

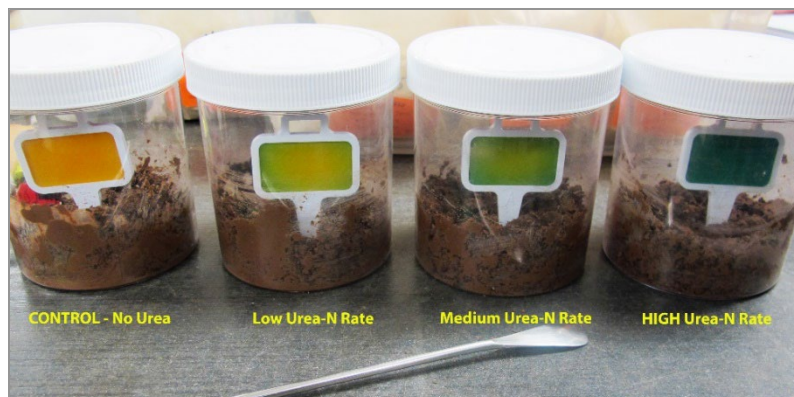
# N-LOSS FROM SOILS AS DETECTED BY SOLVITA®



TECH MEMO 0020-#14

## SOLVITA FOR UREA VOLATIZATION

The use of pelletized urea and heavy manuring of soils has led to situations around the world with distinct  $\text{NH}_3$  emissions and N-release into the atmosphere<sup>1</sup>. This is both a serious loss of N-efficiency for crops and an environmental stress and accounts for 14 to 23% of N applied by these means.<sup>2</sup> Soil cultural practices are available which help mitigate the release and loss of urea and ammonium-N.<sup>3</sup>



A simple, direct test for the loss from soil of volatile ammonia N is possible by using Solvita.

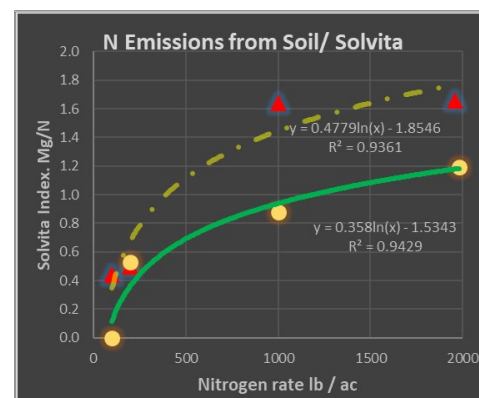
The loss from soil is due to hydrolysis of urea-N via urease activity or urea - ammonia decay in manures. The  $\text{NH}_3$  test probe can be used to observe loss rate and to evaluate treatment modes and soil propensity to release N.

The Solvita  $\text{NH}_3$ -N probe is designed to capture  $\text{NH}_3$ -N (or other forms of amino-N) by means of alkalization of a soil sample and closely correlates with soil-based extraction tests such as ISNT.<sup>4</sup> To make an application for detecting natural release of urea-N from soils the alkali-treatment step of the lab SOP is eliminated, and the natural force of ammonia-induced pH change *in situ* is used to propel  $\text{NH}_3$ -N out of the soil into the detector, therefore mimicking the natural process of field loss. The results of the test are similar to what is seen with the SLAN-application of Solvita across a range of 0 – 2 mg of  $\text{NH}_3$ -N.

The Solvita  $\text{NH}_3$ -N probe is designed

As indicated in the graph at right, the detection range of Solvita for free release of ammonia will depend on the application rate and release rate with a MDL as low as 80 kg/ha. Several factors will determine accurate detectability. The best results are to use the standard Solvita test jars (475 ml) with 200 g of fresh moistened soil, with one Solvita  $\text{NH}_3$ -probe embedded in the soil. The probe can be removed and read over a period of 4 – 48 hrs depending on the rate of release. To quantify the results simply use the mg N reading from the Digital Color Reader (DCR) which may be divided into the soil weight or the quantity of urea (or manure) added to soil to get a relative result.

Alternatively, Solvita can be used as a visual score without the DCR detector to obtain a clear qualitative result indicating presence or absence of levels of ammonia loss.



<sup>1</sup> Reducing Ammonia Emissions from Agriculture. Yara International ASA - Oslo, Norway

<sup>2</sup> Bouwman A F, Boumans L J M, Batjes N H (2002): Estimation of global  $\text{NH}_3$  volatilization from mineral fertilizer and animal manure applied to arable land and grasslands, Global Biochemical Cycles, 16, 1-15.

<sup>3</sup> Al-Kanani, T., and A. F. MacKenzie (1992): Effect of tillage practices and hay straw on ammonia volatilization from nitrogen fertilizer solutions, Can. J. Soil Sci., 72, 145– 157.

<sup>4</sup> Moore, D.B., K. Guillard, X. Geng, T.F. Morris, and W.F. Brinton (2019): Correlations between two alkali extractable amino-nitrogen tests and response to organic fertilizer in turfgrass soils. Soil Sci. Soc. Am. J., 83:791-799. doi:10.2136/sssaj2018.10.0371.