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NITROGEN MANAGEMENT FOR SOUTHEAST POTATO PRODUCTION

Potato is an important, high-value crop in the Southeastern vegetable industry. With approximately 25,000 acres, Florida produces one-third of the nation's winter/spring crop with an annual value of over \$160 million. When producing such a high-value crop, the tendency of some growers is to over-apply certain inputs like N fertilizer and water to provide "insurance" against yield loss. However, over-application of N to a potato crop is just as likely to result in production problems as under-fertilization.

Excessive N fertilizer applied at or before tuberization can extend the vegetative growth period and delay tuber development, resulting in a lower yield. Too much N applied later in the season can delay maturity of the tubers, reducing yield and adversely affecting tuber quality and skin set. Over-irrigation can result in poor soil aeration, which can also result in lower yield and market grade, increased disease problems, and leaching of mobile nutrients like N. Leaching of N can be a particularly high risk on the coarse-textured, low-organic matter soils common to the Southeast.

One of the ways that potato producers can meet the environmental, economic, and social goals of a sustainable agricultural system is to practice 4R Nutrient Stewardship. This involves applying the right fertilizer source at the right rate, at the right time, and in the right place. Considering all four "rights" when determining a fertilizer recommendation will result in a nutrient management strategy that efficiently and effectively meets the grower's objectives. In the case of N recommendations for potato, what's "right" will vary among locations and cropping systems, but the scientific principles behind specific recommendations are the same.

University of Florida researchers are currently evaluating N management strategies to optimize potato production. Started in 2010, this three-year study is investigating the effect on yield and tuber quality of various combinations of N rate and timing, the interactive effects of environmental conditions such as rainfall and air and soil temperature on N requirements, and N uptake and accumulation by potato during the growing season in northeast Florida.

The key to optimizing fertilizer rate in potato is to match nutrient supply with crop requirement. Current N guidelines in Florida provide a recommendation of 200 lb N/A; however, they do not address how environmental conditions or varieties affect specific crop requirements. Other research has shown that as yield potential increases, so does the N requirement, with between 40 and 75 lb N being required for every 100 cwt of tuber yield. The current study is being conducted using various chipping varieties grown under seep irrigation with yield potentials exceeding 400 cwt/A.

Results from 2010 indicate that a difference in N uptake and N fertilizer requirements may exist among varieties. The N uptake for cultivar FL1867 ranged from 130 to 190 lb N/A, while 'Atlantic' potato only accumulated 90 to 140 lb N/A during the growing season. Highest tuber yields for the two cultivars were 290 and 395 cwt/A for 'Atlantic' and FL1867, respectively. No yield responses to rates above 230 lb N/A were observed for any cultivar in 2010; however, no definite conclusions regarding optimum N rate can be drawn following only one year of data (2011 yields have not been analyzed). It was also noted in 2010 that N fertilizer rates exceeding 200 lb N/A resulted in residual soil N (after harvest) between 60 to 120 lb N/A.

This research is scheduled to be continued through the 2012 cropping season. Following the 2012 harvest, a comprehensive analysis of all the data should provide growers with the information necessary to select the right N rate, the right application timing, and the right placement strategy required to optimize yield and profitability within the context of their cropping system.

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Abbreviation: N = nitrogen.

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