

# ESTIMATING LEGUME CROP N CONTENT



The process for estimating the amount of nitrogen contributed from a legume crop comes from the work of the Sugar Yield Decline Joint Venture.

## STEP 1. CALCULATE WET BIOMASS (T/HA).

- Cut all plants at ground level within several 1m lengths of row (plots) from representative sections of the legume crop.
- Immediately weigh (kg) each plot as it is cut.
- Average the weights of all plots that were cut.
- Divide average plot weight (kg) by row spacing (m) to determine kg wet biomass per m<sup>2</sup> (kg/m<sup>2</sup>).
- Multiply kg/m<sup>2</sup> by 10 to determine tonnes wet biomass per hectare (t/ha).

## STEP 2. CALCULATE DRY BIOMASS (T/HA).

- Dry plant samples (or a representative sub-sample) in an oven at 70°C.
- It may take several days to reach a constant dry weight.
- Determine percentage dry matter (%):  
$$\text{Dry matter (\%)} = (\text{Dry weight} \div \text{Fresh weight}) \times 100$$
- If this is not an option, research has shown that the dry biomass per hectare is approximately 25% of wet biomass per hectare.

### STEP 3. MEASURE NITROGEN CONCENTRATION.

- The dried samples can then be sent to a laboratory to have nitrogen concentration analysed, which will be expressed as a percentage of dry weight.
- If this is not an option, table 1 below has some approximate nitrogen concentrations.

**Table 1.**

GENERAL CROP N CONCENTRATION (%)	
Soybean	3.5
Cowpea	2.8
Lab-lab	2.3
Peanut	3.0

*Source:* Sugarcane Yield Decline Joint Venture

Step 4. calculate nitrogen content of above ground biomass.

- Dry biomass (t/ha) x nitrogen concentration (%) = t N/ha
- $t \text{ N/ha} \times 1000 = \text{kg N/ha}$

### STEP 5. CALCULATE NITROGEN CONTENT OF TOTAL CROP.

- The nitrogen content of the roots is approximately 30% of that of the above ground biomass.
- Nitrogen content of above ground biomass + Nitrogen content of crop roots

### ^STEP 6. CALCULATE NITROGEN CONTENT OF CROP IF HARVESTED FOR GRAIN.

Total crop N content (kg N/ha)  $\times 0.33$

### EXAMPLE:

Soybean fallow crop.

**STEP 1.** Three 1m x 1.83m (row spacing) plots were cut from the legume crop

These plots weighed 2.4 kg, 2.6 kg and 2.8 kg

The average weight of the plots was  $(2.4 + 2.6 + 2.8) \div 3 = 2.6 \text{ kg/plot}$

$2.6 \text{ kg/plot} \div 1.83\text{m} = 1.42 \text{ kg/m}^2$

$1.42 \text{ kg/m}^2 \times 10 = 14.2 \text{ t/ha of wet biomass}$

**STEP 2.** Dry matter = 25%

$14.2 \text{ t/ha} \times 0.25 \text{ (25% dry matter)} = 3.55 \text{ t/ha of dry biomass}$

**STEP 3.** N concentration = 3.5%

**STEP 4.**  $3.55 \text{ t/ha of dry biomass} \times 0.035 \text{ (3.5% N)} = 0.1243 \text{ t N/ha}$

$0.1243 \text{ t N/ha} \times 1000 = 124.3 \text{ kg N/ha within the above ground biomass}$

**STEP 5.** Root N content = 30% of the above ground N content

$124.3 \text{ kg N/ha (above ground)} \times 0.30 \text{ (30\%)} = 37.3 \text{ kg N/ha within the crop roots}$

$124.3 \text{ kg N/ha (above ground)} + 37.3 \text{ kg N/ha (roots)}$   
 $= 162 \text{ kg N/ha total crop N content}$

**^STEP 6.**  $162 \text{ kg N/ha} \times 0.33 = 53.5 \text{ kg N/ha}$

*Note:* Numbers for above ground, roots and total crop content have been rounded.

### FOR FURTHER INFORMATION PLEASE CONTACT

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