



PRODUCT KNOWLEDGE · PHOSPHORUS

Fusion Phosphate

Triple Super Phosphate · P_2O_5 46% · 43% water-soluble

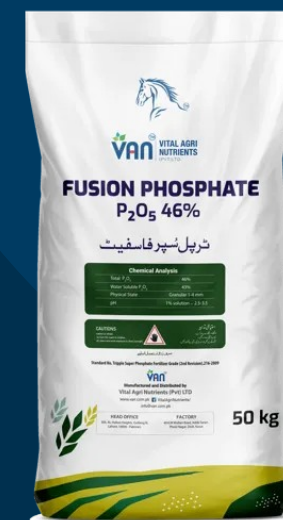
Straight granular phosphate at the highest concentration the chemistry allows — 46% total P_2O_5 , of which 43% is water-soluble, in an acidic granule.

PS 216-2009

Licence CM/L-2942/2023

50 kg

Granular 1-4 mm



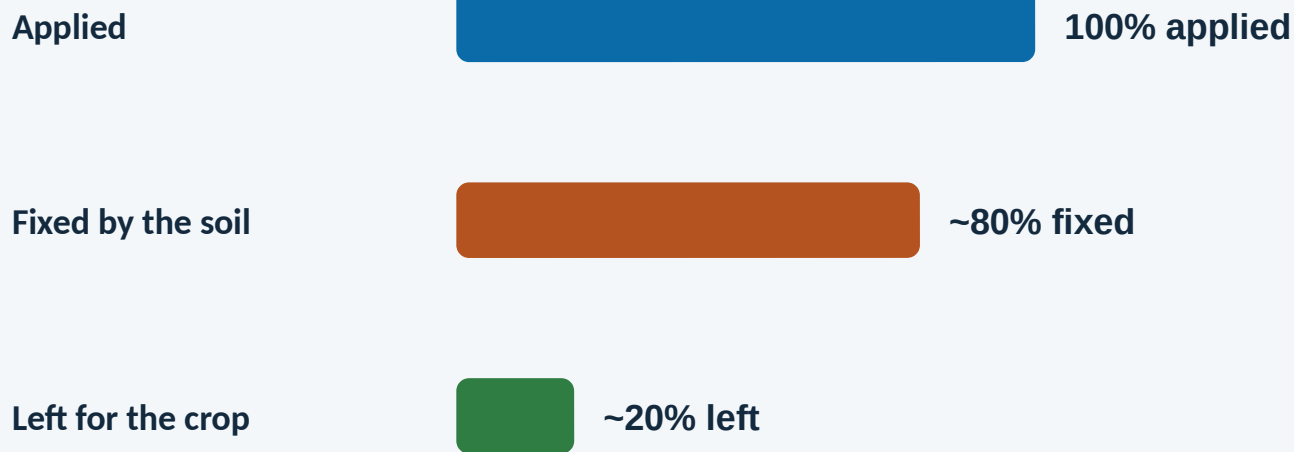
Vital Agri Nutrients (Pvt) Ltd · van.com.pk

For information only. VAN may change a product's composition at any stage for agronomic, efficiency or upgrade reasons.

THE PROBLEM

Pakistan imports phosphate. Then the soil takes most of it back.

What happens to conventional phosphate on calcareous ground.



46%

total P_2O_5 — the highest straight phosphate grade

of which 43% is water-soluble and immediately available

Concentration is freight. A 50 kg bag at 46% carries the phosphorus of far more than 50 kg of a lower grade, and every tonne not moved is a cost not paid.

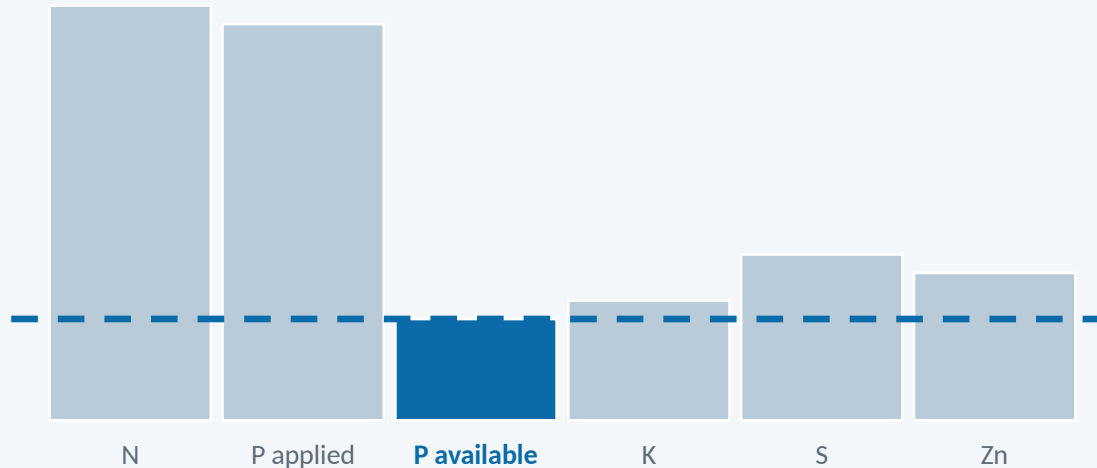
Figures as cited in VAN's product literature; see the sources slide.



Phosphorus is the largest single line in Pakistan's fertilizer import bill. What happens to it after it lands is therefore not a small question.

You cannot fix a phosphorus problem with more phosphorus.

Carl Sprengel set the law out in 1840; Justus von Liebig made it famous. If the limitation is availability rather than quantity, adding quantity raises nothing.



— the water line — what the crop actually yields

Applied $\neq$ available

A soil can hold years of accumulated phosphate and still starve the crop of it. Placement and granule chemistry decide how much of a bag survives its first season — which is why how you apply this matters as much as how much.

The staves show the shape of the problem, not measured soil values. A soil test is what tells you your own — VAN Lab publishes its prices.

What is actually in the bag.

One grade, one job, at the highest concentration available.



Fusion Phosphate — 50 kg

TOTAL P_2O_5

46%

WATER-SOLUBLE P_2O_5

43% — the fraction available immediately

PHYSICAL

Granular, 1-4 mm — sized for spreading and for drilling

REACTION

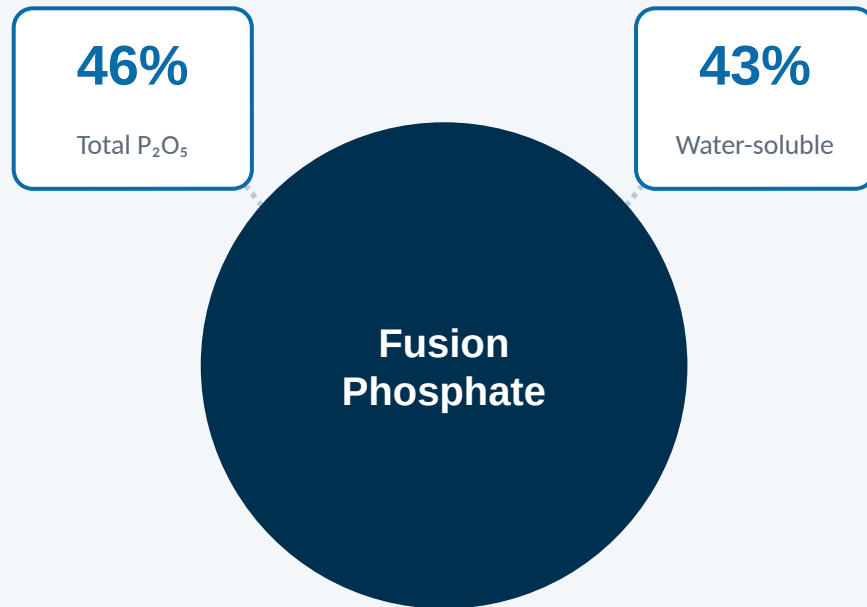
pH 2.5 – 3.5 in solution — strongly acidic

STANDARD & LICENCE

PS 216-2009 · PSQCA marks licence CM/L-2942/2023

What the label declares.

As registered under PS 216-2009 and as published on van.com.pk.



REACTION

pH 2.5 – 3.5

acidic — the opposite of the soil it goes into

GRANULE

1 – 4 mm

sized for uniform spreading and for seed-drill placement

PACK

50 kg

a straight product, so the rate is simple to calculate

Why the acidity and the granule size both matter.

A straight phosphate has fewer variables than a compound one. These are the ones that count.

1 An acidic granule

At pH 2.5–3.5 the granule creates a zone of favourable chemistry around itself. Phosphorus stays in solution there long enough for a root to reach it, instead of meeting free calcium and precipitating out.

2 High water solubility

Forty-three of the forty-six units are water-soluble, which means available now rather than available eventually. For a basal phosphate on a short-season crop, that distinction is the whole product.

3 Granule size 1–4 mm

Sized so it spreads evenly and drills without bridging. An uneven spread of a concentrated product is worse than an even spread of a weak one.

4 Concentration is logistics

At 46% the phosphorus per tonne handled is as high as a straight phosphate goes. Fewer bags, fewer journeys, less handling loss.

Placement beats rate for phosphorus, because phosphorus does not travel to the root — the root has to reach it. Band it or drill it wherever the equipment allows.

Phosphorus is the nutrient most affected by its neighbours.

Established interactions between soil nutrients — after Mulder. These describe how nutrients behave with one another, not how Fusion Phosphate performs.



Works with

Balanced phosphorus improves magnesium uptake, and magnesium improves phosphorus back

An acidic granule holds phosphate in solution — the same principle that makes a sulfur coating or an acidic liquid work on calcareous ground

Nitrogen in the ammonium form acidifies the root zone as it is taken up, helping any phosphate applied nearby

Humic substances chelate the calcium, iron and aluminium that capture phosphate



Competes with

Excess calcium — the defining feature of calcareous soil — suppresses phosphorus along with magnesium, zinc, iron, manganese, boron and potassium

Excess phosphorus itself suppresses zinc, iron and copper. A heavy straight-phosphate programme is a known route into a zinc deficiency

Excess iron and excess zinc both reduce phosphorus availability in return

This is why VAN pairs phosphate programmes with zinc rather than leaving them alone

If you run this product hard, watch zinc. That is not a sales line — it is the second entry in the right-hand column.

What phosphorus is actually doing in there.

Six functions, none of which the plant can perform without it.

1 Energy currency

ATP is a phosphate molecule — phosphorus is how the plant stores and spends energy

2 Pays for uptake

Gives the crop the energy to extract every other nutrient

3 Cell division

Present in every living cell; central to division and new tissue

4 Root architecture

Drives early rooting, which then governs water and nutrient access all season

5 Genetic material

The backbone of DNA and RNA is a sugar-phosphate chain

6 Seed and grain

Concentrates in seed and grain; a short crop sets and fills poorly

What a phosphorus-short crop looks like.

General agronomy, not a VAN measurement — but it is what the grower sees first.

1 Purpling

A purple or reddish cast beginning at the leaf edges

2 Oldest leaves first

Phosphorus is mobile: the plant strips old tissue to feed new growth

3 Stunting without yellowing

The plant stays small, which gets blamed on water or nitrogen

4 Thin roots

A shallow root system, which then limits everything else

5 Late flowering

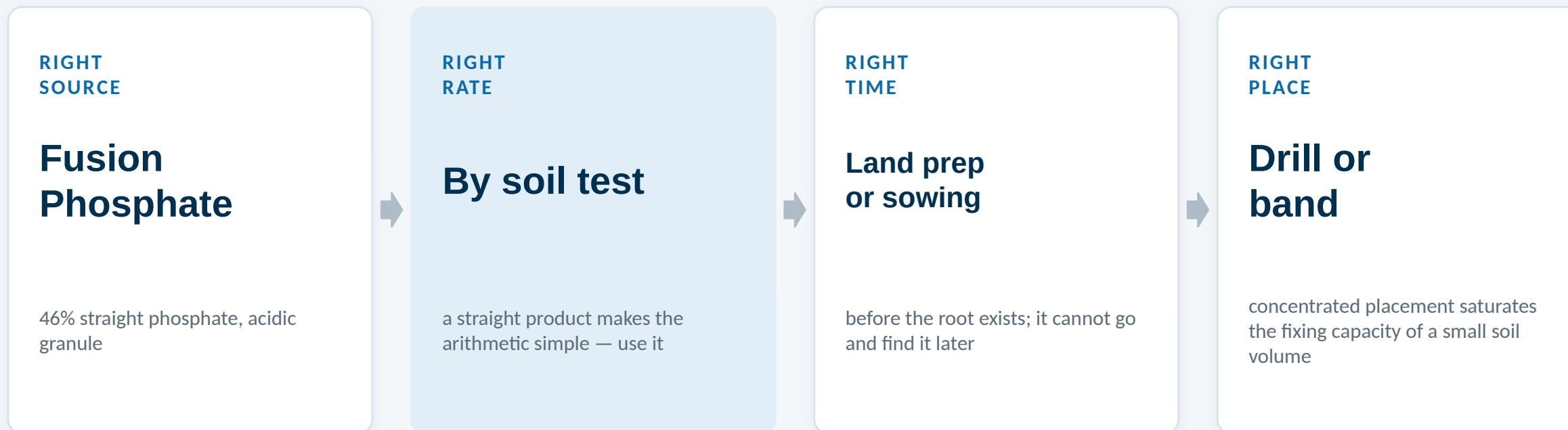
Delayed flowering and maturity, pushing harvest into the wrong weather

6 Poor set

Flowers set badly; grain and fruit fill unevenly

Right source, right rate, right time, right place.

Phosphorus is the nutrient where placement matters most, because it will not come to the root.



Broadcasting exposes the most granule surface to the most soil, which is precisely the wrong thing to do with a nutrient that gets captured on contact.

On this soil, the salt matters more than the analysis.

TSP and DAP both deliver phosphate. What differs is the chemistry each one creates around its own granule.

DAP — the default

An ammoniacal phosphate whose dissolution zone is alkaline.

- Microsite solution around pH 7.5–8.0 — alkaline soil meeting an alkaline reaction
A field trial at pH 8.4 and 33% carbonate found shoot biomass and P content significantly LOWER when the banded rate was doubled — the authors attribute it to probable ammonia toxicity near the seed, not to phosphorus saturation
- Laboratory ammonia release roughly 300% higher than from MAP
- Industry's own guidance: best suited to acidic soils

Fusion Phosphate — TSP

A calcium phosphate with an acidic reaction zone and no ammoniacal nitrogen at all.

- No ammonium beside the seed, so no ammonia ceiling on the rate you can band
- A meta-analysis of 213 paired comparisons found the penalty for rising soil pH held against ammonium phosphates but NOT against superphosphates
- Higher phosphate per tonne handled — fewer bags, fewer trucks, less freight per unit of P
- Nitrogen comes separately, so the rate is set by the crop rather than by the phosphate bag

 Stated honestly: most published field comparisons of phosphate sources show only minor differences in yield with proper management. The defensible claims here are seed safety, ammonia loss and nutrient concentration — not a yield advantage. VAN has not run its own TSP-versus-DAP trial on Punjab soil, and until it does, it will not claim one.

A phosphate granule only ever treats the soil it can physically reach.

Measured on calcareous field soil. These four numbers govern every placement decision you will make.

0.13 mm

how far phosphorus diffuses in a
day

10–15 mm

how far it stays available from the
granule

9.5–18%

of granular P never leaves the
granule shell

1.8%

of the plough layer ever becomes
fertosphere



The stranded fraction is independent of soil type — it is a property of the granule form itself. And because reaction zones occupy under two per cent of the topsoil, spreading phosphorus thinly across the whole field works against you geometrically, before any chemistry is considered.

Split the phosphorus — but keep every split concentrated.

Both halves of that sentence matter, and the second is the one usually dropped.

1

The case for splitting

Phosphorus applied at sowing sits in the soil for weeks before the crop's demand arrives, and every one of those weeks is exposure to fixation. Splitting moves part of the supply closer to the uptake window, and lets you correct after seeing the crop rather than guessing in advance.

2

The case against, which is real

A granule works by saturating the soil's fixing capacity in the first few millimetres around it. Dilute the phosphorus — spread it thinner, or release it slowly — and each small increment meets fresh, unsaturated capacity and is fixed. Spreading supply out can raise total fixation rather than lower it.

3

So: split the season, never the placement

Two or three concentrated band applications beat one, because each still saturates its own microsite. Two or three thin broadcast passes are worse than one concentrated band, for exactly the same reason.

4

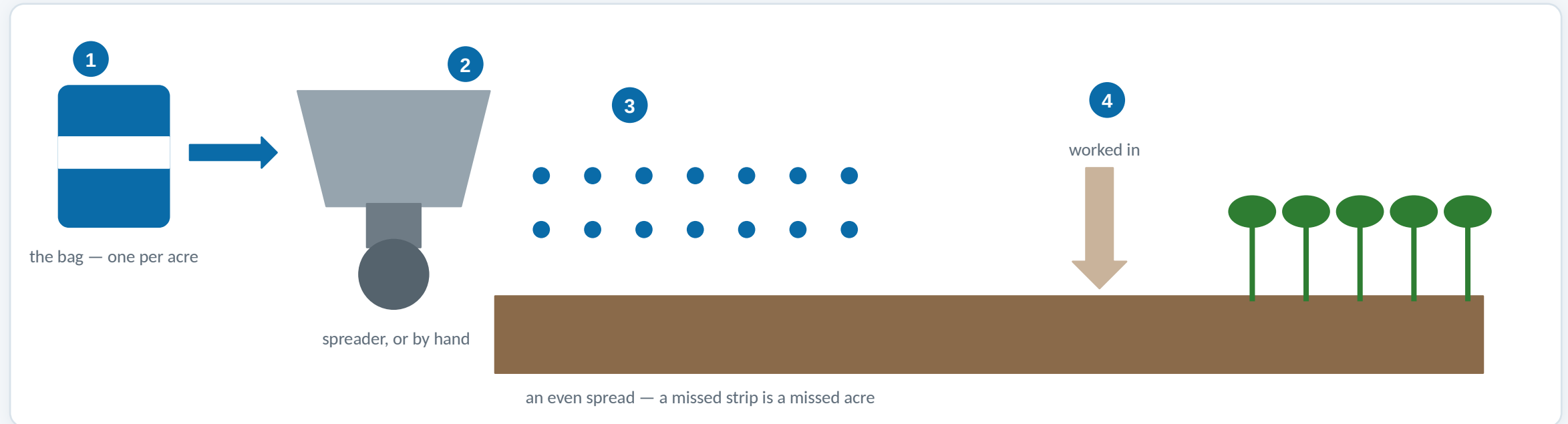


And say what is not known

No published study tests this trade-off on a calcareous soil. VAN states the mechanism and the uncertainty rather than picking whichever half of it sells better.

An even spread, then worked in.

A concentrated band beats a thin spread on fixing soil.



1 Measure it

By soil test.

2 Spread evenly

Spreader or by hand. A missed strip is a missed acre and it shows at harvest, not on the day.

3 Work it in

Incorporate into the root zone. Material left on the surface is not where the roots are.

4 At the right stage

At land preparation or sowing, drilled or banded.

Doses are per acre, from VAN agronomy. Incorporation is not optional — it is the difference between feeding the crop and feeding the surface.

What is behind the bag.

1

PS 216-2009

Registered against the Pakistan Standard for triple super phosphate.

2



Licence CM/L-2942/2023

PSQCA marks licence — this one carries an expiry of 30 September 2026. Confirm the renewal before quoting it.

3

Tested before it ships

Every batch is tested in VAN's own PNAC-accredited laboratory, ISO/IEC 17025:2017, LAB-336.

4

Certificate on request

Send the batch number off the bag and VAN will send the certificate of analysis for that batch. Free, no sample, no form.

SOURCES

Where every figure in this deck came from.

DAP vs superphosphate at high pH

Hertzberger, Cusick & Margenot (2020), SSSAJ 84:653-671 — 213 paired comparisons; the pH penalty held against ammonium phosphates but NOT against superphosphates

Banded DAP ceiling

Doolette et al. (2026), SOIL 12(1):253-261 — Calcisol pH 8.4, 33% CaCO₃; biomass and P content significantly LOWER at the doubled rate, attributed to probable ammonia toxicity

Microsite pH

Mosaic, Incitec Pivot and Back Paddock Co. — MAP ≈3.5-4.5, DAP ≈7.5-8.0. ⚠️ All grey and industry literature, not peer-reviewed measurement

P mobility and geometry

Doolette et al. (2026) fertosphere mapping; Lombi et al. (2005), Plant and Soil 269:25-34 — 9.5-18% of granular P stranded, independent of soil type

⚠️ The counterweight

Mosaic and Back Paddock both state that most field comparisons between phosphate sources show only minor or no yield difference with proper management

Analysis, standard, licence

van.com.pk — total P₂O₅ 46%, water-soluble 43%, granular 1-4 mm, pH 2.5-3.5, PS 216-2009, CM/L-2942/2023

P deficiency and fixation

Ahmad, M. et al. (2022). Sustainability 14(13), 7669

Nutrient interactions

After Mulder's chart — established relationships

Law of the minimum

Carl Sprengel (1840), popularised by Justus von Liebig

⚠️ Licence expiry

30 September 2026 — one of four VAN licences flagged for a September check

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