciens* carrying a recombinant plasmid. A callout indicates that the plasmid can be any gene from any source.
- Calluses form; cells contain T-DNA:** The leaf discs develop into callus tissue on the petri dish.
- Transgenic plants grow:** The callus tissue is transferred to a test tube containing a growth medium, where it develops into a transgenic plant.

Q & A

All (0)

Ask: All Panelists

Select a panelist in the Ask menu first and then type your question here. There's a 512-character limit.

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Sarushi Dhiman Me Aashish Ranjan MANOJ PRASAD Pinky Agarwal

Q & A

Can biotechnology rescue the agriculture?

Stress(es) Biotechnological interventions

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Speaking: MANOJ PRASAD Annotasi Pandey Ashvanya Laxmi Dr. Neetu Chopra KMV Jal Dr. sandeep Kaur

Q & A

All (0)

Example: The Bt revolution

Worms and insects feeds the vegetative parts

Ask: All Panelists

Select a panelist in the Ask menu first and then type your question here. There's a 512-character limit.

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3:53:44

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Webex



8



Use of CRISPR/Cas9 to prevent preharvest sprouting: a major issue with wheat



MANOJ PRASAD



3:57



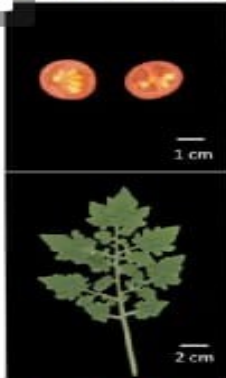
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De novo domestication

Solanum pimpinellifolium



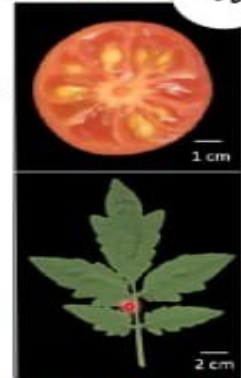
- Indeterminate growth
- pea-sized fruits
- Stress resistant

CRISPR/Cas9

Genes edited

- General plant growth habit
SELFPRUNING
- Fruit shape
OVATE
- Fruit size
FASCIATED
FRUITWEIGHT2.2
- Fruit number
MULTIFLORA
- Nutritional quality
LYCOPENE β CYCLASE

S. pimpinellifolium



- Determinate growth
- Large & more fruits
- 500% high lycopene
- Stress resistant

Modifying six genes of a wild tomato converted the wild into a cultivated species

Zsögön et al. (2018)



MANOJ PRASAD



Conclusions

- ✓ Molecular breeding and genetic manipulation have emerged as the two most potent technologies of crop improvement
- ✓ Advances in NGS technology have enabled the incorporation of genomics with various disciplines of crop breeding
- ✓ Functional and comparative genomics have provided the platform for gene discovery and their functional characterization
- ✓ The key gene or genes regulating a molecular pathway are being genetically engineered or edited to develop phenotypically improved crop lines
- ✓ Collaborative and consorted research is required to circumvent the global challenge of feeding the 10 billion by 2050



MANOJ PRASAD



< Chat with everyone

MN Mushtaq Ahmad Najar 14:59
Hii I am Mushtaq Ahmad Najar
from division of plant biology Bose
institute Kolkata

S shagun 14:59
shagun student of kanya maha
vidyalaya jalandhar

JK Jannat Kainth 14:59
Hello Everyone
I'm Jannat from KMV COLLEGE
JALANDHAR

U Urvashi 14:59
Urvashi
student at kanya maha vidyalaya
Jalandhar

R Radhika 15:00
Radhika student of KMV college
jalandhar

A Akanksha 15:01
Akanksha Student of Kanya Maha
vidyalaya Jalandhar

GK gagandip kaur 15:03

15:57



Chat with everyone

True ma'am...

TS

Tanu sharma 15:55

Tanu sharma ,bsc biotechnology;
Kanya Maha vidyalaya Jalandhar

MN

Mushtaq Ahmad Najar 15:56

Thank you Mam, for your kind word.

PK

poonam k 15:56

please share link for further details

NP

Neha Parveen 15:56

Great learning experience!!!
Thank you ma'am.

MA

Michelle Arland 15:56

Thank you for your inspiring talk (got
to know from your twitter account).
I would like to know more about
the ways to proceed with data from
metabolomics and connect it with
transcriptome data etc

15:56

Good to know about your summer
internship programs. Hoping to have good
collaboration in future.

Enter message here.

