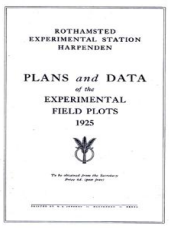
Plans and Data of the Experimental Field Plots - 1925



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Rothamsted Research

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ROTHAMSTED EXPERIMENTAL STATION HARPENDEN

PLANS *and* DATA

of the

EXPERIMENTAL FIELD PLOTS

1925

To be obtained from the Secretary
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The Field Work at Rothamsted

UNDER LAWES & GILBERT, 1843-1901.

The field experiments were begun at a time when farmyard manure was the best known agent for maintaining the fertility of the soil under tillage conditions, though others, such as bones, were also used. Supplies, however, were insufficient; knowledge was, therefore, needed of the sources of the food supply of plants and the fertiliser requirements of the common farm crops.

In order to get this knowledge one field was assigned to each crop and divided into a number of plots, each receiving a different manurial treatment. Each field was drilled year after year with the same crop, and every plot received annually the same quantity of the same manures. Systematic observations were made of the yields under the varying conditions, while information was also obtained as to the chemical composition of the crop.

These classical fields are still maintained under their original treatments and present an unrivalled series of demonstration plots, as well as material for much fuller investigation; they are—

Broadbalk Field	...	11 acres	Continuous Wheat since	1843.
Hoos Field ...	...	5½ ,,	,, Barley ,,	1852.
Barn Field ...	...	8 ,,	,, Roots ,,	1843*.
				Mangolds since 1876.
Park Grass ...	...	7 ,,	,, Grass for Hay since	1856.
Agdell Field	...	3 ,,	Four Course Rotation since	1848.

* A break in 1853-55 when barley was grown without manure.

The outcome of this early work was the introduction of superphosphate, sulphate of ammonia, and nitrate of soda as manures; the working out of the correct and economical use of these substances; and the realization that judicious artificial manuring could do much to supplement and economise farmyard manure.

The loss of nitrates which occurred from land not carrying a crop during the wet periods of the year was demonstrated and the costliness of bare fallows was thus proved.

UNDER A. D. HALL, 1902-12.

During this period much attention was given to the use of lime on arable and on grass land. The loss of lime from the soil by drainage was shown to be related to the manurial treatment, and it was demonstrated that certain manures, notably sulphate of ammonia and superphosphate, exert their best effect only when the soil contains sufficient lime. Certain of the Park Grass Plots were divided transversely into a limed and an unlimed portion, and valuable information was obtained concerning the effect of lime on land laid in for hay.

The residual values of farmyard and of artificial manures were investigated. Little Hoos field in 1904 was divided into plots and cropped on a rotation in such a way that the effect of manurial residues could be observed. This experiment is still continued.

RECENT PERIOD—1912 ONWARDS.

In the last few years the number of field experiments has been considerably increased to deal with problems of present day importance as they arise.

PROBLEMS CONNECTED WITH THE HUMUS SUPPLY.

1. The crop producing power of dung stored in different ways.
2. Systems of green manuring ; the effect is measured by the yields of the succeeding crops, and a comparison is made between green manuring and direct dunging. The green crops are sown in the corn and allowed to grow after harvest.
3. Experiments on the fertilizing value of artificial farmyard manure, i.e., rotted straw.
4. Manurial trials with sewage sludge of various kinds.
5. Town refuse compared with dung as a manure for roots.

PROBLEMS CONNECTED WITH THE NEWER FERTILISERS.

1. The fertilizing value of the new basic slags and certain of the mineral phosphates, such as Gafsa, and Nauru phosphate for :—
   (*a*) Grazing.
   (*b*) Hay.
   (*c*) Rotation of crops.
2. Comparison of the newer sources of quick acting nitrogen with sulphate of ammonia as a top dressing for :—
   (*a*) Cereals.
   (*b*) Roots.

   Ammonium chloride, urea and ammonium nitrate have been used.
3. The effect of various potassic manures (notably sulphate of potash, muriate of potash, Kainit and Sylvinite) on the yield and quality of potatoes.

OTHER MANURIAL PROBLEMS.

1. The influence of manuring on the malting quality of barley.
2. The influence of varying the quantity and the time of application of nitrogenous fertilisers on the more important arable crops.

CHALKING.

Several arable fields have had chalk applied over certain areas leaving the remainder unchalked, thus allowing the effects of the chalking to be followed through subsequent rotations.

CULTIVATION PROBLEMS.

1. Subsoiling.—Many of the fields have subsoiled strips running through them giving areas which can be compared with the adjacent land where no subsoiling has been done.
2. Dynamometer measurements are made of the draw-bar pull of various tractor implements in order to throw light on the effect of implement design, and of manurial treatment, on draught.
3. Various cultivation operations are being compared in their effect on plant growth and crop yield.

PROBLEMS RELATING TO EXPERIMENTAL METHODS.

Trials of improved methods of plot arrangement and management are in progress. In addition detailed field studies of crops are made for the purpose of elaborating an adequate system of crop observation.

Notes on the Diagrams

The following diagrams are intended to assist visitors in locating the experimental plots, and in ascertaining their treatments and average yields. Each plot is numbered as shown on the map. The block diagrams in the maps of the various plots afford a comparison of the relative productiveness, while the figure above each column is the average yield of the plot measured in the units given below.

The fields are taken in the following order :—

Agdell Field.

The yield of swedes is given in tons of roots per acre.
The yield of barley, beans, and wheat in bushels of dressed grain per acre.
The yield of clover hay (1st and 2nd crops together) in cwts. per acre.
All averages are taken over the period 1848-1919.
The manures are applied to the swede crop only.

Barn Field.

The yield of mangolds is given in tons of roots per acre.
The average of strip 7 is taken over the years 1903-1921.
,, ,, Plot 9 ,, ,, ,, 1916-1921.
,, ,, the remaining plots is taken over the years 1876-1921.
The manures are applied every year.
The shaded area is not under experiment.

Park Grass Plots.

The yield of hay (1st crop only) is given in cwts. per acre.
All plots are averaged over the period 1912-1921.
The manures are applied every year unless otherwise stated.
The shaded areas represent the unmanured plots.

Broadbalk Field.

The yield of wheat is given in bushels of dressed grain per acre.
For plots 9 and 16 the averages are taken over the 38 years ending 1922.
For plot 19 the average is taken over the 30 years ending 1922.
,, ,, 20 ,, ,, ,, ,, 15 ,, ,, ,,
For the remainder of the plots the average is taken over the 71 years ending 1922.
The centre pathway which cuts the plots transversely is for convenience of inspection and does not mark any change in treatment.
The manures are applied each year unless otherwise stated.
Plot 17 contains the block representing the yield in the year of the nitrogen application.
Plot 18 contains the block representing the yield in the year of the mineral application.

Hoos Field.

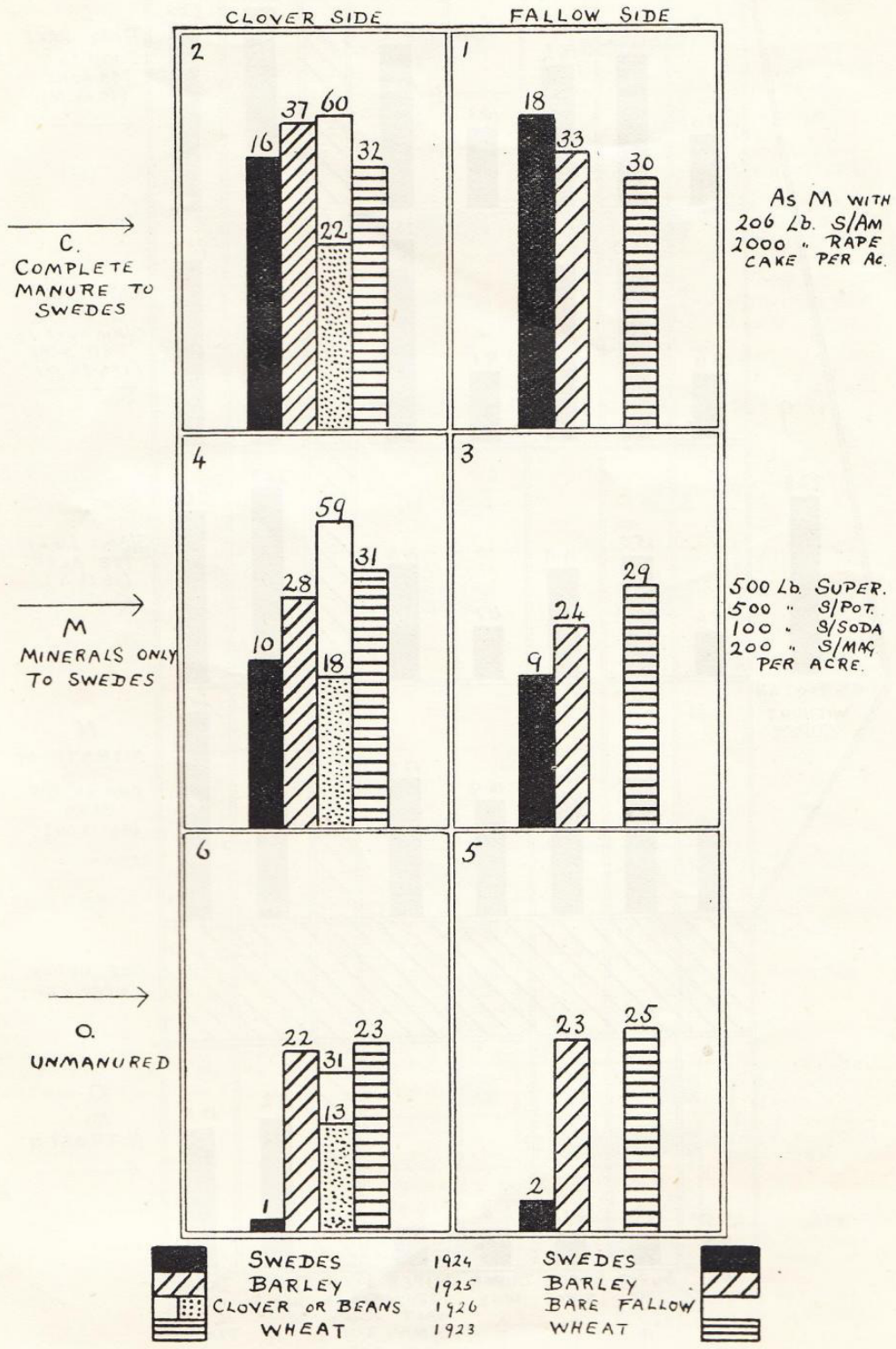
The yield of barley is given in bushels of dressed grain per acre.
For series AA the average is taken over the 54 years ending 1922.
For the remaining plots the average is taken over the 70 years ending 1922.
Series AA is divided transversely into two sections, one receiving nitrate of soda (for which the block diagrams indicate the yields), the other receiving 400 lb. per acre of silicate of soda in addition to the nitrate of soda.
The manures are applied each year.

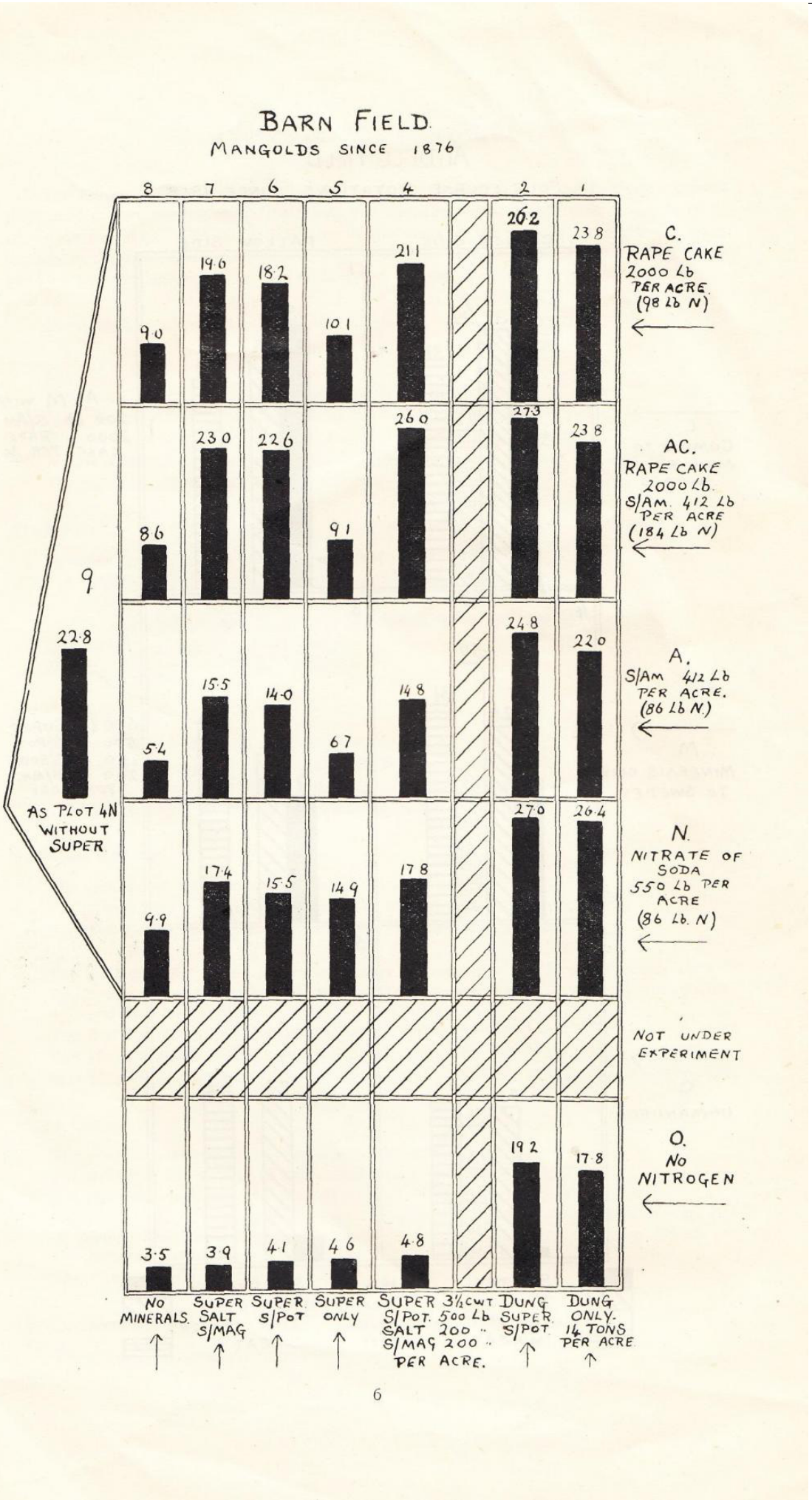
Little Hoos Field.

The shaded plots receive no manure.

AGDELL FIELD

FOUR-COURSE ROTATIONS SINCE 1848.





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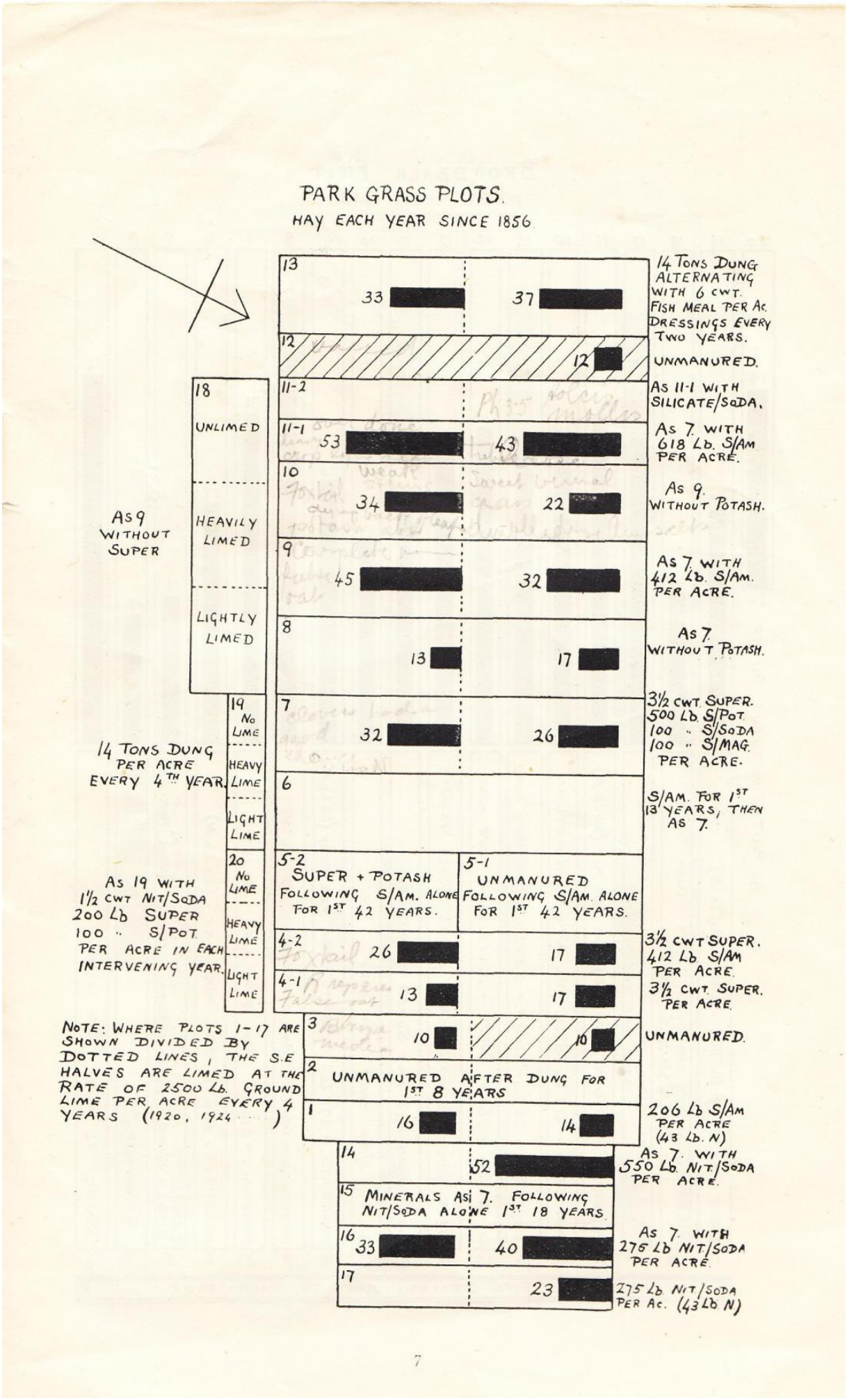
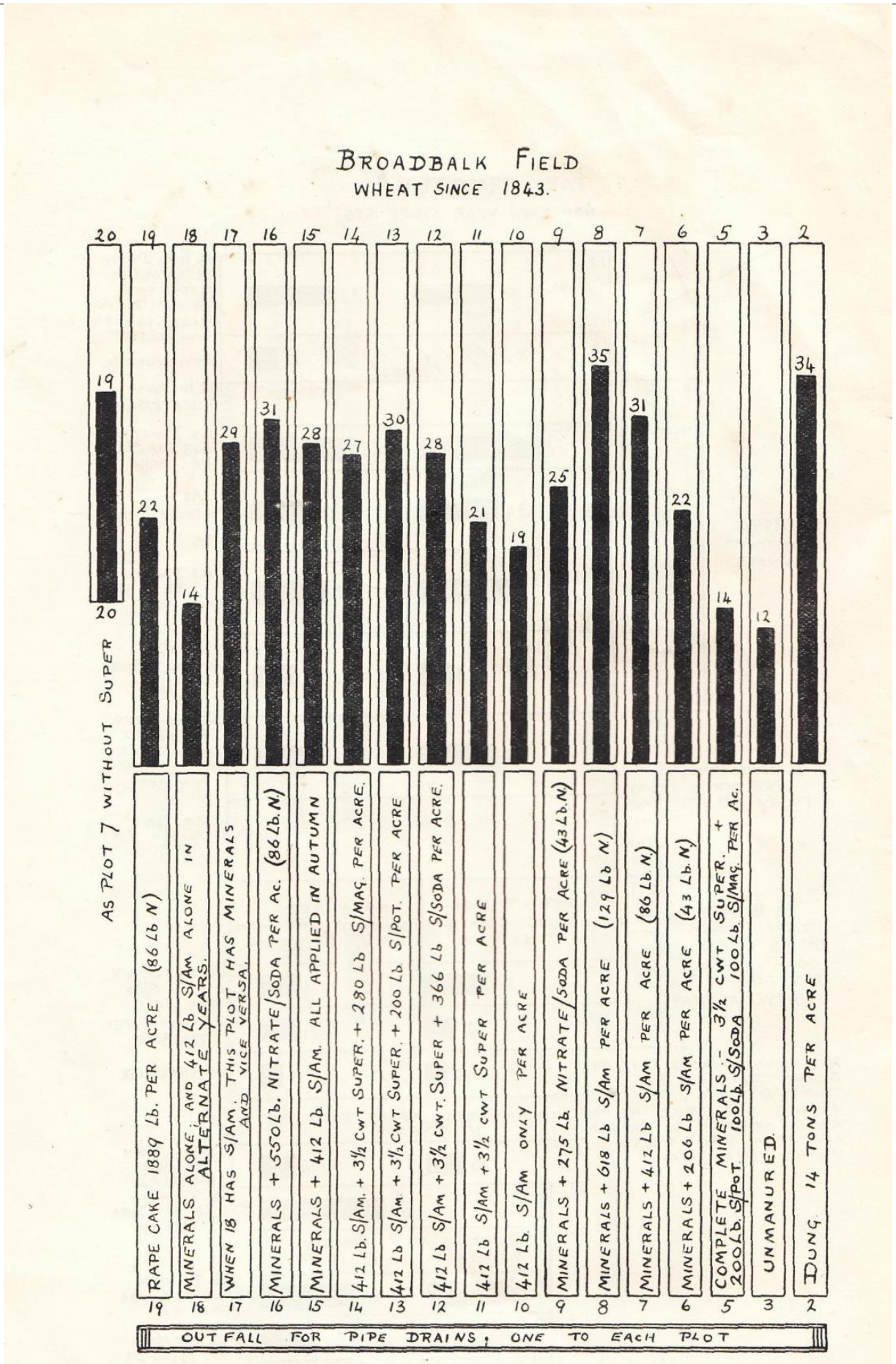
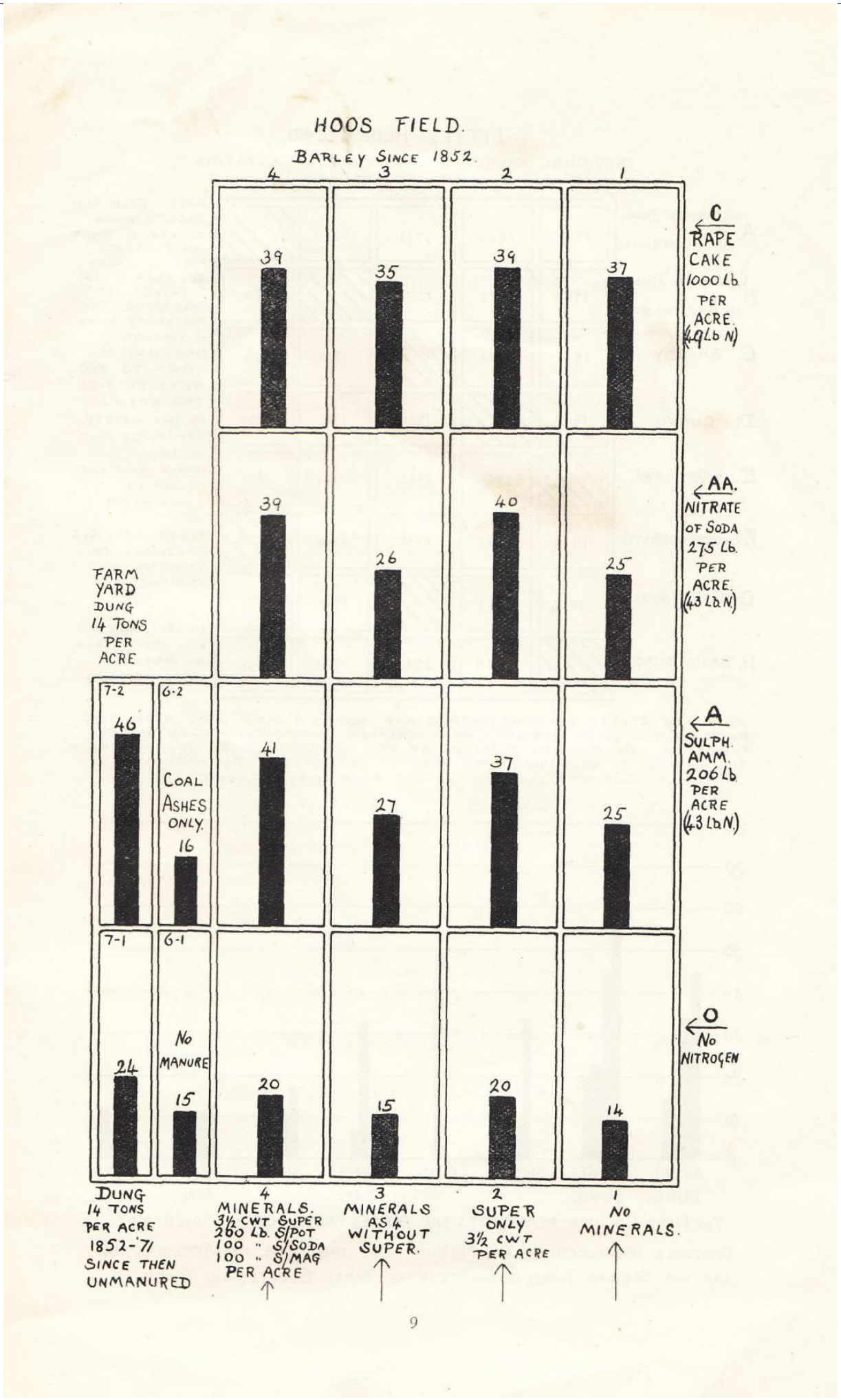






LITTLE HOOS FIELD.

RESIDUAL VALUES OF MANURES IN ROTATION

1904 ONWARDS

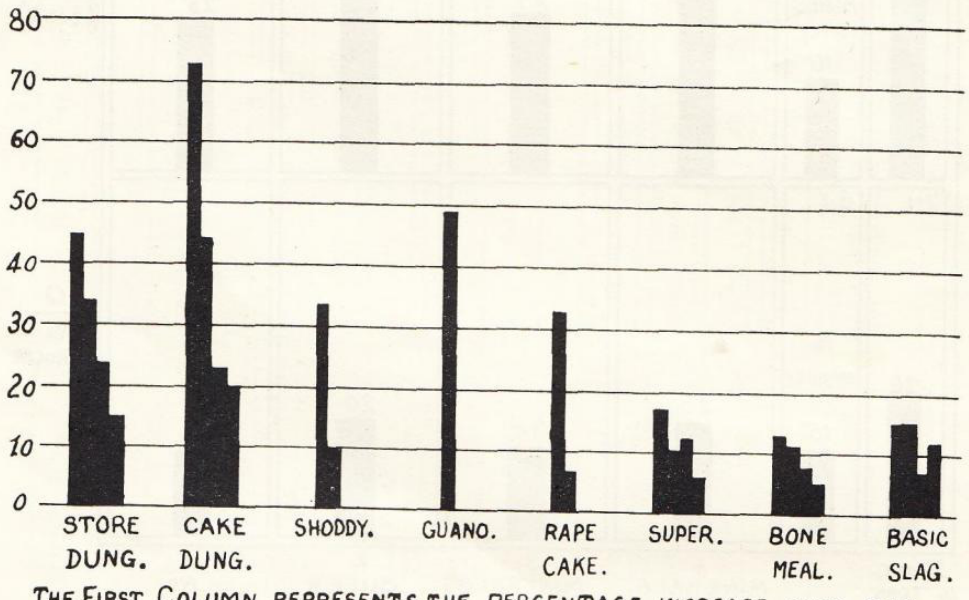
	5	4	3	2	1
A. ORDINARY DUNG. 16 TONS PER ACRE	1924	1922	1921	1920	
B. CAKE FED DUNG. 16 TONS PER ACRE.	1924	1922	1921		1920
C. SHODDY.	1924	1922		1921	1920
D. GUANO.	1924		1922	1921	1920
E. RAPE CAKE.		1924	1922	1921	1920
F. SUPERPHOSPHATE.	1924	1922	1921	1920	
G. BONE MEAL.	1924	1922		1921	1920
H. BASIC SLAG.		1924	1922	1921	1920

NOTE EACH YEAR (EXCEPT WHEN CLOVER IS TAKEN) ONE TREATED PLOT OF EVERY SERIES (A, B, ... H) RECEIVES ITS DRESSING. THE FOLLOWING YEAR A SIMILAR DRESSING IS GIVEN TO THE NEXT PLOT OF THE SERIES. IN DUE COURSE THE FIRST PLOT IS DRESSED AGAIN AND THE CYCLE IS CONTINUED

PLOTS RECEIVED DRESSINGS IN THE YEARS INDICATED.

IN 1923 CLOVER WAS TAKEN AND NO MANURES WERE APPLIED

ALL PLOTS EXCEPT CONTROLS (SHADED) AND SERIES A AND B HAVE A DRESSING MADE UP TO 40 Lb. NITROGEN, 100 Lb CALCIUM PHOSPHATE 50 Lb POTASH PER ACRE. AS MUCH AS POSSIBLE OF THIS IS SUPPLIED BY THE MANURE OF THE SERIES IN QUESTION; ANY DEFICIT IS MADE UP BY ADDITIONS OF SUL/AMM. SUPER. + SUL./POT AS THE CASE MAY REQUIRE.



THE FIRST COLUMN REPRESENTS THE PERCENTAGE INCREASE OVER THE CONTROLS PRODUCED BY THE MANURES IN THE YEAR OF APPLICATION AND THE SECOND, THIRD, & FOURTH IN THE THREE SUCCEEDING YEARS.

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