Influence of pH on Carryover of Triketone Herbicides in Missouri No-till Corn and Soybean Rotations

Missouri Fertilizer and Lime Council

Progress Report

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Accomplishments in 2007:

- Lime and iron sulfate applications were made in late winter/early spring to maintain the desired range in soil pH levels. The soil pH treatments in this experiment are: 1) high lime, 2) low lime, 3) high acid (iron sulfate), 4) low acid (iron sulfate), and 5) 'no amendment' (limed just enough to maintain initial pH). Lime was applied to the 'high lime' plots and iron sulfate was applied to the 'high acid' plots. These applications were made based on the fall 2006 pH in each plot, as these plots had been maintained with varying soil pH levels at the Bradford Research and Extension Center for a number of years. A small lime application was also made to the 'no amendment' treatment (the first in 9 years) to counteract the acidifying effect of nitrogen fertilizer over that span and return the treatment to its original pH.
- One-half of the research area was no-till planted into corn while the other half of the research area was no-till planted into soybeans. The experiments were arranged in a split-plot design with four replications of four herbicide treatments and five soil amendment treatments/pH ranges. Soon after corn planting, a preemergence application of Dual II Magnum® (*S*-metolachlor) was made to reduce early season weed competition and reduce overall weed pressure. Dual II Magnum® is also labeled for use in soybean, thus there is no chance of carryover injury to soybean in 2008 as a result of applications of this herbicide. A Roundup Ready® corn and soybean hybrid was also utilized in these experiments in order to keep all plots weed-free throughout the season with applications of glyphosate (Roundup®).
- Herbicide treatments evaluated for carryover potential in 2008 were applied on June 21st to corn that was 29- to 30-inches tall. The herbicide treatments applied to each soil amendment treatment were 1) Callisto® at 3 fluid ounces per acre, 2) Impact® at 0.75 fluid ounces per acre, 3) Laudis® at 3 fluid ounces per acre, and 4) an untreated control.
- One month after the herbicide treatments, soil pH was measured in each plot. Results from the soil testing laboratory indicate that the soil amendment treatments listed above provided the following average soil salt pH values for the various treatments: 1) high lime = 7.1, 2) low lime = 6.6, 3) high acid = 4.3, 4) low acid = 5.0, 5) no amendment = 5.9.
- Corn and soybeans were harvested from all plots with a small plot combine and grain yields determined. Although this first year was a set-up year in this experiment, yields

were taken in order to determine the response of corn and soybean yields to the varying soil pH's that have been established. As expected, the only factor that had a significant influence on corn or soybean yield in the 2007 experiments was soil pH. The following table provides these results:

Treatment	Yield[a] Corn	Yield[a] Soybean
	---------- Bu / A ----------	
Low Lime (avg. pH_s 6.6)	157 a	43 b
High Lime (avg. pH_s 7.1)	155 a	45 a
Low Acid (avg. pH_s 5.0)	156 a	44 ab
High Acid (avg. pH_s 4.3)	147 b	38 c
No Soil Amendment (avg. pH_s 5.9)	150 ab	43 b

[a]Means followed by the same letter are not different, $P \leq 0.05$.

Objectives for 2008:

- All corn plots from 2007 will be rotated into soybeans. A Roundup Ready® soybean variety will be no-till planted and early-season soybean stunting and injury in response to the previous corn herbicide treatments and pH levels will be evaluated visually and by measuring the heights of soybeans in response to each treatment. All soybean plots will be maintained weed-free throughout the season and soybeans will be harvested with a small plot combine.
- Conversely, all soybean plots from 2007 will be no-till planted with corn and the same four triketone herbicide treatments discussed previously will be applied to plots having the variation in soil pH values. As in the first year experiments, corn will be harvested and grain yields determined.

Budget Request for 2008 (Same as 2007):

Category	2007	2008	2009	Total
Salary				
Research Associate (20% in years 1 & 2, 10% in year 3)	12,000	12,000	6,000	30,000
Fringe Benefits (31%)	3,720	3,720	1,860	9,300
Materials and Supplies (seed, stakes, herbicides, etc.)	1,000	1,000	500	2,500
Soil Analyses	800	800	800	2,400
Total	$17,520	$17,520	$9,160	$44,200