

When and how to apply aglime

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Aglime is used to neutralize soil pH. Because lime reacts relatively slowly, it needs to be in place well before planting acid-sensitive crops such as alfalfa to allow adequate time for the pH change to occur. This publication describes the considerations for deciding when to apply lime and the best strategy for applying it.

When to apply aglime

When deciding the time to apply aglime there are several things you should consider:

- crops to be grown,
- lime particle size (neutralizing index),
- your soil and current pH, and
- convenience.

Crops to be grown

In Wisconsin soil is limed to the optimum pH for the most sensitive crop in the rotation. Due to the slow reaction time, aglime should be applied at least one year (preferably longer) before seeding alfalfa or other sensitive crops. In a legume forage-based rotation, the best time to apply lime is when

you are coming out of alfalfa or other forage legume. The pH will then be raised to the desired level by the time you rotate back to an acid-sensitive crop.

Aglime applied immediately before seeding a legume may not benefit the new seeding. This may result in a poor stand and reduced forage yield and quality, particularly if the soil is quite acid. Topdressing the stand after it is established will not solve a soil acidity problem because the entire plow layer must be neutralized. Surface applications of aglime without incorporation will only move downward about $\frac{1}{4}$ to $\frac{1}{2}$ inch per year through natural processes. The rate of movement depends on soil texture and the fineness of the topdressed lime. Wisconsin research has shown that topdressing established alfalfa being grown at below-optimum pH levels will not yield as well as where the lime is incorporated.

For crops such as no-till alfalfa or grass-legume pastures where lime incorporation is not possible, apply as fine a grade of lime as possible at least one year before the seeding.

Lime particle size

Unlike fertilizer, aglime may not promote increased plant growth immediately after application. This doesn't mean aglime is not needed—it simply reacts more slowly. However, also unlike fertilizer, once a soil is limed adequately, it will remain that way for several years without additional applications.

The effectiveness of aglime at neutralizing soil pH is based on chemical purity (calcium carbonate equivalent) and fineness of grind. The higher the percentage of fine particles, the faster the aglime neutralizes soil acids. In Wisconsin, aglime is sold on the basis of neutralizing index which takes into account both particle size and calcium carbonate equivalent. For more information about the neutralizing index, see Extension publication *Aglime, Key to Increased Yields and Profits*, A2240.

Wisconsin aglimes have coarse as well as fine particles which react with soil acids at different rates. The fine particles begin neutralizing acids immediately, while the coarser particles continue the process after fine particles have dissolved. Table 1 shows that finer (60 to 100 mesh) aglime particles increase the soil pH more than do coarser particles in the same time period. Wisconsin studies have shown that particles coarser than 8 mesh are not effective in reducing soil acids in three years, and particles finer than 60 mesh are considered to be 100% effective (figure 1).

Coarse aglime must be applied farther in advance of legume seeding than fine aglime to achieve the same pH. Coarse aglime must also be applied at somewhat higher rates but is usually less expensive per ton than fine lime. In addition, it may not be necessary to relime

as often where some coarse lime is used. However, when comparing prices be sure to evaluate materials on the basis of amounts of lime needed to achieve similar effectiveness and include hauling and spreading costs.

Selecting a liming material should be based on a comparison of cost, convenience, availability, and expected rate of reaction. For more information on differences between liming materials, see Extension publication *Choosing Between Liming Materials* (A3671).

Soil

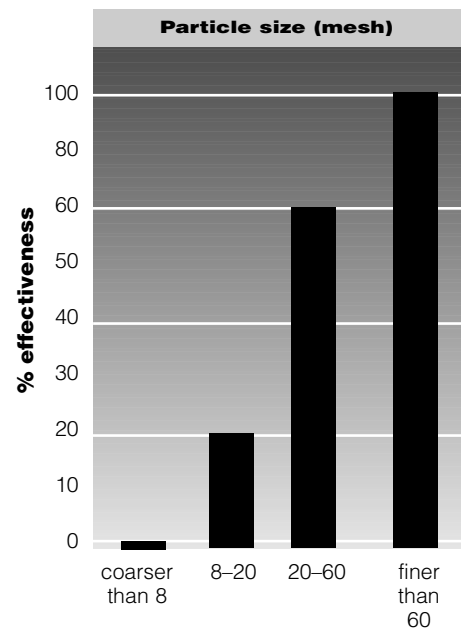
Aglime may be applied anytime the soils are fit and spreading equipment doesn't damage crops. A good time to apply lime is after a cutting of legume forage in the year before it is plowed under. Summer liming can be ideal, particularly on somewhat poorly

Table 1. Comparison of three aglime particle sizes in changing soil pH over 3 years.

Time (months)	Particle size (mesh)		
	8-20	40-60	60-100
	Soil pH		
1	5.00	5.35	5.43
12	5.65	5.96	6.19
24	5.91	6.33	6.37
36	6.30	6.54	6.65

The original soil pH was 4.6, a Plano silt loam in Arlington, Wisconsin

Figure 1. Effectiveness of aglime at various particle sizes (mesh size) over a 3-year period



drained soils, as the soil is normally in excellent condition to bear the weight of a lime spreader.

Sample soils preferably every three to five years to determine the lime requirement for the rotation you choose.

Convenience

There is a lot to be said for applying aglime in fall and summer. Did you have a long wait in the spring to get aglime because your trucker had so many orders? Were there weight limitations on the roads? Or, was the soil so wet the trucker could not spread the aglime before planting time? You can avoid these problems by applying aglime on cropland in the fall or on hay fields in summer. This is a satisfactory time because the lime is not lost by leaching, and it will have more time to neutralize soil acids.

How to apply aglime

Spread aglime with equipment designed for this purpose. Be sure that the field is covered uniformly, including the corners, and that no areas were missed or have double applications. Slight overlapping is a good practice to ensure evenness of spread. Wind speeds should be less than 10 mph as aglime applications are very dusty.

Aglime should be broadcast on the surface of the soil, disked in twice, and then plowed under for maximum distribution and neutralization of acids in the lower layer. Plowing without disking may deposit the lime in a layer at the plow sole.

If you need more than 4 tons of aglime per acre, apply half of the aglime before working the field. Apply the remaining half after plowing or other field preparation, and then disk it into the soil.

Other considerations

Soil sampling

Since the lime recommendation is made from a soil sample, it is very important that the sample accurately represents the field. If the sample doesn't represent the field, the recommendation will be unsatisfactory—or worse—misleading. Avoid sampling unusual areas in fields including low spots, eroded knolls, fence rows, areas where aglime or manure was piled, and back or dead furrows. Ordinarily it is necessary to re-lime every 5 to 10 years. Where a significant amount of barn lime is used, re-liming may not be needed for longer periods. For detailed instructions on soil sampling, consult publication *Sampling Soils for Testing* (A2100), available through your county UW-Extension office.

Liming conservation tillage fields

Continuous use of nitrogen fertilizer on continuous corn will gradually lower the soil pH. The acidity produced by 1 pound of nitrogen will be neutralized by 3 to 5 pounds of aglime, depending on the source of nitrogen.

In reduced tillage systems, particularly no-till, the acidification caused by nitrogen fertilization

results in a more rapid drop in the pH of the top 1 to 2 inches of soil. Because there is little or no tillage to mix the acid surface layer with the “plow layer,” the surface pH may drop quickly. This could reduce the effectiveness of some triazine herbicides as well as the availability of some nutrients.

How can a grower lime a field in a reduced-tillage system? The best approach is to lime the field adequately before getting into conservation tillage. Lime to the pH suggested for the most acid-sensitive crop in the rotation. Using a coarser grade of lime will provide some larger particles that will continue reacting with soil acids after the fine lime has dissolved. Check the pH of the top 2 inches of soil every two years. This will require taking a separate sample from the one used for fertilizer recommendations. If the pH of the surface soil drops more than 0.2 units below the target pH for the rotation, apply 1.5 to 2.0 tons per acre of a fine grade lime. Lime suspensions may work well in this situation, but the cost may be greater than for conventional aglime.

If the pH of the top 6 inches of soil is acidic, annual topdress applications may be required for a period of time. If the subsoil is also acidic, the best choice may be to add the needed lime, plow the field and start over.



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