National SCIENCE Challenges

OUR LAND AND WATER

Toitū te Whenua, Toiora te Wai

FACTSHEET

Science-based advice for Applying phosphorus fertiliser

Science-based advice

When and where to apply phosphorus (P) fertiliser

- Apply annual P fertilisers when the probability of surface runoff or leaching is lowest.
- Always avoid applying P-based fertiliser if significant (>10 mm) rain is forecast within the next 14 days.
- Runoff can also occur in dry times of year when soils cannot absorb water. Avoid applying P-based fertiliser at these times (common from midsummer to autumn on north-facing slopes in the eastern regions of both islands, and in the Central Plateau) as surface crusting can cause increased runoff and fertiliser P loss.
- Target fertiliser good management practices (the four Rs – the right fertiliser in the right place at the right time and rate) to critical source areas (such as land with a moderate to high slope, regular and frequent rainfall, or with soil that cannot retain P) to make them even more effective. In one case P losses were halved with minimal impacts on profitability.

Type of P fertiliser to apply

- When runoff or leaching is unavoidable (for example, where rainfall is frequent or heavy enough to produce runoff or leaching events year-round) consider applying a partially water-soluble P fertiliser, such as reactive phosphate rock, Serpentine Super or products coated with a polymer to control the rate of P release.
- Data shows that at a catchment scale, reactive phosphate rock can potentially decrease P in streams by up to 38% compared to superphosphate. Other products, such as Serpentine Super, can also decrease losses by about 20–30% compared to superphosphate.
- A cautionary note: Data shows that products such as reactive phosphate rock only produce the same amount of pasture as superphosphate when soil pH is <6 and rainfall is >800 mm.
- In ideal conditions, when transitioning to reactive phosphate rock from single or triple superphosphate, replace a third of the superphosphate with reactive phosphate rock each year: 33% in year one, 66% in year two, and 100% in year three.

Questions and answers

What affects P fertiliser loss?

Fertiliser P can be fully or partly water-soluble, and can be lost in surface runoff, or as subsurface flow (leaching), when water moves into and across the soil or leaches down through the soil.

Fertiliser P can be lost in both a solid and dissolved form. Solid P loss occurs mainly due to erosion, and slope and other factors affect its movement to waterways. Dissolved P loss can occur when water-soluble P is present, and also depends on the soil's ability to retain P.

How much fertiliser P is lost?

With fertiliser good management practices (the four Rs), recently applied P fertiliser is responsible for less than 10% of farm P losses. If this advice is not followed, losses of 30–80% of P applied have been recorded.

Why does this matter?

Applying the right P fertiliser in the right places at the right time and rate can reduce losses.

Many farmers know the importance of reducing P losses from P fertiliser application to pasture. Phosphorus losses reduce nutrient use efficiency and profits, and can also impact waterways. For this reason, P losses are already regulated in many regions, and by 2026 are likely to be regulated across New Zealand.

Who's this factsheet for?

This factsheet is primarily for farmers, including those interested in front-footing P loss regulations.

What's this advice based on?

The information below is sourced from an Our Land and Water research paper:

Direct exports of phosphorus from fertilizers applied to grazed pastures

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Image: Paul Sutherland Photography