



Soil testing without labs



NZ farming is built on a pasture based system and each year farmers test their soils and herbage through the labs. They rely on these results to buy farms, make fertiliser decisions and establish grazing management. There is an opportunity to soil test without labs by looking at the pasture composition and performance.

Plants species and behaviours can give some fairly good ideas about what's going on. Sometimes before you do a lab test it is worth getting an idea of what you could be looking for. Does a certain weed tell you something about a nutrient level or the pH? Do clover leaves show a nutrient deficiency? You might even see something a lab test won't tell you. But as with all living systems, your conclusions should be made with caution and be followed up with further proof including in many circumstances, a lab test.

Weed presence

Weeds are often a symptom of poor conditions for crop or pasture growth and when the conditions are improved the desirable plants species might be able to out-compete the weeds. For example the presence of common daisy in pasture is often a sign of potassium deficiency (the daisy can still grow well in poor potassium conditions while other plants suffer more). Caution is warranted here because the daisy could in fact be more a symptom of overgrazing in the winter period (when daisies can establish better than many other plants). Another example is buttercup that performs better in wetter conditions. This may indicate either poor drainage or a paddock that has had treading damage.

More weeds and their potential significance are mentioned in the table below. Indicator plants can be very useful but you need to keep in mind that the pasture plant composition is affected by more than just soil nutrients. Other factors include soil structure, soil moisture levels and grazing/cultivation management.

| Weed Species | Possible Soil Implications | Other Possible Reasons |
|---------------------------|--|---|
| Annual Meadow Grass (Poa) | High N (if urine scorch present from high protein) | Quickly taking advantage of bare patches from dry conditions or pugging |
| Barley Grass | High N | Dry conditions, disturbed areas e.g. stock camps, tracks, overgrazing in summer or autumn |
| Browntop | Low pH, Low Nitrogen, Low Phosphorus, Low Potassium, Low Molybdenum, low fertility generally | Under-grazing, spread by cultivation and by late hay cuts |
| Californian thistle | Low N, moderate fertility generally | Under grazing in summer, over grazing in winter |
| Cats ear | Low K, Low P, Low fertility generally | Overgrazing, frequent hay cutting, insect damaged pasture |
| Chickweed | High fertility, though low fertility if this has caused bare patches | Quickly taking advantage of bare patches, relatively dry conditions, well aerated |
| Couch or Twitch | Low soil biological activity, Low Ca, High N | Overgrazing in summer, under-grazing in autumn, hay cutting |
| Creeping Buttercup | Poor drainage, Low N | Horse grazing |
| Daisy | Low Potassium, low fertility generally, poor drainage | Overgrazing in winter |
| Dandelion | Low fertility generally (but not always an undesirable plant), friable | Overgrazing, cold winters |
| Dock | Poor Drainage, Compaction, Acid Soil, High Nitrogen | excessive trampling, preferential grazing (esp. cattle not eating it), short term pastures cut for silage, seed spread from effluent applications or infested hay |
| Fathen | High N, friable | Dry conditions, bare patches |
| Rushes | Poor drainage, Low pH | Pugging, wet conditions |
| Sheep Sorrel | Low pH, Low fertility generally | Overgrazing in summer, hay cutting, over-cropping |
| Stinging Nettle | High N, friable | Recently disturbed fallow ground |
| Sweet Vernal | Low Potassium, Low fertility generally, Low friability | Unimproved, declining pastures |
| Yorkshire Fog | Low N, Low pH, Low fertility generally | Under-grazing |

Patchiness of pasture

Aside from insect attack there can be a number of reasons for patchiness of pasture. If clumps of lush pasture are present in otherwise poor performing pasture this can be due to urine patches. If the urine patches contain good clover growth with more weedy growth elsewhere, suspect potassium deficiency, or it could be poor nodulation of clover in which case suspect nitrogen deficiency.



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Large areas of weedy annual grasses such as brome, sweet vernal and barley grass could be symptomatic of low soil fertility, availability of phosphorus, potassium or molybdenum (resulting in poor clover levels which fail to drive good pasture). Browntop and sheep sorrel may both be symptoms of similar conditions and quite often of low pH. Dock can also be a symptom of low pH but it is also a potential sign of poor drainage or soil compaction. Some of these weeds can also be a reflection of the animal browsing patterns.

Lack of clover

A general lack of clover can be due a large number of reasons including nutrient deficiency, grazing management, pugging and treading damage, compaction etc.

Confirming observations

If visual observations show irregularities then these results should be confirmed. Soil tests could be used by comparing one area performing well and the area with an observed problem to see if it confirms visual observations before spending too much on one particular fertiliser.

A clover-only herbage test is a good way of getting further confirmation on nutritional deficiencies that are holding back clover and whole pastures. Select only clover that shows the symptoms of the problems rather than healthy looking clover that may be present in patches. With crops compare samples from good areas with poor areas of the same crop. In most cases there are big differences in nutrient levels according to time of year and age of plant as well as the type of leaves sampled. Hence it is important to follow lab instructions precisely if relying on lab recommended values.

Another method of confirming an observation is to actually apply the deficient element. This can be done by treating a strip and looking for a visual response compared to the surrounding untreated area. The experiment needs to be replicated to confirm the result.

Visual observations are an effective way of getting a handle on the nutrient status of your soils and pastures. Any observations should be confirmed with soil or herbage testing, undertaking on the ground element trials, and/or visual soil assessment before recommending fertilisers.

Want to know more, email LandVision at landvision@gmail.com. LandVision acknowledges the work of Dr Tim Jenkins, Biological Husbandry Unit of Lincoln University when preparing this column.