Smarter nutrient use starts with better formulation

An EU-certified biostimulant compatible with high-salt fertilizers

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Borregaard


AGRICULTURE HAS CHANGED THE PLANET
MORE THAN ANY OTHER HUMAN ACTIVITY

Fertilizer inefficiency: A threat for food security & global warming

N & P USE

Less than **50% of synthetic N and 15% of P** inorganic fertilizers applied are utilized by crops.

FOOD SECURITY

Limited P deposits may not be able to meet the increasing global demand to **ensure food security**.

GHG EMISSIONS

Synthetic N fertilizers account for **2-3% of global GHG emissions**, 2/3 of the emissions are generated when fertilizers are used in the field.

COST OF N LOSSES

Annual social cost of agricultural N losses was **€40-230 billion** in EU in 2008.

So… what NUE solution to choose?

Robustness – multiple ways of action

Products with multiple ways of actions are more successful than a single way of action approach (i.e. CRF or inhibitors).

Straightforward regulatory compliance

Solutions enhancing NUE shall be microplastic-free, non-toxic and safe products.

Regenerative agriculture

Improved NUE shall be achieved through products that help preserving soil health & biodiversity.

Fertigation – compatibility and solubility

Wider adoption of fertigation due to water shortage will demand NUE products with high solubility & fertilizer compatibility.

Why Activance® NUE

Multiple modes of action

Stimulates H^+-ATPase, root development & nutrient uptake.

Solubilizes P through metal-phosphate complexes.

Accelerates NO_3^- uptake rate and reduces leaching.

EU-certified biostimulant (2030-DE.6691)

PFC 6 Claim: Improvement of the use efficiency of nitrogen and phosphorus.

Contribution to sustainable agriculture

Reduction of fertilizer use CO_2 emissions, enhanced nutrient & water use efficiency, increase beneficial soil microbial strains.

Full compatibility with commercial fertilizers

Designed to deliver full compatibility even with concentrated liquid fertilizers with acidic pH and/or high ionic strength.

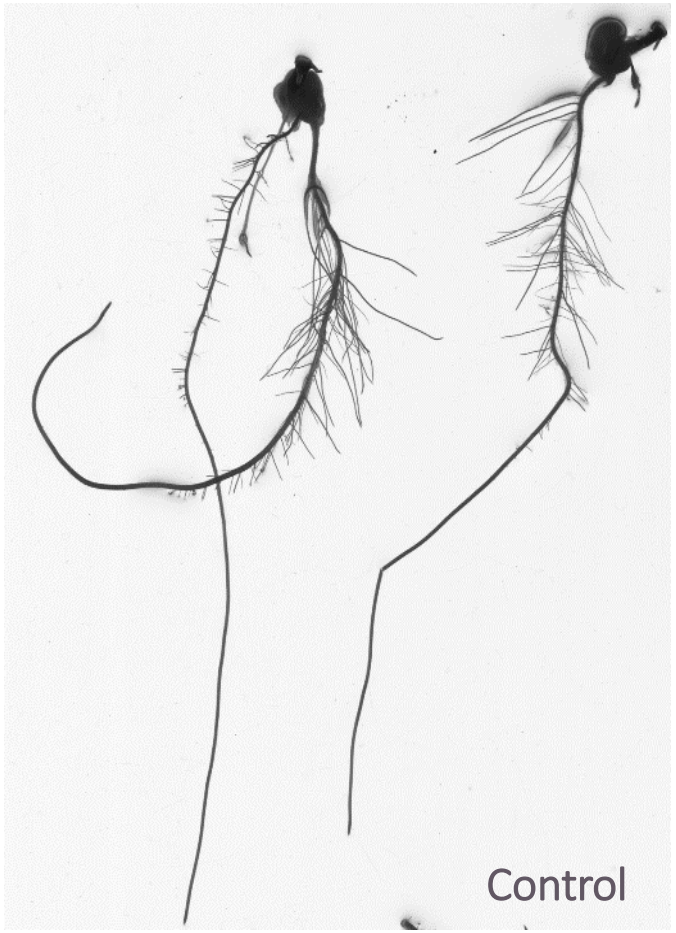
Root growth through H^+-ATPase stimulation

Activance® NUE

Corn trial in Padova (Italy)

- Trial conditions:
  - Hydroponic trial in growth chamber.
  - Seeds germinated on filter paper for 3 days.
  - 3-day-old seedlings transplanted into 1 L pots.
  - Activance NUE added to the nutrient solution at 4 g/1000 L.
  - Root morphology evaluated after 6 days.

Activance NUE increased total **root length by +29%** over control.



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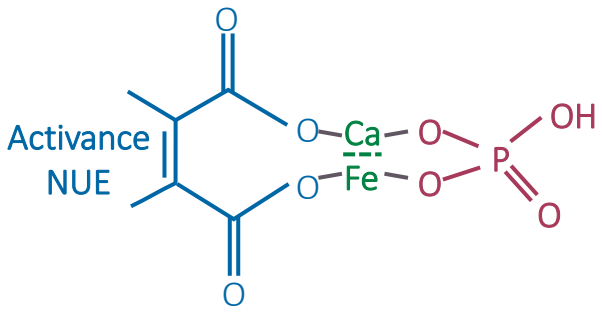
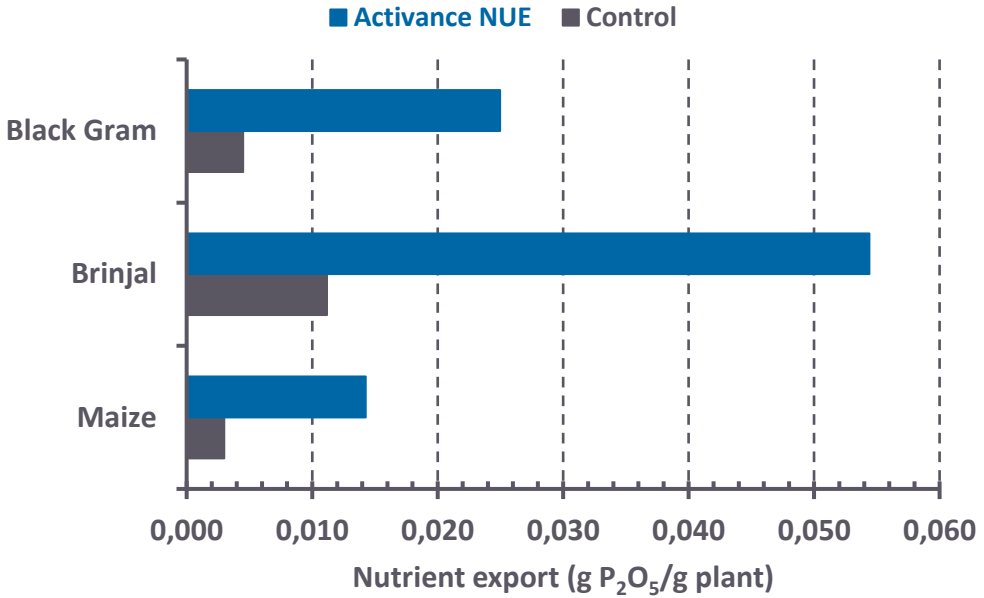
Availability of phosphorus in the soil

Black Gram, Brinjal and Maize pot trial in India

- Trial conditions:
  - Acidic soil (pH 4.6), 2,8% OM, 1,9 ppm available P.
  - Phosphorus applied at 46 kg P_2O_5/ha to Brinjal & Black gram and 69 kg P_2O_5/ha to Maize. Activance NUE applied at 8 kg/ha.
  - Biomass dry matter and P content in plant tissue measured after 21 days PUE calculated as Nutrient export (*Ne*).



Activance NUE significantly **increased availability of phosphorus** measured as nutrient export.



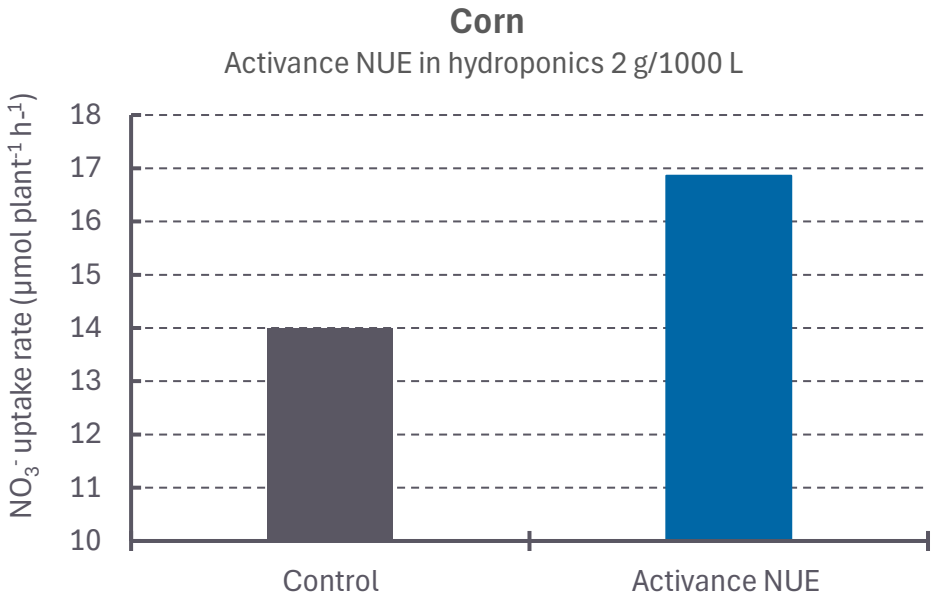
$$Ne = C\ x\ Y$$

Ne: nutrient export into the plant (shoot or root or both), in g/ha or g/plant
C: concentration of the plant nutrient in the part of interest, in g/g
Y: crop yield: harvested part or total biomass, in g/ha or g/plant.

Enhanced nitrate uptake rate

Corn trial in Padova (Italy)

- Trial conditions:
  - Hydroponic trial in growth chamber.
  - Seeds germinated on filter paper for 3 days.
  - 3-day-old seedlings transplanted into 1 L pots.
  - Seedlings grown for 6 days in a nitrate-depleted solution containing 2 g/1000 L Activance NUE.
  - Plants transferred to 1,5 mM NO_3^- solution for 150 min to measure nitrate uptake rate.

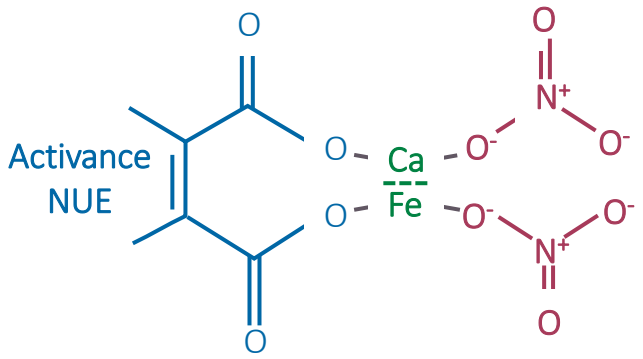


Activance NUE increased **nitrate uptake rate +21%** over control.

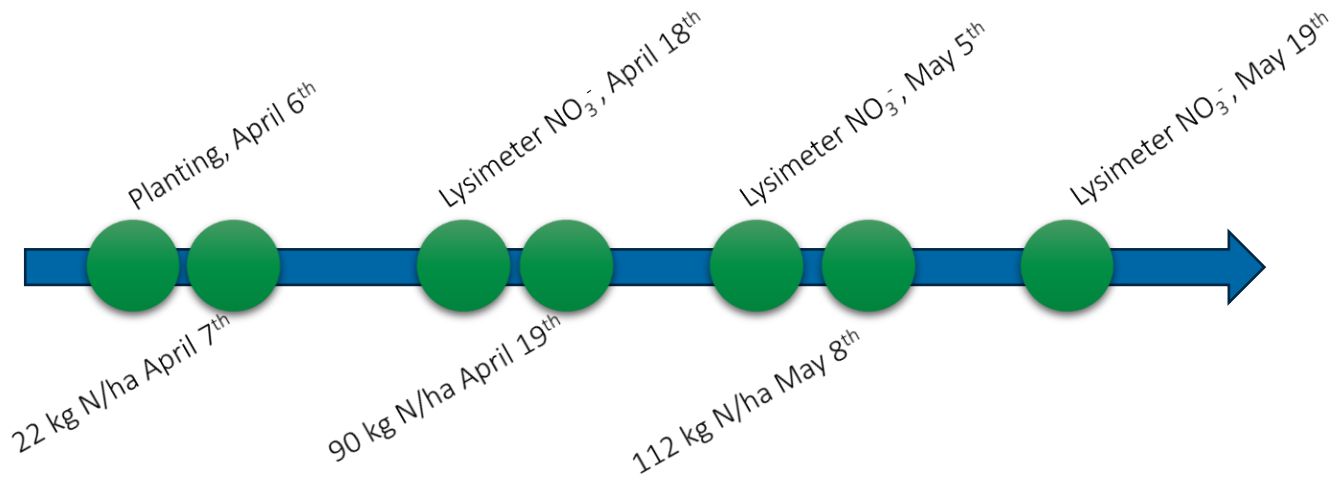
Reduced nitrate leaching

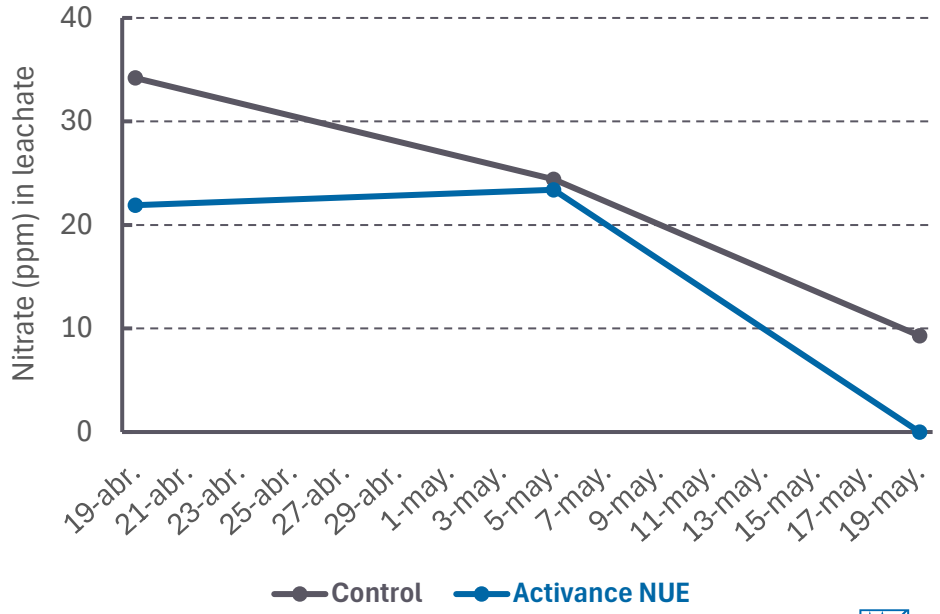
Broccoli trial in Somis (CA), US

- Trial conditions:
  - Fertilizer: 890 L/ha AN20 split in 3 applications. Activance NUE @ 3 kg/ha with each N application.
  - Clay loam soil. pH 6,5 & 3,1% OM.
  - Activance NUE complexing capacity key to minimize nitrate leaching.



On average, **nitrate leaching** during the trial was **reduced by 40%**.





N & P_2O_5 use efficiency in hydroponics

Activance® NUE

Corn trial in Padova (Italy)

- Trial conditions:
  - Hydroponic trial in growth chamber.
  - Seeds germinated on filter paper for 60 h in the dark at 25 °C.
  - Germinated seeds transplanted into 3 L pots with Hoagland nutrient solution (fertilizer).
  - Activance NUE added to the nutrient solution at 3 g/1000 L 12 days after transplanting.
  - Plants evaluated 48 hours after Activance NUE application.

Activance NUE **increased N & P_2O_5 Partial Factor Productivity by +56%** over control.

Enhanced photosynthetic activity:

- +19% SPAD index.
- +17% RuBisCo enzyme activity.

Activation of primary metabolism:

- +29% Protein in leaves.
- +136% GS & +96% GOGAT activity in roots.
- +10% Glucose & +47% Fructose in leaves.

Activation of secondary metabolism:

- +74% Total phenols in leaves.

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N&P Use efficiency in corn

Contribution to regenerative agriculture

Activance® NUE

- Increase productivity, employment & value addition in food systems.
- Protect and enhance natural resources.
- Improve livelihoods and foster inclusive economic growth.
- Enhance the resilience of people, communities and ecosystems.
- Adapt governance to new challenges.

Source: Sustainable Food and Agriculture | Food and Agriculture Organization of the United Nations

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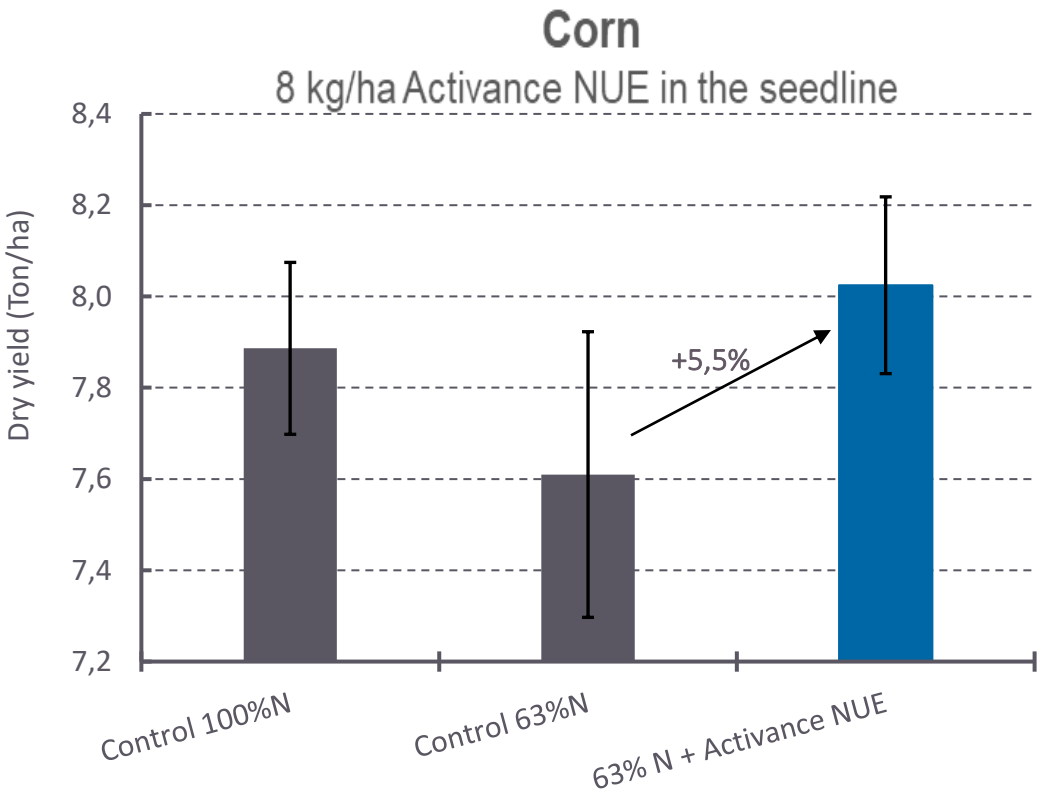
N&P Use efficiency in corn

Contribution to regenerative agriculture

Activance® NUE

- Same yield with 37% less N fertilizer.
- Soil microbiome analysis: +31% strain biodiversity.
- 12% increase in farmer's net profit.
- Reduction of carbon footprint by 24 kg CO_2-eq/Ton (ca -28%).



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N&P Use efficiency in mandarine
Contribution to regenerative agriculture

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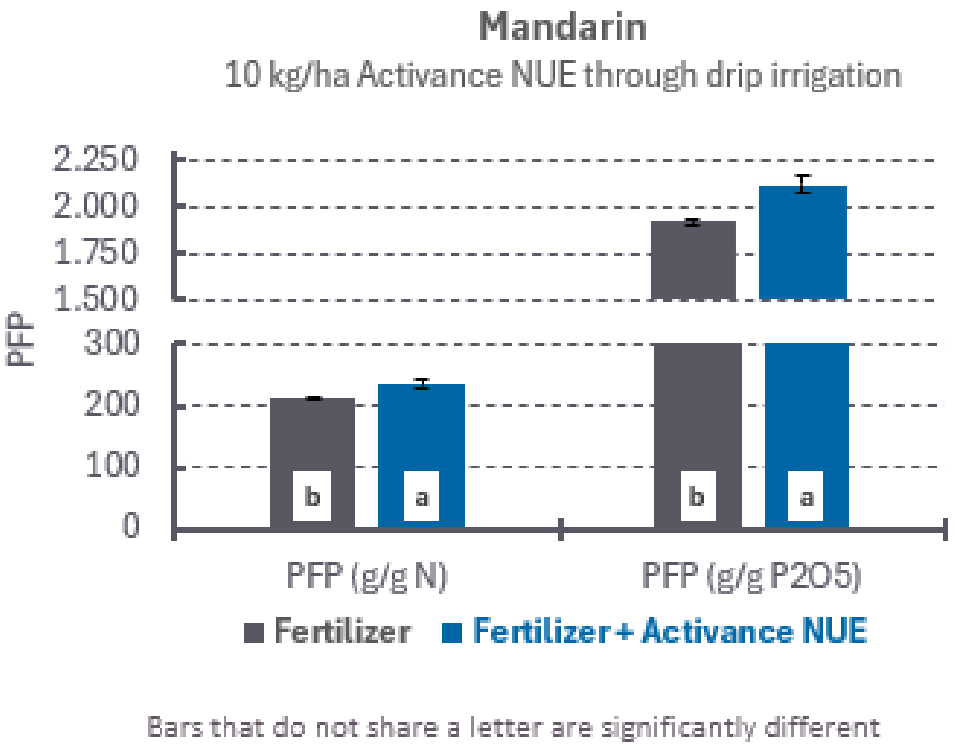
N&P Use efficiency in mandarine
Contribution to regenerative agriculture

Activance® NUE

10% yield increase with same amount of fertilizer.

+0,64 kg mandarin per m^3 irrigation water.

10% increase in farmer's net profit.



Bars that do not share a letter are significantly different

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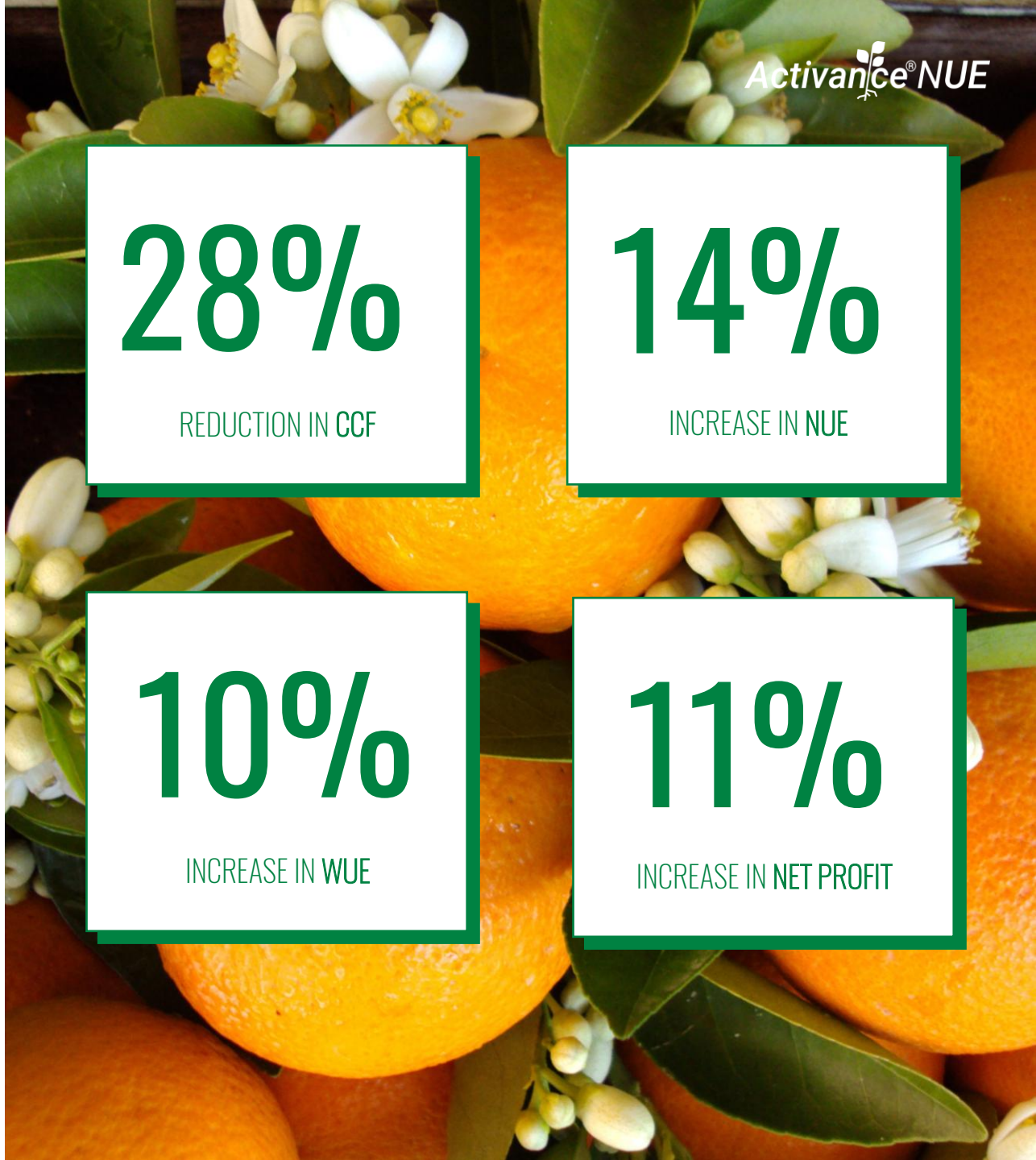
Activance® NUE

A proven **biostimulant** that enhances **N & P nutrient use efficiency**, offering reliable **field performance** and **formulation flexibility**

What our customers see:

- **Reduced** CCF (Crop Carbon Footprint) by up to 28% of fertilizer emissions
- **Increased** NUE by 5-40%
- **Increase** Water Use Efficiency (WUE) by 10%
- **Increase** in net profit by 10-12%



Thank you!

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Visit us at booth E20

Learn more about Activance NUE here: