

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 m² (kg/m²).
- Multiply kg/m² 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
- $t\ N/ha \times 1000 = kg\ N/ha$

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) x 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 $(2.4 + 2.6 + 2.8) \div 3 = 2.6\ kg/plot$

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

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

STEP 2. Dry matter = 25%

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

STEP 3. N concentration = 3.5%

STEP 4. $3.55\ t/ha$ of dry biomass x 0.035 (3.5% N) = 0.1243 t N/ha

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

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

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

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

***STEP 6.** $162\ kg\ N/ha \times 0.33 = 53.5\ kg\ N/ha$

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

FOR FURTHER INFORMATION PLEASE CONTACT

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