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WHAT IS IN A NITROGEN BUDGET?

Getting a return on an investment is a concept familiar to all of us. Decisions regarding equipment, field practices, and labor are all governed by getting a benefit from the action. However measuring the benefit from the action is sometimes hard to do.

Farmers and government regulators are increasingly asking how to document the benefit from applied fertilizer. One way to do this is to make a balance of nutrients entering and leaving a field. There are several ways to do this, but the simplest way is to make a checkbook-type budget to compare inputs (purchased fertilizer and feed) with outputs (crop or animals sold).

A more detailed approach to an N budget considers more of the sources and losses. This closer look is very useful for identifying areas for improvement. This budget includes:

Sources of N:

N fertilizer – This is perhaps the easiest to measure, but efficiency also depends on having the applicator properly calibrated for supplying an accurate rate and for uniform distribution.

N in irrigation water – Periodic water analysis is useful for monitoring water quality. Nitrate present in irrigation water should be considered as a nutrient input. Multiply the parts per million of nitrate N by 2.7 to get pounds of N added per acre foot.

Residual soil N – Depending on your soil and climate, there can be considerable carryover of plant-available N in the root zone. Deep soil sampling—down to where the roots will be growing—may be required to measure this resource.

N from legumes – Legumes are capable of obtaining their N from the atmosphere through fixation in their roots. If legumes are part of the rotation, account for their N contribution as they decompose.

Decomposition of plant and animal residues – If crop residues, compost, or animal manure is present in the field, their gradual breakdown will also add to the total N supply for growing plants.

Mineralization of soil organic matter – Soil organic matter gradually releases N during the growing season. Know how much organic matter your soil contains and get an estimate of N release from reliable local experts.

Losses of N:

Crop removal – Use the average yield from each field and multiply this value by the average N concentration to estimate the N removed in the crop.

Leaching – Some water will pass beyond the root zone during the year, but the challenge is to minimize the amount of nitrate that is carried with it. This is done by precisely timing fertilizer applications and carefully managing water.

Denitrification – Some nitrate may be converted to nitrous oxide gas when wet soil conditions persist. This pathway of loss can be minimized by good management. Overly wet soils can also accelerate undesired nitrate leaching.

Volatilization – Some N sources are susceptible to loss of ammonia. If animal manures or urea-containing fertilizer are being used, appropriate management practices can greatly reduce the loss of ammonia N to the air.

Making your own N budget, whether simple or detailed, will help you identify areas where efficiency can be improved. Being more efficient with N will pay both economical and environmental benefits. Take time to consider how to do a better job with your important N fertilizer.

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Abbreviation: N = nitrogen.

Note: *Plant Nutrition TODAY* articles are available online at the IPNI website: www.ipni.net/pnt