Determination of nitrate nitrogen content in undried soil samples with Rapid analysis instruments such as Laqua LA-NO3 or Nitracheck

Sampling

The standard sampling depth is 0...60 cm, divided into the layer thicknesses 0...30 cm (upper layer) and 30...60 cm (lower layer). The soil samples from the topsoil (0-30cm) and those of the underbody (0-60cm) are collected separately (two buckets).

Number of incremental samples (punctures): at least 15. The punctures are randomized (randomly distributed) over the entire surface (without headland).

An aggregate sample is formed from the incremental samples for each stratum thickness and is well mixed (good mixture very important!).

Sample preparation:

100 g soil sample (mixed sample, precisely weighed) is mixed with 100 ml of a 0.01 M CaCl2-solution or with distilled water (shake for 30 min). The solution is filtered through a nitrate-free paper filter. In the filtrate (= the filtered solution) the measurement of the nitrate content is done.

Interpretation

With increasing soil moisture, the measured value must be corrected. To determinate the nitrate content of a soil from which several layers or horizons have been sampled, the measured values of the individual horizons are added together.

The following values are included in the calculation:

- Measured value (in ppm or mg/litre)
- Current moisture content of the soil sample (measurement or estimate)
- Soil density (= 1.5; value can generally be used for mineral soils)
- Strength of the sampled soil horizon in decimetres (dm)
- Nitrogen content of nitrate (nitrate (NO3) contains 22.58% nitrogen (N))

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Calculation formula:

$$\text{Kg NO3-N/ha} = \frac{\text{Measured value} \times (100 + \text{soil moisture}) \times 1.5 \times \text{thickness of soil horizon} \times 0.2258}{(100 - \text{soil moisture})}$$

Example:

Measured value = 18 ppm NO3

Actual soil moisture = 14%.

Strength of sampled soil profile = 3 dm (30cm)

$$\text{Kg NO3-N/ha} = \frac{18 \times (100 + 14) \times 1.5 \times 3 \times 0.2258}{(100 - 14)}$$

$$\text{Kg NO3-N/ha} = \frac{2085{,}0372}{86}$$

Kg NO3-N/ha = 24,24 (the soil has approx. 24 kg NO3-N in the layer 0 to 30cm)