Integrated Pest & Crop Management

Nitrogen: Choosing source and timing for wheat and grass

By Peter Scharf and Rob Kallenbach

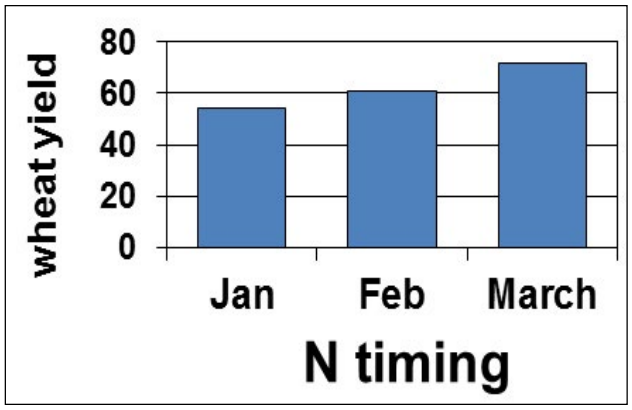
Is it time to fertilize yet?

A couple of warm days in late January got the wheat and grass growing. It's January 30th and the weather has turned chilly again, but with some warm days in the forecast. Any farmers with wheat or grass who weren't already thinking about nitrogen are thinking about it now.

Is it time to fertilize wheat and grass yet? Not really. N uptake for wheat and grass during February will be minimal, and there is a risk that fertilizer applied now will be lost before peak uptake time in April and May.

In a 2-year research project near Columbia, Missouri, wheat yielded about 10 bushels better with N applied in mid-March than when N was applied mid-February (and 20 bushels better than when N was applied mid-January). The graph below shows the effect of N timing on wheat yield, averaged over 2 years and 5 N sources, all at an N rate of 70 lb N/acre. Applications were made in the middle of each month.

Only these two experiments had N topdressed on wheat in all three months, but we have had 17 experiments over 16 years with N applied in February or March. Over all 17 experiments, at a 70 lb N rate, the March application has given a 6.8 bushel/acre yield advantage over the February application. 'March' applications in these studies have been applied just before the crop joints, at a time when a short hollow space (about one-half inch) can be found at the bottom of the main stem where it meets the crown. This is, in my opinion, the ideal time to apply N for wheat in the vast majority of wheat fields. In years with late springs, the pre-joint N applications were sometimes made in early April.



This yield differential between March and February applications can be partially made up by putting out higher N rates in February. We had 15 experiments with a range of rates in February and again in March. For March applications, average optimal N rate was 79 lb N/acre, giving a yield of 67 bushels. For February applications, average optimal N rate was 93 lb N/acre, giving a yield of 64 bushels. Optimal February N rates were 14 lb N/acre higher than in March, while giving yields 3 bushels lower, for a net loss of about $35/acre at current prices. While February applications may be a reasonable choice to get field operations done, it would be appropriate to pencil in a $35/acre penalty when deciding whether to apply N in February rather than March. A better option is to use ESN.

If you must topdress wheat early, use ESN (but not on grass)

If you feel compelled to get some topdressing done in February, ESN from Agrium is a good choice. This is a polymer-coated urea product that slowly releases the urea through the polymer coating. In two years of research, ESN out-yielded urea by 15

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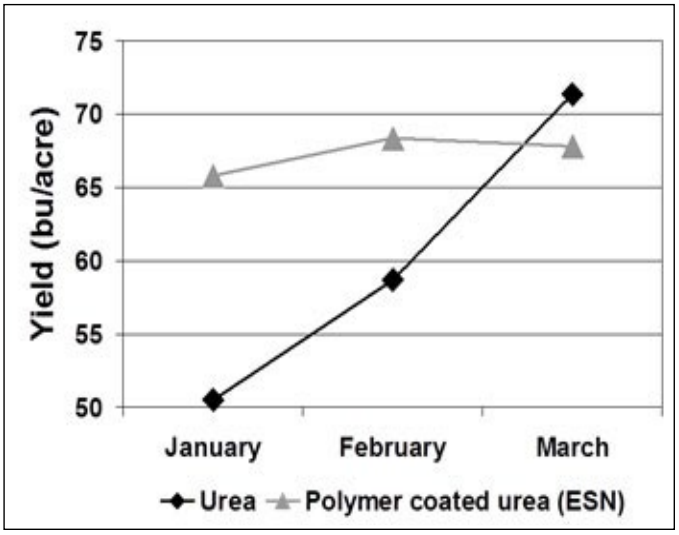

bushels when both were applied mid-January, and by 10 bushels when both were applied mid-February. However, when both were applied mid-March, the urea out-yielded the ESN by 4 bushels. Nitrogen release from the polymer capsules is too slow to adequately supply the crop's needs when ESN is applied in mid-March, and these treatments were visibly N-deficient throughout the spring. It was a surprise that they fell only 4 bushels short of regular urea. But it's clear that the capsules protected the fertilizer from losses that were experienced when urea was applied in January or February.

Missouri research with ESN applied in spring to tall fescue has been carried out only in March. As with wheat, March applications of ESN performed poorly, reducing yield by about 800 lb/acre compared to urea. Research on the effects of spring N timing on fescue yields is thin to non-existent for both ESN and other N sources. If fescue parallels wheat, earlier timing of ESN may give acceptable results and out-perform other N sources applied in January or February. However, March is probably still the ideal time for N application to grass, especially hay. Pastures may benefit from delaying application into April or even May in order to push the grazing period farther into the summer.

Topdressing early to stimulate tillers

The one case where we would recommend an early (greenup) N application to wheat is when tiller number is low. Ideally wheat should form several tillers per plant in the fall. If you don't see at least two good tillers per plant (in addition to the main stem) at greenup, an N application at that time will stimulate formation of additional tillers. An quickly available N source (NOT ESN) is required to accomplish this. Your tillers are your yielding population, and if there are not enough, yield will suffer. Fields in this situation generally have an appearance of thin stand at greenup, and individual plants are small. For anyone with the stomach to count tillers (not me any more), fields with less than 80 tillers per square foot should probably receive their N at greenup rather than just before jointing. Stimulating spring tiller formation can't completely make up for lack of fall tillering, but is a lot better than doing nothing about a poorly tillered stand.

Should I split my topdress N?

In some environments, research has shown that splitting spring applications can produce better wheat yields than a single spring topdress. Missouri is not one of those environments. In 15 Missouri experiments comparing split to single spring N applications, split applications came out $6 to $14/acre behind putting all N on in a single application just before jointing. Responses to split spring N applications have come mainly in coastal plain environments with dominantly sandy soils—these fields often need a greenup N application because the sandy soils have not held N through the fall and winter to support adequate tiller formation. But a single N application at greenup will sometimes be leached below rooting depth in these sandy soils, leading to the need to split N. If it makes sense to split spring N on wheat anywhere in Missouri, it would be on sandy river- or creek-bottom soils.

Topdressing urea on wheat or grass? Use Agrotain

Urea is a great fertilizer product but with one hitch: surface applications are prone to volatile loss of ammonia gas. Depending on complex interactions between a range of weather parameters, losses can range from 0 to 50% of applied N. A good number to pencil in for average loss is 25%. When urea first hit the world scene, this tendency to volatilize was almost universally managed by tilling it in

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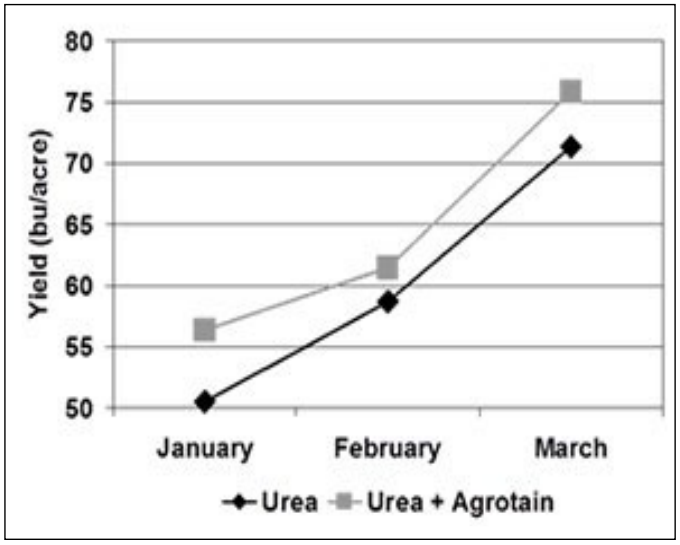

following broadcast application. As we have moved to less tillage and more targeted goals for tillage, this option has become less attractive and less widely used.

Although ammonia volatilization from urea applied to summer crops like corn, rice, and cotton is widely acknowledged to be a problem requiring focused management, rumors have circulated through agricultural and fertilizer circles that ammonia loss is not an issue in cool-season crops like wheat and fescue. This was never based on any research that I am aware of, and recent research in Montana and Alaska has shown convincingly that ammonia volatilization from urea can be substantial even under cool temperatures, and even from frozen soil. Urea breakdown to ammonium/ammonia is accomplished by an enzyme, but an enzyme that is loose in the soil rather than only in living cells. This means that urea breakdown is a purely chemical reaction and is much less temperature-sensitive than other reactions (like the conversion of ammonium to nitrate) that take place only in living cells. Our research showed about a 5-bushel yield advantage for Agrotain-treated urea over regular urea, and this was true whether these products were applied in mid-January, mid-February, or mid-March. This clearly implies that ammonia was being lost from the urea, and that Agrotain was effective in reducing this loss. Measurements of ammonia volatilization following the March N applications confirmed this idea—12 lb N/acre was lost as ammonia from the urea treatment, while only 1 lb N/acre was lost when the urea was treated with Agrotain.

Agrotain treatment of urea applied to grass in March increased yield by an average of 330 lb N/acre over six experiments. This is only a bit better than break-even in most years, but still supports the use of Agrotain when urea is applied to tall fescue or other grasses, even in cool spring weather. In some of these experiments, rain within a few days of nitrogen application moved the urea into the soil and avoided volatile loss of ammonia. If rain is probable in the forecast within a day or two, it would be reasonable to omit the Agrotain.

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A Six-pack of Tips for Healthy Cotton in 2013

By Allen Wrather

The day cotton farmers' plant is the most important day for that crop the entire year. If the weather is warm 10 to 14 days after planting, the plants will emerge quickly, the seedlings will develop a robust root system, and the plants will grow and yield well that year. If the weather is cold and wet for 10 to 14 days after planting, diseases will attack the seedlings and kill many so the stand will be thin and uneven, the roots of surviving plants will be stunted, and the plants will grow and yield poorly that year. Farmers can help protect their young cotton crop against seedling diseases that may develop during cool wet weather by following the six steps listed below. I call these six steps a six-pack of tips for a healthy cotton corp.

1. Plant only when the soil temperature 4 inches deep has warmed up to about 65 F by 8:00 a.m. and plant only when at least 7 days of warm and dry weather are predicted.

2. Plant only high-quality seed. Seed quality can be partially judged by the warm and cold germination test results. The seed should germinate better than 80% in the warm test and better than 50% in the cold test. The warm test results are printed on the seed bag, but the results of the cold test are not. Ask your seed dealer about the cold germination test results.

3. Plant in fertile soil. Ensure that soil pH, phosphate and potash levels are proper for new plant growth.

4. Plant on high beds. Seedling diseases are worse when the soil is cold and wet. To minimize seedling diseases, plant on raised beds to maximize drainage and soil temperature. The top of a raised bed is generally warmer than flat soil. Make sure field drainage is adequate to quickly eliminate excess water. Internal soil drainage will be improved if hardpans are broken with a ripper.

5. Have the seed treated with extra fungicides when cotton is planted early in the season, in poorly drained fields, or in clay soils, and certainly in fields where seedling diseases have been a problem in previous years.

6. When planting no-till, equip your planter to move trash away from the row, so the sun can warm the soil around the seed faster.

Following these suggested procedures will give cotton farmers a better chance of producing high yield and profit during 2013. More information is available at your county extension office or on the University of Missouri Delta Center Web Page (www.aes.missouri.edu/delta).

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Weather Data for the Week Ending February 28, 2013

By Pat Guinan

Station	County	Weekly Temperature (ºF)						Monthly Precipitation (in.)		Growing Degree Days‡	
		Avg. Max.	Avg. Min.	Extreme High	Extreme Low	Mean	Departure from long term avg.	February 1-27	Departure from long term avg.	Accumulated Since Apr.1	Departure from long term avg.
Corning	Atchison	34	19	43	3	28	-6	0.51	-0.40	*	*
St. Joseph	Buchanan	*	*	*	*	*	*	*	*	*	*
Brunswick	Carroll	32	15	39	-1	25	-11	1.65	-0.03	*	*
Albany	Gentry	34	18	41	1	26	-7	0.66	-0.56	*	*
Auxvasse	Audrain	34	19	41	9	28	-8	1.92	0.00	*	*
Vandalia	Audrain	35	18	43	6	27	-8	2.02	+0.10	*	*
Columbia-Bradford Research and Extension Center	Boone	35	20	46	9	27	-11	1.52	-0.74	*	*
Columbia-Capen Park	Boone	38	17	52	2	28	-11	2.10	-0.12	*	*
Columbia-Jefferson Farm and Gardens	Boone	36	22	50	10	29	-9	1.81	-0.44	*	*
Columbia-Sanborn Field	Boone	36	22	47	12	29	-10	1.80	-0.48	*	*
Columbia-South Farms	Boone	35	21	45	9	28	-10	1.77	-0.51	*	*
Williamsburg	Callaway	35	21	43	10	28	-9	1.76	-0.54	*	*
Novelty	Knox	33	17	43	5	26	-8	2.28	+0.63	*	*
Linneus	Linn	33	20	41	6	27	-7	1.01	-0.41	*	*
Monroe City	Monroe	34	17	46	5	26	-9	1.84	+0.20	*	*
Versailles	Morgan	39	24	52	14	31	-9	1.49	-0.62	*	*
Green Ridge	Pettis	35	19	48	5	28	-10	1.58	-0.22	*	*
Lamar	Barton	37	26	51	17	31	-10	2.83	+0.64	*	*
Cook Station	Crawford	40	24	52	16	32	-8	3.78	+1.40	*	*
Round Spring	Shannon	42	24	53	15	33	-8	3.58	+1.15	*	*
Mountain Grove	Wright	38	25	49	19	31	-9	3.08	+0.29	*	*
Delta	Cape Girardeau	*	*	*	*	*	*	*	*	*	*
Cardwell	Dunklin	47	32	56	28	39	-5	4.31	+0.68	*	*
Clarkton	Dunklin	45	31	56	27	38	-5	4.23	+1.03	*	*
Glennonville	Dunklin	45	32	55	28	38	-5	3.97	+0.83	*	*
Charleston	Mississippi	46	31	56	26	38	-5	3.50	-0.18	*	*
Portageville-Delta Center	Pemiscot	47	33	57	29	40	-4	4.13	+0.43	*	*
Portageville-Lee Farm	Pemiscot	47	33	57	28	39	-5	3.40	-0.21	*	*
Steele	Pemiscot	48	33	58	30	40	-5	4.21	+0.40	*	*

‡Growing degree days are calculated by subtracting a 50 degree (Fahrenheit) base temperature from the average daily temperature. Thus, if the average temperature for the day is 75 degrees, then 25 growing degree days will have been accumulated.

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