

Monday 15 June

FOR IMMEDIATE RELEASE

To dress or not to dress

The recent rainfall (25 – 50mm) received across the Wimmera Mallee is a positive start to the 2009 growing season and no doubt farmers will be thinking about bigger yield potentials. While the rain was needed and most welcome, it is important to keep it in perspective when determining further inputs, particularly nitrogen (N). Top dressing N can have both positive and negative financial consequences for farm businesses. Therefore, it is important to carefully consider the situation before rushing nitrogen input decisions.

Calculating N requirements

So how do we determine if our wheat crop needs additional N and more importantly how much it needs?

Estimating potential yield

The first step is to calculate the potential yield of a crop. As crop yields are closely related to the amount of rainfall and consequently soil water available for plant growth, yields can be estimated using the following equation:

Potential yield = (GSR – evaporation + available soil water at the start of the growing season) × WUE.

Where:

- WUE (Water Use Efficiency) is the amount of grain that a particular crop has the potential to produce for each mm of available soil water (Table 1).
- GSR (Growing Season Rainfall)— the long-term average (April – Oct).
- Evaporation is the amount of water that is lost from the soil surface over the growing season due to surface evaporation (Table 1).
- Available soil water is the amount of plant available water present in the crop rooting zone of the soil when the crop was sown.

Fortunately many years of research have identified the WUE and evaporation values for our major crops and these are listed in Table 1.

Available soil water values can be determined via a soil test at the start of the season or, if no soil test was undertaken, an estimation may have to be made. Below is an example of how this calculation is completed.

Example: 230mm (predicted growing season rain) – 110 (evap for wheat) + 30mm (available water at seeding) × 0.018 t/ha/mm (WUE for wheat) = 2.7 t/ha

Table 1: Water use efficiency and evaporation values for the major crops of the Wimmera Mallee region

Crop	Water Use Efficiency (WUE) t/ha/mm	Evaporation mm
Wheat	.015 – .018	110
Barley	.018 – .020	90
Canola	.010	110

Estimating nitrogen needed using potential yield

To produce each tonne per ha of grain yield, barley and wheat require 40kgN/ha while canola needs 80kgN/ha. Therefore, to calculate crop demand for N, we need to multiply our potential yield × N demand.

Example: 2.7t/ha × 40kgN/ha = 108kg N/ha

Calculation of soil nitrogen

The next step is to work out how much N is available in the soil and therefore how much fertiliser is required to meet crop demand. To do this you can use the soil nitrate figure from your soil test results in the following equation

Available soil N in kg/ha = nitrate (mg/kg) × bulk density of soil (g/cm³) × test depth/10

Example: 5 (soil test nitrate value) × 1.3 (fine sand) × 60(test depth)/10 = 39kg N/ha

Soil bulk density values are known for various soil types and are presented in Table 2. Test depth is the depth of the soil sampling (usually 60cm but can vary so check you soil test).

Table 2: Soil Texture Characteristics: (From: Better Soils (www.bettersoils.com.au), Soil Matters (APSRU), Booklet: Nitrogen Management for Wheat and Malting Barley)

Soil texture	Bulk density (g/cm ³)
Coarse sand	1.3 – 1.8
Fine sand	1.3
Light sandy clay loam	1.3 – 1.6
Loam	1.1 – 1.4
Sandy clay loam	1.3 – 1.6
Clay loam	1.3 – 1.6
Clay	1.3 – 1.5
Self mulching clay	1.2 – 1.3

Calculating mineralised N

It is important to remember that some mineralisation of N will occur during the growing season. This additional available N needs to be added to the equation. Mineralisation is calculated using the following formula:

Mineralised N = 0.15 (this figure is constant) × GSR × organic carbon %

Organic carbon can be measured in a soil test. If a soil test value isn't available 0.5 – 1% can be used and adjusted according to stubble and soil type.

Example: $0.15 \times 230\text{mm} \times 1\% = 34.5\text{kg N/ha}$

Adding already applied N

Many farmers may have already applied N at the start of the growing season. This also needs to be taken into account.

Example:

Applied fertiliser: 40kg MAP = 4kg N/ha

Total available N in the soil = available soil N + mineralised N + applied N

$39\text{kg N/ha} + 34.5\text{kg N/ha} + 4\text{kg N/ha} = 77.5\text{kg N/ha}$

Finally to determine if N needs to be top dressed on the crop:

$\text{N to top dress} = \text{Crop N demand} - \text{Total available N}$

The result is the amount of N required to achieve the predicted crop yield. However, if the resulting value is zero or negative there is sufficient N supply in the soil to achieve the predicted crop yield.

Example: $108\text{kg N/ha} - 77.5\text{kg N/ha} = 30.5\text{kg N/ha}$

Before deciding whether to top dress this year, farmers are encouraged to undertake some of the above calculations or undertake soil tests in-crop, particularly if soil tests weren't taken at the start of the season. BCG is offering this service. Farmers can sign up for in-crop N testing at the BCG Grains and Research Expo to be held on Thursday 2 July or at the BCG office: (03) 5492 2787.