DATE: JUNE 2007

Nitrate-Nitrogen in Forage and Plant Tissues

1. Application

In this procedure nitrogen, in the form of the nitrate and nitrite ion, is extracted from forage or tissue samples and analyzed by flow injection technology.

2. Summary of Methods

A 2% solution of acetic acid is used to extract NO_3^--N from the forage and tissue samples.

3. Safety

All chemicals should be considered a potential health hazard. The laboratory is responsible for maintaining a current awareness file of OSHA regulations regarding the safe handling of the chemicals specified in this method. A reference file of material handling data sheets should be made available to all personnel involved in the chemical analysis.

4. Interferences

5. Sample Collection, Preservation, and Handling

All samples are dried at 55^{o}C in a cabinet-type forced air dryer for 12-18 hrs. After drying the sample is ground to pass through a 1 mm Wiley mill.

6. Apparatus and Materials

6.1 Weighing paper
6.2 Erlenmeyer flasks (50ml)
6.3 Pipette bank (15ml)
6.4 Time-controlled, oscillating shaker
6.5 Filter paper, 9cm (Whatman No. 2 or equivalent)
6.6 Funnel tubes (15ml)
6.7 Glass test tubes (6.2ml)
6.8 Flow injection unit

7. Reagents

7.1 2% acetic acid solution (40 ml acetic acid, bring to 2L with distilled water)

8. Methods

8.1 Grind the dried sample through a 1 mm sieve.
8.2 Weigh 0.10 g of forage or plant tissue onto weighing paper.
8.3 Transfer sample to a 125 ml Erlenmeyer flask.
8.4 Add 25 ml 2% acetic acid solution using a constant suction pipette.
8.5 Shake for 15 minutes on oscillating shaker.
8.6 Filter immediately through filter paper atop funnel tubes.
8.7 Transfer filtrate into glass test tubes.
8.8 Analyze by flow injection technology.

9. Calculations

9.1 Sample concentration is calculated from a regression equation by plotting response verses standard concentration.

10. Quality Control

10.1 Laboratory Reagent Blank (LRB) – At least one LRB is analyzed with each batch of samples to assess contamination from the laboratory environment. Contamination from the laboratory or reagents is suspected if LRB values exceed the detection limit of the method. Corrective action must be taken before proceeding.
10.2 Standard – One or more standards of known extractable nitrate content are analyzed with each batch of samples to check instrument calibration and procedural accuracy.

11. Reporting

Results are reported as ppm of nitrogen (DM basis) in the form of nitrate NO_3^--N.

12. References

12.1 Lachet Instruments. 1992. Nitrate/Nitrite, Nitrite in 2% Acetic Acid Plant Extracts. QuickChem Method 13-107-04-1-A.
12.2 Jaromir Ruzicka. 1983. Flow Injection Analysis – From Test Tube to Integrated Microconduits. Analytical Chemistry 55: 1040A-1053A.