




## Sampling Notes


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.

Ranges are also available for wholecrop cereal forage (milky ripe stage) for animal feed value.

### Leaf - Ear Emergence

<b>Sampling Time:</b>	When stem extension is complete and the head of the ear emerges from the boot.	
<b>Plant Part</b>	Whole above portion of the plant.	
<b>Collect From:</b>	Random sites throughout the sampling area.	
<b>Quantity per Sample:</b>	20 to 30 plants.	
<b>Recommended Tests:</b>	Basic Plant (BP).	
<b>Comments:</b>	Testing at this later stage will indicate more accurately whether the crop was adequately supplied with the required nutrients.	

### Leaf - Late Tiller

<b>Sampling Time:</b>	When the leaves have formed, and the leaf-sheaths are lengthening and becoming erect. Just prior to stem extension.	
<b>Plant Part</b>	Whole above portion of the plant.	
<b>Collect From:</b>	Random sites throughout the sampling area.	
<b>Quantity per Sample:</b>	30 to 40 plants.	
<b>Recommended Tests:</b>	Basic Plant (BP).	
<b>Comments:</b>	The advantage of sampling at this early stage is that there may be time to correct nutrient disorders observed in the current crop.	

### Soil

<b>Sampling Time:</b>	Prior to crop establishment
<b>Core Depth</b>	15cm
<b>Collect From:</b>	Random sites throughout the sampling area
<b>Quantity per Sample:</b>	12 - 20 cores
<b>Recommended Tests:</b>	Basic Soil (BS), Sulphate Sulphur (SO <sub>4</sub> ), Available Nitrogen (AN)
<b>Comments:</b>	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 is based on the best information available and relate specifically to the sampling instructions given.

Leaf - Ear Emergence			Leaf - Late Tiller			Soil		
Analyte	Unit	Range	Analyte	Unit	Range	Analyte	Unit	Range
Nitrogen	%	2.0 - 3.0	Nitrogen	%	2.5 - 5.0	pH	pH	5.7 - 6.2
Phosphorus	%	0.20 - 0.50	Phosphorus	%	0.30 - 0.60	Olsen Phosphorus	mg/L	20 - 30
Potassium	%	1.5 - 3.0	Potassium	%	3.0 - 5.8	Potassium	me/100	0.30 - 0.60
Sulphur	%	0.15 - 0.40	Sulphur	%	0.30 - 0.45	Calcium	me/100	5.0 - 12
Calcium	%	0.20 - 1.2	Calcium	%	0.30 - 1.0	Magnesium	me/100	0.60 - 1.2
Magnesium	%	0.15 - 0.50	Magnesium	%	0.12 - 0.30	Sodium	me/100	0.0 - 0.50
Sodium	%	0.0 - 0.10	Sodium	%	0.0 - 0.10	CEC	me/100	12 - 25
Iron	mg/kg	25 - 150	Iron	mg/kg	50 - 150	Volume Weight	g/mL	0.60 - 1.0
Manganese	mg/kg	25 - 100	Manganese	mg/kg	30 - 100	Sulphate Sulphur	mg/kg	10 - 15
Zinc	mg/kg	15 - 70	Zinc	mg/kg	20 - 70	Available Nitrogen	kg/ha	100 - 150
Copper	mg/kg	5.0 - 25	Copper	mg/kg	6.0 - 15			
Boron	mg/kg	5.0 - 10	Boron	mg/kg	5.0 - 15			

## 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 in the leaf. 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

- Jones Jr, J.B 1967. Soil testing and plant analysis. Part 2. SSSA Special Publication Series, p 49-58.  
 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.  
 Lockman, R.B. 1969. Agronomy Abstracts, American Society of Agronomy, Wisconsin, pg 97.  
 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.  
 Reuter, D. J. and Robinson, J. B. (Eds) 1997. Plant analysis. An interpretation manual. Second edition.

## Disclaimer

Normal Range levels quoted 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.