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## Sampling

Plant growth stage has a major influence on the nutrient levels in the tissue. Two distinct growth stages are specified for sample collection; neither preferred over the other, though each is useful for a specific purpose.

### Leaf - Late Tiller

**Sampling Time:** When the leaves have formed, and the leaf-sheaths are lengthening and becoming erect. Just prior to stem extension.

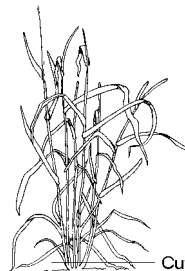
**Plant Part:** Whole above portion of the plant.

**Collect From:** Random sites throughout the sampling area.

**Quantity per Sample:** 30 to 40 plants.

**Recommended Tests:** Basic Plant (BP).

**Comments:** The advantage of sampling at this early stage is that there may be time to correct nutrient disorders observed in the current crop.



### Leaf - Ear Emergence

**Sampling Time:** When stem extension is complete and the head of the ear emerges from the boot.

**Plant Part:** Whole above portion of the plant.

**Collect From:** Random sites throughout the sampling area.

**Quantity per Sample:** 20 to 30 plants.

**Recommended Tests:** Basic Plant (BP).

**Comments:** Testing at this later stage will indicate more accurately whether the crop was adequately supplied with the required nutrients.



### Soil

**Sampling Time:** Prior to crop establishment.

**Core Depth:** 15 cm.

**Collect From:** Random sites throughout the sampling area.

**Quantity per Sample:** 12 - 20 cores.

**Recommended Tests:** Basic Soil (BS).

**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.

## Interpretation

Interpretation of the laboratory's results is possible by comparison with normal levels expected for the crop in question. The interpretation given here are based on the best information available and relate specifically to the sampling instructions given.

### Leaf - Late Tiller

Element	Unit	Normal Range
Nitrogen	(%)	2.5 - 5.0
Phosphorus	(%)	0.30 - 0.60
Potassium	(%)	3.0 - 5.8
Sulphur	(%)	0.30 - 0.45
Calcium	(%)	0.30 - 1.00
Magnesium	(%)	0.12 - 0.30
Sodium	(%)	0.00 - 0.10
Iron	(ug/g)	50 - 150
Manganese	(ug/g)	30 - 100
Zinc	(ug/g)	20 - 70
Copper	(ug/g)	6 - 15
Boron	(ug/g)	5 - 15

### Leaf - Ear Emergence

Element	Unit	Normal Range
Nitrogen	(%)	2.0 - 3.0
Phosphorus	(%)	0.20 - 0.50
Potassium	(%)	1.5 - 3.0
Sulphur	(%)	0.15 - 0.40
Calcium	(%)	0.20 - 1.20
Magnesium	(%)	0.15 - 0.50
Sodium	(%)	0.00 - 0.10
Iron	(ug/g)	25 - 150
Manganese	(ug/g)	25 - 100
Zinc	(ug/g)	15 - 70
Copper	(ug/g)	5 - 25
Boron	(ug/g)	5 - 10

### Soil

Element	Unit	Normal Range
pH	-	5.5 - 6.4
Olsen P	(ug/ml)	20 - 30
Potassium	(me/100g)	0.50 - 0.80
Calcium	(me/100g)	5.0 - 12.0
Magnesium	(me/100g)	0.80 - 3.00
Sodium	(me/100g)	0.00 - 0.50
CEC	(me/100g)	12.0 - 25.0
Volume Weight	(g/ml)	0.60 - 1.00

#### Comments:

Small grain production and quality are greatly influenced by fertilisation.

Nitrogen has been found to be the most important fertiliser element in New Zealand cereal crops. Significant responses to potassium, sulphur or magnesium have also been recorded.

Different cultivars have been found to have some differences in nutrient concentrations; however, these differences are relatively small, and one set of interpretation criteria can be used.

Improper growth stage identification can result in errors in interpretation. Nutrient uptake precedes dry matter accumulation occurring between tillering and head emergence. Consequently, nutrient concentrations generally decline between these stages.

Diagnosis of sulphur deficiency can be assisted by using the N:S ratio. A sulphur deficiency may exist when the N:S ratio is greater than 16:1. Severe deficiency is likely when the ratio is greater than 20:1.

#### References

- Reuter, D. J. and Robinson, J. B. (Eds) 1997. Plant analysis. An interpretation manual. Second edition.
- 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.
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- Ward, R.C.; Whitney, D.A. and Westfall, D.G. 1973. Plant analysis as an aid in fertilising small grains. Soil testing and plant analysis.
- Jones Jr, J.B 1967. Soil testing and plant analysis. Part 2. SSSA Special Publication Series, p 49-58.

#### Disclaimer:

Normal Range levels quotes relate specifically to the sampling procedure given. The Normal Range levels and Comments provided are the most up to date levels 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.