

VISUAL INDICATORS OF SOIL CONDITION

Online Edition

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PADDOCK SCALE OBSERVATIONS

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PLANT & SOIL SCALE OBSERVATIONS

CLICK TO OPEN

1



Dark green patches with greater growth of grass or clover, paler green in other areas.

Increased or fast pasture growth surrounding manure pats, shorter paler green growth elsewhere.

Observed: Late winter to early spring

WHAT COULD THIS INDICATE?

2



Yellowing or pale green colour in pastures.

Observed: Late winter to spring

WHAT COULD THIS INDICATE?

3



Grass dominant pasture with little or no legume and slow growth.

Observed: Late winter to mid spring

WHAT COULD THIS INDICATE?

4



Increased growth and high fertility indicator weeds growing on stock camps.

Observed: During the growing season

WHAT COULD THIS INDICATE?

5



Areas that stay green during summer but have reduced growth. Bare patches remain damp and white salt crystals may be visible on soil surface.

Different plants growing to the rest of the paddock.

Observed: Late spring

WHAT COULD THIS INDICATE?

6



Lucerne stunting or patchy poor growth following establishment.

Observed: First 3-4 months of establishment

WHAT COULD THIS INDICATE?

1



Small, stunted or dark green leaves on sub-clover plants.

Observed: Early spring

WHAT COULD THIS INDICATE?

2



Bronzing of sub-clover leaf margins which develop into pale grey spots.

Observed: Late winter to early spring



WHAT COULD THIS INDICATE?

3



Stunted sub-clover plants, usually pale green in colour.

Rapid death of sub-clover plants.

Observed: Autumn and winter

WHAT COULD THIS INDICATE?

4



Few or whitish nodules on legume roots.

Observed: 12 weeks post-germination

WHAT COULD THIS INDICATE?

5



Soil disturbance with lots of soil crumbs on the surface.

Observed: Moist soil in winter and spring

WHAT COULD THIS INDICATE?

6



Milky tea coloured water on soil surface (left).

Observed: After rain



Soils form surface crust and set hard when dry (below).

Observed: Once soil is dry

WHAT COULD THIS INDICATE?

1



What do you see & when?

Dark green patches with greater growth of grass or clover, paler green in other areas.

Increased or fast pasture growth surrounding manure pats, shorter paler green growth elsewhere.

Observed:

Late winter to early spring

What could this indicate?

Pale green areas deficient in nitrogen, potassium, phosphorus or sulphur.

Dark green areas are urine patches or manure. Urine contains high levels of nitrogen and potassium and some sulphur. Dung-affected areas also

contain phosphorus.

Selective grazing – Stock avoid pasture near dung while odour remains (up to 3 months).

What tests can I do to confirm?

- Soil testing with reference to potassium, nitrogen and sulphur. Avoid sampling the dark green areas.
- Test strips of potassium, nitrogen and sulphur fertiliser.

Pictured: Nitrogen response (left) with 25kg/ha applied in May.

Photo Lisa Warn Ag Consulting



2



What do you see & when?

Yellowing or pale green colour in pastures.

Observed:

Late winter to spring

What could this indicate?

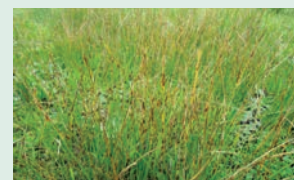
Deficiency in potassium, nitrogen or sulphur or trace elements.

Waterlogging, resulting in transient nitrogen loss.

Maturing/flowering winter grass (*Poa annua*)

Dying plants caused by red-headed cockchafer pruning plant roots.

*Pictured: Winter grass (above) and Onion grass (*Romulea rosea*) (below) infected with yellow brown spots caused by *Helminthosporium fungus*.*



What tests can I do to confirm?

- Soil test, with reference to phosphorus, potassium and sulphur. Tissue test for micronutrients, with attention to molybdenum.
- Abundance of low fertility weeds and absence of high fertility weeds.
- Test strips of nitrogen and / or potassium, sulphur and molybdenum fertiliser.

Pictured: Potassium response in test strip.



3



What do you see & when?

Grass dominant pasture with little or no legume and slow growth.

Observed:

Late winter to mid spring

What could this indicate?

Possible phosphorus or molybdenum deficiency

Low soil pH (soil acidity)

Inappropriate sub-clover management, such as leaving too

much dry material at the autumn break, long rotations encouraging grass dominance or cutting hay in later maturing clovers.

What tests can I do to confirm?

- Soil test, with reference to phosphorus, pH and aluminium.
- Plant tissue test for molybdenum.
- The dry material litter test in late summer/early autumn.

Pictured: Amount of loose litter in late summer. Ideally one to two handfuls in 0.1m² quadrat promotes hard seed breakdown of sub-clover.



4



What do you see & when?

Increased growth and high fertility indicator weeds growing on stock camps.

Observed:

During the growing season

What could this indicate?

High soil fertility

Stock empty out dung and urine, so nutrients concentrate.

Bare ground at autumn or overgrazing

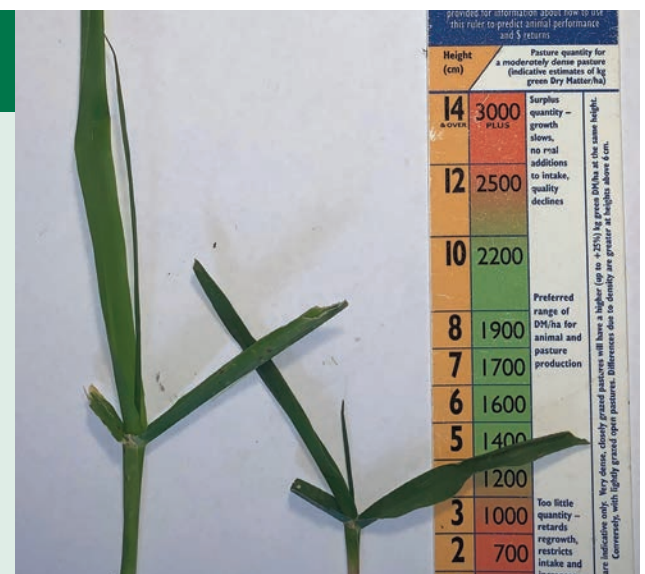
Pictured: Bare ground at autumn and false breaks can favour capeweed growth.



What tests can I do to confirm?

- Identify if weeds growing on camp area thrive under high fertility.
- Compare size of fully-emerged leaf blades of the same grass species from the stock camp to the rest of paddock.

Pictured: Larger yet same number of leaves (right) due to higher fertility.



5



What do you see & when?

Areas that stay green during summer but have reduced growth. Bare patches remain damp and white salt crystals may be visible on soil surface.

Different plants growing to the rest of the paddock.

Observed: Late spring

What could this indicate?

Salinity

Caused by a salty water table less than two metres from the soil surface.

Freshwater spring

What tests can I do to confirm?

- Soil test with reference to electrical conductivity (EC).
- Identification of individual plant species to confirm their salt tolerance.

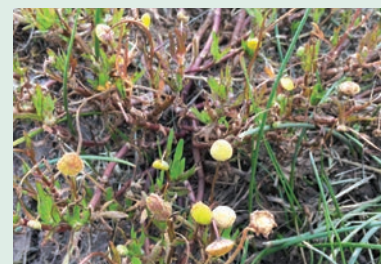
Pictured: Examples of salinity indicator plants.



Buckshorn plantain
(*Plantago coronopus*)



Sea barley grass
(*Hordeum marinum*)



Yellow buttons
(*Cotula coronopifolia*)

6



What do you see & when?

Lucerne stunting or patchy poor growth following establishment.

Observed:

First 3-4 months of establishment

Photo Malcolm McCaskill, Agriculture Victoria

What could this indicate?

Soil acidity with associated high soil aluminium

This affects root growth, causing stunting, sideways growth of roots and plant loss.

Waterlogging may cause a similar effect.

Pictured: Stunted lucerne with J-shaped roots from poor growth patches (left) compared to healthy plants.

Photo Neil James, Agriculture Victoria



What tests can I do to confirm?

- Soil test, with reference to pH and aluminium at 0-10, 10-20 and 20-30cm to detect top and sub soil acidity.

Pictured: Soil pH tested along 30cm soil core using pH kit available from hardware stores or nurseries.



1



What do you see & when?

Small, stunted or dark green leaves on sub-clover plants.

Observed:

Early spring when clover is adequately growing

What could this indicate?

Phosphorus deficiency

Only when phosphorus deficiency is extreme do leaf symptoms appear. Slow and poor growth of pasture occurs from “Hidden hunger” of all

nutrients before appearance of leaf symptoms.

Sub-clover leaves with adequate fertility should be the size of a 20 cent piece.

What tests can I do to confirm?

- Soil test with reference to phosphorus.
- Test strips of phosphorus fertiliser.

Pictured: Hand-operated soil sampler.



2



Photo James Easton, CSBP



Photo Department of Agriculture, Fisheries and Forestry

What do you see & when?

Bronzing of sub-clover leaf margins which develop into pale grey spots.

Observed:

Late winter to early spring

Pictured left: Sub-clover plants with symptom progression

What could this indicate?

Potassium deficiency

Avoid confusion with red-legged earth mite feeding damage, which occurs randomly across the leaves (pictured).



What tests can I do to confirm?

- Soil test with reference to potassium.
- Test strips of potassium fertiliser.

Pictured: Potassium response in test strip.



3



Photo Sue Briggs, CSBP

What do you see & when?

Stunted sub-clover plants, usually pale green in colour.

Rapid death of sub-clover plants.

Observed:

Autumn and winter

What could this indicate?

Soil acidity and associated high soil aluminium

Soil borne diseases – caused by four main pathogens (*Phytophthora*, *Pythium*, *Aphanomyces*, *Rhizoctonia*).

Pictured from left: Sub-clover with relatively healthy roots; diseased plant with root branch pruning (commonly seen symptom); extreme diseased roots with tap root pruning and brown lesions on roots.

Photos Richard Simpson, CSIRO



What tests can I do to confirm?

- Soil test, with reference to pH and aluminium.
- Test strips with lime. (Lime responses are often not seen in first year.)
- Inspect roots. Hostile soil conditions will result in stunted roots.
- Diseased roots are commonly yellow with reduced or pruned branches and may have brown/black lesions.
- Test strips of foliar fungicide.
- Predicta B to identify any pathogens.

4



Photo Jo Powell, NSW LSS

What do you see & when?

Few or whitish nodules on legume roots.

Observed:

12 weeks post-germination

What could this indicate?

Inadequate nodulation – there could be many reasons for this, including:

- Soil acidity and high soil aluminium.
- Insufficient rhizobia in the soil as a result of cropping for many years.
- Residual herbicide damage.
- Molybdenum deficiency.
- Sulphur deficiency.

Pictured: Healthy pink nodules.



What tests can I do to confirm?

- Inspect nodules. Look for many big pinkish coloured nodules rather than small white nodules.
- Conduct nodulation score.
- Examine cropping history as soil rhizobia declines after three years without a host.
- Tissue test clover leaves with reference to molybdenum.
- Test strips of sulphur and molybdenum fertiliser.

5



What do you see & when?

Soil disturbance with lots of soil crumbs on the surface.

Observed:

Moist soil in winter and spring

What could this indicate?

Earthworms

The disturbed soil is excreted waste called casts.

Avoid confusion with blackheaded cockchafer which form mounded tunnels.



What tests can I do to confirm?

- Dig up the soil and check for earthworms.

Pictured: Earthworms in soil clod eating decayed roots and microorganisms.



6



What do you see & when?

Milky tea coloured water on soil surface (left).

Observed: After rain

Soils form surface crust and set hard when dry (below).

Observed: Once soil is dry

What could this indicate?

Soil dispersion – Individual clay particles separate from one another when soil becomes wet due to excessive sodium and insufficient organic matter binding the soil together.

Slaking – Soil crumbs break apart when wet due to low organic matter which results in surface crusting. Often seen around gateways.

Pictured: Cloudy water indicating dispersion of soil crumbs; collapsed crumbs indicating slaking.



What tests can I do to confirm?

- Soil test with reference to the amount and proportion of sodium compared to calcium, potassium and magnesium.
- An aggregate stability test. This involves placing small soil crumbs (sized about 5-10mm) into a dish with distilled water and observing their reaction over time.