

from 5,000 to 10,000 lbs. of phosphoric acid. Similarly, in soils of good average fertility we find : nitrogen, 2,500 to 5,000 lbs.; potash, 5,500 to 11,000 lbs., and phosphoric acid 3,500 to 6,000 lbs.

From comparing these figures with those that I gave representing the amounts used by various crops, it would at first sight appear as if adding plant food to the soil were quite unnecessary, a "carrying of coals to Newcastle"; that where there is such an abundance of food there would be no economy in supplying more. The explanation lies in the fact that while the vast stores that we have mentioned are truly present, but a *very small percentage of them is immediately available to plants*. In this we recognize a wise provision of nature, for if it were otherwise soils might soon become exhausted by the leaching of the food constituent, below the reach of roots, and by the selfish practices of farmers who care nought for posterity and return nothing to the soil. I have alluded to the agencies and forces instrumental in soil formation; it is by a continuation of these and by the solvent action of root sap that soil constituents are being continually prepared for the use of the higher plants. We have to recognize that the very small proportion of the nitrogen present as nitrates, and those minute percentages of phosphoric acid and potash soluble in water or in 1% citric acid solution—a solvent of approximately the same activity and strength as root sap—represent all the quantities immediately available to crops, and give a measure of the soil's productiveness. We have made determinations of this soluble plant food in many Canadian soils. One instance is given below of a rich and fertile black loam from British Columbia.*

*COMPARISON of "Available" with "Total" Amounts of Potash and Phosphoric Acid.

No.	SOIL.	POTASH.			PHOSPHORIC ACID.		
		Total Potash.	Available Potash.	Percentage of total Potash available for plant use.	Total Phosphoric Acid.	Available Phosphoric Acid.	Percentage of total Phosphoric Acid available for plant use.
1	Surface	0.23	0.00483	2.20	0.19	0.01020	5.66
2	Between 12 and 18 ins.	0.23	0.00299	1.36	0.19	0.01055	5.85
3	Between 18 and 24 ins.	0.26	0.00169	0.64	0.12	0.00588	4.90