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PLANT LONG NONCODING RNAs: FROM BIOLOGY TO BIOTECHNOLOGY FOR SUSTAINABLE AGRICULTURE

Abstract: Eukaryotic organisms have large genomes, but only a small fraction of their DNA encodes proteins. Remarkably, a much larger portion is actively transcribed into RNA. Among these transcripts, long noncoding RNAs (lncRNAs) have recently attracted attention. Although they do not produce proteins, lncRNAs play crucial roles in regulating gene activity through different mechanisms. In plants, they have been shown to participate in processes such as epigenetic regulation and the three-dimensional organization of DNA inside the nucleus. At the same time, RNA has gained prominence in medicine through vaccines and gene therapies, highlighting its potential as a versatile tool. In agriculture, RNA-based technologies could replace pesticides with information-carrying molecules—similar to vaccines—and help crops cope with environmental stress without the need for genetic modification. APOLO Biotech, a startup created within CONICET, is working to bring these innovations from the lab to the field, paving the way toward more sustainable and smarter farming.

About the speaker: Federico Ariel holds a PhD in Biological Sciences and is a specialist in plant epigenetics and noncoding RNAs. He is currently an Independent Researcher at CONICET, working at IFIBYNE (CONICET-UBA) in Buenos Aires, Argentina. He currently co-leads an International Associated Lab between France and Argentina, backed by CNRS. Since January 2025, he has been holding the AXA Chair, funded by the AXA Research Fund, for a five-year term. He ranks among the top 2% of the most-cited scientists worldwide (Stanford Ranking 2025) and #1 in plant long noncoding RNA research (ScholarGPS 2020–2025). In recent years, he has received several national and international awards, including the Stimulus Award 2018 (ANCEFN); Fima Leloir 2019, Hermann Burmeister 2020 (ANC), the 2023 Bunge y Born Prize in Agrobiotechnology, and notably the UNESCO Al-Fozan Award 2023, recognizing him as one of the five most outstanding young scientists in STEM worldwide. Federico served as CONICET's representative on the Board of Directors of Y-TEC (a joint venture between YPF and CONICET) from 2021 to 2023, and on the Board of Directors of the Argentine Nanotechnology Foundation (2022–2024). He was also Co-Chair of the Young Academy of Argentina between 2022 and 2024. In 2022, he founded APOLO Biotech, a technology-based company dedicated to designing RNA-based solutions to replace synthetic pesticides in crops.