Slow-release Fluid N Bumps Potato Yields Versus Other N Sources

Trials at Cornell Cooperative Extension and University of Wisconsin compare fluid N with ammonium nitrate, urea, and ammonium sulfate.

In replicated research trials performed by the Cornell Cooperative Extension and the University of Wisconsin, Madison, fluid nitrogen (N) in the form of Nitamin® 30L significantly improved marketable potato yield and increased tuber size when compared to granular quick-release N sources. The urea polymer-based, slowly available fluid N (30-0-0) fertilizer was developed by the Plant Nutrition group at Georgia-Pacific. In both locations, high N-use efficiency in sandy soils was a critical factor for attaining high production.

Cornell study

Cornell University Extension specialists evaluated Georgia Pacific's slow-release fluid N as a sidedress application versus split applications of urea or ammonium nitrate. The trial was conducted on fresh market 'Reba' potatoes at the Long Island Horticultural Crops Research Station in Suffolk County, New York. The N rate of 200 lbs/A, recommended by Cornell, was compared along with a lower N rate treatment applied at 150 lbs/A (75% rate). Results showed that the slow-release N applied at 200 lbs/A produced the highest total yield and marketable yield (Table 1). Marketable yields with slow-release N increased by 108 cwt over ammonium nitrate and 88 cwt over urea.

As the table shows, the slow-release fluid N applied at 150 lbs/A produced yields equivalent to the 200 lbs/A rates of urea and ammonium nitrate, suggesting that the slow-release N product improved the crops' N-use efficiency compared to the two conventional N sources.

Wisconsin study

At the University of Wisconsin Hancock Research Station, trials over

Table 1. Potato yield data from trial at Long Island Horticultural Research and Extension Center, 2006.

Treatment	At planting lbs N/A	At sidedress lbs N/A	Total N lbs/A	Total yield cwt/A	Marketable yield cwt/A
Urea	105	45	150	341	309
Urea	140	60	200	367	340
Am nitrate	105	45	150	346	319
Am nitrate	140	60	200	357	320
Nitamin 30L	30	120	150	389	355
Nitamin 30L	30	170	200	454	428

three years compared slow-release fluid N to quick-release N sources on Russet Burbank potatoes. Slow-release N was most effective when applied as a split application—one-third at emergence and two-thirds at tuberization (2.5 weeks later). Applying N at 200 lbs/A increased marketable potato yield by 10 to 37 percent in two out of three years, and resulted in 5 percent less hollow heart compared to applying ammonium sulfate at emergence and ammonium nitrate at tuberization. Yields of all treatments in 2005 and 2006 were higher than yields in 2004 due to improved irrigation practices at the research center.

Over the three-year study, slow-release N applied at 200 lbs/A produced 20- to 30-cwt/A yield increases of U.S. #1A Grade potatoes in most years compared to the commercial N program (Table 2). In 2005, a severe potato scab outbreak caused upward to 47 percent culls in some treatments, resulting in no marketable yield differences between N sources that year. N treatment had no effect on scab incidence. In a separate study conducted at the same location in 2005, where scab was not a problem, slow- release fluid N increased total yields by 53 cwt compared to the commercial treatment. In 2004, slow release fluid N tended to result in fewer culls and only 1 percent hollow heart compared to 6 percent hollow heart in the commercial fertilizer program. Trends in the 2006 data confirmed the improved yield responses observed in the earlier studies.

The steady release of N from our slow-release fluid N fertilizer resulted in more N-use efficiency over the growing season, which is a key factor for improving crop yields and minimizing N losses. Soil samples taken in early July 2004 demonstrated delayed N release compared to ammonium-based fertilizers. Applying our slow-release N at the same rate as the conventional treatments resulted in higher N uptake due to increased potato yield and comparable tuber-N concentrations. The data from 2005 and 2006 also showed that slow-release N applied at a reduced rate of 150 lbs/A produced similar yields to the higher N rate used in the conventional program.

Table 2. Potato yield data from trials at University of Wisconsin Hancock Agricultural Research Station, 2004 to 2006.

Treatment lbs N/A	Total yield cwt/A			Yield US#1 (6 to 13) oz		
	2004	2005	2006	2004	2005	2006
Standard* 200	319	595	649	80	207	244
		398**			87**	
Nitamin 200	340	604	675	110	143	269
		451**			107**	
Nitamin 150		571	639		146	264

* Ammonium nitrate and ammonium sulfate split applications.
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