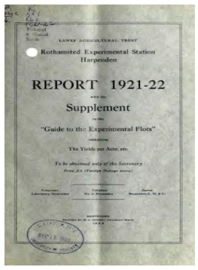
Report 1921-22 With the Supplement to the Guide to the Experimental Plots Containing the Yields per Acre Etc.


Rothamsted Experimental Station
Harpenden
REPORT 1921-22
Supplement

Soil Acidity

Rothamsted Research

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FULL MINERALS, AND, IN ADDITION:—

No Nitrogen Plot 5	Sulph/ammonia 200lb. per acre Plot 6	Sulph/ammonia 400lb. per acre Plot 7	Sulph/ammonia 600lb. per acre Plot 8	Nitrate/soda 275lb. per acre Plot 9
14.2%	12.7%	16.3%	21.5%	8.1%

when compared with the unmanured plot.

The mineral manures have caused some reduction in power requirement, and a still further reduction has been caused by addition of sulphate of ammonia, but nitrate of soda has acted the other way and increased the power requirement.

There are, however, other ways of altering the resistance of soil to the plough, and an interesting electrical method is being studied.

The depth of ploughing influences the power consumption more than might have been expected. An increase of only one inch in depth, *i.e.*, going from 5″ to 6″ deep, increased the power consumption no less than 32%, a portion of which is due to the resistance offered by the "plough-sole" produced below 5″ depth. Against this, maladjustments of the hitch were not particularly wasteful of power, although they caused bad ploughing. Perhaps the most surprising result was that the drawbar pull was practically the same whatever the speed of ploughing within the ordinary limits of the tractor; hence the power consumption per acre depends mainly on the speed and is smallest at the highest speeds. Another way of stating this fact is that the paraffin consumption per hour for the same tractor is approximately the same whether it is taking 1½ hours or 3 hours to plough an acre of ground.

The factors determining the resistance and the power consumption are intimately bound up with the physical properties of the soil which are systematically studied in the Physical Department. These physical properties determine also the water relationships—evaporation of water, percolation, etc.—which are being carefully investigated. This work has important applications in tropical and sub-tropical countries where irrigation is practised, and the Indian Government regularly sends experts to study for a year or two in the Physics Department.

Dr. Keen is also co-operating with Professor Sven Odén, of Stockholm, in elaborating the original Odén apparatus for estimating the amount of fine material of different sizes in soils.

SOIL ACIDITY.

The electrometric method used in the Physics Department by Mr. E. M. Crowther is giving good results and is sharply distinguishing soils of varying degrees of acidity. The values are labelled pH, and the lower they are the greater the degree of acidity. Thus the following Garforth soils have been tested :—

	pH value
Very acid, wheat bad	4.37
Less acid, wheat poor	4.44
Still less acid, wheat better	4.65
Still less acid, wheat good	4.82

Another set gave these results :—

Acid, finger and toe prevalent on turnips .	5.64
Less acid, no finger and toe	6.13

It is also shown that there is a closer relationship between the pH values and the Hutchinson-McLennan "Lime requirement" values than might have been expected, and the latter afford useful guidance in placing similar soils in order of acidity.

THE FEEDING OF THE PLANT.

Farmers are now thoroughly familiar with the fact that the production of heavy crops necessitates a skilful and adequate use of fertilisers. In spite of the severe agricultural depression of the past two years, there has been a considerable consumption of fertilisers : in some cases greater than in pre-war times ; this is shown in the following table :—

AVAILABLE SUPPLIES OF FERTILISERS IN TONS : GREAT BRITAIN AND IRELAND. (1)

(1) Min. Ag. Statistics, 1921, Vol. LVI, p. 107 and private communication. No information is available as to actual consumption on farms or as to stocks carried over from one year to another.

	1912	1918	1919	1920	1921	1922
Sulphate of Ammonia	60,000	250,000	240,000	240,000	112,000	147,000
Nitrate of Soda .	100,000	9,000	40,000	100,000*	55,000*	33,000*
Superphosphate .	700,000	650,000	580,000	660,000	450,000	515,000
Basic Slag . .	300,000	550,000	485,000	550,000	210,000	283,000†
Potash Salts (including Muriate and Sulphate of Potash) . . .	80,000	5,000	50,000	125,000	53,000	201,000

* Net imports for all purposes. † Ignoring imports and exports.

Artificial manures influence not only the amount but also the character of the plant growth, and very often the quality of the produce. So long as farmers were confined mainly to farmyard manure they could and did discover for themselves its effects on the crop. But there are now more than thirty manures available for the farmer, and an ingenious chemist could make up over 6,000 different recipes for the potato crop alone, to say nothing of the mixtures required for other crops on the farm ; and to add to the complexity of the matter no manure acts in quite the same way on two different farms, while even on the same farm the effect may vary considerably from season to season. Hence the need for experimental work to discover the general rules by which to guide farmers as to the most suitable of the possible mixtures.

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