Corn & Soybean News

January 2024

Volume 6, Issue 01

Martin-Gatton College of Agriculture, Food and Environment

Grain and Forage Center of Excellence

Corn N Timing Research

Over 50% of the years in the past decade have been exceptionally wet at/near planting. These conditions complicate early corn nitrogen (N) nutrition management. The soil organic matter is an important source of N to corn, but there is considerable uncertainty in its value because relationships between soil organic N supply, seasonal weather and early corn growth exhibit significant year-to-year and field-to-field variability. Many soil samples are analyzed for soil organic matter, and many labs then calculate an ENR (Estimated N Release) value, but there is little science behind the relationship between that value and seasonal soil N supply. In the spring, cooler temperatures slow soil N release and greater rainfall drives N loss.

We know that preplant/at-plant fertilizer N application rate recommendations are higher than those for split/delayed N applications, especially for moderately well to poorly drained soils. Split/delayed N applications better match N availability to corn growth and increasing N nutritional need while avoiding greater early season N loss potential. For these soils the recommended total fertilizer N rate is reduced by 35 lb N/acre if at least two thirds of the total N rate is applied 4 to 6 weeks after planting. But, knowing that the first one third may still be subject to greater N loss, can we better understand just when that first portion of split/delayed corn N should be timed? Can the soil organic matter release enough N to 'carry' the early corn crop? Can all the N be applied in a single delayed application?

With funding from the Kentucky Corn Growers Promotion Council, we conducted 10 field trials in 2021 (six locations) and 2022 (4 locations) to get a representative range in soil N supply potential, corn plant-ing dates, and seasonal weather. The previous crop was either soybean or wheat/ double-crop soy-bean. The corn was planted no-till at nine locations and after tillage at one location. The fertilizer N treatments consisted of 2 rates of early N (0 and 40 lb N/A); 4 early N application times (at-planting-AP, V2, V4 and V6) and 2 later (V8) N rates (120 and 160 lb N/A). The N source was Super U – urea co -prilled with both a urease inhibitor (NBPT) and a nitrification inhibitor (DCD). The N was applied by hand broadcasting to the soil surface. We collaborated with the Corn Variety Testing Program to get

four dryland corn locations and with the Wheat Tech Research Division to get six more dryland corn locations. Early spring soil samples were taken just prior to treatment applications. Ear leaf tissue was taken at silking. The plots were combine harvested and the grain yield data has been statistically analyzed and is the basis of this article.

Table 1, arranged by season/year and planting date, also shows the site location, soil type and corn hybrid. Sites were located across Kentucky, with soils that ranged from well-drained to somewhat poorly drained. Corn planting dates ranged from the second week in April to the second week in May. Two high-yielding hybrids were used.

In 2021, corn stands and weed control were very good at all sites. Yield, and yield statistics, for the six sites are shown in Table 2. Site-average yields ranged widely, from about 165 to 260 bu/A. On an individual site basis, only two sites, 5 and 6, gave a significantly different yield response to one or more of the six treatments. At Site 5, with the moderately permeable Elk soil, the treatment where 25% of the N was applied at planting (AP) and 75% was applied at V8 resulted in greater yield than all the other treatments. At Site 6, the highest average yielding location, the single application of 120 lb N/A at V8 resulted in 10 bu/A less yield than all the other treatments, where N rates totaled 160 lb N/A. Soil N release from soil organic reservoirs appears to have been generally sufficient to carry the corn crop through until the V8 application. At V8, the crop had sufficient root growth to maximize nitrogen use efficiency (NUE) in taking up N from the larger N application made at that time. The use of Super U may have contributed to improved NUE in 2021.

Table 1. Site Information.

Site Number	County – Soil Series	Corn Hybrid	Planting Date
		2021	
1	Christian – Pembroke	Stewart 14DD339	15 April
2	Breckinridge – Sadler	Pioneer 1197AM	16 April
3	Warren – Pembroke	Stewart 14DD339	17 April
4	Fayette – Lanton	Pioneer 1197AM	20 April
5	Larue – Elk	Stewart 14DD339	27 April
6	Caldwell – Crider	Pioneer 1197AM	12 May
		2022	
7	Warren - Pembroke	Stewart 14DD339	22 April
8	Simpson - Pembroke	Stewart 14DD339	23 April
9	Christian - Pembroke	Stewart 14DD339	24 April
10	Caldwell - Crider	Pioneer 1197AM	10 May

Table 2. Grain Yield Response – 2021 Trial Sites.

Treatment	----------bu/acre, by Site----------						
Description	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Ave.
0 early 160 V8	242a[†]	192a	221a	166a	232b	262a	219
40 AP 120 V8	252a	184a	236a	169a	256a	259a	226
40 V2 120 V8	239a	193a	231a	161a	232b	263a	220
40 V4 120 V8	255a	199a	227a	166a	236b	265a	225
40 V6 120 V8	247a	195a	230a	177a	228b	263a	223
0 early 120 V8	253a	196a	215a	162a	242ab	249b	220
Site Ave. (reps)	248 (4)	192 (5)	227 (4)	167 (5)	238 (4)	260 (5)	222

[†]For any site, treatment yield values followed by the same letter are not significantly different at the 90 % level of confidence.

The 2022 season was more difficult, with droughty periods during the season. Some of those periods were quite lengthy, increasing N volatilization loss potential considerably. Two of the original six locations were lost to drought/poor weed control. The 2022 yield results, shown in Table 3 and with site averages ranging from 165 to 200 bu/acre, were interesting in several ways. First, except for Site 10, applying all N at V8 was as good as applying 40 lb N/A earlier and 120 lb N/A at V8. In 2022, applying only 120 lb N/A at V8 was generally inferior to all other treatments, except at Site 7. And though split N application was generally superior at Sites 8, 9 and 10, particular benefit was achieved when the first N application was delayed until at least V2-V4 at these three sites. This was especially true at Site 10, the last planted and driest location. Applying 40 lb N/A at-planting was problematic at Sites 9 and 10, the two lower yielding sites. This N appeared to be less effective, relative to the first N applications made at V2-V4, suggesting some at-planting N was lost. Soil N release from soil organic reservoirs appears to have been generally insufficient to carry the corn crop through until the V8 application was made but was sufficient to meet crop needs up to V2-V4 at most locations. This season's results gave a different outcome from that generally observed in the 2021 corn production season, where yield differences among the treatments were fewer.

Combining the yield data across the two seasons, several observations can be made. Generally, at 8 of 10 sites, there was no significant difference in how the 160 lb N/acre was split. All 160 lb N/acre could be delayed until V8 if need be as there were only two sites where waiting to apply all the N at V8 resulted in a yield loss. There was only one site where an at-planting 40 lb N/acre was needed to maximize yield. In 7 of 10 sites, 120 lb N/acre gave the same yield as most all of the 160 lb N/acre treatments, demonstrating that 160 lb N/acre was likely enough to maximize corn yield. This means that, on average, with 120 lb N/acre generating an average yield of 207 bu/acre at those 7 locations

(1, 2, 3, 4, 5, 7, and 9), there was an apparent NUE of = 0.58 lb fertilizer N/bushel. At the other 3 locations (6, 8 and 10), 160 lb N/acre was needed to maximize yield (and averaged 211 bu/acre) and gave an apparent NUE of 0.76 lb fertilizer N/bushel, which is still very respectable and may be due in part to the use of Super U.

In summary, answering the questions that were posed, we found that the timing of the first portion, 40 lb N/acre, was not very important to N nutrition. Generally, soil N coming from the mineralization of soil organic matter and the residues remaining from the previous crop was adequate to sustain small corn up to the V8 growth stage. We also observed that if a producer was forced to wait until V8 to apply all needed fertilizer N, there would only be a small risk of significant yield loss. Interestingly, soil drainage classification did not explain the yield response patterns observed. The benefit to split/delayed N application occurs regardless of the soil drainage classification.

Table 3. Grain Yield Response – 2022 Trial Sites.

Treatment	----------bu/acre, by Site----------				
Description	Site 7	Site 8	Site 9	Site 10	Ave.
0 early 160 V8	208a[†]	196ab	186ab	153b	186
40 AP 120 V8	197ab	206a	177b	168ab	187
40 V2 120 V8	180b	209a	190a	174a	188
40 V4 120 V8	191ab	203a	193a	175a	190
40 V6 120 V8	207a	202a	195a	169ab	193
0 early 120 V8	201a	184b	182ab	152b	180
Site Ave. (reps)	197 (4)	200 (4)	187 (4)	165 (5)	187

[†]For any site, treatment yield values followed by the same letter are not significantly different at the 90 % level of confidence.

Dr. John Grove
UK Agronomy/Soils Research & Extension (859) 568-1301 jgrove@uky.edu

Dr. Edwin Ritchey
UK Extension Soil Specialist (859) 562-1331 edwin.ritchey@uky.edu

Chasing the Silver Bullet – An Exercise in Futility?

This is the time of the year when contest winning corn and soybean yields are announced. Some of the winners set records for the highest yield ever – yields that can be as much as 3 or 4 times the average U.S. yield. Yields that high bring to mind the silver bullet syndrome – what single management practice was responsible for that extraordinary yield? The unspoken idea behind the silver bullet syndrome is - if we can identify a silver bullet, we can increase everyone's yield.

The production of yield by a crop community (a field of corn or soybean) is complex, starting with all the cycles, reactions and processes responsible for plant growth. The system requires a supply of raw materials (mineral nutrients, water and carbon dioxide), solar radiation to provide the energy to run the system, and the appropriate temperatures. Yield then is the integration of this system over the 100 to 120 or more days the crop takes to reach maturity. Identifying one aspect of this system, a silver bullet, which can be manipulated to dramatically increase yield is not easy.

Historical yield growth of corn and soybean was a result of genetic improvement (better varieties or hybrids) and improvement in crop management. Genetics removed negative plant characteristics (e.g., tendency to shatter and lodge, disease susceptibility) and improved the plant's inherent productivity. Management improved the crop's environment by controlling weeds, fertilizing, irrigating to avoid drought stress, manipulating planting date, row spacing, plant population, and controlling disease and insect infestations. These activities remove negative aspects from the crop's environment, pushing it closer to the perfect environment that will maximize yield. However, the closer the crop is to the perfect environment, the less room there is for improvement.

These improvements resulted in a steady increase in corn and soybean yields in the US, (1.9 and 0.5 bu/acre/year, respectively, based on trend lines from 1980 to 2023). These steady improvements don't provide much support for a role for a silver bullet – a single change that drastically increased yield.

We have a good idea of what it takes to produce high yields. High yield starts with the latest variety (hybrid) that has high-yield potential, good agronomic characteristics, and broad-spectrum disease and nematode resistance (when needed). Growing this variety (hybrid) in a fertile soil with high water holding capacity using recommended management practices (planting dates, populations, row spacings. fertility levels, good weed, disease and insect control) provides the foundation for high yields. Unfortunately, weather conditions and the water supply have the final say and they cannot be manipulated, unless irrigation is available. These management practices have evolved over many years and are the result of detailed field experimentation; testing and verifying individual practices in many environments.

It is worth noting that there are probably greater opportunities to improve efficiency of these systems

(principally as a result of new technologies – precision agriculture, see and spray systems, drones, remote sensing etc.) than to increase yield. Efficiency doesn't necessarily increase yield, but it can improve the all-important bottom line.

Chasing the silver bullet can distract producers from the use of tried-and-true best management practices known to provide high-yield potential. It can lead to excess and unnecessary fertilizer or pesticide applications that not only reduce profits but can contribute to pollution that may ultimately lead to unwanted governmental regulation. Overuse of pesticides may encourage development of resistance that reduces their effectiveness.

In my opinion, the search for a silver bullet that will lead to much higher yield is futile. Actually, it is worse than futile if it distracts producers from applying best management practices. If a silver bullet is found, it will be more likely to come from careful, detailed laboratory and field research than from haphazard trial and error efforts in farmer's fields. Producers will be better off focusing on applying well-understood best management practices as efficiently as possible to improve their bottom line and keep their banker happy. In these matters, it is a good idea to remember the words of Hippocrates (Greek physician, 460 – 375 BC) "There are, in fact, two things, science and opinion; the former begets knowledge, the latter ignorance".

Adapted from Egli, D.B. 2021. Applied Crop Physiology: Understanding the Fundamentals of Grain Crop Management. CABI. 156 pp.
https://www.cabidigitallibrary.org/doi/book/10.1079/9781789245950.0000

Dr. Dennis Egli
UK Professor Emeritus (859) 218-0753 degli@uly.edu

WINTER WHEAT MEETING

Feb 1, 2024

TOPICS INCLUDE:

- Keynote Speaker - Rick Siemer
- Wheat Crop Update
- Preparing Grain Producers for the Evolution of Carbon Markets
- Soil Ph Management
- Wheat Diseases Update
- Differences on Cereal Aphids Captured in Suction Traps vs Scout Sampling
- Capitalizing on Price Volatility in Soft Red Winter Wheat
- Kentucky Wheat a Perfect Scenario for Winter Annual Grass Weeds
- An Herbicide Resistance Screening Program for the Commonwealth of Kentucky
- Yield Contest Winners' Practices
- YEN – Dennis Pennington

Martin-Gatton College of Agriculture, Food and Environment
University of Kentucky.

Bruce Convention Center
Hopkinsville, KY 42240
9 am - 3 pm CT
Registration 8:30 CT

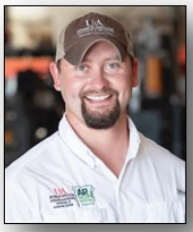
KENTUCKY Small Grain GROWERS' ASSOCIATION

For additional information email claurent@uky.edu

KCHC
Kentucky Crop Health Conference

Feb. 8, 2024 - National Corvette Museum - Bowling Green, Ky.

Speakers include University of Kentucky Extension Specialists
and invited nationally prominent Extension Specialists from across the United States



Thomas Butts
University of Arkansas

Topic: Drone Herbicide Applications: What Do We Need to Know for Success?

Nicholas Seiter
University of Illinois Urbana-Champaign

Topic: Above- and below- ground traits for insect management in corn – new tools, old pests, and resistance

Gregory Tylka
Iowa State University

Topic: Soybean Cyst Nematode: Past, present, and future

Carl Bradley
University of Kentucky

Topic: Red Crown Rot of Soybean: Disease Management and Potential Impacts of this New Disease on Soybean Production in Kentucky

Travis Legleiter
University of Kentucky

Topic: Dealing with the Stretch - Early Planted Soybean and Weed Control

Raul Villanueva
University of Kentucky

Topic: Abundance of Emergent Pests in the 2022-23 Corn and Soybean seasons in Kentucky

Kiersten Wise
University of Kentucky

Topic: It's always something! New corn disease concerns for Kentucky

Ticket sales close on Feb. 1, 2024

and are non-refundable after Jan. 25, 2024

Scan QR Code above or visit: https://kchc2024.eventbrite.com
Breakfast and lunch included — *Conference sign-in begins at 8:30 a.m. CST*

CREDITS — CCA: 5 CEUs, IPM — KY PAT: 6 CEUs Category 1A (Ag Plant); 1 CEU Category 11 (Aerial)
Tennessee PAT: 5 points each in Categories C01, C10 and C12.
Email jason.travis@uky.edu for more information

Italian Ryegrass Control Field Tour

Thursday, March 28, 2024
8:30 a.m. to 11:30 a.m.

Please meet at the Caldwell County Extension Office
1025 U.S. Highway 62 West, Princeton, KY
Sign-in begins at 8:30 a.m. CDT

A caravan will proceed to the UKREC in Princeton for plot tours of Italian ryegrass research

Please pre-register by scanning QR Code or clicking link:
https://uky.az1.qualtrics.com/jfe/form/SV_3w9zPIbfbHT33Jl

Credits — CCA: 3 CEUs for IPM; KY PAT: 1 CEU for Category 10, 2 CEUs for Category 1A

Italian ryegrass (aka Annual Ryegrass) is rapidly becoming one of the most problematic weeds in no-till corn and soybean production in Kentucky.

Presented by **Dr. Travis Legleiter, UK Extension Associate Professor - Weed Science**, this field tour will highlight the options available to Kentucky farmers for maximum control of this problematic weed in the fall and spring prior to corn and soybean planting.

For more information about the field tour call (859) 562-2569.

Cooperative Extension Service
Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development
Community and Economic Development

MARTIN-GATTON COLLEGE OF AGRICULTURE, FOOD AND ENVIRONMENT

Lexington, KY 40506

UPCOMING EVENTS

2024 Winter Wheat Meeting

February 1, 2024

Kentucky Crop Health Conference

February 8, 2024

Italian Ryegrass Control Field Tour

March 28, 2024

KATS Planter Workshop

April 4, 2024

Wheat Field Day

May 14, 2024

KATS Crop Scouting Workshop

May 21, 2024

KATS Soil Properties & Their Impact on Delivering Water & Nutrients

June 6, 2024

Pest Management Field Day (IPM Grain Crops)

June 27, 2024

Corn, Soybean & Tobacco Field Day

July 23, 2024

KATS Field Crop Pest Management & Spray Clinic

August 29, 2024

Cooperative Extension Service
Agriculture and Natural Resources
Family and Consumer Sciences
4-H Youth Development
Community and Economic Development

Educational programs of Kentucky Cooperative Extension serve all people regardless of economic or social status and will not discriminate on the basis of race, color, ethnic origin, national origin, creed, religion, political belief, sex, sexual orientation, gender identity, gender expression, pregnancy, marital status, genetic information, age, veteran status, or physical or mental disability. University of Kentucky, Kentucky State University, U.S. Department of Agriculture, and Kentucky Counties, Cooperating.

LEXINGTON, KY 40546

Disabilities accommodated with prior notification.