

## **SCIENCE SETU WEBINARS by NIPGR**

### **Roots of plant life: Mechanism of root adaptation to nutrient deficiencies**

#### **Press Note**

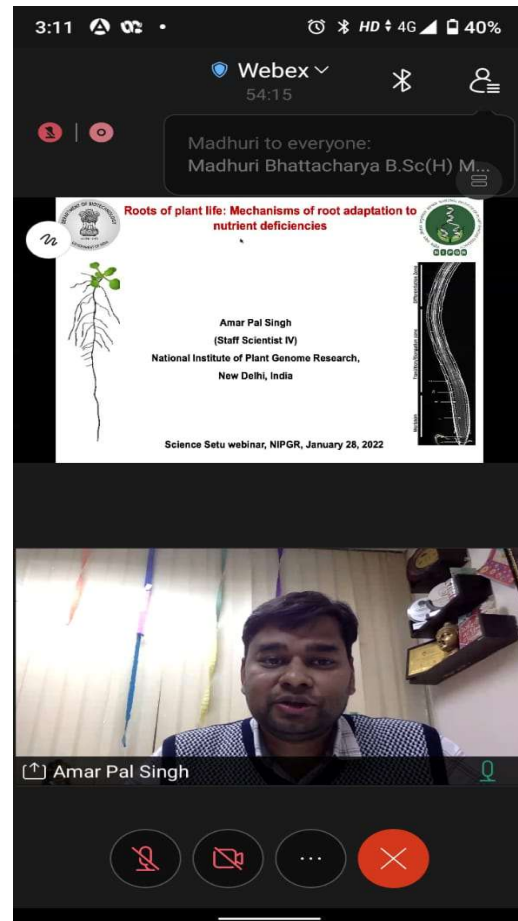
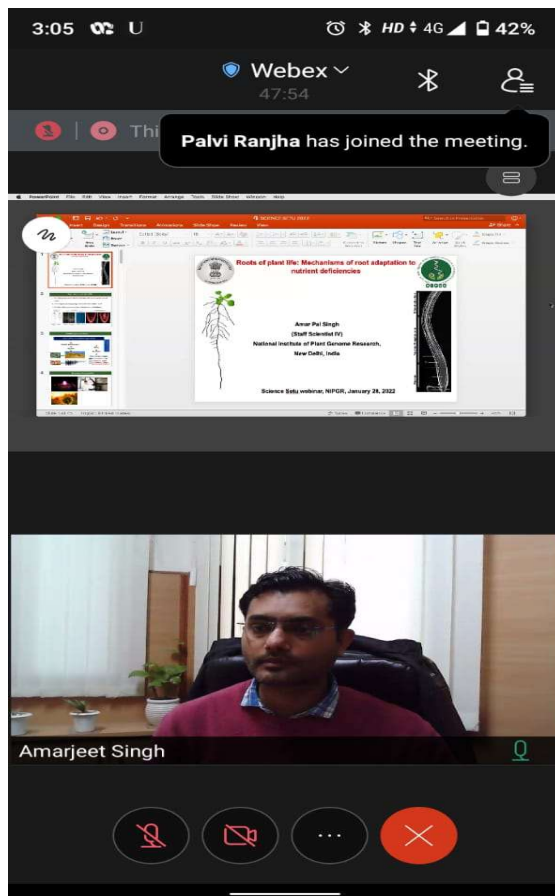
**Date: 28th JANUARY, 2022, Friday**

**Resource person: Dr. Amar Pal Singh, Scientist IV, NIPGR**

The Department of Biotechnology, Government of India, had planned “Science Setu Webinar” as a virtual platform to connect the Research Institutes with postgraduate and graduate 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 focusing on functional, structural, evolutionary and applied genomics of plants, including crop plants. Through this fourth webinar program, our students and faculty members virtually gained an amazing opportunity to connect with NIPGR, New Delhi and anticipated the effects of combined stresses of environmental factors on plant life. It was a spectacular opportunity for students at undergraduate and postgraduate level of science background on exposure to plant-based research on much higher level.

**Dr. Amarjeet Singh**, Scientist, NIPGR gracefully introduced the resource person with his warm words. The resource person, **Dr. Amar Pal Singh**, Scientist, NIPGR, started his talk by explaining how plants encounter differential availability, i.e. how they suffer from various nutrient deficiencies. He stated that roots act as sensors as they sense altered nutritional balance in the rhizosphere and adapt according to the changes in the nutrient composition. He also explained the new mechanisms underlying the root adaptation during differential and low availability of P and Fe and this includes hormonal signaling pathways. He gave an overview about how roots adapt to different environments by creating a shallow root system, by growing deep tap roots and growing above the ground to support the tree. He discusses the root adaptations to nutrient deficiency in *Arabidopsis*, rice and tomato. He also talked about the regulation of plant root growth under phosphate deficiency. He stated that brassinosteroids are essential for normal plant growth and discussed the regulation of brassinosteroid signalling transcription factors such as BES-1 and BZR-1. He concluded his talk by summarizing the factors that affected root adaptation, he also acknowledged his team and their publications. In total 80 participants, including faculty of science and students attended the event. **Dr. Pinky Agarwal**, Scientist, NIPGR attended the questions of the

participants and gave vote of thanks. It was quite an exciting and brainstorming experience for everyone.



3:12 HD 4G 40%

Webex 54:51

Mohini Sharma has joined the meeting.

### Major research activities of lab

- Root adaptation to nutrient deficiency (nitrogen and iron)- Arabidopsis, rice and tomato
- Uncovering the signals triggering adaptation to survival phase of plants
- Regulation of cell elongation and stem cell maintenance in Arabidopsis

Model plant Arabidopsis Crop plants Rice Tomato Arabidopsis root tip

Sufficient Nitrogen Low Nitrogen Sufficient Nitrogen Low Nitrogen Sufficient Nitrogen Low Nitrogen

Amar Pal Singh

3:12 HD 4G 39%

Webex 55:31

Amar Pal Singh is sharing. This meeting is being recorded.

### Survival: plants vs animals

Adverse Environment (looking for food)

Animals and mammals → Migration

Plants → Adaptation

- Physiological Changes
- Morphological Changes
- Biochemical Changes
- Developmental Changes (Root system architecture)

Amar Pal Singh

3:15 Webex 57:46

Reetu kumari has joined the audio conference.

**The Art of Being Flexible: How to Escape from Nutrient deficiency, Salt, and Drought**

**How to survive during stresses: Which Way to Grow?**

Plank et al., 2012

3:17 Webex 01:00:42

ANU CHOUDHARY has joined the audio conference.

**Roots are highly plastic in nature**

Spatial organization of roots is necessary for plant adaptation to nutrient stress.

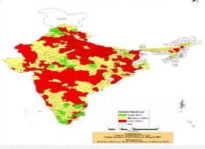
Spatial organization of roots is an important strategy for plant survival during stress.

How plants attenuate or enhance root elongation in response to nutrient stress?

Amar Pal Singh

Amar Pal Singh

Nutrient status of Indian soils




**Deficiency in soil**

NUTRIENTS	%
Nitrogen	90
Phosphorous	30
Potassium	50
Zinc	49
Sulphur	41
Boron	33
Iron	12
Manganese	5
Copper	3

How do plants adapt during P deficiency?

Senjuti Sinharoy has joined the audio conference.

P deficiency hampers overall plant growth



Wheat: Low P, sufficient P

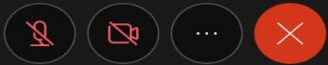
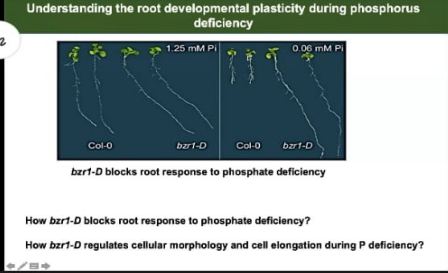
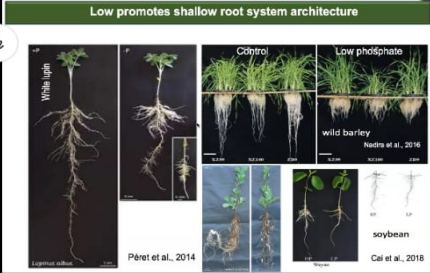
Rice: +P, -P

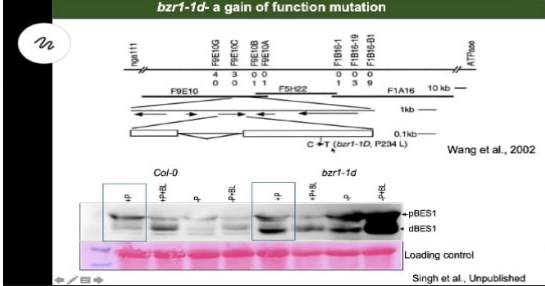
Photo credit: Patrick Wall/CIMMYT. AfricaRice News blog, June 5, 2019



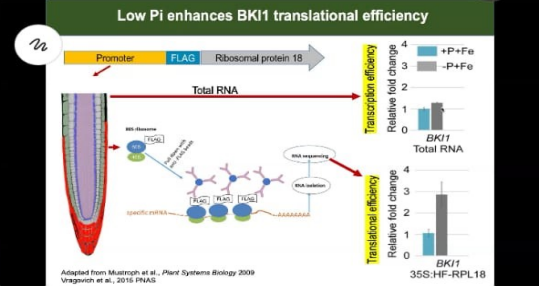
Webex control bar with icons for mute, video off, chat, and end call.

Ishita Gupta has left the meeting.





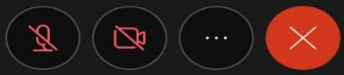
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Amar Pal Singh

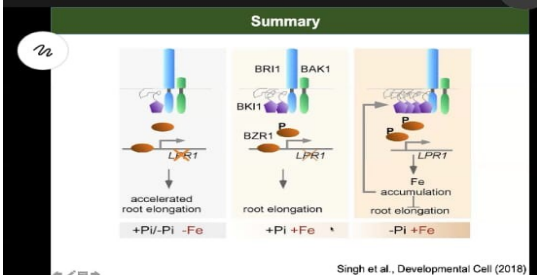


Amar Pal Singh





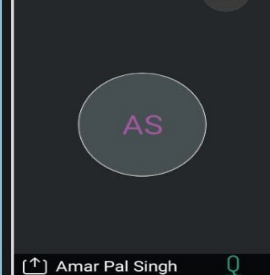
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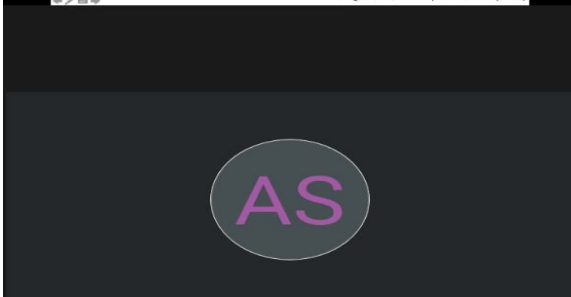
karishma has left the meeting.



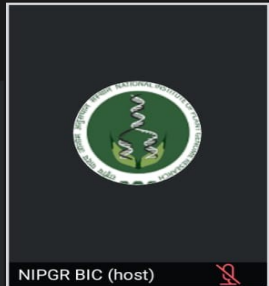
Pinky Agarwal



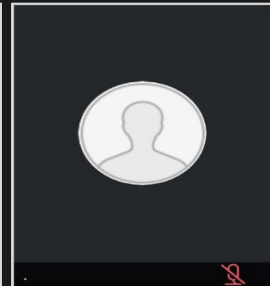
Amar Pal Singh



Amar Pal Singh



NIPGR BIC (host)



Speaking: Pinky Agarwal

Meeting controls: Mute, Video Off, More, End Meeting