

in fertile soils throughout the world. These have a valuable function to perform in adding to the soil's natural store of nitrogen, in building up a productive soil. And these also need for their development a slightly alkaline soil, such as is brought about by the presence of carbonate of lime.

And, lastly, there are the nitrogen-gathering bacteria associated with the legumes—clover, alfalfa, peas, beans, etc. These bacteria, residing in nodules or tubercles on the roots of the legumes, are able, in some way not as yet perfectly understood, to appropriate the nitrogen of the air existing in the interstices of the soil and to pass it on in a form serviceable to their host, where it is built up into the tissues of root, stem and leaf. The legumes generally are among our most important forage crops and they possess this unique property of leaving the soil richer in nitrogen from their growth. The bacteria that enable them to play this important role in agriculture cannot thrive in an acid soil, and thus it is that an application of lime or of carbonate of lime favouring their development encourages the luxuriant growth of the legumes—the crops that enrich our soils in nitrogen and at the same time furnish us with forage high in the most valuable of all the nutrients, protein.

COMPARATIVE VALUES OF LIME COMPOUNDS.

From what has been said with respect to the composition of the various forms of lime used in agriculture, it will be clear that all are not of equal value, especially for the correction of acidity. It frequently happens, for instance, that lime, air-slaked lime and ground limestones may be all obtainable and the question then arises, which will be the best to purchase at the price offered?

In acid-correcting power and in furnishing available lime, and considering the various forms on a basis of equal purity, 56 pounds of quicklime is the equivalent of 74 pounds of freshly slaked lime and of 100 pounds of carbonate of lime whether it be as marl or ground limestone. Air-slaked lime, as has been pointed out, is partly hydroxide and partly carbonate, the proportions being dependent upon the length of time it has been exposed to the air; its value will, therefore, be intermediate between that of freshly slaked lime and the carbonate, that is, 56 pounds quicklime will be equal to a weight of air-slaked lime between 74 and 100 pounds. Presenting these facts in tabular form we have:—

2,000 lb. quicklime	=	3,571 lb. ground limestone and marl.
2,000 " "	=	2,643 lb. freshly slaked lime.

If quicklime were worth \$5 per ton, ground limestone, equally free from impurities, would be worth \$2.80 per ton and freshly slaked lime \$3.80 per ton.

It may be repeated that these compounds as found in commerce are never absolutely pure; there may be considerable variation in composition among the several samples offered the purchaser. While, therefore, the above comparison, as to equivalent weights and values, may serve in a general way, an analysis is necessary when the exact lime value of any particular sample or samples, is desired.

IS LIME OR CARBONATE OF LIME PREFERABLE?

The cost of the material should not in all cases finally settle the question which of these two forms will be the better to apply. There are at least two other factors or conditions that should receive consideration—the character of the soil and the rapidity of action required.

Quicklime and slaked lime are not so desirable or safe for light, sandy and gravelly loams as are ground limestone and marl. These soils are usually poor in organic matter and the effect of lime, as is well known, is to hasten the oxidation and dissipation of this constituent. Hence, unless the lime were applied in small dressings (less than 1,000 pounds per acre) and at long intervals, the humus of the soil—certain-