

ously cropping with grain. The particulars respecting the nitrogen are given in the following arrangement, which allows a ready comparison of the two soils in this important matter.

DEPLETION OF THE NITROGEN.

NITROGEN-CONTENT OF VIRGIN AND CULTIVATED SOILS, INDIAN HEAD, SASK.

	To a Depth of 4 INCHES.		To a Depth of 8 INCHES.	
	Per cent.	Lbs. per acre	Per cent.	Lbs. per acre
Virgin soil.	409	3,824	371	6,936
Cultivated soil	250	2,421	254	1,750
Difference or loss due to removal in crops and to cultural methods	159	1,403	117	2,186

Though the cultivated soil to-day, after nearly a quarter of a century's working, is still very rich, and possibly might yield as fine a crop as it did at the outset, yet, compared with the untouched prairie, it is seen to have lost practically one-third of its nitrogen.

An inquiry as to what proportion of this loss is due to removal by crops and what to cultural operations shows that the nitrogen contained in the various grain crops grown in the twenty two years amounted to approximately 700 lbs. per acre. If we subtract this amount from the total loss, calculated to a depth of eight inches of soil, we shall see that more than twice as much nitrogen has been dissipated by methods of cultivation as has been removed in the crops. The loss ordinarily in the grain growing districts of the Northwest would not, in all probability, be as great as that here recorded, because, as a rule, the land is fallowed every third year only. Nevertheless, the deterioration must be marked, and, unless checked by the adoption of a system of rotation involving the formation of a soil and by the keeping of stock, will inevitably lead to that low degree of productiveness which now characterizes large areas in eastern North America. A study of these partially exhausted areas both in Canada and in the Northeastern States makes it clear that the deterioration has been, in a very large measure, due to the loss of humus and the dissipation of nitrogen consequent upon grain and potato growing, without any due return of organic matter.

A quite marked falling off in phosphoric acid is also to be noted, though what is perhaps of more significance is the reduction in the proportion of this element in the available condition. Since loss of phosphoric acid cannot be accounted for save in removal by crops, it would seem that in continuous grain growing the rate of abstraction exceeds that of conversion, a probability to which we have already referred.

In the "total" potash, the differences throughout the series are not large, but, as in the case of phosphoric acid, we find that the percentage of "available" in the cultivated soil is considerably less than in that of the prairie.*

No. 11 from the prairie in the neighbourhood of Vermilion Hills, 130 miles west of Indian Head and some 20 miles north of Lake Chaplin. It is a dark brown, sandy loam. In organic matter and nitrogen it is fully the equal of the heavier (clay) loams of the prairie, but as regards phosphoric acid, potash and lime it is, as might be expected, somewhat inferior. Although the "total" stores of this mineral plant food may not be very large, it is significant that the "assimilable" proportions are not less than in those heavier loams which are considered wheat soils *par excellence*.

* There is at times a certain loss of surface loam in the older cultivated areas by drifting and this in some cases would affect the phosphoric and potash content, and more especially that portion which is available.