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## Using Fertiliser Test Strips on Pasture

Fertiliser test strips are a tool that can assist in determining the responsiveness of a pasture to applied nutrients. They are useful in certain situations or in combination with other tools.

### Introduction

A pasture's nutrient requirements should be assessed using a number of methods, including soil and plant tissue testing and visual paddock indicators.

Soil tests are a good tool for assessing the fertility levels of the major nutrients (Phosphorus, Potassium, and Sulphur) as well as soil characteristics, properties and structure. Tissue tests are the preferred method for testing the trace element status of the soil. Soil test strips are another tool that can provide a guide to the responsiveness of a pasture to nutrients, but they are not always effective.

Fertiliser test strips are basically a trial conducted in the paddock to see if there is any response to added nutrients or a combination of nutrients.

### Using Fertiliser test strips

Fertiliser test strips are useful for determining what nutrients to apply but are of no use in determining the appropriate application rate. Test strips may be used to check results of soil tests or as another way to test soil fertility and what may be restricting pasture growth if soil or tissue tests are not available. They may be of limited use on high-fertility pastures where there are no obvious nutrient limitations to plant growth. To determine the application rate, it is more important to prepare a nutrient budget based on soil tests and to evaluate the costs of nutrients.

Two ways to set up test strips are:

1. small hand-spread strips (e.g. 20 m x 2 m) or
2. longer machine-spread strips the length of a paddock

Whichever system is used, stock need to be kept off the fertilised strips for a period of time (at least four to eight weeks, depending on the season) to allow the effects of the fertilisers to show.

A 20 m x 2 m test strip is equal to 1/250th of a hectare. Therefore, to apply the equivalent of 250 kg/ha, you need to weigh out 1 kg of the product to be applied. Examples rates are given table 1 below.

Compared to machine-spread strips, small hand-spread strips are easier and less costly to set up and, provided they are around 20 m in length, will cover sufficient good and bad areas of pasture to allow a representative comparison to be made. Several sets of test strips may be needed around the farm to help in determining the final fertiliser strategy.

Machine-spread strips using a typical fertiliser spreader leaves denser fertiliser deposits in the centre of the spread row and becomes less dense towards the outer edges. Unless the paddock is severely lacking in a nutrient where a response will be obvious, a fertiliser deficiency may not be detected.

However, using a drop spreader which leaves definitive edges, will overcome this problem. In fact, very small drop spreaders, approximately 1 m width, are available and ideal for laying fertiliser strips.

### Site selection

Test strips are best sited towards the centre of a paddock or at least three metres from a fence line. Run the strips at right angles to the fence line ensuring they are up and down a slope, rather than across it. Fertility drift is usually towards the tops of slopes or towards gateways. Surface runoff immediately after topdressing can also shift fertiliser from one strip to another, thereby compounding results.

Choose an area that is typical of the paddocks soil and pasture type and, if possible, that has a responsive pasture (improved species) with some clover present. Avoid fence lines, trees, gates, stock troughs, sites from earlier silage and haystacks, old firebreaks, corners of paddocks, stock camps or poorly drained areas. Avoid high fertility areas such as hill tops and plantations.

Test strips will be of more use if they are put on an area that has not yet been top dressed that year. Alternatively, spread the strips after the paddock has been top dressed and evaluate the potential for additional response above what is to be gained from the paddock topdressing.

## The best time to set up a test strip

Strips can be set up at any time from March to the end of July, if the pasture is growing. The best time to set up strips is three to four weeks after the autumn break. By then it is possible to see if the proposed site is representative of the paddock and contains some clover.

## Creating a test strip treatment plan

Table 1 shows a set of typical fertiliser treatments with the amounts of fertiliser needed for 20 m x 2 m strips at the specified fertiliser application rates. These include the major nutrients plus some trace elements and are at high rates so any effect can be clearly seen. The treatments are designed to show a comparison to the control strip. For example if the strips with potassium (3, 5 and 6) show a response, this indicates that potassium is limiting pasture growth.

A suitable layout for this typical set of test strip treatments is shown in the site plan, Figure 1. Additional strips could be included to look at the responses to other fertiliser mixes, such as Super Potash 3 & 1, other trace elements, reactive rock phosphate, DAP, Urea or boosters.

Fowl manure, lime or nitrogen could be spread across all the treatments at either end of the strips to look at these responses. However, surface applied lime may not show a response for a year or two, except where the lime has triggered a molybdenum response. If you apply lime, always have a

molybdenum strip without lime applied somewhere on the site.

Alternative fertilisers can also be used in strips but should always be applied at the same rate as the other major nutrient(s) being tested such as phosphorus in single super. The other method is to apply the alternative fertiliser at their recommended rate and apply inorganic fertiliser at the same rate as that of the major nutrient(s) being applied by the alternative product. This will allow you to compare the different products on the same basis. Always compare costs per applied nutrient as well as noting the responses.

## Setting up the test strips

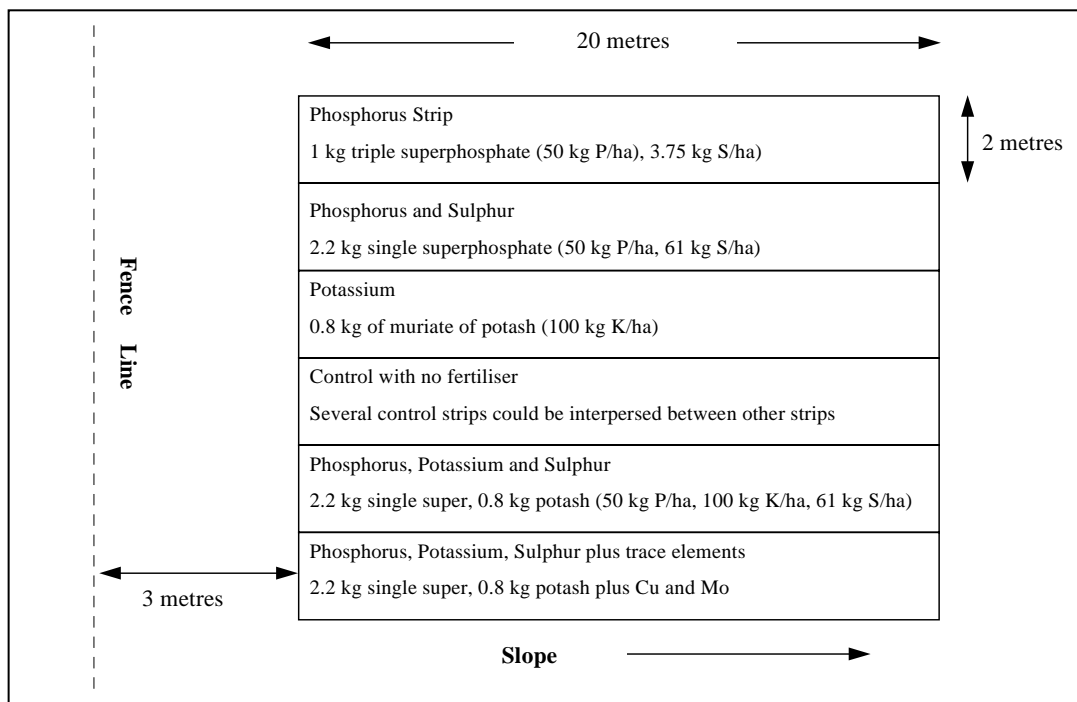
Measure out the 20 m x 2 m plots with a piece of string or tape measure, and mark the corners with semi-permanent wooden pegs or steel posts. These should be “cattle” proof, and if necessary, set below mower cutting height in case they are lost or forgotten. The edges of the strips should be marked out with string.

Draw a plan of the site, similar to Figure 1 below, and identify the strips by tagging the pegs before the fertiliser is spread.

When spreading the fertiliser, make sure it covers the entire width of the strip. After the fertiliser has been spread, the string can be removed and permanent pegs can be used to mark the corners of each strip.

*Table 1: Typical fertiliser strip treatments*

| Strip | Amount of Fertiliser/Plot   | Approximate Nutrient Rates/ha  | Equivalent Fertiliser Rate/ha   |
|-------|---|--|---|
| 1     | 1 kg triple superphosphate  | 50 kg phosphorus /ha and 3.75 kg sulphur/ha  | 250 kg/ha triple superphosphate   |
| 2     | 2.2 kg single superphosphate  | 50 kg phosphorus/ha and 61 kg sulphur/ha   | 555 kg/ha single superphosphate etc.  |
| 3     | 0.8 kg of muriate of potash   | 100 kg potassium/ha  | 200 kg/ha muriate of potash   |
| 4     | No fertiliser   | CONTROL with no fertiliser   |   |
| 5     | 2.2 kg single super plus 0.8 of muriate of potash                                 | 50 kg phosphorus /ha, 100 kg potassium/ha plus 61 kg sulphur/ha                    | 555 kg single superphosphate/ha plus 200 kg muriate of potash/ha                        |
| 6     | 2.2 kg single super plus 0.8 kg muriate of potash plus trace elements (Cu and Mo) | 50 kg phosphorus /ha, 100 kg potassium/ha plus 6 kg sulphur/ha plus trace elements | 555 kg single superphosphate/ha, 200 kg muriate of potash/ha plus 3 kg trace element/ha |



*Figure 1. Typical fertiliser test strip site plan*

### Weighing and spreading the fertiliser

Weigh the fertiliser treatments for each strip, and place them in labelled bags. Before you start spreading, place the bags of fertiliser on the marked-out strips, according to the site plan.

Mix the contents of the bag in a bucket before spreading. To get an even spread of fertiliser it is best to go over the plot two or three times, using one-half or one-third of the fertiliser each time. Walk along the strip and evenly spread the fertiliser by hand, right up to the edges of the strip.

Repeat going back the other way. Start off the spreading lightly so you don't run out before you reach the end of the strip. Avoid windy a day to avoid fertiliser drift onto the adjacent strip.

If you have small quantities of fertiliser or trace elements, mix them with washed sand or sawdust to increase the volume being spread to ensure a more even spread and to ensure it does not run out before the strip is covered.

### Assessment of the strips

The control (no fertiliser) strip is most important. Without this, it is impossible to compare treatments to determine whether the fertiliser has had any effect or not. Consider having more than one control strip.

When comparing the strips consider:

- Pasture height and density
- Size and colour of grass and clover leaves
- Botanical composition e.g. increased grass content versus weeds
- Evenness of pasture

On dryland pastures it is recommended that test strips be closed up when hay paddocks are normally shut up. There are two main reasons for this. Potential pasture growth then is high, giving the treatments the best chance of clearly showing their value. Secondly, where strips are not in hay paddocks it is easier to erect a fence that will keep stock off the strips in spring than in winter.

Strips should be inspected regularly after being closed up. The final assessment must be made before the grasses reach canopy closure or approaching the three green leaf stage, and if applied late in the season, before plants come into head. To see the effects of the fertiliser, it is important to keep stock off because they will preferentially eat the good strips where there is a response, giving the observer the incorrect answer for responses on the site.

It is also valuable to check the test strips in the following autumn approximately three weeks after the 'break'. This may

provide a guide to any longer term effects on pasture species and on plant growth response.

The strips can be inspected in the following years to observe carryover effects on pasture production and changes to botanical composition. The benefits of some fertilisers may not appear until the clover content of the pasture has increased, so sometimes responses are not evident until the second year. If the strips are to be observed in the second year, make sure that the test site is grazed down similarly to the rest of the paddock over summer. Remove the fences to allow better grazing and to reduce the likelihood of stock camping on the plots or over/under grazing them.

### Interpreting the results

If there are clear differences in pasture growth between strips, you will be able to assess which nutrient or nutrients your pastures require to improve production. A 20% or greater difference in growth rate can be visually detected, whereas a pasture meter can detect about a 10% difference.

If there is poor growth on all strips, it may be due to other factors, such as poor soil structure, soil acidity, plant diseases, pests, waterlogging, salinity or lack of productive (responsive) pasture species. A pasture containing say, 30 to 40% bent grass may have an organic mat which may 'tie up' nutrients

and prevent a response from showing. Usually these factors have all become evident before the test strips were even established.

Unfortunately research has shown that a nil response to fertiliser strips in soils of reasonable soil fertility, does not necessarily mean that no fertiliser is needed. The paddock may actually respond to fertiliser application.

A pasture's nutrient requirements should be assessed using a number of methods, including soil and plant tissue testing. Other tools such as visual paddock indicators and soil test strips are also useful indicators of nutrient requirements of pastures.

### Acknowledgements

This Agnote was developed by Peter Schroder January 1998 and titled - Using Test Strips to Help Plan Fertiliser Programs for Pastures

It was reviewed by Alex Goudy Farm Services Victoria, September 2008 and retitled – Using Fertiliser Test Strips on Pasture.

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