

# LABORATORY RECOMMENDATION OF LIME TO AN ACID SOIL CHECKS WITH EXPECTED pH CHANGES

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## INTRODUCTION

The agricultural value of about one million acres of acid soils in the humid area of Puerto Rico may be improved with the application of lime. The textures of these soils vary from the sands to the clays. Their organic matter has been reported (1) to vary from 1.0 per cent in the sandy soils to 51.5 per cent in the mucks. The buffer capacity of these soils is variable. A laboratory method for determining the lime requirement, which will be applicable to field conditions, is, therefore, of paramount importance.

Dr. B. G. Capó, Head of the Department of Agronomy and Horticulture, worked as a Soil Chemist in the Department of Soils from 1936 to 1942. While he was working in pot studies with soil-sand mixtures, using Hegari sorghum as a plant index to determine the available major nutrients in the soils, he adopted the following lime-requirement method to bring the acid soils to a convenient pH value.

## LABORATORY METHOD

The air-dried soil samples are ground to pass a 1 mm. sieve. Calcium carbonate c.p. Baker Analyzed, is used as the lime source. Five portions of 20 grams of soil are weighed and placed in each of five 250 ml. beakers. The amounts of calcium carbonate added respectively, to each beaker, are 20, 40, 60, 80 and 100 milligrams corresponding to 1, 2, 3, 4 and 5 tons of calcium carbonate per acre. One hundred and fifty cubic centimeters of distilled water are added to each beaker. The mixture is stirred for 3 hours in a Ross-Kershaw apparatus, described as #9235 of Arthur H. Thomas catalog. The pH values of the supernatant liquids are determined and plotted on coordinate paper against the tons of calcium carbonate. The amount of limestone necessary to bring the pH of the supernatant liquid to the desired pH value is estimated from the corresponding curve.

## FIELD RESULTS

"Fajardo clay" is an acid soil type derived from ashy shale. This soil type is well distributed in the terraces of the Experiment Station farm. Soil samples, at six-inch depths were taken on June 1943 from each of nine plots of "Fajardo clay" for the lime requirement tests. The amount of limestone necessary to bring the soil of each plot up to pH 6.5 was cal-

culated from the corresponding pH-lime requirement curve as described above.

The required amount of commercial ground limestone was applied to each of these plots and "malojillo" (Para) grass was planted on them on July 1943. On October 1944, soil samples were taken again at each of these plots, for pH determinations with the results that appear on table 1.

TABLE 1  
*Values of pH before and after liming*

PLOT NUMBER	pH VALUE BEFORE LIMING	CALCIUM CARBONATE TO RAISE UP TO pH 6.5	pH VALUE 15 MONTHS AFTER LIMING
		<i>tons/acre</i>	
1	4.4	10.0	6.2
4	4.4	10.0	6.3
5	4.1	8.0	6.4
8	4.6	10.0	6.6
9	4.7	10.0	6.7
12	4.9	10.0	6.6
13	5.5	8.0	6.9
18	4.2	12.0	5.2
20	4.6	10.0	6.1

The difference between the mean pH values does not differ statistically from the desired value 6.5.

#### SUMMARY

A laboratory method for lime requirement in soils is presented. Lime was applied to the acid soil of nine plots of a field experiment at the rate found by this method. The pH changes fifteen months later did not differ statistically from the ones expected.

#### RESUMEN

Se expone aquí un método de laboratorio relacionado con la cal que necesitan los terrenos. Se aplicó cal a los terrenos ácidos de nueve parcelas que constituyeron el campo de un experimento, en la proporción determinada por dicho método. Los cambios pH, quince meses después, no se diferenciaron estadísticamente, de aquellos que se habían esperado.

#### LITERATURE CITED

- (1) Bonnet, J. A. Chemical data of Puerto Rico soils. Correlation of data for humid and arid areas. Field response of crop to available phosphorus and potash in soils. University of Puerto Rico, Agr. Exp. Sta. Res. Bul. 1, 53 p. April 1941.