NITROGEN BUDGETING FOR ORGANIC PRODUCTION

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Nitrogen management for high value vegetable crops under organic management is challenging. Organic systems rely on N mineralization processes in soil to deliver nitrate-N in adequate amounts with appropriate timing. The traditional nutrient management planning process (checkbook method: matching nutrient supply and demand over a production cycle) contains too many assumptions for accurate forecasting of plant-available N supply for organic systems.

Organic fertilizers fall into three broad categories: 1) specialty products like feather meal or fish or seed meals that supply N rapidly over a 3 to 6 week period, 2) manure-based fertilizers or cover crops with more variable N release characteristics, and 3) composts that contribute little or no plant available N in the application year.

Nitrogen mineralization from soil organic matter in the absence of current season organic N inputs can often supply much of the N needed by a vegetable crop. However, the low accuracy of soil N mineralization forecasts based on soil testing or field management history leads many farmers to apply "insurance" N inputs.

To improve N management, the following approaches are recommended for adaptation by CCAs and other qualified agronomists/horticulturalists: 1) frequent in-field evaluation of current N management practice vs. a reduced N input regime on crop yield and quality, 2) soil nitrate testing continuously during the crop production cycle: prior to planting, during the first 4 to 6 weeks of crop development, and near the time of harvest.

Western U.S. research has shown that an in-season soil test value > 25+ ppm NO_3-N (0-12 inch depth) indicates N sufficiency for many vegetable crops. In organic systems, in-season soil nitrate tests will generally be used as a "report card" on current practices, since sidedress fertilizer application is often impractical. The combination of web-based soil N mineralization forecasts (based on temperature, soil type, and local historical data) with in-season soil nitrate monitoring is recommended as a logical next step forward to fine-tune N supply for organic crops.

REFERENCES

Andrews, N., D. Sullivan, J. Julian, and K. Pool. 2011 (revised). Oregon State University Organic Fertilizer and Cover Crop Calculator. http://smallfarms.oregonstate.edu

Collins, D., C. Miles, C. Cogger, and R. Koenig. 2013. Soil Fertility in Organic Systems: A Guide for Gardeners and Small Acreage Farmers. Pacific Northwest Extension Publication 646.

NRCS. 2014. Nutrient Management Plan (590) for Organic Systems, Western State Implementation Guide. Available online from Oregon Tilth: http://tilth.org/files/r-e/ocp/nutrient-management

Sullivan, D.M. and N.D. Andrews. 2012. Estimating plant-available nitrogen release from cover crops. Pacific Northwest Extension Publication 636.

Sullivan,D.M. 2010. Managing plant-available nitrogen from organic amendments and cover crops. p. 12-18. In: J. Hart et al. Nutrient management for sweet corn (western Oregon). EM 9010-E. Oregon State University Extension Service. Corvallis, OR. http://hdl.handle.net/1957/19064

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