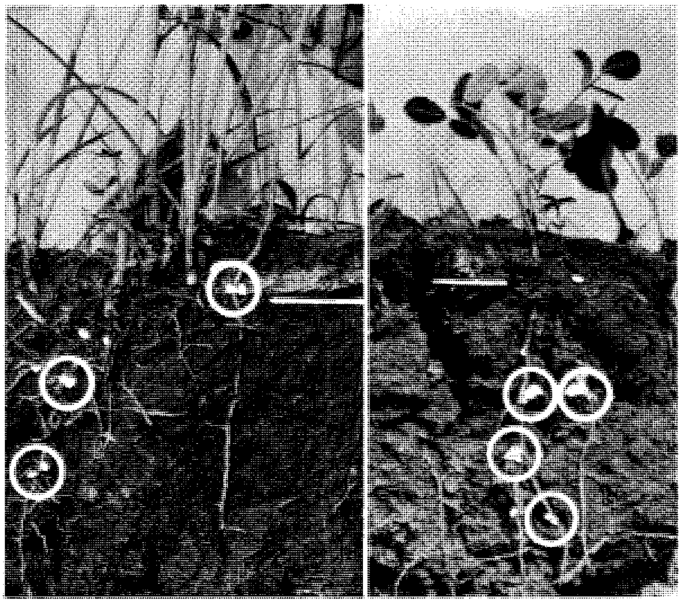
LIME SOIL TO FEED CROPS — NOT TO REMOVE SOIL ACIDITY



Streaks of limestone drilled into the soil (white lines) with seedings of red clover and sweet clover established the crops. They also produced nodules (white circles) in acid parts of the soil far below the lime.

Nodules on roots of clovers in acid soil far below streaks of limestone drilled with seedings show that legume bacteria do not require lime mixed throughout the soil, says William A. Albrecht, chairman, department of soils at the University of Missouri.

Such observations suggest that limestone is needed to feed plants rather than to fight acidity. All acidity does not need to be removed from the entire soil layer in which roots are growing.

Measurements of soil acidity demonstrated that drilling limestone no deeper than a few inches did not change the degree of soil acidity (pH) very much. This was even true in soil near the limestone.

Yet red clover had numerous nodules on roots at varying depths below streaks of limestone in the soil. Those evidences of action by nitrogen-fixing bacteria were in soil areas of decidely acid nature with pH values as low as 4.5.

It can scarcely be believed that bacteria were dragged down there by advancing roots, Albrecht states. Very likely they were down there beforehand but went into action only when roots came along that had been properly nourished by contact with limestone calcium or magnesium in upper soil layers.

This nutrition served to make the symbiotic connection between roots and these particular bacteria possible. This evidence needs only to be seen to doubt the validity of the belief that soils must be neutral, or have all acidity removed before red and sweet clovers will grow, he continues.

In some other trials using sweet

clover, a supposedly "acid-sensitive" legume, applications of mill-run, ten-mesh limestone at rates of 300 and 600 pounds per acre served to establish this legume better than the same application of pulverized or highly active limestone.

While none of the soil under these treatments showed measurable changes in degree of acidity, or pH, sweet clover roots were still getting enough calcium to nourish the crop from coarser particles that lasted longer in clay.

According to Albrecht, roots were not so nourished where pulverized limestone was used. Speedy reaction and absorbtion of pulverized limestone made this soil fraction too much of a competitor to be matched by roots as a force taking up limestone calcium.

Apparently a few coarser limestone particles scattered through the soil to break down slowly and to feed the legume in those few focal points were all that was required. It was not necessary to drive out all soil acidity.

Much has been learned about clay and its capacity to adsorb and exchange calcium and magnesium. Also, it is known that plant roots have similar capacities taken by hydrogen —that is, acidity. From these facts it is known that legumes can grow on soils that are by no means neutral and free of acidity.

Even when clay carries a set of nutrient ions well balanced for a particular crop, some heavier soils will still grow good legume crops when as much as 20 percent of the soil's exchange capacity is taken by acidity or hydrogen, Albrecht says.

The pH of the soil does not need to be brought up to 7.0. There is no need to get rid of all soil acidity for growing nitrogen-fixing, protein- producing, mineral-rich forages. Lime is required. But this serves to feed them by its contents of necessary calcium and magnesium, rather than to fight soil acidity by carbonates.

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