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EVALUATION OF THE LIMING POTENTIAL OF NUTRA-LIME™

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Background. The increasing volume of wastes created by municipalities demands innovative methods for disposal. One method of preparation of municipal sewage sludge for disposal is the addition of lime to create heat that sterilizes the sludge, decreases the intensity of odors, and makes handling and disposal less difficult. Addition of lime creates a product that has some acid neutralizing capability. This study evaluated the effectiveness of Nutra-Lime for neutralizing acid soils. The initial pH of the Cuthbert soil averaged 4.9. The sample of Nutra-Lime was dried, passed through a 4-mesh (¼-inch) screen, and homogenized by mixing. The neutralizing value analyzed in the laboratory was determined on finely ground material. The neutralizing value of the agricultural limestone and Nutra-Lime was determined in the laboratory according to the official methods of analysis of the Association of Official Analytical Chemists.

The liming potential of Nutra-Lime was evaluated in a greenhouse incubation study. Seven post-treatment sampling times were 0, 1, 2, 4, 8, 16, and 32 weeks after treatment. Rates of Nutra-Lime and rates of fine limestone were equivalent to 0, 1, 2, 3, and 4 tons/acre in three replications. Limestone and Nutra-Lime materials were mixed into the mass of soil needed for each material and rate on Nov. 18 and 19, 1998. Potted soils were moved to the greenhouse and water was added November 23, 1998. After adding the water treatments, the zero-time pots were pulled and placed in an oven to dry for 48 hours at 60 degrees centigrade. Pots of soil remaining in the greenhouse were allowed to dry to 10% moisture before rehydrating to the original moisture content. Additional sampling dates were: Nov. 30 (1 week after hydration); Dec. 7 (2 weeks), Dec. 21 (4 weeks), Jan 18 (8 weeks); Mar. 15 (16 weeks); and July 5 (32 weeks).

Research findings. Tests on agricultural limestone determined that its neutralizing value was 99.35% and Nutra-Lime averaged 36.43%. Results indicate that limestone and Nutra-Lime were significantly different ($P = 0.001$) in their effect on soil pH at all sampling dates, with limestone raising soil pH to a greater extent than did Nutra-Lime (Figures 1-6). This was to be expected due to the greater fineness and higher neutralizing value of limestone compared to Nutra-Lime. The ANOV also indicated statistically significant pH change due to application rate. The interaction of source and rate was significant at all sampling dates except 5 July 1999.

Application. Results from these tests indicate that Nutra-Lime used as a liming agent will neutralize less acidity than will an equal quantity of ECCE 100 limestone because the neutralizing value (±36%) and the percentage of coarse particles in Nutra-Lime cause its reaction to be less effective.

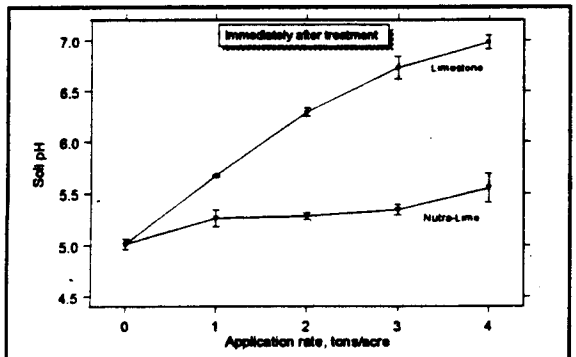

Figure 1. Effect of rates of Nutra-Lime and limestone on pH of samples of a Cuthbert fine sandy loam collected immediately after treatment and hydration, followed by drying the soil for 48 hours at 60 degrees Centigrade.

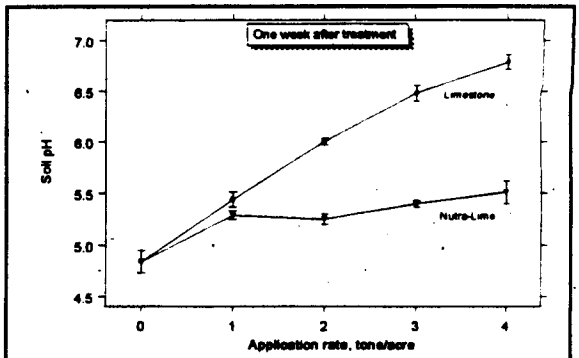

Figure 2. Effect of rates of Nutra-Lime and limestone on pH of samples of a Cuthbert fine sandy loam collected one week after treatment and hydration, followed by drying the soil for 48 hours at 60 degrees Centigrade.

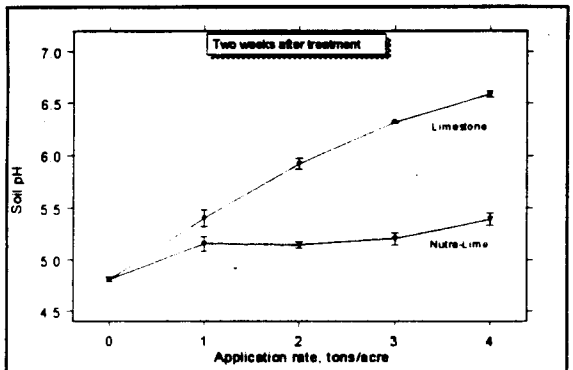

Figure 3. Effect of rates of Nutra-Lime and limestone on pH of samples of a Cuthbert fine sandy loam collected two weeks after treatment and hydration, followed by drying the soil for 48 hours at 60 degrees Centigrade.

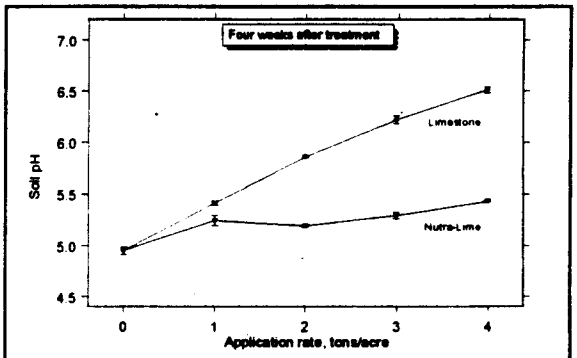

Figure 4. Effect of rates of Nutra-Lime and limestone on pH of samples of a Cuthbert fine sandy loam collected four weeks after treatment and hydration, followed by drying the soil for 48 hours at 60 degrees Centigrade.

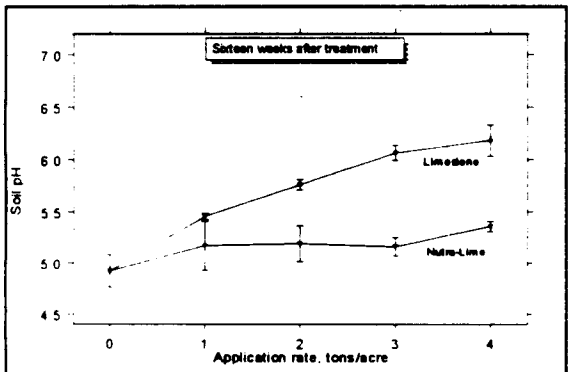

Figure 6. Effect of rates of Nutra-Lime and limestone on pH of samples of a Cuthbert fine sandy loam collected sixteen weeks after treatment and hydration, followed by drying the soil for 48 hours at 60 degrees Centigrade.

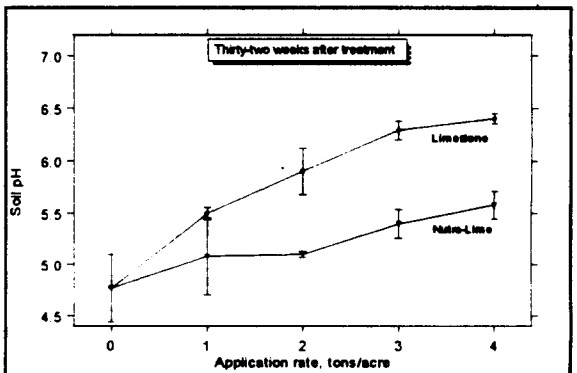

Figure 7. Effect of rates of Nutra-Lime and limestone on pH of samples of a Cuthbert fine sandy loam collected thirty-two weeks after treatment and hydration, followed by drying the soil for 48 hours at 60 degrees Centigrade.