



Hosting NMSP Double-Crop N Rate Study Proves Useful to Curtis Martin's Farm

By Lisa Fields

Curtis Martin has made some changes to his crop practices since moving to Savannah NY from southern Pennsylvania in 2001. Martin has a 70 cow dairy and 25 head of beef along with cash grain and forage crops. His cash grain crops include about 200 acres of soybeans and 50 acres of wheat. In addition, he has 120 acres of corn of which some is harvested for grain, some for high moisture corn, and some for silage, and 200 acres of grass-clover and alfalfa hay. Winter triticale is double-cropped in rotation with either silage corn, soybeans, or wheat. Martin explained, "For over 10 years we double-cropped winter barley harvested in the soft dough stage and followed it with soybeans. That put soybean planting into June which works well in Pennsylvania, but it's a big gamble to get a mature crop here. I switched from barley as high moisture grain to winter triticale as forage. The triticale makes excellent silage harvested before mid-May with soybeans planted right after that for harvest before fall frost arrives."



The triticale N rate trial at Curtis Martin's farm in Savannah, NY. Tom Kilcer (left) and Curtis Martin (right) during May 2016 harvest.

Martin credits Tom Kilcer, Advanced Ag Systems in Kinderhook, NY with the change in double crop choice. Kilcer, a former Eastern NY Area Extension Field Crops Specialist, said "I've been working with winter triticale as a forage double-crop for seventeen years. When managed right, it makes superb quality forage that gives dairies more milk than a corn silage-alfalfa-grass haylage program can do alone." Adoption of double crop rotations with triticale requires a change in thinking, away from a corn centered mindset.

Kilcer noted, "A barrier to double-crop adoption is the timing challenge to get winter forage planted in the fall after harvest of long season corn varieties, and the conflict between timely spring harvest of winter grain forage and corn planting. But as dry weather in recent years has caused low yields in traditional crop programs of hay and longer season corn varieties, interest in double-cropping has increased."

Questions arose about managing winter grains along with the increased interest in double-cropping. One of those questions was "How much fertilizer N do we need to apply at green-up in the spring to get the best yield and forage quality?" Cornell Nutrient Management Spear Program (NMSP) leader, Professor Quirine Ketterings, initiated the statewide Double-Crop N-Rate Study, examining yield and crude protein impacts of spring applied nitrogen from 2013-2016. The collaborative study included Kilcer, extension educators, Soil and Water Conservation District staff, agricultural consulting firms, certified crop advisors, and farmers like Martin. On-farm trials were set up across NY with five N rates of 0, 30, 60, 90 and 120 pounds per acre applied as Agrotain® treated urea to reduce the risk of N volatilization. Data were obtained from 38 winter triticale and 21 cereal rye fields harvested at flag-leaf stage from sites representing a variety of soil types, manure management and tillage practices.

At Martin's farm, the N Rate Study was done in a triticale field on rented ground. "I've worked that field for just two years, applying 6,000 gallons of hog manure each fall from my brother-in-law's farm to improve the fertility," he stated. "What really struck me was that the higher the N rate, the greener the triticale looked. I really expected to see a yield bump from the added N, but it didn't happen."

Martin's zero N plots yielded 2.85 ton dry matter of triticale per acre. No yield increase occurred from added N, but crude protein went up from 9.5% in the zero N plots to 12.8% with 30 lbs N/acre, gaining another 1.5 to 2.5% with each N rate increase. The increase in crude protein from added N caused the darker green color that Martin observed. He noted, "After seeing the study results here, I'm changing the spring N rate on triticale from the 30 lbs/acre I had been applying to about 50 lbs/acre to get higher protein forage for the dairy herd. The cost of N makes it worthwhile for the feed quality benefit."

Sarah Lyons, graduate student with the NMSP commented, "Yields across all trials in the project as tons dry matter per acre ranged from 0.6 to 3.0 and averaged 1.6 to 2.0, so Curtis's site yielded very well. The lack of yield response when extra N fertilizer was applied is likely a reflection of the hog manure additions."

Ketterings added, "Of the 59 trials, about a third did not show a yield increase when N was added. For fields where N was limiting yield, the optimum economic N rate typically averaged 70-90 lbs N/acre. Crude protein averaged 15-17% at the optimum N rate, but ranged from 7-28% dependent on the amount of N applied".

Current field studies are focusing on evaluation of the value of manure for winter triticale. Kilcer explains, "I'm researching fall applied, incorporated manure with nitrification inhibitors to reduce the risk of N loss in the fall. We want to see if the extra N will be there in the spring when the crop needs to pull it from the soil. Fall manure spreading is preferred by many farms as the soil is often drier and there's no conflict with spring fieldwork."

Martin described his cropping practices. "Where triticale follows wheat or short-season corn silage, manure is surface applied and followed right after by chisel plowing, disking and culti-mulching so I don't lose the ammonia-N. If wheat was the prior crop I drill oats and triticale in two separate passes to place the oats at 0.75 inch depth and the triticale at 1.5 inches. Planting depth is really critical for both crops, and a late August planting date gets the oats off to a fast start for a good fall crop of oatlage. Where I plant triticale alone I put it in by mid-September so it's well-established before frost and can yield well the next spring."

He added, "I got tremendous quality from fall oats for baleage or silage. The energy (NEL) was 0.70 and the 30 hour NDFD was 74%. I get the benefits of year-round cover whether I put in triticale or just plant a cover crop, which I do following corn or soybeans harvested by early October. The soil is more productive and there's less weeds so I can use fewer herbicide applications. On the double-cropped ground soybeans are no-till planted into 4 inches of triticale stubble. The stubble shades the beans as they emerge and holds in soil moisture so they get off to a good start. This year I increased my triticale from 40 to 70 acres because the crop grows well and gives me high quality forage."

Martin was happy to have participated in the Double-Crop N-Rate Study. "You need to be open to changing your practices to succeed in farming," he said. "The on-farm research really helps to see what can work. Double cropping with winter triticale is great for my feed program and fits in beautifully with short rotations that keep soil covered to help my farm stay productive into the future."

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The **Nutrient Management Spear Program** (NMSP) is an applied research, teaching and extension program for field crop fertilizer and manure management on dairy and livestock farms. It is a collaboration among faculty, staff and students in the Department of Animal Science, Cornell Cooperative Extension, and PRO-DAIRY. Our vision is to assess current knowledge, identify research and educational needs, facilitate new research, technology and knowledge transfer, and aid in the on-farm implementation of strategies for field crop nutrient management including timely application of organic and inorganic nutrient sources to improve farm profitability while protecting the environment. An integrated network approach is used to address research, extension and teaching priorities in nutrient management in New York State. For more information on NMSP projects and extension/teaching activities, visit the program website (<http://nmsp.cals.cornell.edu>) or contact Quirine Ketterings at qmk2@cornell.edu or (607) 255-3061.