

Diagnostic Tools for Efficient Nitrogen Management of Vegetables Produced in the Low Desert

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Project Leader:

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Objectives

1. Evaluate, develop and calibrate a pre-sidedress nitrate-N test. Both a standard laboratory test and a quick test will be evaluated.
2. Continued testing the accuracy of diagnostic plant tissue standards (Reflectance technologies including aerial photographic surveys, dry midrib nitrate-N test and the Cardy sap nitrate-N test)

Summary

In 1995, a project was initiated to evaluate several diagnostic tools for efficient N management of desert vegetables. Research was focused on broccoli, cauliflower and lettuce because these crops occupy the largest acreage of all cool season crops produced in the desert. Diagnostic tools evaluated included the traditional midrib (or petiole) nitrate-N test, the sap nitrate-N test, absorbance using the chlorophyll meter, and various reflectance technologies, including digital analysis of aerial response to N was observed which allowed for correlation of the diagnostic tools to growth and yielding. Aerial photographs (or digital images) proved to be the best qualitative tools which could be used as photographs. Generally a curvilinear trend to trouble shoot fields.

Studies conducted during 1995-1997 were designed to evaluate the response of broccoli, cauliflower, and lettuce to sidedress N fertilizer application and test the effectiveness of various diagnostic plant tests as predictive tools. During this season, a preliminary evaluation of a pre-sidedress soil $\text{NO}_3\text{-N}$ test was also conducted. The high frequency with which the dry midrib or petiole tests resulted in incorrect diagnosis suggested that either this test needed revision or that it is an unreliable N management tool for the low desert. Results from evaluations of a pre-sidedress soil nitrate-N test were also inconclusive. It was suspected that variation in soil salinity interfered with nitrate-N readings.

Results collected during 1997-1998 corroborated the concerns about using midrib or petiole nitrate-N testing as a basis for making fertilizer recommendations. Statistical analysis showed marketable yields were significantly reduced and economic evaluations showed reduced net returns when making sidedress N fertilizer decisions exclusively on the basis of midrib or

petiole nitrate-N analysis. While midrib or petiole tests give an indication of the crops N status, they are not sufficiently sensitive or reliable to serve as the sole basis for making sidedress N fertilizer decisions in the low desert. Pre-sidedress soil testing was also evaluated using conventional laboratory analysis and a colorimetric paper quick test approach. Overall, results showed soil testing was superior to midrib testing in that it resulted in a higher frequency of correct diagnosis. It was speculated that genetic variation among cultivars, inefficient irrigation, and perhaps other unknown factors interact to limit the precision and reliability of midrib or petiole nitrate-N tests. Inefficient irrigation practices or perhaps inappropriate critical levels are the factors reducing the predictability of the pre-sidedress soil test. It was concluded that pre-sidedress soil test may work reasonably well with some modification and under conditions of efficient irrigation.