AVAIL®

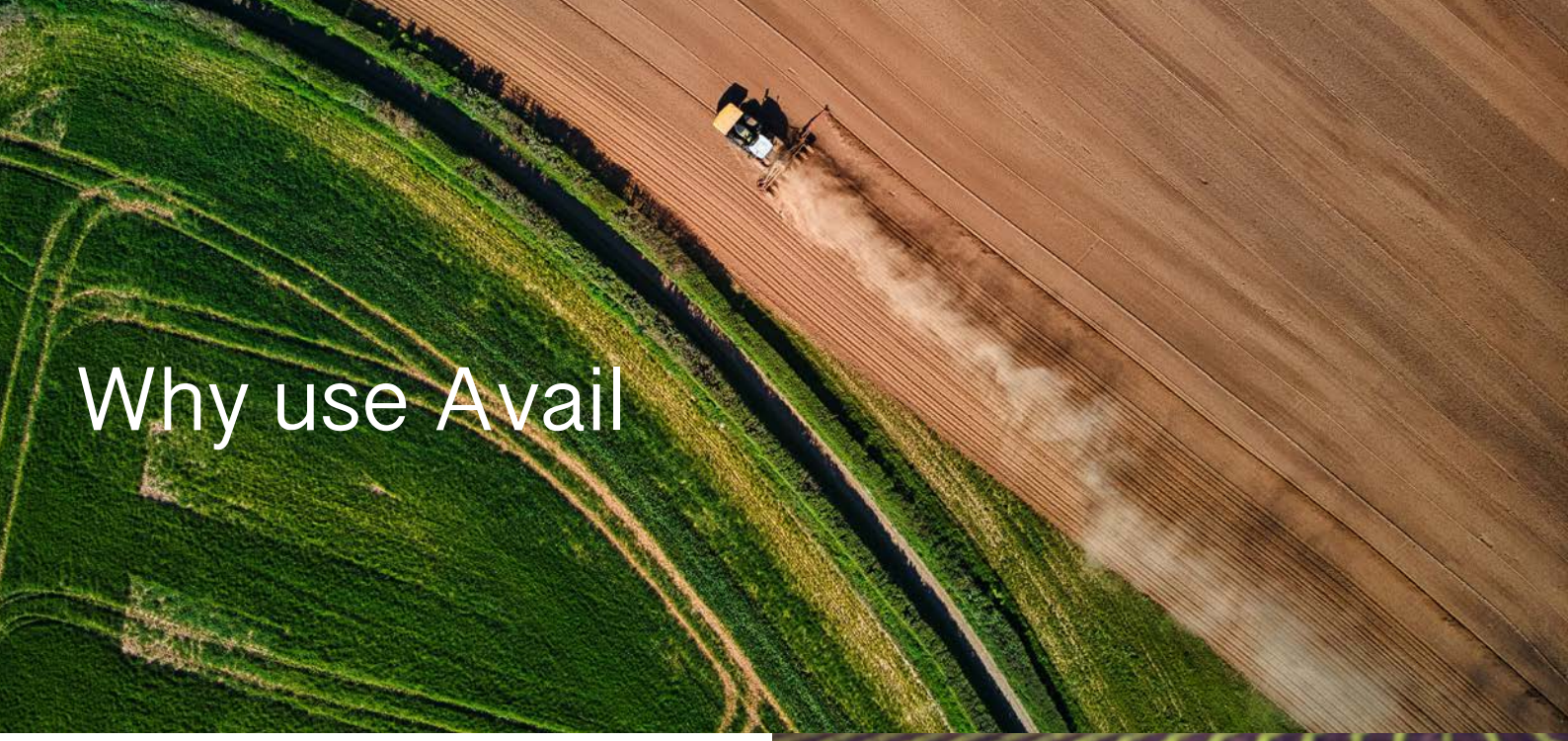
PRODUCT GUIDE

AVAIL FOR GRANULAR PHOSPHATE FERTILISER

VERDESIAN

THE NUTRIENT USE EFFICIENCY PEOPLE®

VERDESIAN LIFE SCIENCES EUROPE LTD.



Why use Avail

Reduces Environmental Impact on Water Quality

We all know that plants require phosphate to grow however according to government statistics 28% of the phosphate found in water courses originates from agriculture. The safe level of phosphate in water is only 0.02ppm and x3 that level will create algae bloom which uses up the oxygen in the water killing fish, plants and other aquatic life. Avail has been shown to improve the availability of applied phosphate by up to 30%, meaning more uptake by the plant and less P finding its way into the water courses.

Source - Dept of Agronomy , Kansas State Univ 2012

Reduces Environmental Impact on the Soil Biome

Compared to the standard application of DAP granular fertiliser, the Avail treated DAP increased the microbial activity in the soil by 23% over a 111 day period post application. This increase in microbial activity is important as certain bacteria and the enzymes they produce improve the availability and uptake of P for the plant.

Source – University of Athens, Greece 2016

In a 12 month study on earthworms where the technology was applied at x10 normal dose rate there was no impact on reproduction or mortality of the earthworms.

Source - Eurofins, France 2018

Reduces Environmental Impact on Aquatic Organisms

Operating to international ISO standards experiments were conducted using the technology at x 10 normal dose to assess the effects on sensitive aquatic organisms. There was no mortality when assessing toxicity to freshwater fish, no immobilisation of water fleas and no inhibition of growth for unicellular green algae.

Source - Various

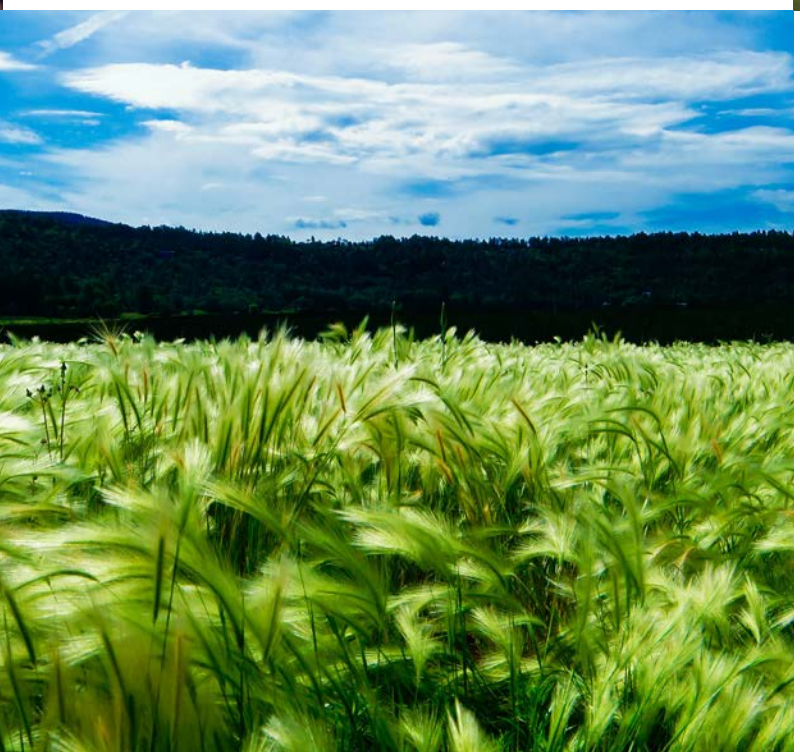
Improves Agronomic Efficiency and Crop performance

Over the 6 years 2015 - 2020, Verdesian has commissioned 35 independent trials with Avail covering 7 crops and 6 countries across Europe. The program was spread across a variety of soil types ranging from pH 5.5 - 8.5 and climatic conditions and resulted in an average +5% yield increase across all crops and years. A positive yield result was obtained in 80% of the trials conducted.

Source - Verdesian

Trials have also shown that Avail increased the agronomic efficiency of DAP fertiliser by +23% compared to untreated DAP.

Source - University of Athens, 2016

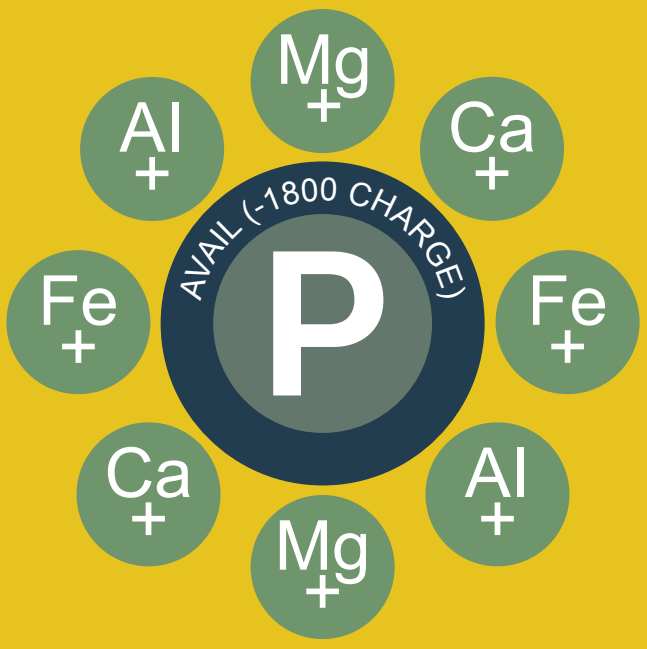


Reduces Granular Phosphate Input

Applied phosphate can on its own have a negative effect on the soil biome and water courses . It also introduces cadmium into the soil which has been shown to be toxic to humans, plants, animals and microorganisms. Therefore applying less P will reduce the potential environmental impact.

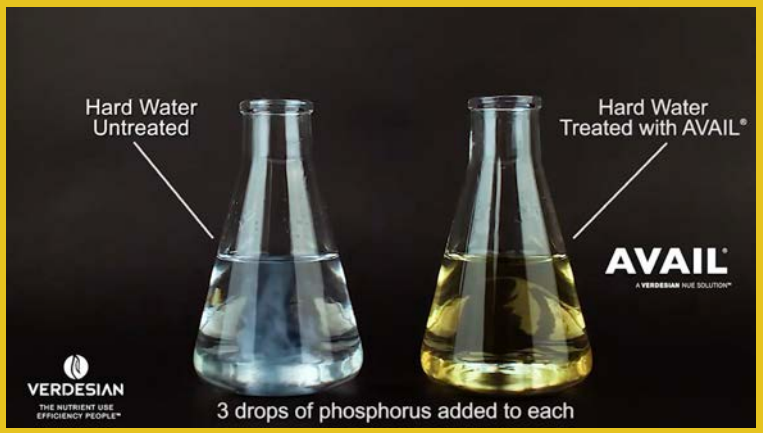
Verdesian commissioned 10 independent trials in France to look specifically at the effect on yields when using reduced P inputs combined with Avail. The results found that DAP fertiliser treated with Avail used at a 25% reduced input compared to standard farmer practice of 110kg P_2O_5 per hectare, demonstrated on average 3.8% higher yield than the 100% standard farmer practice fertiliser application.

How Avail Works



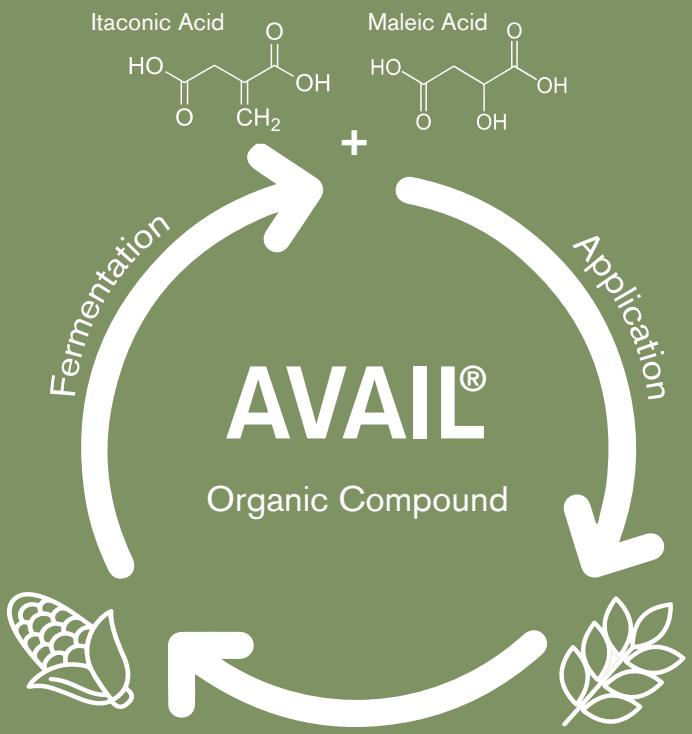
By creating a high negatively charged cation exchange capacity of 1800 meq/100g in the micro-environment around the phosphate. The positive ions, Al, Mg, Ca and Fe that normally attach to the phosphate now bond with Avail, leaving more of the applied phosphate available to the crop. Avail can be applied to any phosphate based fertiliser granule for example DAP, TSP and MAP.

The AVAIL jar test shows how crop yield increase is achieved



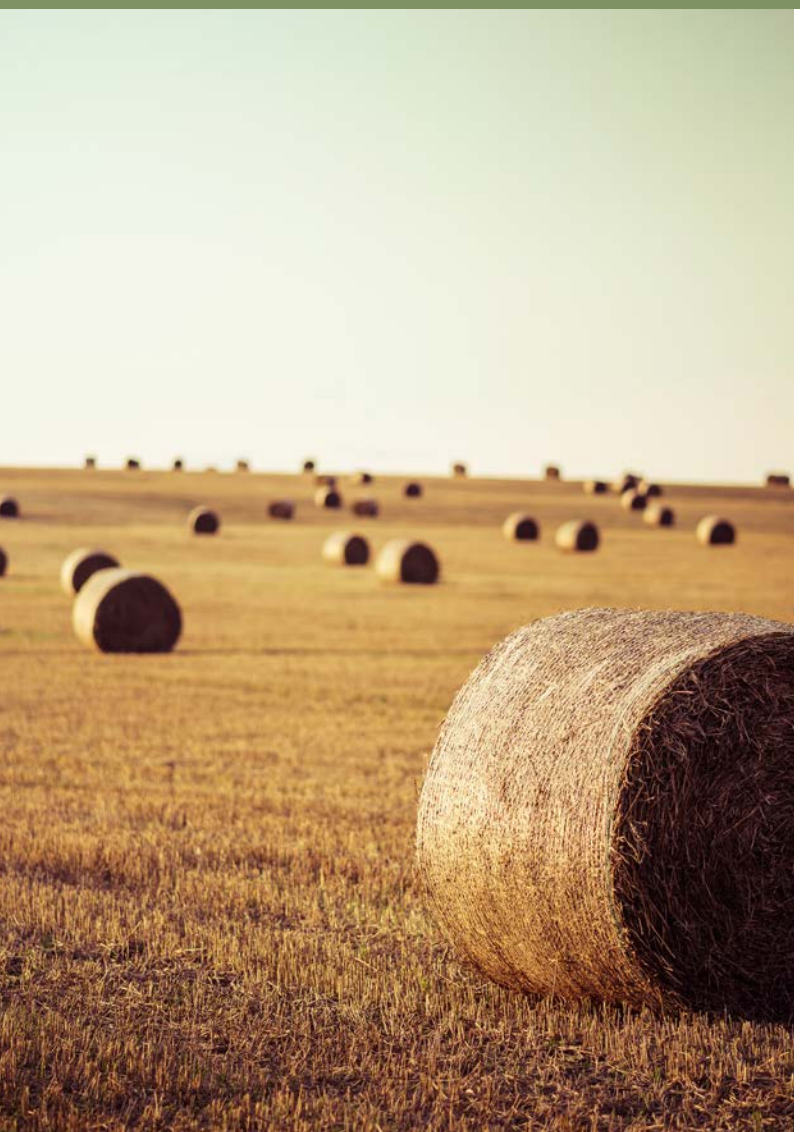
Click the link to watch the AVAIL jar test video:
https://eu.vlsci.com/vlogs/the-avail-jar-test

What is Avail?



The driving force behind Avail is a long chain organic water soluble compound made up of 2 key organic acids – maleic acid and itaconic acid, both acids are REACH registered in the EU.

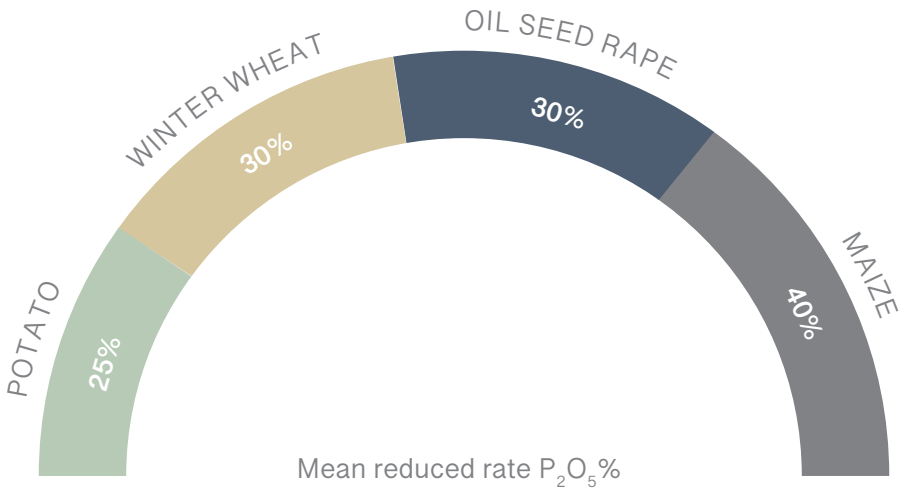
- The Itaconic acid is derived from a fermentation process of maize – so a natural organic compound. The maleic acid which is used widely in the food industry is combined to slow down the degradation in the soil
- When the two acids are combined, this creates the 1800 cation exchange capacity (CEC)
- As an organic compound Avail degrades in the soil to leave only carbon, hydrogen and oxygen. This is how the technology achieves the Environmental benefits



Summary

- Avail is a highly water-soluble organic compound primarily created from fermentation of maize
- The technology improves the availability of applied phosphate by up to 30%
- Avail is proven to provide farmers with a return on investment
- The technology keeps the fertiliser where it is needed for longer, increasing P efficiency, yield and crop quality
- The technology has demonstrated a beneficial effect on soil biome
- The technology helps reduce the environmental impact on the soil and water
- Avail can help growers reduce their phosphate fertiliser inputs, especially in environmentally sensitive zones

Potential to Reduce Phosphate Input



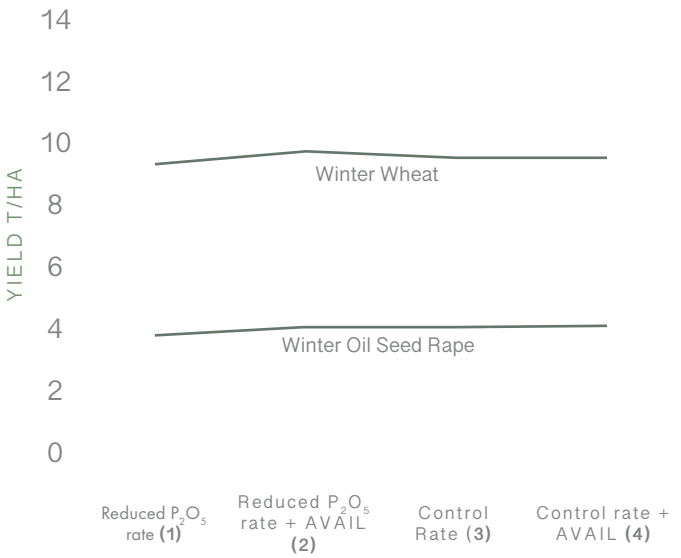
35 trials | Over 6 years | Across 6 European countries | *Conducted by accredited independent trial organisations sponsored by Verdesian

Crop	*SFP (T/ha)	Reduced *SFP rate + AVAIL (T/ha)	Mean reduced rate P_2O_5%
OIL SEED RAPE	5.1	5	30%
WINTER WHEAT	6.7	7.2	30%
POTATO	41.6	41.1	25%
MAIZE (Silage)	18.2	29.2	40%

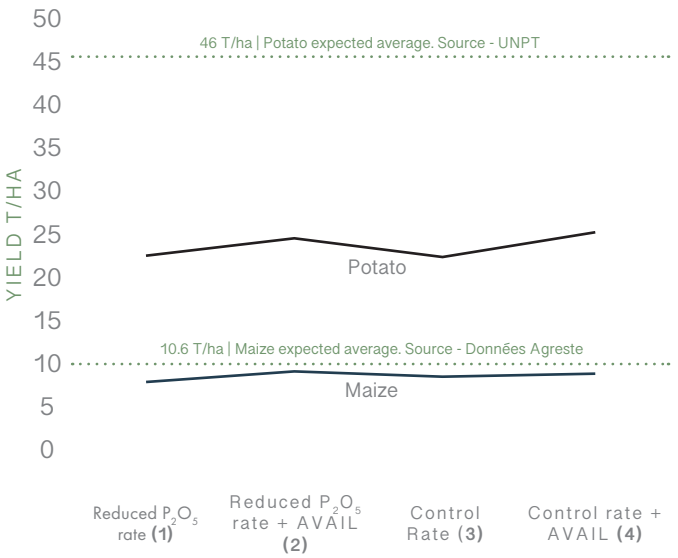
*SFP = Standard Farmer Practice

Average results over 6 years

Normal Growing Conditions



Under drought stress



Background

Crop	Country	Soil pH (%)	Sand (%)	Silt (%)	Loam (%)	Applied P2O5 kg/ha	
						Reduced rate	Std farmer practice (SFP)
MAIZE	France	8.4	13.9	45	16.2	55 (-40%)	92
WINTER WHEAT	Germany	6.5	2	78.4	20	72 (-30%)	103
POTATO	France	6.5	2	78.4	20	75 (-25%)	100
WINTER OIL SEED RAPE	France	8.5	-	-	-	40 (-33%)	60

Results

Yield T/ha				% Yield Gain **4 vs 3**	% Yield Gain **2 vs 3**
Reduced P_2O_5 rate **(1)**	Reduced P_2O_5 rate + AVAIL **(2)**	SFP* **(3)**	SFP* + AVAIL **(4)**		
8.1	9	8.4	8.7	4%	7%
9.3	9.7	9.6	9.6	0%	1%
22.5	24.6	22.3	25.2	13%	10%
3.9	4	4.0	4.1	3%	0%

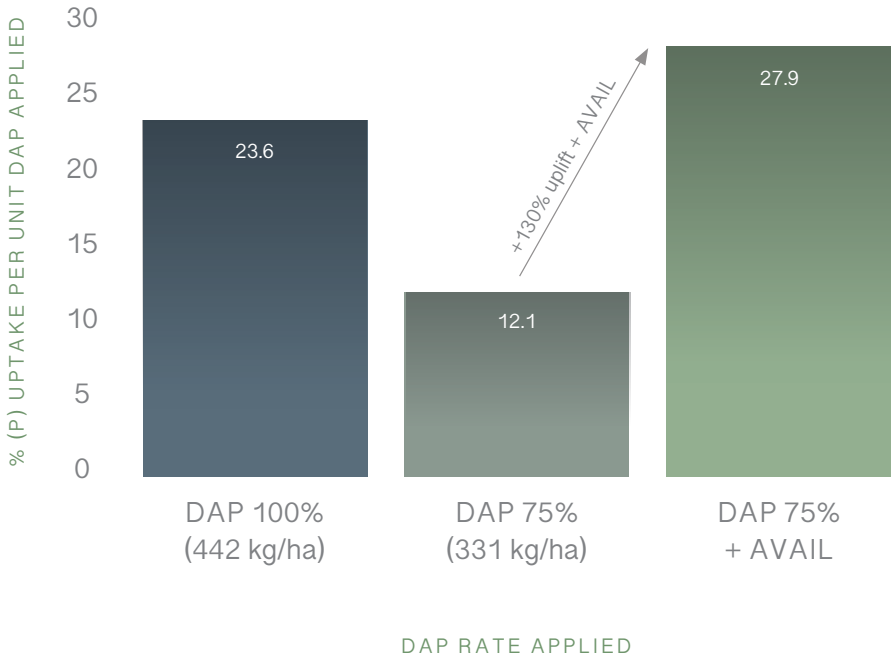
*Conducted by accredited independent trial organisations sponsored by Verdesian

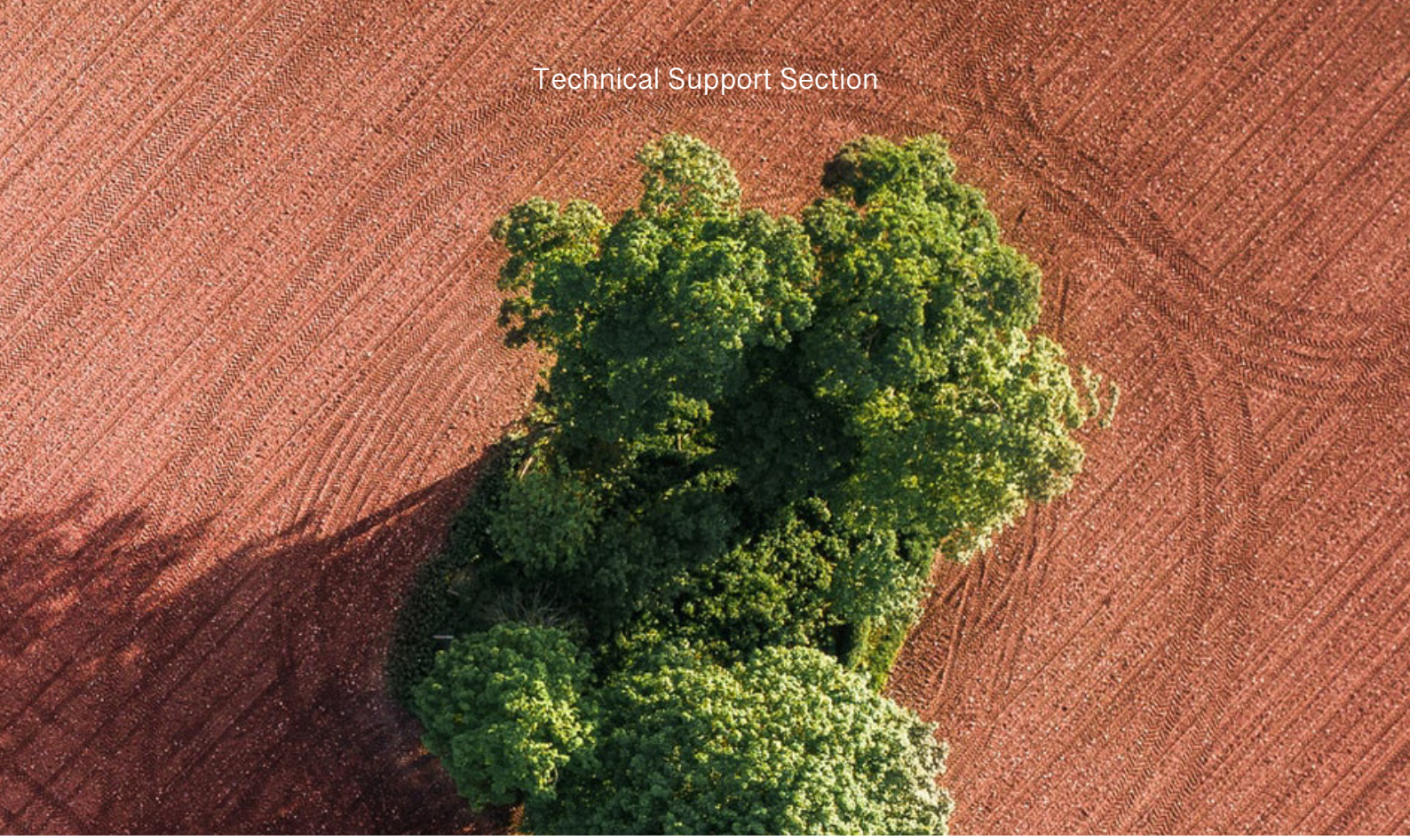
Improves Agronomic Efficiency & Crop Performance

Apparent Recovery Efficiency (ARE) of DAP with AVAIL in Maize

Apparent Recovery Efficiency (ARE) = Quantity of nutrient uptake per unit of nutrient applied

A 25% reduction in DAP with Avail, provided an 18.2% increase in ARE vs DAP at 100%



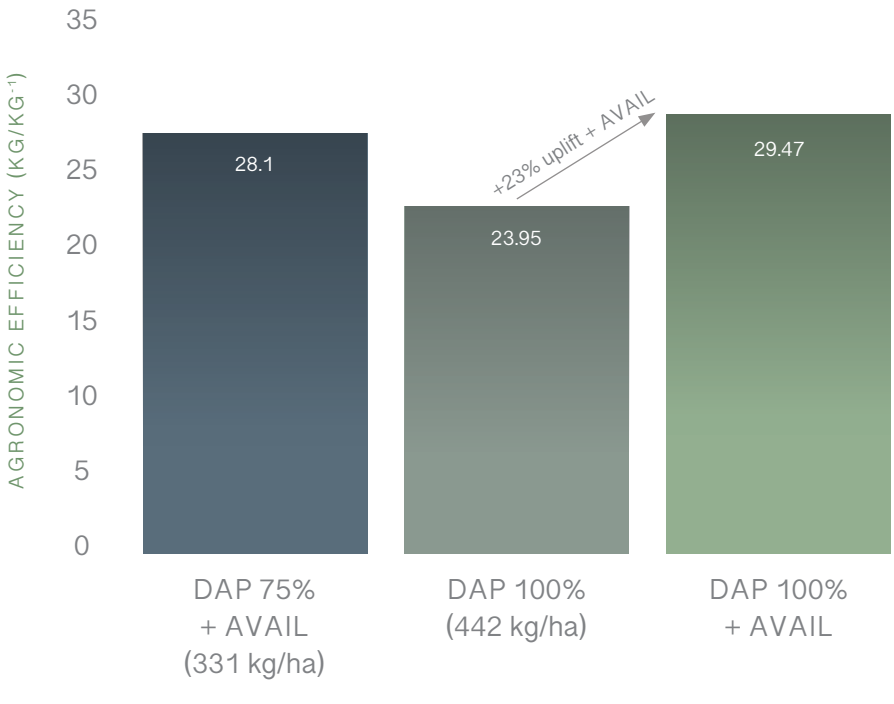


Agronomic Efficiency of DAP with AVAIL in Maize

Agronomic Efficiency = Economic production (yield) obtained per unit of nutrient applied

AE = kg yield per Kg DAP applied

A 25% reduction in DAP with Avail, improved the agronomic efficiency by 17.3% vs DAP at 100%



HELLENIC REPUBLIC
National and Kapodistrian University of Athens
EST. 1837

Source - University of Athens, 2016

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