Corn & Soybean News

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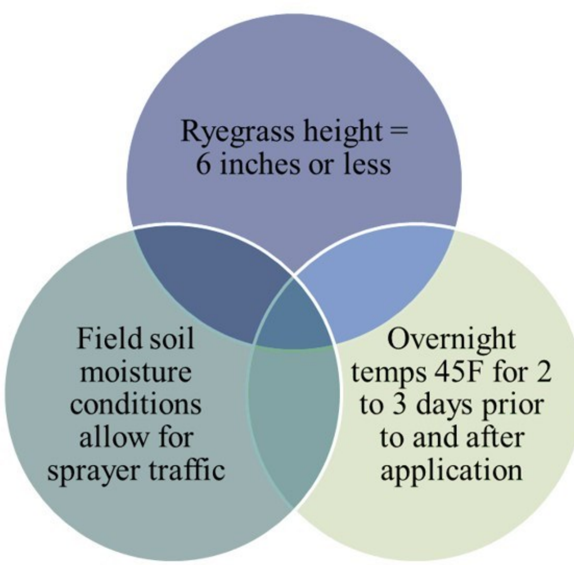
Considerations for Ryegrass and Marestail Burndowns in 2022

Spring is rapidly approaching, and field work will soon begin in Kentucky with spring weed control practices taking front stage. This year our farmers are facing the additional challenge of herbicide shortages. In many casesfarmers may have to make difficult decisions about when and where to use the limited supply of product available to them. A comprehensive list of options for spring burndowns with considerations of herbicide shortages was included in the January 2022 Corn and Soybean Newsletter. The goal in this article is to follow up with specific recommendations for two of our more problematic winter annuals in Kentucky.

Italian (annual) ryegrass

This weed is a well-known pest in Kentucky wheat, but the number of complaints of failed burndowns on annual ryegrass in corn and soybean is on the rise. The number one call received in the spring of 2021 was about burndown failures on ryegrass. This weed is no longer just a wheat problem for Kentucky it is a problem in all row crops.

Annual ryegrass emerges in the fall, rapidly grows into the late fall putting on a couple of tillers, then continues to grow in the early spring. Annual ryegrass is one of the first weeds to green up in late winter and will begin rapid growth in March and early April. The key for successful annual ryegrass burndown is all about timing. Successful annual ryegrass burndowns occur in the window when the following three conditions are occurring at the same time:



This window capturing both the correct growth stage and air temperatures can be difficult to find, especially when you also consider that field soil conditions need to be dry enough for sprayer traffic. Although, this year with herbicide shortages it is as critical as ever to hit this window, as resprays may not be possible due to shortages.

In evaluations of spring burndown options for ryegrass control in Kentucky, the following keys stand out:

- Use at least 1.5lb ae/a glyphosate (See table 1 for glyphosate rate based on formulation)
- Mixtures of 1.5 lb ae/a glyphosate plus 1 fl oz Sharpen results in the consistently greatest ryegrass control
- Avoid tank mixing glyphosate and atrazine or metribuzin as these products will antagonize glyphosate activity in ryegrass

The additional challenge this year is that one of the products that is at the top of the shortage list is glyphosate. The temptation is to either pull glyphosate out of burndown application or cut the rate of glyphosate. While this strategy may be viable for other burndown scenarios, it is not an option when dealing with Italian (annual) ryegrass. If there is one place you should prioritize the use of glyphosate in burndown applications, it should be on fields with ryegrass.

For those dealing with ryegrass in corn the temptation is to put the burndown and preemergence herbicide on at the same time prior to corn planting. While that has proven to be successful for the majority of acres and weed species, the inclusion of a pre-emerge herbicide that likely contains atrazine can antagonize the glyphosate. In these scenarios a farmer is better suited to apply their burndown without atrazine early in the spring and follow with an at planting application of the atrazine based residual herbicide.

Again, 2022 is the year we want to avoid initial burndown failures, as our respray or rescue options will be extremely limited.

Marestail (horseweed)

Another culprit that continues to be problematic for Kentucky grain crop growers is marestail or horseweed. Marestail is most troublesome due to its seemingly random emergence patterns. Marestail can emerge in the fall, early spring, late spring, as well as throughout the early summer months. While the majority of our marestail emerges in the fall or in the early spring, the continual emergence into the summer makes this species especially troublesome for soybean farmers.

The biggest key for marestail management is burndown timing, regardless of what herbicide you are using for your burndown. In 2022, it will be critical that farmers are making applications to small rosette stage marestail to assure efficacy of that application. The wide range of emergence timing for marestail means every field is likely to have different stages of marestail. Scouting fields now and into early March will be key to identifying fields with fall emerged marestail that need earlier burndowns to achieve optimal marestail control.

Overall, we have found the following burndowns to be most effective for marestail:

- Glyphosate (0.75 to 1.5 lb ae/a) plus Sharpen (1 fl oz/a)
- Glyphosate (0.75 to 1.5 lb ae/a) plus Dicamba (0.25 to 0.5 lb ae/a)
- Glyphosate (0.75 to 1.5 lb ae/a) plus 2,4-D (0.7 to 1 lb ae/a)
- Glyphosate (0.75 to 1.5 lb ae/a) plus Elevore (1 fl oz/a)
- Glyphosate (0.75 to 1.5 lb) plus Reviton (1 fl oz/a)
- Liberty (29 to 36 fl oz/a)

In the few cases of a field lacking winter annul grass pressure, the option to eliminate glyphosate from the burn-down should be considered in light of the 2022 shortages. A few burndown mixtures without glyphosate that have shown high marestail control are:

- Dicamba plus Sharpen
- 2,4-D plus Sharpen
- Dicamba plus Reviton
- 2,4-D plus Reviton

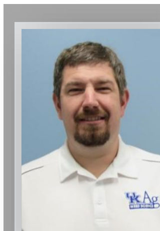
Another alternative for those fields with low winter annual grass pressure and high broadleaf and marestail pressure is Gramoxone. A mixture of Gramoxone plus metribuzin plus dicamba or 2,4-D has shown to beeffective on marestail. The use of Gramoxone also has the additional benefit of controlling small winter annual grasses, which the above non-glyphosate options do not offer. The recent introduction of Enlist E3 and RR2Xtend/RR2XtendFlex soybean varieties has greatly increased the flexibility of 2,4-D and Dicamba for burndown applications in front of soybean planting for effective marestail control. Farmers using either of these soybean systems in fields with marestail are encouraged to take advantage of this flexibility and use these effective growth regulators for spring burndowns.

Table 1. Glyphosate product formulations and equivalent use rates to achieve outputs of 0.56, 0.75, 1.13, and 1.5 pounds glyphosate acid equivalent per acre.

Example Product(s)*	**Formulation** *lb ae/gal***	**Rate Equivalents**			
		0.56 lb ae/a	**0.75 lb ae/a**	**1.13 lb ae/a**	**1.5 lb ae/a**
Buccaneer Plus, Cornerstone Plus, Mad Dog	3	24 fl oz	32 fl oz	48 fl oz	64 fl oz
Buccaneer 5	3.75	19 fl oz	26 fl oz	38 fl oz	52 fl oz
Durango DMA, Conerstone 5 Plus, Credit 5.4 Extra	4	18 fl oz	24 fl oz	36 fl oz	48 fl oz
Abundit Edge, Credit Xtreme	4.5	16 fl oz	22 fl oz	32 fl oz	44 fl oz
Roundup PowerMAX 3	4.8	10 fl oz	20 fl oz	30 fl oz	40 fl oz

* A complete list of glyphosate products can be found on page 21 of the [2022 edition of AGR-6]

** Glyphosate in pounds acid equivalent per gallon



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Calcium or Lime? Which raises soil pH?

Soils become acidic for different reasons, but the primary reason in Kentucky's production agriculture is nitrogen (N) fertilizer application. Managing soil pH is a crucial part of your crop production program and can be monitored with regular soil sampling and testing. With the soil test report, you know the active acidity (water or salt pH) and the buffer pH (Sikora buffer) values that guide the rate of liming material needed to adjust soil pH to the range desired for a given crop. Soil testing is important for soil pH management.

By definition, an acidic soil has a higher concentration of hydrogen ions (H^+) than hydroxyl ions (OH^-) in the soil solution. However, a soil pH of ~6.5 is considered ideal for Kentucky row crops. Liming agents such as ag lime, pelletized lime, and other materials that consume hydrogen ions (acidity) are used to raise soil pH in agricultural fields. Ag lime consists of either calcitic ($CaCO_3$) or dolomitic ($CaMg(CO_3)_2$) limestone, in a range of particle sizes, and is bulk spread over the soil to neutralize soil acidity. Pelletized lime is typically calcitic limestone and consists of smaller particles that are pressed into a "pellet" and held together using a chemical binding agent. This reduces dust and improves spreading performance.

Below is the generalized acid neutralizing reaction using calcitic limestone.

$$CaCO_3 + 2H^+ \rightarrow H_2CO_3 \rightarrow H_2O + CO_2 + Ca^{2+}$$

The reaction shows that acidity (H^+) is consumed by carboxyl ions (CO_3^{2-}) to form water (H_2O) and carbon dioxide (CO_2). Although calcium (Ca^{2+}) is often thought to be the cause of soil pH change with limestone addition, Ca^{2+} actually has nothing to do with the neutralizing reaction. An example of this is shown below, when gypsum ($CaSO_4$) is applied to the soil.

$$CaSO_4 + 2H_20 + 2H^+ \rightarrow Ca^{2+} + SO_4^{2-} + 2H_2O + 2H^+$$

The reaction shows that hydrogen ions ($2H^+$) are still present after dissolving the added gypsum because gypsum is a simple salt. The dissolved sulfate (SO_4^{2-}) present is not a base and cannot react with, and neutralize, the acid hydrogen ions ($2H^+$) in the reaction. The same is true for other salts, such as calcium chloride ($CaCl_2$) or calcium nitrate ($Ca(NO_3)_2$), where there is no liming ability in either product - as shown in the following reaction for $CaCl_2$.

$$CaCl_2 + 2H^+ \rightarrow Ca^{2+} + 2H^+ + 2Cl^-$$

In short, hydroxides (OH^-), oxides (O^{2-}) and carbonate (CO_3^{2-}) ions are required to neutralize H^+ ions, effectively raising soil pH. Calcium (Ca^{2+}) and magnesium (Mg^{2+}) ions have nothing to do with soil pH change.

The effectiveness of limestone is determined by the purity of the material, referred to as the calcium carbonate equivalence (CCE), and the particle size of the material. The smaller the particle size of limestone the more quickly it will react with the soil when applied. The combination of particle size and CCE is used to calculate the relativeneutralizing value (RNV) of the product in the following equation.

RNV (%) = CCE/100 x [0.5 x (% passing 10 mesh + % passing 50 mesh)]

Now that we have a basic understanding of how acidic soils are neutralized, we will share the preliminary findings of a liming study being conducted across the state. The objectives of this study were to compare the effectiveness of liquid calcium, pelletized lime and agricultural lime in raising soil pH in both the laboratory and the field.

The experiment was conducted at 16 locations across the state in forage production fields (pastures or hayfields). The target soil pH for site selection used for this experiment was 6.0, but this target was not always met. Once the site was identified, plots (5 ft by 5 ft) were established, an initial soil sample was collected, and treatments were applied. Treatments included an untreated check, liquid calcium (Advanced-Cal, AgriTec International) at 5 gallon per acre, pelletized lime (RNV of 83) at 2.4 ton/A, and agricultural (ag) lime (RNV of 77) at 2.6 ton/A. The rate of lime used at all locations was 2 ton/A with an RNV of 100 and both pelletized and ag lime rates were adjusted upward according to their RNV values. Soil samples were collected again, later in the season, typically when the producer harvested hay 2 to 3 months later. A laboratory soil incubation study was conducted in conjunction with the field study. Soil with an initial pH of 5.2 was incubated in specimen cups and maintained at 80% water-filled pore space. Treatments equal to those used in the field study were applied and mixed into the soil in the cups. Soil pH was then measured at 1 and 3 months of incubation (Table 1 – first three columns).

The soil samples from the field study sites were collected approximately three months after treatments were applied. The average pH prior to treatment application was determined and then determined again on the samples taken later (Table 1 – fourth column). This data shows that there was little to no change in soil pH in the untreated check and liquid calcium (Advanced-Cal, AgriTec International) treatments in the laboratory incubation (Table 1). In the field, both these treatments actually resulted in a decrease in soil pH, relative to the initial field soil pH. Both pelletized and ag limes caused a positive change in field soil pH, between 0.30 and 0.40 pH units. Similar trends were observed in the laboratory study, which shows that pelletized and ag lime amended soils exhibited increased soil pH with time while the check and liquid calcium treated soils did not. The soil pH changes with time show the natural progression of soil pH decline when liming agents are not used and soil pH increase when high quality liming agents are used.

Table 1. Lab soil pH values with incubation time, and field soil pH change after 3 months.

Product	Lab soil pH (initial)	Lab soil pH (1 month)	Lab soil pH (3 months)	Field soil pH Change (3 months)
Check	5.2	5.2	5.1	-0.08
Liquid Calcium	5.2	5.3	5.0	-0.03
Pelletized Lime	5.2	5.9	6.3	+0.30
Ag Lime	5.2	6.1	6.2	+0.40

Both pelletized lime and ag lime have increased soil pH during the measurement time frame in these experiments. Both are effective liming agents. The liquid calcium product has not raised soil pH and is not an effective liming agent. This comes back to the liming reactions shown above. There must be something present to consume the soil acidity, such as carbonate, hydroxyl or oxide, and the liquid calcium product has none of these. The pH of the liquid calcium product was measured in-the-jug and found to be 4.5, which means that this product would actually lower the pH of most field soil if a large quantity were applied. Fortunately, a 5 gallon/A use rate is not enough to alter soil pH one way or the other in most any agricultural field.

Another factor to consider is the cost of the products. Prices vary from location to location and should always be checked prior to making any decision on input purchases. In western Kentucky at the time this study was initiated ag lime was roughly $15 per ton or less. There is an additional delivery/spreading fee associated with this. Pelletized lime was between $200 and $300 per ton and still has an associated spreading fee. We purchased the liquid calcium for approximately $30 per gallon with a recommended use rate of 2-4 gallons per acre. Ignoring application fees, this works out to about $30/A for ag lime, $400-600/A for pelletized lime and $60-120/A for liquid calcium. An advanced degree in mathematics is not needed to determine which is the better route to go when trying to neutralize soil acidity, especially when one of the products doesn't actually raise soil pH.

In closing, there are many products on the market that make great claims. Some even work. However, when a person is deciding on the best way to lime a production field there are two primary questions that need to be answered. Does the product work? What does it cost? Pricing the proven products will go a long way towards making good agronomic and economic decisions for soil pH management.

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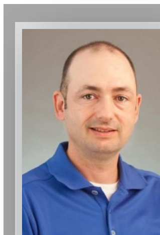

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UKREC summer intern Ben Setchell also contributed to this article.

Register now for "Scabinar", a Free National Webinar on Fusarium Head Blight (Scab) of Small Grain Crops

A free national webinar event focused on Fusarium head blight (also known as "scab") of small grain crops, known as "Scabinar", will be held on March 15, 2022 at 10:00 AM – 12:00 PM CST (11:00 AM – 1:00 PM EST). Fusarium head blight is the most damaging disease of wheat, barley, and rye grown in Kentucky, and can cause devastating economic losses to Kentucky farmers. Caused by the fungus *Fusarium graminearum*, Fusarium head blight causes both yield and quality losses. In addition to reducing test weight, the Fusarium head blight fungus also produces a toxin, known as deoxynivalenol (DON or "vomitoxin") that contaminates grain. This toxin is regulated by the FDA and tested for at grain elevators. Market price discounts or sometimes outright rejection of contaminated seed lots can occur when high levels of DON are detected. However, management of Fusarium head blight and DON is possible, using the best management practices available.

The Scabinar event is sponsored by the U.S. Wheat and Barley Scab Initiative and will feature presentations and panels composed of experts across the country. The first hour of the Scabinar will focus on the biology of the pathogen, *Fusarium graminearum*, and the second hour will focus on management of Fusarium head blight. Certified Crop Advisers (CCAs) will be able to earn 2 continuing education units (CEUs) for attending the live Scabinar online. Registration is required to attend the live Scabinar. More information about the event and how to register is available at: https://scabusa.org/scabinar.

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2022 IPM Training School

March 9, 2022

College of Agriculture, Food and Environment

Location
Christian County
Extension Office
2850 Pembroke Road
Hopkinsville, KY 42240

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Program

Field Crops Session – Morning

8:00	**Registration**	
8:30	**Welcome**	**Dr. Ric Bessin**
8:45	Spots, Rots, and Syndromes: Managing Challenging Soybean Diseases	Dr. Carl Bradley
9:15	Updates on Entomological Studies in Corn and Soybeans: 2020-2021	Dr. Raul Villanueva
9:45	Blue Water Farms – Edge-of-Field Water Quality Monitoring in Western Kentucky	Dr. Brad D. Lee
10:15	**Coffee Break**	
10:30	An integrated Approach to Optimizing the Productivity of Grassland Ecosystems	Dr. Chris Teutsch
11:00	Managing Soil pH-the Foundation of a Good Soil Fertility Program	Dr. Edwin Ritchey
11:30	**Lunch Break (on your own)**	

Horticulture Session – Afternoon

12:30	Limiting Pests Using Exclusion Netting in Fruits and Vegetables	Dr. David Gonthier
1:00	Soilborne Fungi in Vegetables: Management of Persistent Disease Agents	Dr. Nicole Gauthier
1:30	Rotational Practices for Vegetable Crops to Prevent or Reduce Disease Pressure	Dr. Rachel Rudolph
2:00	**Coffee Break**	
2:15	Weed Management in Turf	Dr. Shawn Wright
2:45	The Future is Now: Novel Horticulture Pest Management Techniques	Dr. Jonathan Larson

To register to attend the in person or online meeting Click Here

	Field Crops Session - CEUs	Horticulture Session - CEUs
Pesticide Applicator	2 General and 1 Specific for Categories 1A and 10	1 General and 1 Specific for Categories 1A and 10
Certified Crop Adviser	Nutrient Mgmt:1; Soil & Water Mgmt:0.5; IPM: 1	IPM: 2.5

2022 Upcoming Events

Date	Event
March 9	IPM Training School
May 10	Wheat Field Day
July 21 or 26	Corn, Soybean & Tobacco Field Day
July 28 (tentative)	High School Crop Scouting Competition