SOIL AND PLANT ANALYSIS: HOW THEY FIT INTO A "GREEN" NUTRIENT MANAGEMENT PROGRAM

Keith M. Backman, MS Horticulture/Pomology UC Davis
Dellavalle Laboratory, Inc. Fresno, CA, Owner and Consultant Mgr
Certified Crop Advisors, Calif. State Board, Nutrient Manure Mgt specialty
CCA, International Board Exam Committee

ABSTRACT

Environmental concerns are changing the face of agricultural fertilization across the nation and world. Both nitrogen and phosphorus have become the major concerns in this area with other nutrients, salts, and chemicals being discussed for future regulations. The focus of environmental regulation depends on the characteristics of different geographical regions. Soil, water, and tissue analyses are needed to meet application requirements as regulatory documents are being drafted and implemented. Certified agricultural professionals are being designated to perform the task of controlling these "fugitive" materials in the environment and overseeing cleaning up of the situation when an excess if found.

DISCUSSION

California environmental regulations are rapidly expanding and moving into new areas of concern at a very rapid pace. Most of recent requirements are based primarily on nitrogen and how it fits into a Nutrient Management Program (NMP). Farmers are being asked to tightly control nitrogen use to reduce/avoid nitrogen discharge to the environment. The Regional Water Quality Control Board of California classifies a discharge as lateral movement to surface waters or movement past the root system towards ground water.

Soil test evaluations are interesting to begin with because the criteria have little to do with the soil and a lot to do with the intended (or current) specie being planted. Everything from pH, nutrient status, salinity targets, and soil amendment requirements are projections for ideal plant growth, not a target for the soil. Decisions are further complicated by variables in root depth, weather at planting, etc., etc.

Nitrogen is a primary nutrient of concern in California due to ground water contamination, leading to nitrate toxic conditions in drinking water wells. Recently environmental monitoring has been mandated on dairies in the central valley. Soon all farms may be required to implement nutrient programs on much of the state's cropped lands.

An accurate nitrogen management program has 3 major components:

1) Carryover Nitrogen
2) Applied Nitrogen
3) Removed Nitrogen

Each of the above has major subcomponents. Soil tests are needed to evaluate residual nitrogen include nitrate-nitrogen and top foot ammonia nitrogen (to determine residue N in residual plant material). Multiple depths are needed to produce quantitative information regarding reclaimable N near the surface, at deeper rooting levels, and lost nitrogen. In annual crops the agricultural specialist will use this information to determine the amount that still needs

to be applied. Also, deeper levels will indicate how much N will become available mid season. Misapplications and poor decisions of the past will also be evident in the deeper samples.

Once the carryover has been evaluated and the anticipated crop consumption determined, the application plan will need to be determined. When irrigation wells are providing significant N levels, the amount to be applied this season will be calculated (based on water tests). This data will be added to the amount of N supplied by any preplant manure, compost, or effluent water. It is at this point that the necessary amount of commercial N needs to be calculated. Advice will be needed regarding how to split the applications and what forms to choose.

Historically, growers have looked at their calendar and in many cases applied additional N during mid to late season. This decision is often based on whim, a funny symptom, the fertilize company's suggestion, or coffee shop speculation. In the world of Nutrient Management Programs it needs to be prescribed using tissue analysis, interpreted by a Certified Professional.

At the end of the season all forms of the preplant and applied N are tabulated and compared to the amount of N used by the crop. Techniques to determine crop need vary and are designated by the regulatory agency. From this information a factor is developed which is used for each field to determine the efficiency of N application. A factor of 1.0 indicates that the N program matched crop use. A 1.5 indicates 50% more N was applied than the plant needed (thus, the 50% has become a fugitive in the environment). Adjustments will be needed for the problematic "high factor" farm situations.

SUMMARY

These are not "One Size Fits All" situations. Solutions will involve changes in timing, rates, choices of fertilizer materials, applications practices, irrigation practices (a huge component in California), and advanced planning. The answers can't be provided here. In fact, the same Certified Agriculturist will probably need 10 different programs for 10 different growers. And each may have different situations on different fields. By reducing N applications to match nutrients already available, the N is converted to protein. This conversion converts a problem into a *green* plant, creating additional dollars ($ *green*) for the farmer, and putting him on the front line of the *greening* of America!

Remember the day when a farmer phoned his chemical man and asked him to schedule a 150# N application on all of his fields? Gone.

REFERENCES

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Program Chair:
Robert Flynn, Program Chair
New Mexico State University
67 E Four Dinkus Road
Artesia-NM 88210
(575) 748-1228
rflynn@nmsu.edu

Coordinator:
Phyllis Pates
International Plant Nutrition Institute
2301 Research Park Way, Suite 126
Brookings, SD 57006
(605) 692-6280
ppates@ipni.net