CALCIUM PRODUCTS INCORPORATED

First Things First
Dealer eletter
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Is Soil pH Affecting Your Soil-Applied Herbicide?

Note: This eletter is intended as a general guide to herbicides and pH. It is not a substitute for herbicide labels, nor promotes or discourages the use of one or more herbicides.

Soil pH can make a big impact on soil-applied herbicides. Low soil pH (<6.2) will cause the triazine herbicides (Atrazine, Sencor) to be bound to the soil. When herbicides are *adsorbed* they are not effective at controlling weeds since they are not available in the soil solution.

This is why pH sensitive herbicides like Atrazine, and Sencor can be used with less risk of crop injury in low pH soils. At low pH higher rates are need to control weeds. Crop injury increases when pH is higher.

When higher rates of herbicides are used in an attempt to get better weed control in low pH soils, herbicide residue in the soil increase. These bound herbicides are released if the soil is over-limed. If AgLime is postponed until just before planting, this release of bound herbicide can have serious detrimental effects on sensitive crops.

"Over-liming" Injury

Sometimes there are problems when soils are limed with large amounts of AgLime. Spreading more lime than required or quickly raising a very acidic soil can cause crop injury. If there is a long history of triazine herbicides used, liming can release these chemicals and kill sensitive crops.

Decreased crop growth because of "over-liming" injury is usually associated with lowered availability of phosphorus, potassium, or boron. Over-liming acidic sandy soils can produce zinc and copper deficiencies

Nutrient deficiency is a blamed for poor crop since symptoms of Atrazine, and Sencor do not develop until 2 to 3 weeks after emergence. Moldboard plowing can reduces phytotoxicity of Atrazine, and Sencor by diluting the herbicide residue in a large volume of soil.

The best way to avoid these problems is to consistently maintain the soil pH above 6.2. Applying SuperCal 98G minimizes the adsorption of triazine herbicides to the soil and results in improved crop safety and performance. Properly limed fields will reduce the residual herbicide in the soil and avoid large release of bound herbicide causing crop injury.

Poor Performance and Carry-over

The half-life of many herbicides varies with soil characteristics and environment. For example, the half-life of atrazine in Georgia on a soil with a pH of 6.8 was reported to be 39 days, whereas in Minnesota the half-life was 261 days on a soil with a 7.9 pH.

Whether a herbicide has basic, acidic or neutral properties can

Improve soil to battle weeds?

Why is this field clean of foxtail except for the strip in the foreground and the mess along the woods?

This field has always had a severe foxtail problem for as long as anyone can remember. It did not matter what herbicides were used.

Our neighbor began farming this field. In 2001, he applied gypsum to correct the soil, which was too high in magnesium but ran out before finishing the last pass along the woods. Since then, the foxtail is virtually gone except on the headland and the area where no gypsum was applied.

Did the gypsum kill the foxtail? No, but this field is very typical of many here. The high magnesium content makes the soil hard and crusty. These are conditions that favor foxtail. The addition of calcium sulfate (gypsum) raises the calcium while lowering the magnesium, softening the soil, making it less crusty and less favorable to foxtail. When the soil environment was improved, foxtail was no longer the plant "best suited" for the field.

More than 20 years of applying herbicides on this field were a waste of effort and money. They did not change the soil conditions that were causing foxtail to be the dominant species. A small amount of gypsum was far more effective. Not only did it get rid of the foxtail, but it improved the growing conditions for the crops as well.

But don't try this without a soil test! Soil amendments like gypsum or lime should not be applied unless a soil test shows an imbalance or deficiency. If gypsum were applied to a soil that is too low in magnesium, it could actually make the deficiency worse.

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determine its ability to exist in the soil solution or adsorbed by soil solids. In general, herbicides whose pH is close to the pH of the soil are strongly adsorbed and are not subject to runoff or leaching. In contrast, herbicides whose pH is not close to that of the soil are likely to stay in the soil solution and are subject to runoff or leaching. Herbicides in the soil solution are more available for plant uptake than strongly adsorbed herbicides.

Soil pH Effects on Carryover & Breakdown of some herbicides.

Herbicide	Effects of pH
Clomazone (Command)	Carryover at low pH (<6)
Prosulfuron (Exceed, Spirit)	Breakdown increases when soil pH is below 6.8 Carryover greater on high pH soils (>7.5)
Imazethapyr + imazapyr (Lightning) Imidazolinones (Pursuit) Flumetsulam (Python/Broadstrike) Imazamox (Raptor)	Rate of breakdown increases as soil pH increases Carryover is greater on low pH soils (<6)
Triazines (Atrazine), Simazine (Princep), Chlorimuron (Canopy, Synchrony STS)	Less available at low pH, bound to soil (<6) More available to plants over 7.5 pH
Sulfonylureas (Accent)	Carryover at higher pH, (>6.8) Reduced efficacy at low pH <6.0
Halosulfuron (Permit) Rimsulfuron (Matrix and Resolve)	Breakdown faster with pH above and below 7.0 Herbicide breakdown is slowest in neutral soil pH of 7.0
Cloransulam (FirstRate)	Breakdown increases until 7.8, Do not apply over 7.8 pH

Additional determinants of herbicide behavior include soil texture and organic matter

Some herbicides will be neutral or uncharged regardless of soil pH. Pendimethalin and Metolachlor are examples of this type of herbicide. Rate recommendations for these herbicides are made strictly on the basis of soil texture and % organic matter.

Many herbicide complaints can be avoided by keeping soil pH in the proper range. Most herbicides perform much better at pHs of 6.5 to 6.8. When making herbicide recommendations, it is important to know what the pH of the soil the chemical is being applied to. If pH is not optimal, herbicides may not kill intended weeds and/or cause crop injury.

When scouting fields for complaints one can use "indicator weeds" as a rough estimate of the soil pH. A soil sample is the best way to accurately determine pH.

Weeds that can indicate soil pH

High pH	Low pH
Dandelion, Common Sagebrush, Clover, Bellflower, Chamomile, Pennycress, Field Peppergrass	Field Bindweed, Buckhorn, Burdock, Curly Dock, Common Chickweed, Wild Ox Eye, Hawkweed, Horsetail, Knapweed, Common Mullein, Quackgrass, Canadian Thistle, Waterhemp

Soil moisture is also a factor

To be effective, the herbicide must also be present in the zone of the soil profile where the majority of weed seeds germinate. In no-till rain is need to work in soil-applied herbicides. Typically a 0.5-inch of rain is sufficient to 'activate' most herbicides. This amount can vary among soil types and the soil moisture content prior to the rainfall event. A dry soil requires more rain than a moist soil. This is because rainfall must wet a dry soil before significant movement of the herbicide will occur.

Using SuperCal SO4 can help increase water infiltration, decrease runoff and soil erosion.

Maximize fertilizer and chemical usage, resulting in better yield, make sure you are using SuperCal 98G and Super Cal SO4 when needed.