

Spring-Applied Aglime Can Provide Immediate Soybean Response

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Maintaining proper soil pH is the foundation of a good soil fertility and nutrient management program. Agricultural limestone (aglime) use where needed remains a good investment and is a critical best management practice (BMP) in crop production. With increased nitrogen (N) use for rotational crops, larger amounts of crop residues associated with reduced tillage practices, and higher yields, soil acidity and aglime needs should be monitored through soil testing.

Many farmers believe that if they don't apply aglime at least six months ahead of the crop, they won't see a benefit. While it is best to apply aglime and incorporate it well in advance of the targeted crop, university research in the Midsouth U.S. indicates good crop responses can be experienced when it is applied as late as planting time.

Liming Materials

High quality aglime has a calcium carbonate equivalence (purity) of 90 percent or more. It also has a desirable distribution of effective particle sizes. In quality aglime, 90 percent of the particles pass a 10 mesh sieve, 40 percent pass a 60 mesh sieve, and 25 percent pass a 100 mesh sieve. Each ton may contain 500 lb or more of fine particles that begin to neutralize soil acidity immediately. Larger particles (60 to 100 mesh) react over sev-

eral months. Even larger particles within the range of 10 to 60 mesh may require a year or longer to neutralize soil acidity.

Other liming materials include fluid or suspension lime and pelletized lime. Fluid lime is a mixture of fine lime (often 200 mesh or finer), water, and a suspending agent in about a 50:50 mix of water and fine lime particles. Pelletized lime is fertilizer granule-sized pellets made from relatively fine limestone particles. As much as 50 to 70 percent of the

aglime used to make the pellets is 100 mesh or finer. The final pellet size is comparable to fertilizers so that pelletized lime may be spread by conventional fertilizer spreaders.

In central Arkansas, aglime costs range from \$12 to \$24 per ton spread. The price of pelletized lime often ranges from \$90 to over \$100 per ton spread. Fluid or suspension lime may be priced near \$30 per ton spread. This equates to about \$60 per ton of dry, high quality aglime. Transportation distance is one of the major factors affecting the price of the various sources.

Comparison of Liming Materials

Applications of 250 to 300 lb/A of pelletized lime have been suggested as a substitute for one ton of aglime. At a 250 to 300 lb/A rate of pelletized lime, costs might range from \$11 to \$15 per acre. Lower rates are normally intended only to

Research in the Midsouth shows that application of good quality agricultural limestone can have beneficial effects on soybean yields even when applied immediately prior to planting.

maintain soil pH at present levels, or to prevent further pH decline.

Arkansas research with aglime and pelletized lime was recently conducted on a Loring silt loam soil with a 3 to 8 percent slope and a 4.8 water pH, using no-till soybeans (nonirrigated) doublecropped after wheat. Liming materials were applied in early July and a disk was used to very lightly scratch the soil surface to help ensure the materials stayed in place on the slope. The results indicate that it would take about 500 to 700 lb/A of pelletized lime to equal the soil reaction and soybean yield response from one ton of good quality aglime (**Figure 1**). Both were effective in increasing no-till soybean yields even with minimal incorporation.

Similar work with soil-incorporated fine lime (100 mesh) and aglime has been conducted in Tennessee. The fine lime material was suspended in water and applied as fluid lime. **Figure 2** illustrates the pH response measured within 100 days of application. Little change in soil pH was noted until lime rates were 1,000 lb/A or greater.

First-year soybean lime responses in Tennessee (**Figure 3**) were about 6 bu/A and peaked at the recommended rate of 2 tons/A of aglime. A rate of about 500 lb/A of fine lime was required to produce a significant yield response. Responses over a five-year period (**Figure 4**) of continued aglime application rose to about 14 bu/A with a net application of 4 tons/A.

Summing up, here are several guidelines.

- Recommended rates of good quality aglime can significantly change soil pH within 100 days of application, and frequently within 45 to 60 days, if properly incorporated.

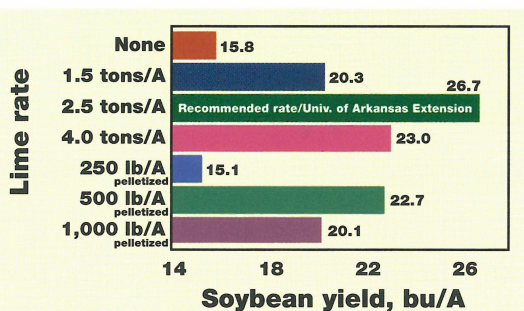


FIGURE 1. Doublecropped soybean responses to aglime and pelletized lime.

Source: Muir et al., Arkansas

- Low rates (250 lb/A) of pelletized lime are not an agronomic or economic substitute for one ton of good quality aglime.

- It may take 1,000 lb/A or more of fluid lime (50 percent water: 50 percent 100 to 200 mesh fine limestone) or 500 to 900 lb/A of pelletized lime to provide the

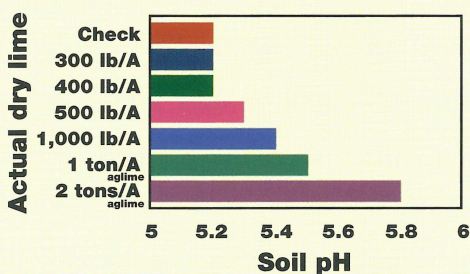


FIGURE 2. Soil pH 100 days after lime application.

Source: Lessman, Tennessee

same short-term response as one ton of good quality aglime.

- Use of low rates of pelletized lime or fluid lime will probably result in a need to re-lime sooner than if recommended rates of aglime are used.

- If pelletized lime is used, it should be allowed to “melt-down” with rain or irrigation before soil incorporation. Subsurface banding of lime has failed to show any practical yield benefits com-



SOYBEAN DEVELOPMENT suffered in this field area with soil pH of 4.1. Manganese toxicity also affected the plants, with "crinkle leaf" symptoms.

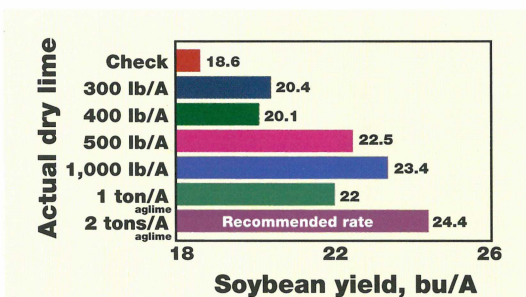


FIGURE 3. Aglime effects on soybean yields – first year.
Source: Lessman, Tennessee

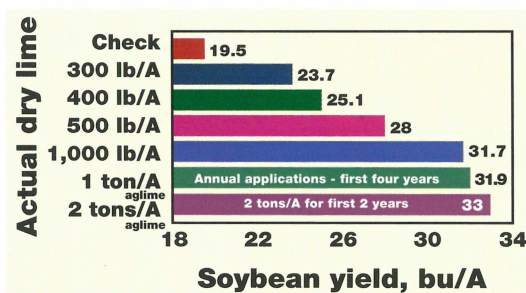


FIGURE 4. Annual aglime application effects on soybean yields – five-year average.
Source: Lessman, Tennessee

pared to broadcast, soil-incorporated aglime at recommended rates.

Recommended rates of aglime applied ahead of soybean planting have resulted in yield increases of 4 to 10 bu/A or more the first year, and also for the next three to seven years. One of the major benefits from liming is an increase in the availability of soil molybdenum (Mo) when the soil pH is increased. If the decision is made not to lime acid soybean land, then a Mo seed treatment should be considered.

When soils are strongly acidic and Mo is not used, response to applied phosphorus (P) and potassium (K) may be limited. Maximum efficiency in nutrient uptake by plants will not be realized unless the root environment is maintained in the desirable pH range, usually 5.8 to 6.5 for southern soybeans. **BC**

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