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Department of Agronomy

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## Effectiveness Of Two Lime Sources With Different Relative Neutralizing Values (RNV)

Greg Henson and Lloyd Murdock

Quality of agricultural lime (ground limestone) is an important factor in maintaining proper soil pH. The quality of lime is determined by its purity and fineness of grind. Purity is the amount of calcium and magnesium carbonate present in the limestone. Clay, silt, sand, organic matter, and other materials present in limestone rock dilute its purity. Since limestone is slowly soluble, it must be finely ground to be effective. The more finely ground the lime, the more rapidly it will dissolve in the soil.

The minimum quality of aglime set by state law in Kentucky is a purity of 80% calcium carbonate equivalent and a fineness of 90% that must pass a 10 mesh screen and 35% that must pass a 50 mesh screen.

In order to better evaluate limestone quality, the purity and fineness have been combined into one value called the relative neutralizing value (RNV). The RNV is an estimate of the percent of lime that will be effective in neutralizing soil acidity during a 3 to 4 year period. The RNVs, calculated by the Extension Service and available in the Extension offices, are reported on all lime sources in Kentucky as sampled and analyzed by the Kentucky Department of Agriculture, Division of Weights and Measures. Although they make it possible to compare sources of lime on an equivalent basis, RNV's are not a required part of the Kentucky lime law.

To test the value of the RNV calculations for field use, two lime sources with different RNVs were tested for their ability to neutralize soil acidity. Both lime sources would be acceptable under the present state law (Table 1). According to the RNV calculations (68 vs 56), Source A should be 21% more effective than Source B.

Table 1. Quality of lime applied on trial area.

Lime Source	Percent CaCO <sub>3</sub>	Percent Passing 10 mesh sieve	Percent passing 50 mesh sieve	RNV
A	95	93	50	68
B	82	96	39	56

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A field in McLean County with a low pH was selected and 2 tons per acre of each lime source were applied to different areas in the field on October 20, 1986. Soil samples were collected over a period of 3 years from eight different sites in each area. The average pH values before liming were 4.85 for the area receiving Source A and 5.11 for the area receiving Source B.

The increase in soil pH in water is shown in Table 2. The pH increase was 25% greater for lime Source A than Source B. Since soil pH in water is not a direct measure of the total soil acidity, the pH in SMP buffer was used to calculate the total acidity neutralized by the two lime sources. These data are also in Table 2. Source A neutralized more than twice as much acidity as Source B. A low soil pH in water, as was found at the beginning of this experiment usually indicates a high amount of total acidity. Therefore, small changes in pH in water can mean large changes in total soil acidity.

Table 2. Average change in soil:water pH and total acidity neutralized by two limes sources over 3 years.

Lime source	pH changes	Neutralized acidity
	pH units	meq/100 gm soil
Source A	+ 0.90	2.5
Source B	+ 0.72	0.9

More than 95% of the pH adjustment by both lime sources took place in the first 9 months, and both performed equally in terms of reaction time. The pH measurements taken 3 years after application show that lasting effect was equal for both sources, and as each maintained its achieved soil:water pH.

The trends seem to be set. However, data will continue to be taken. The lime source with the highest RNV was more effective in raising the pH and neutralizing soil acidity. This is good evidence that the RNV measurement is helpful in evaluating lime sources and lime costs.

  
Extension Soils Specialist