



Oxen as Motive Power in a Nova Scotia Orchard. A Barrel Sprayer at Work

fertilizers are of mineral origin," to which statement I still adhere. Mineral phosphates are more extensively employed than any other fertilizer material, and then basic slag, the potash salts, sulphate of ammonia and nitrate of soda are all mineral fertilizers. Although the latter may have been produced partially through the agency of organisms, it certainly contains no organic matter.

Dr. Dandeno's assertion that I re-

ferred to the soil constituents as "hash" is not correct. I did not do so—not even metaphorically.

Like my opponent in this controversy, I am quite willing to allow the plant to "pronounce upon the value of a fertilizer." If the farmer finds that the use of fertilizers increases production, he will continue their use, even though he may never be able to define "plant food."

## The Use of Commercial Fertilizers Defended\*

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**F**ERTILIZERS are to feed plants those elements found by analysis to enter into their composition and which they do not obtain in sufficient quantity from the soil or air; to feed the soil as well as the plants and in the feeding of them to furnish those forms of 'plant food' which experience has shown to be best adapted to perfect growth and yield.

A 'plant food' may be defined as any material applied as manure, whether it is derived from natural or artificial sources. Its value is determined by its percentages of the three essential elements, nitrogen, phosphoric acid and potash, and the state of combination in which these elements are held over or in other words—their degree of availability.

The "degree of availability" of the plant foods contained in any mixture is

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the most important factor to be taken into consideration, when comparing the value of two fertilizers of the same analysis. The guaranteed analysis does not in any way signify what materials are used to obtain the percentages of nitrogen, or ammonia, available phosphoric acid or potash claimed to be present. It is generally admitted by those who look at the matter in a fair and

square way that a mixture in which the various plant foods (with the exception of potash) are derived from different materials furnishing the same essential element but with varying degrees of availability is by far the most satisfactory and most economical for general use. The adjoining cut will illustrate this point:

In the upper section of the cut the reader will notice that two materials, nitrate of soda and sulphate of ammonia, are indicated as sources of plant food nitrogen. These materials are purely nitrogenous in nature, so far as 'plant food' is concerned. No matter whether these are applied singly or together they are very readily available: that is, the plant food furnished by them is in such a state that it is taken up by the plant almost immediately the material is applied to the soil. A plant or crop is indicated in four stages of its growth while the shading graphically represents the amount of 'plant food' at the plants' disposal during the whole season.

Owing to the high degree of availability of the two salts, nitrate of soda and sulphate of ammonia, they will give the plant a good start; but, as the season progresses their effect is gradually diminished (as indicated by the shading) and as a result the plant has to do without one of its most important foods—nitrogen—at the time it is filling out, or producing its fruit. A fertilizer furnishing nitrogen solely in this form as a good many of the home mixtures which are recommended by those solely interested in the sale of certain raw materials do, cannot be considered an economical or satisfactory one to use, not only on account of the lack of desired plant food at certain stages of the plant's growth as already pointed out, but owing to the obvious necessity of having to apply such materials regularly either during the growing season or year after year in order to receive any benefits whatever. No beneficial effect is carried over from one season to the other when such materials as the above are used alone.

On the other hand you will notice by glancing at the lower section of the same cut, that it is quite possible to remedy the above state of affairs providing we demand our mixtures to be composed of certain materials. Here we have represented a mixture in which the nitrogen instead of being derived solely from the in-organic sources, nitrate of soda and sulphate of ammonia, is obtained from a mixture of organic mater-

