Crop Guide KB Item 3507v5

White Clover

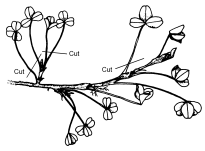
Sampling Notes

White clover is vitally important to New Zealand pastures. It is the principal source of nitrogen for all pasture species, as well as being a major pasture constituent with a high feed value.

Soil test information is supplied here for establishment of White Clover Seed crop.

For further information on pasture testing, including soil testing and interpretation, refer to the Crop Guides for "Ryegrass" and "Mixed Pasture". An overview is also provided in the Technical Note "Sampling Options for Pastoral Farms" (KBI 3187).

Leaf



Sampling Time: At a vegetative growth stage. Usually late spring/early summer, or in autumn.

Plant Part Leaves plus petiole.

Collect From: Areas showing poor or stunted growth.

Quantity per Sample: 50 leaves.

Recommended Tests: Basic Plant (BP), Molybdenum (Mo).

Comments: Clover tissue testing is perhaps the most powerful tool available to diagnose nutrient deficiencies in pasture.

Being a legume, white clover can support nitrogen fixing bacteria in nodules on its roots. This is the principal source of nitrogen for pasture, and it is important that the clover has an adequate supply of all essential nutrients to support this function.

Clover is not as efficient at harvesting soil nutrients as grasses, and is therefore more likely to develop nutrient deficiencies (with the exception of nitrogen). Once clover is affected, nitrogen fixation is impaired and overall pasture production is reduced.

Concentrating specifically on the nutrient requirements of the clover plant thereby ensures that nitrogen fixation can occur, and that optimum pasture production is maintained.

Clover only samples are normally taken when an area is suspected not to be growing to its full potential, and a visual assessment shows poor clover vigour.

White clover should be sampled as a single species, and the sample collected specifically from the area that is performing badly. Remember that the purpose is to diagnose why the plants are performing poorly. It is pointless to sample vigorous plants from alongside dung or urine patches. Plants affected should show clearly the nutrient deficiencies from the chemical analysis.

Avoid sampling when clover is under drought stress or flowering.

Soil

Sampling Time: Prior to crop establishment.

Core Depth 15cm

Collect From: Random sites throughout the sampling area.

Quantity per Sample: 12-20.

Recommended Tests: Basic Soil (BS), Sulphur profile (S), Available Nitrogen (AN)

Comments: Soil samples are usually collected for analysis prior to planting the crop.

If trying to diagnose a problem with crop growth and yield, samples should be collected from the rooting zones of the worst affected areas. In these circumstances, a second sample taken for comparative purposes from the rooting zones of normal areas may be useful.

Comments

Probable deficiencies in clover (in order of likely occurrence) are: phosphorus, sulphur, potassium, molybdenum and boron. Phosphorus deficiencies are not always readily diagnosed from a tissue analysis, as it may manifest itself as poor growth in the plant with only a small drop in the tissue phosphorus concentration.

Phosphorus is an important nutrient for the development of a vigorous root system, and a phosphorus deficiency may affect the plant's uptake of other nutrients. Consequently, a phosphorus deficient plant may show a number of other apparent deficiencies, but in correcting the principal phosphorus deficiency, the other nutrient problems may disappear.

As many nutrient levels are interdependent, nutrient ratios are very useful in diagnosing problems. The N/P and N/S ratios will indicate whether the phosphorus and sulphur levels are adequate for the nitrogen status of the plant.

An interaction also exists between potassium and sodium. High potassium levels suppress sodium uptake, whereas low potassium levels will enhance sodium uptake. Clover samples with high sodium levels (greater than 0.50%) therefore are probably deficient in potassium. Interpreting sodium in this way can assist in assessing the potassium status, as sodium is not an essential element for plant growth.

Molybdenum and nitrogen levels together provide the best indication of molybdenum deficiency. If the molybdenum and nitrogen levels are both low, this would indicate the low molybdenum status is adversely affecting nitrogen fixation. A low molybdenum but adequate nitrogen level would suggest there is sufficient molybdenum available.

As for all plant analyses, a very low level of a particular nutrient may not necessarily mean that this nutrient is deficient in the soil. Other non-nutritional factors may be the cause of the plant ill-thrift, e.g. low soil temperature or drought stress, particularly for boron. Soil tests should therefore be performed in conjunction with the plant analyses to help elucidate the cause of the problem.

References

McNaught, K.J. 1970. Proceedings of the XI international grassland conference. p334.

Cornforth, I.S. and Sinclair, A.G. 1984. Fertiliser recommendations for pastures and crops in New Zealand. MAF Publication, Wellington.

Blackmore, L.C; Searle, P.L and Daly, B.K. 1987. Methods for chemical analysis of soils. NZ Soil Bureau Scientific Report 80. NZ Soil Bureau, DSIR.

Weir, R.G. and Cresswell, G.C. 1995. Plant nutrient disorders 4. Pastures and field crops. Inkata Press.

Disclaimer

Normal Range levels shown as histograms in test reports relate specifically to the sampling procedure provided in this crop guide. The Normal Range levels in test reports and Comments provided in this Crop Guide are the most up to date available, but may be altered without notification. Such alterations are implemented immediately in the laboratory histogram reports. It is recommended that a consultant or crop specialist be involved with interpretations and recommendations.