19th January 2026 PMFAI- Dubai

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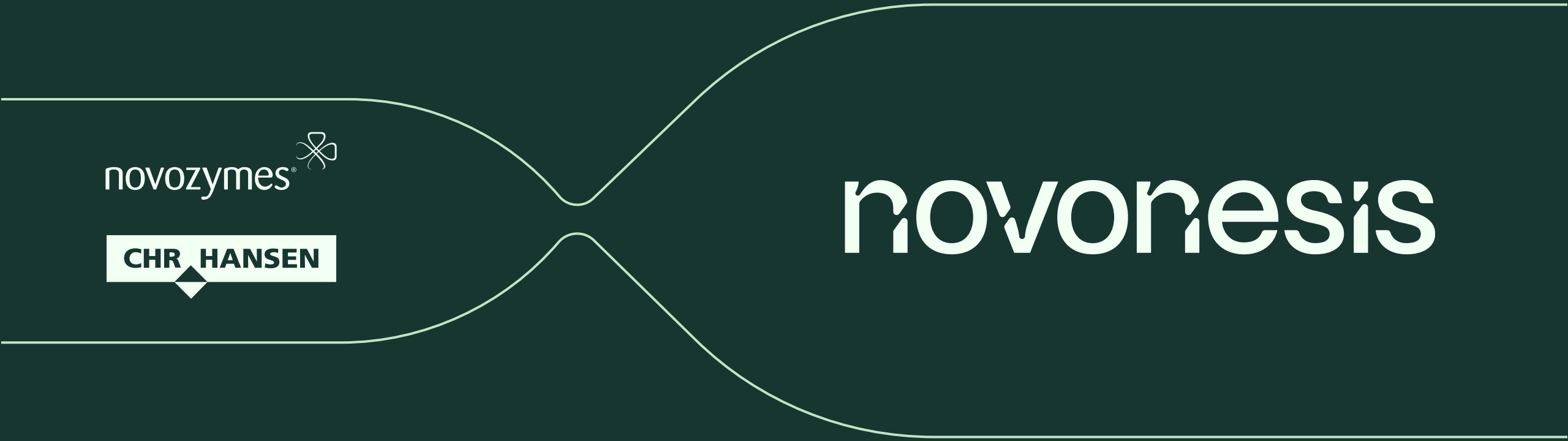
Fertilizer fortification: Boosting nutrient use efficiency through biosolutions

Shanmugam Sambanthan
Head – Plant Health, South Asia, Middle East & Africa
Novonesis

With 100+ years of innovation as our foundation, we will keep delivering transformative solutions



Across 30+ industries, our innovations both help businesses and balance the needs of people and our planet

Food & Health biosolutions division

Food & Beverage

- Baking
- Beverages
- Functional foods
- Meat
- Plant-based foods
- Dairy
- Other foods

Human health

- Early life nutrition
- Dietary supplements
- Advanced protein solutions

Planetary Health biosolutions division

Plant & Animal

- Plant
- Animal
- Pet care

Ind. bioprocessing

- Starch
- Textile
- Leather
- Pulp & paper
- Fine chemicals
- Distilling
- Oils & fats
- Sustainable plastics

Bioenergy

- Ethanol
- Biodiesel
- Biomass
- Carbon capture
- Biogas
- Renewable diesel

Household care

- Laundry
- Dish
- Professional cleaning

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Plant Biosolutions:

Transforming plant health and enabling farmers to grow more

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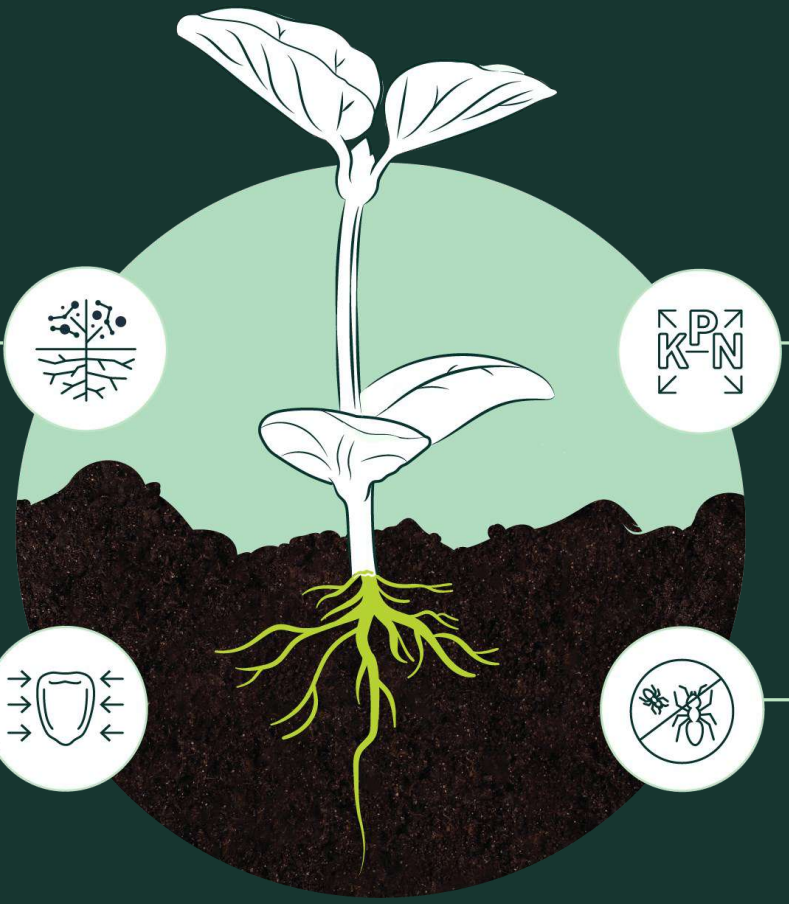
Think bio-logical

Novonesis' scientific heritage guarantees innovative technologies and reliable products to boost crop performance while preserving nature. We deliver impactful innovation where it is most needed.



Biostimulant

- Naturally derived Biostimulant Blend
- Cell free microbials
  - LCO Foliar
  - Plant signaling proteins

Bionutrition

- Rhizomyx Technology
- Complete P Biosolution
- NPK Consortia

Seed Applied Solutions

- Microbial Seed Treatment
- Signalling Molecule Seed Treatment

Biocontrol

- Microbial Biofungicide
- Bionematicide
- Enzymatic Biocontrol*

* Pipeline project

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Farmers are facing complex, interconnected challenges threatening productivity and sustainability

Fertilizer Access

- Limited availability
- High cost & affordability
- Inefficient application

Imp. of Climate Change

- Water scarcity
- Extreme heat & drought
- Unpredictable rainfall

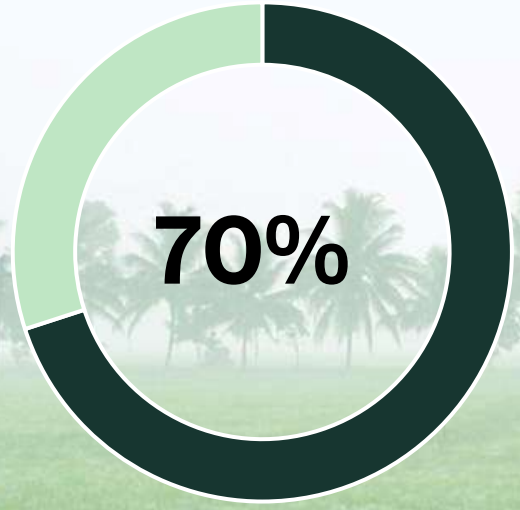
Soil Organic Carbon

- Extensive soil degradation
- Nutrient depletion
- Erosion & desertification

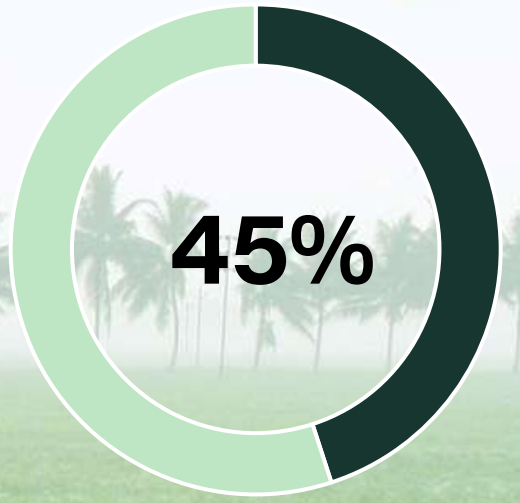
Source: FAO, World Bank, IFPRI, regional agricultural development reports, 2020-2024

Critical Nutrient depletion threatens farm yields and soil health

Average percentage of cropland showing significant **decline in soil organic matter** across the regions.



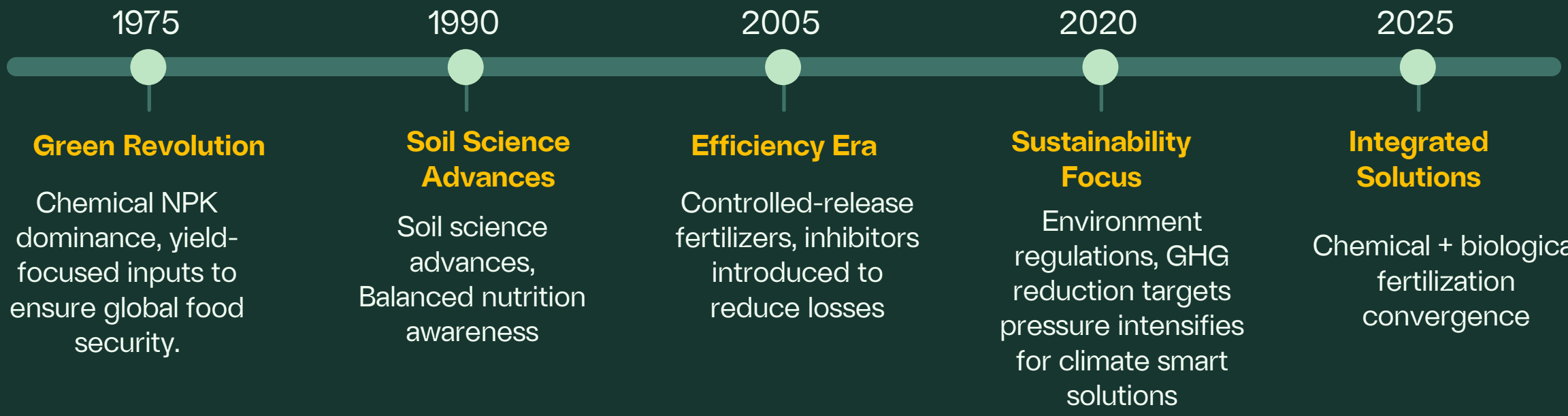
Estimated % of applied **phosphorous becoming unavailable** to plants.



Nitrogen fertilizer loss through various environmental processes, impacting efficiency & costs.

Source: FAO, IFDC, regional soil health reports, 2019-2024

The fertilizer industry is advancing towards climate smart solutions



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Biosolutions Vs Chemical Fertilizers

Biostimulants

Boost plant resilience and nutrient uptake efficiency

Chemical Fertilizers

Provide concentrated nutrients for immediate crop needs

Microbes

Fix nitrogen and solubilize nutrients naturally

Enzymes

Break down organic matter and enhance nutrient availability

Biosolutions work as complementary tools for an integrated nutrient management strategy

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Combining biosolutions with fertilizers to enhance farm productivity and soil health

Biosolutions Technologies

- Signaling Molecules
- Nutrient Cycling Enzymes
- Microbial Platform

Fortification Method

→ Fertilizer Manufacturing

→ In furrow

→ On-farm application

WSF / Bulk Fertilizers (Chemical Fertilizers) Fortified with Biosolutions

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Use case: Lipochitooligosaccharide (LCO) signaling molecule combined with Water Soluble Fertilizer during the manufacturing process

Multi-location field trials demonstrated yield improvements of 8–12%.

- Field Trials were conducted through State Agriculture Universities and private CROs on tomato.
- Fertilizers fortified with LCO recorded statistically significant yield increase compared to conventional practice
- Significant increase in number of fruits and fruit weight contributed to the increase in yield.
- The data recorded emphasize the advantage of combining LCO Promoter Technology with conventional fertilizer to improve nutrient uptake.

Data Source: Trial conducted through State Agriculture Universities in India (Karnal, UAS Bengaluru, UAS Dharwad, Madanapalli, Annamalai –TN, BCKV, Mohanpur, I.A.Sc. Varanasi, UP, Manchar, Pune

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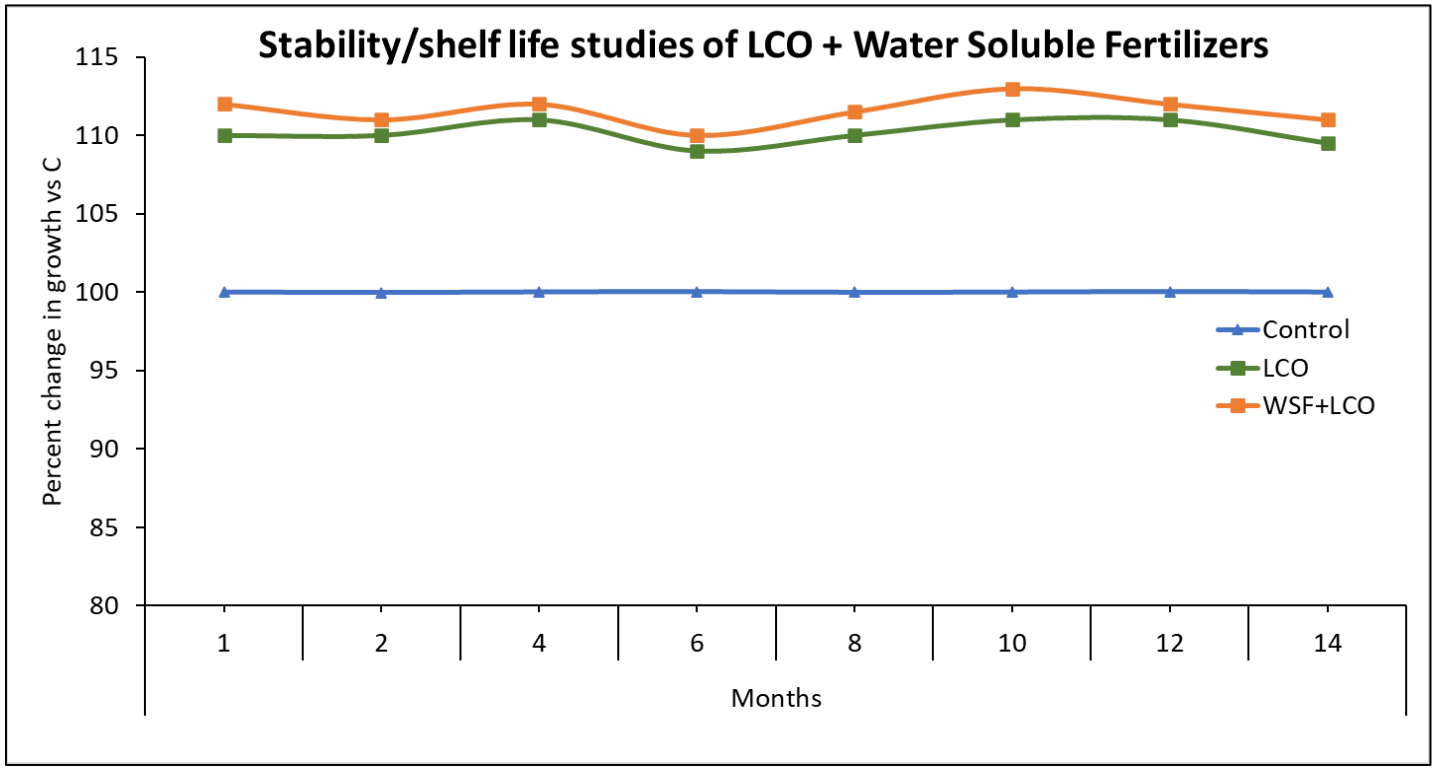
LCO Signalling molecule is stable when combined with WSF improves nutrient uptake, growth rate and NUE of fertilizers

LCO is highly stable when combined with fertilizers as indicated by the 14-month stability data



Data Source: Stability/Shelf-life data from Inhouse R&D study

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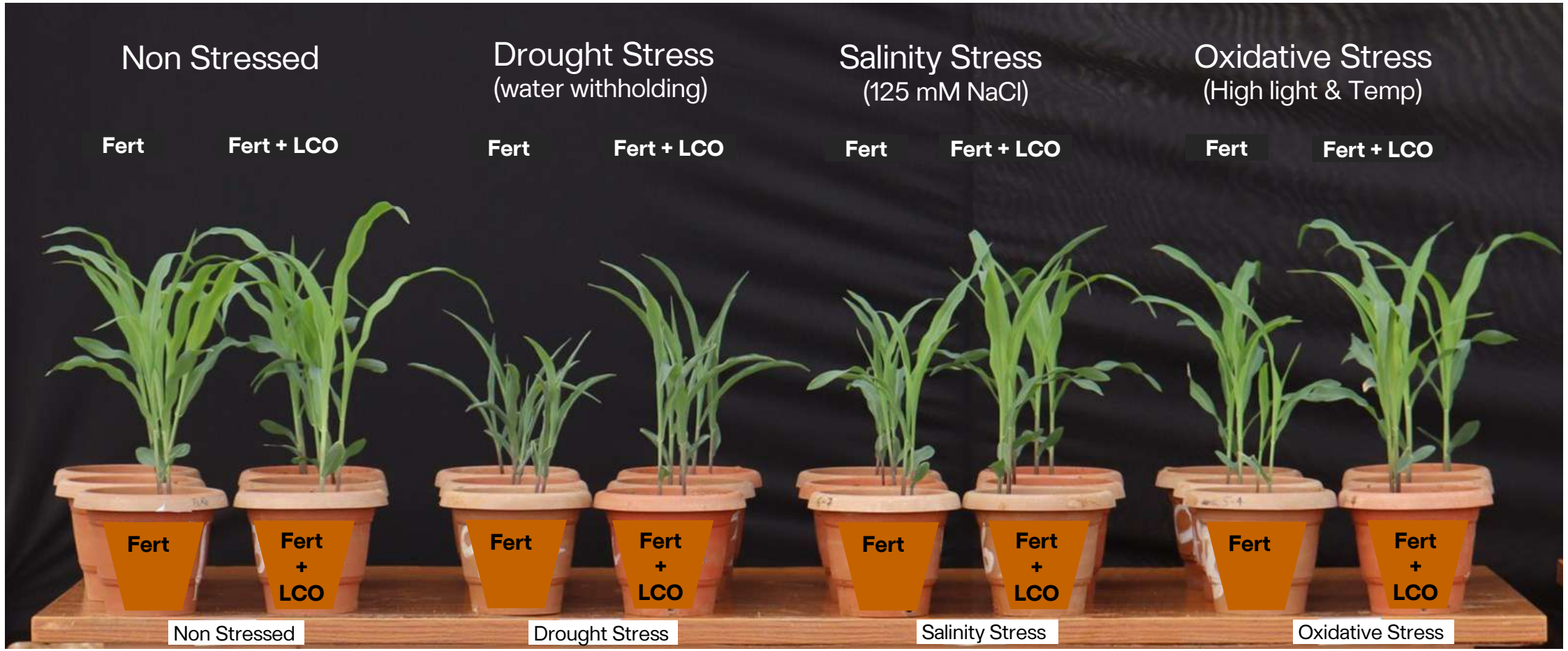
WSF Fertilizers fortified with LCO exhibited impressive stress tolerance to drought, salinity and oxidative stress



Data Source: Inhouse R&D study on Corn

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Combining Biosolutions with fertilizers **directly impacts 5 out of the 17 SDG Goals**

Created a **powerful synergy** that enhances soil health & Farm productivity

Nutrient use efficiency improved by 15 -20%

Soil microbial activity enhanced by >10%

Fortification supports crops to **withstand Abiotic stresses**

Yield increase of 8-12% with increased profits of ~30%

Data source: Multi-location SAU trials & in-house data

Our innovation directly impacts 5 out of the 17 SDG Goals

SDG 2.4: Innovation ensures sustainable food production systems and implements resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improves land and soil quality.

SDG 12.2: Innovation achieves the sustainable management and efficient use of natural resources.

SDG 13: Increases crop yields while maintaining inputs that can reduce the GHG emissions per unit of crop.

SDG 14.1: By optimizing fertilization and preventing excess fertilizer usage this technology can reduce nutrient run off, preventing and reducing marine pollution.

SDG 15: We support multiple targets by enabling more efficient agriculture production reducing the pressure for land conversion to meet growing demand.

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Potential Policy intervention – Enabling innovation

- High subsidies for chemical fertilizers have discouraged the adoption of organic and biological inputs.
- Policy frameworks should enable and incentivise incremental and sustainable innovation in the fertilizer Industry
- Encouraging manufacturers to incorporate biosolutions such as microbes (Biofertilizers), Enzymes, Biostimulants (Cell free microbials, Protein Hydrolytes, Amino acid etc) into chemicals fertilizers during the production would unlock best of both worlds to farmers.

Thank you

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