

Keeping the legume in mixed pastures with potassium

Mixed legume and grass pastures continue to form the basis of intensive grazing industries in Australia with the legume component providing the double benefit of improved feed quality and a source of nitrogen to the pasture system. As improved pastures age, the legume component becomes less prominent, with re-sowing necessary to return pasture composition to a more favourable balance. However, some factors can cause the legumes in a pasture to disappear faster than expected, a common culprit being a deficiency of potassium (K).

Grasses have a higher K concentration and are better at getting K than legumes

When grown alone both grasses and legumes can contain high concentrations of K in the herbage, however when grown together grasses (particularly perennial grasses) are much more efficient at accumulating K.

Surveys of mixed pastures, which have separated the grass and legume components for tissue analysis, have shown that grasses generally contain a higher K concentration than do legumes.

Several factors combine to result in the superior accumulation of K by grasses. The deeper and more dense root system of grasses is more effective at competing for scarce soil K resources. It has also been suggested that the root system of legumes tends to absorb calcium and magnesium in preference to potassium, whereas the reverse occurs with grasses.

Grasses need less soil K to produce well

Because of their inherent efficiency in extracting it, grasses require a lower soil K content for optimum production. For example, in Western Australia a series of field experiments showed that clover growth in mixed pastures responded to K fertiliser when soil test values were less than 80-100 mg/kg in the top 40cm. Grass growth, however, was only responsive where soil test values were less than 20-25 mg/kg in the top 40cm.

It is understandable that as a K deficiency develops, legumes are the first to display deficiency symptoms. Seed production of clover is also reduced when K is deficient and eventually the legume component of the pasture will decline.

Pasture growth responses to K depend on the ability of legumes to regenerate

In most cases growth responses in mixed pastures is due almost exclusively to an increase in the growth of the legume component. If seasonal conditions or a poor seed bank prevents the establishment of legume plants, responses to K fertiliser will be lower than expected.

For example, if a poor or false break to the season prevents the germination or establishment of clover seedlings, pastures may not respond to K fertilisers. Similarly, if years of poor clover growth have resulted in a sparse clover seed bank, pasture response will not be as marked as expected.

Adequate K + legumes = better feed quality

Plants have a much higher requirement for K than do grazing animals, in fact up to 90% of the K ingested by cattle is excreted in dung or urine. So a pasture K deficiency will not result in K deficiency in grazing animals. Correcting a K deficiency can, however, improve the feed quality characteristics of the pasture.

Improving the legume content of a mixed pasture will result in an increase in the protein

content of the herbage, and has been shown to increase the digestibility of sub clover. Some studies have also noted an improvement in the palatability, even of poorer grass species, where a K deficiency has been corrected.

Deciding if a pasture will benefit from K fertiliser

Soil and tissue testing are readily accessible tools for determining if a mixed pasture will respond to K application, but remember the test results are only as good as the sample that was taken. Because of the wide variability in K content of pastures mostly due to transfer by stock, a permanent transect sampling strategy may be more appropriate than taking random samples. This will also allow the comparison of soil test results taken over several years.

Where severe deficiency occurs, pasture appearance and individual plant symptoms will become apparent. Legume plants will be sparse and will display scorching or spotting on the margins of older leaves. Small patches of healthy clover plants may be associated with recent urine or dung deposits. However, by the time these visible symptoms appear, large losses in pasture productivity will already have occurred.

So keep an eye on the legumes in the mixed pastures in your region - they might be trying to tell you something!

Further Information

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