

FERTILISER FACT SHEET

Using test strips to fine-tune fertiliser recommendations

Fertiliser test strips are useful for determining the type and amount of fertiliser to apply to a paddock or zones within a paddock.

KEY POINTS

- Nitrogen (N) test strips are the most common test strips and these help growers decide on N top-up rates during the season
- For phosphorus (P) and other nutrients only applied at sowing, test strips can help gauge the rates needed for future crops
- Run the strips across different parts of the paddock which are representative of production zones used for pre-season soil testing
- Assess the strip's performance within each zone throughout the season, especially at the start of stem elongation
- Look for clear visual differences in growth between strips and consider taking plant tissue samples to quantify nutrient uptake
- If the crop responds to a high rate of N or sulfur (S) fertiliser (i.e. it is significantly better in the high rate compared to the grower rate), topping up that nutrient may boost crop performance. If plants in the high rate or half rate test strips are no better than the grower rate, fertiliser rate adjustment may be warranted, or another other factor may be limiting growth
- Harvest the strips separately and compare the yields to assess responsiveness and profitability
- Comparison of crop performance between treatments can help guide local critical soil test values and targets for future seasons

Photo: AgCommunicators



Fertiliser test strips are sections of a paddock set up to compare the impact of different rates of nutrient on crop growth and yield

Application rates can be estimated using the pre-season soil testing results from within paddock zones. Test strips can then verify the effectiveness of these rates and whether in-season applications of nitrogen are warranted.

What are fertiliser test strips?

Fertiliser test strips are sections of a paddock set up to compare the impact of different rates of nutrient on crop growth and yield. Often the fertiliser rate used in the paddock (referred to

as grower rate) is compared to a strip where the fertiliser is applied at a high rate, which is generally double the grower rate. If the grower is worried about over fertilising, they might also include another strip with either no nutrient applied (or close to nil), or about half the grower rate (referred to as a nil/low strip).

Test strips can be used for any nutrient. Nitrogen (N) test strips are the most common and help growers decide on the N top-up rates to use during the season.

Phosphorus (P), potassium (K), sulphur (S), copper (Cu) and boron (B) can also be tested where appropriate.

For nutrients only applied at sowing, such as P and granular trace elements (e.g. zinc and Cu), test strips can help gauge the effectiveness of seeding application, and the need for any adjustments for future crops.

The benefit of fertiliser test strips

If the crop responds to a high rate of fertiliser in that strip (i.e. it is significantly better than the grower rate), increasing the application rates of that nutrient may boost crop performance. If plants in the high rate or half rate test strips are no better than the grower rate, decreasing rates may be warranted. Growers should be aware that some factors other than nutrition may be limiting growth and responses to fertilisers, such as a soil constraint, weeds or diseases.

Comparing response to fertiliser strips between different zones in the paddock can help growers and advisers understand what is limiting crop growth and yield.

How to use fertiliser test strips

When and which nutrients?

Use fertiliser test strips at sowing for P, N, S, K and granular trace elements and during the season for N, S and foliar trace elements.

Where?

Run adjacent strips with different rates of fertiliser across representative parts of the paddock, crossing the zones which were used for pre-season soil testing. It is a good idea to put the strip in a place frequently driven past to keep an eye on any visual changes. Use a GPS to record the four corners of the strip, or a drum as a corner marker, or a sign on the fence to determine the location of the strips.

Ensure strips set up at seeding are wider than the harvester to avoid overlapping. Two or three seeder runs of the same treatment are recommended.

During the GRDC's *Soil and Plant Testing for Better Fertiliser Decisions* investment, growers applied fertiliser strips along the

length of the paddock, beginning 50 metres before the soil sampling zones identified during pre-season soil testing and finishing 50 metres after the zones.

What application rates?

An agronomist can help recommend the optimum fertiliser application rate for each nutrient from the soil test results. These are known as the **grower rate**, used in the bulk of the paddock.

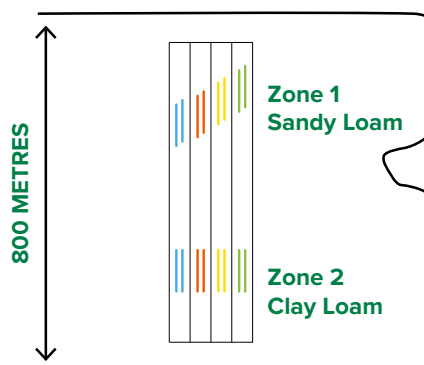
In one strip, apply more fertiliser than the grower rate, up to twice as much. This is known as the **high rate**.

In another strip, leave a **nil or half rate** strip to assess if the grower fertiliser rate is excessive.

It is ideal to vary one nutrient per test strip and to ensure that all other nutrients are not limiting.

When setting up the different P rates for the fertiliser test strips, most growers would do this using MAP or DAP fertiliser products as these are the most popular choices of starter fertiliser. Increasing or decreasing MAP (10% N) and DAP (18% N) rates will inevitably also change the supplied N rate, not just the P rate, so any crop growth response seen could be due to either the N or P. If P is the nutrient a producer is looking to target, then either the N rates will need to be adjusted to balance out the N supplied so it is the same for every strip or N will need to be supplied at a rate that is non-limiting as early in the season as possible to make sure the crop growth effect is due to P only.

Example of how to apply fertiliser test strips to a paddock

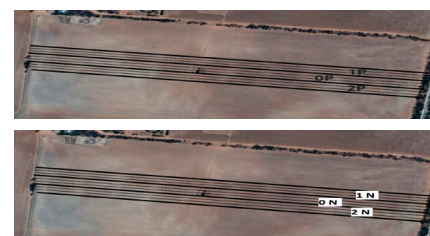


P rates kg/ha
 ■ 0P ■ 4.5P ■ 9P (paddock rate) ■ 18P
 Note these rates are indicative only and are based on the results of the soil test

How to apply

The type of fertiliser used in the strips should be the same as the rest of the paddock. When applying the fertiliser strips, use the same application technique and timing as the rest of the paddock.

Make the strip wide enough to ensure at least one full cut of the harvester is within the strip. This can usually be done by making each strip two or three seeder runs. This makes it easier to compare yield results and can be seen on a yield map. Most modern variable rate seeders can be pre-programmed to implement fertiliser strip trials automatically.



Nil or half rate, grower rate and high rate fertiliser strips of P and N applied in a paddock

What to look for in the test strip

Regularly assess the crop performance within each strip throughout the season, especially at the start of stem elongation.

When comparing strips, consider crop height and density, size and colour of plants, and evenness of the crop. Normalised difference vegetation index (NDVI) either from a drone or satellite can be used to get more quantitative comparisons.

Beware that a visual growth response may not reflect the final yield.

It can be very informative to collect plant samples from each strip and send these to a laboratory for nutrient analysis.

Agronomists can support growers to assess and measure the response of their fertiliser test strips as well as plant tissue analysis.

The strips should be regularly assessed throughout the year and observations recorded. Photos may be a useful for future reference.

Using test strip data for fertiliser decisions

The value of test strips can often be lost if yield data is not captured at harvest. Growers and advisers using test strips should discuss how to make sure all observations and information from the test strip is recorded.

Test strip yield data can be captured by using yield monitoring equipment on the harvester which can map yields, or harvesting with a small plot harvester, if available. Alternatively, hand harvesting

of several representative quadrats within each test strip can be used to measure total biomass and grain yields.

If possible, keep a sample of grain from the test strip within each zone for quality and nutrient testing, and use the results to calculate nutrient performance indicators. These indicators are used to assess how effective and efficient fertiliser applications have been.

Impacts on profitability can be calculated from any extra yield produced less the cost of the extra fertiliser. If crop performance at low rates was not

less than the grower rate or high rate, fertiliser savings may have been possible.

Consider the impact of the season, soil constraints and other crop management on the fertiliser responses. For example, if the season was not favourable and yield potential was low, then the nutrient demand by the crop was small and the nil or low strip may have performed no worse than the high rate. It would be unwise to cut fertiliser rates based on the results from a poor season.

USEFUL RESOURCES & REFERENCES

GRDC Communities Crop Nutrition, 'Showy test strip? You need more nutrients' [Showy test strip? You need more nutrients - Crop Nutrition | Crop Nutrition \(grdc.com.au\)](#)

GRDC Communities Crop Nutrition, 'Data gold from your test strip at harvest' [Data gold from your test strip at harvest - Crop Nutrition | Crop Nutrition \(grdc.com.au\)](#)

GRDC Project Soil and Plant Testing for Better Fertiliser Decisions, 'Establishing Test Strips – Video' [Establishing Test Strips - YouTube](#)

Hart Field-Site Group, '2020 Case Study and Grower Feedback: Economic gains through soil testing in the mid north' [HFDG2020_Soil_and_plant_testing_for_better_fertiliser_decisions.pdf \(hartfieldsite.org.au\)](#)

MORE INFORMATION

Sean Mason
0422 066 635
sean@agronomysolutions.com.au

Harm van Rees
0419 325 252
harm@cropfacts.com.au

Daniel Bell
0439 668 192
daniel.bell1@nutrien.com.au

GRDC RESEARCH CODE

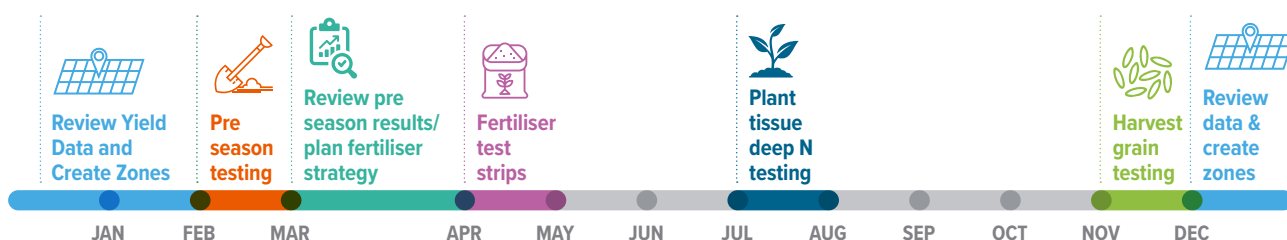
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SOIL AND PLANT TESTING STRATEGY



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