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Yields of the Field Experiments 1898



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Potatoes; Hoos Field

Rothamsted Research

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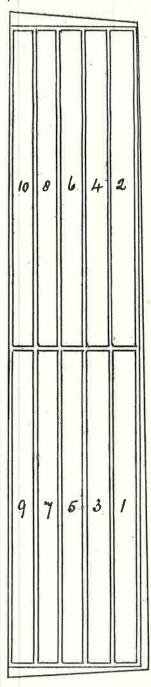
(76)

PLAN OF THE PLOTS IN HOOS FIELD, ON WHICH EXPERIMENTS HAVE BEEN MADE ON POTATOES,

WITHOUT MANURE, AND WITH VARIOUS MANURES.

23 years, 1876-98.

[For brief summary of results and conclusions, see opposite page.]



Total area of ploughed land about $2\frac{1}{10}$ acre.

Area of each plot $\frac{1}{6}$ acre.

The double lines indicate division paths between plot and plot.

[For details of the manuring and produce, see pp. 78–97.]

(77)

RESULTS OF EXPERIMENTS MADE IN HOOS FIELD, ON THE GROWTH OF POTATOES.

These experiments were commenced in 1876, so that 1898 is the 23rd year of their continuance. The descriptions grown were "Rock," 4 years, "Champion," 11 years, "Sutton's Abundance," 5 years, "Bruce," 1 year, and "White Beauty of Hebron," 1897, and 1898. The question was not as to the comparative merits of different descriptions, and different sorts were selected on the supposition that in growing the crop year after year change was desirable, especially with a view to the avoidance or lessening of disease. The special object was to ascertain the manurial requirements of the crop, and the comparative characters and composition of the produce.

The crop was grown continuously without manure, with various artificial manures, and also with farmyard manure, both alone and with some artificial manures. There were 10 differently manured plots, and under each of the 10 conditions the crop more or less declined over the later compared with the earlier years. The average produce per acre of total tubers over the 20 years was—without manure, only 1 ton, 11½ ewt.; with ammonium-salts alone, 1 ton, 18½ cwt.; with nitrate of soda alone, 2 tons, 8 cwt.; with superphosphate alone, 3 tons, 2½ cwt.; with mixed mineral manures, including potash, 3 tons, 6½ cwt. Thus, purely nitrogenous manures yielded less than purely mineral manures, indicating that there was a deficiency of ash-constituents rather than of available nitrogen within the soil. With the mixed mineral manure and ammonium-salts together, the average produce of total tubers was nearly 6 tons, and with the mixed mineral manure and nitrate of soda rather over 6 tons per acre. The better result by the nitrate of soda is doubtless due to its nitrogen being more immediately available, and more rapidly distributed within the soil, and so inducing a more extended development of feeding root. The average produce by the mineral and nitrogenous manures together, over 20 years of continuous growth, was very nearly that of the estimated average produce of Great Britain under ord than many of them, and about 3 times as much as that of the United States.

than many of them, and about 3 times as much as that of the United States.

The plots receiving farmyard manure containing about 200 lb. of nitrogen, gave less produce than the mixture of mineral manure and ammonium-salts, or nitrate of soda, supplying only 86 lb. of nitrogen. In fact, only a small proportion of the nitrogen of farmyard manure is rapidly available, that due to undigested matter being more slowly available, and that in the litter remaining a long time inactive. Farmyard manure is, however, often applied in very large quantities for potatoes, the process being to a great extent one of forcing, and there remains a great amount of unexhausted manure-residue within the soil.

The percentage of nitrogen in potato tubers is much increased by the application of nitrogenous manures, but the less so the riper the crop. Without manure there is a comparatively low percentage of mineral matter and a medium percentage of nitrogen. With mineral manure alone there is the highest percentage of mineral matter, and the lowest of nitrogen. With purely nitrogenous manures there is the lowest percentage of mineral matter, and the highest of nitrogen. Lastly, with mineral and nitrogenous manures together, there are intermediate percentages, both of mineral matter and of nitrogen, in the tubers. More than 80 per cent. of the total nitrogen of the tubers exists as albuminoids in the solid portion; perhaps on the average only about 15 per cent.; whilst from 40 to 50 per cent. of the total nitrogen may exist as soluble albuminoids in the juice, so that about or nearly two-thirds of the total nitrogen may exist as albuminoids, by far the larger proportion being, however, in the juice. The non-albuminoid nitrogenous manures, provided there be a sufficient available supply of ash-

The non-albuminoid nitrogenous matter exists chiefly as amides.

The characteristic effect of nitrogenous manures, provided there be a sufficient available supply of ashconstituents, and especially of potash, is to increase the amount of the non-nitrogenous substance—starch, in
the tubers. Thus, the produce of starch per acre was about 1100 lb. without manure, nearly 2000 lb. with
purely mineral manure, and with nitrogenous and mineral manures together about 3400 lb., or about 1½ ton.
In other words, the increased produce of starch by the use of the mineral and nitrogenous manures together
was more than 1 ton per acre. That is, there was a great increase in the production of the non-nitrogenous
constituent—starch, by the use of nitrogen in manure, just as there is an increase in the produce of the nonnitrogenous constituent—sugar, by the use of nitrogenous manures to root crops. The increased production of nitrogenous constituent—sugar, by the use of nitrogenous manures to root crops. The increased production of non-nitrogenous substances by nitrogenous manures, is equally striking in cereal crops; the result in their case being an increased production of starch in the grain, and of cellulose in the straw. Indeed, it is for the production of the non-nitrogenous substances—starch, sugar, and cellulose—that our direct nitrogenous manures

are chiefly used.

It is well known that season has much to do with the development of the potato disease; and there was on the average much more disease in the wetter seasons. As regards the influence of manure, the proportion on the average much more disease in the wetter seasons. As regards the influence of manure, the proportion of diseased tubers was the least where there was no supply of nitrogen; that is, where there was the least luxuriance, the most restricted growth, and where the ripening was early developed. On the other hand, with liberal supply of nitrogen, and luxuriant growth, there was the greatest proportion of diseased tubers; these being the conditions in which the juice is relatively rich in nitrogenous and mineral matters. Indeed, when the unsuitable weather comes, those tubers suffer the most which have the richest juice, that is, the least fixity of composition. It was found that there was always a higher, and sometimes a much higher, percentage of nitrogen in the dry substance of the diseased than in that of the sound tubers, indicating a loss of non-nitrogenous constituents. In many cases the still white, and also the separated discovered portion of the diseased tubers were omposition. It was found that there was always a higher, and sometimes a much higher, percentage of introgen in the dry substance of the diseased than in that of the sound tubers, indicating a loss of non-nitrogenous constituents. In many cases the still white, and also the separated discoloured portion of the diseased tubers, were analysed. Whilst the juice of the white portion contained approximately the normal amount of nitrogen, that of the discoloured portion contained very much less. On the other hand, the washed "Mare" of the white portion contained very little nitrogen, whilst that of the discoloured portion contained very much more. The distribution of the mineral matter to a great extent followed that of the nitrogen. The juice had obviously suffered exhaustion of much of both its nitrogen and its mineral matter in the development of the fungus. Further, there was more sugar (partly cane and partly glucose) in the diseased potatoes, which probably contributed to the development of the fungus. Apparently the first material change in the development of the disease is the destruction of starch and the formation of sugar. There is also a considerable loss of organic, and chiefly non-nitrogenous substance, due in part to the decomposition of the produced sugar, but probably in part to the evolution of carbonic acid, as a coincident of the growth of the fungus at the expense of readyformed organic substance, this being a characteristic of the growth of such non-chlorophyllous plants. Thus the results adduced as to the course of the disease are quite consistent with the fact that it develops the more in tubers grown by highly nitrogenous manures, and having a highly nitrogenous juice.

A full available supply of ash-constituents is essential for the successful growth of the potato, but these being provided, the amount of produce is largely dependent on the available supply of nitrogen. In ordinary practice, farmyard manure is mainly relied upon. It is used in very large quantities, and it is sometimes supple

tubers, see pages 78-97.

EXPERIMENTS ON POTATOES.—HOOS FIELD; commencing 1876.

Below are given the particulars of the Manures and Produce of each of the first 5 Seasons, 1876-1880; also the average Produce of those first 5 Seasons. For continuation, 1881 and since, see pp. 82-3, 86-7, 90-1, and 94-5.

The Land had been under experiments with Wheat, differently manured, from

Plots 1, 2, 3, and 4 had been unmanured for the Wheat, Plots 5 and 6 had out as Nitrate of Soda, instead of Ammonium-salts. Plots 7 and 8 received the same received the same quantity of Ammonium-salts alone every year for the Wheat, as Plot 5 now receives for potatoes: Plot 6 now receiving the same amount of nitrogen, amount of complex mineral manure, and Ammonium-salts, for the Wheat, as Plot 7 1856 to 1874; and was fallowed in 1875.

phate only. (3) Description of Potatoes, in 1876, 1877, 1878, and 1879, the "Rock" now receives for potatoes; and Plot 8 now receives the same complex mineral manures, and the same amount of nitrogen, but as Nitrate of Soda instead of Ammonium-salts. Plots 9 and 10 received the same complex mineral manures alone plant to plant in the rows, In 1880, the description was the "Champion" for the Wheat as Plot 10 now receives for potatoes; Plot 9 now receives superphos-(White); and in those years the rows were 25 inches apart; with 12 inches from (White); and the rows were 25 inches apart, with 14 inches from plant to plant in the rows.

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| C 1 | |
| experiment, | |
| under | |
| Area | |
| | |

| Tubers T | | Tons | | | Withered, not weighed, each lot spread on its own Plot and and ploughed in. | | Withered, not weighed, each lot spread on its own Plot, but high win (Oct. 14th) blew all off, before |
|--|-----------|------|-----------|---------------|--|------------|--|
| Piret Seasox, 1876. Potatoes planted, June 10–13; Crop taken up, Oct. 30–31. | R ACRE. | | TOTAL. | | Tons. cwts. 2 174-174-174-174-174-174-174-174-174-174- | | 8. 7. 7. 7. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. 8. |
| Pirst Seasox, 1876. Potatoes planted, June 10–13; Crop taken up, Oct. 30–31. | SODUCE PE | ers. | Diseased. | | | | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 |
| Handel First Season, 1876. Potatoes planted, June 10–13; Crop taken up, Oct. 30–3. Farmyand Manure (14 tons), and 29 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate, and 550 lbs. Nitrate of Soda Farmyand Manure (14 tons), and 39 ovts. Superphosphate, and 550 lbs. Nitrate of Soda Farmyand Manure (14 tons), and 39 ovts. Superphosphate, and 550 lbs. Nitrate of Soda Farmyand Manure (14 tons), and 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. Farmyand Manure (14 tons) Second Season, 1877. Potatoes planted, April 27–28; Crop taken up, Oct. 8–18 Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate (') Farmyand Manure (14 tons), and 39 ovts. Superphosphate, and 550 lbs. Nitrate of Soda Sodo lbs. Nitrate of Soda, 39 ovts. Superphosphate, and 550 lbs. Nitrate of Soda, 100 lbs. Sulph. Mag. (') Sodo lbs. Nitrate of Soda, 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. (') Sodo lbs. Nitrate of Soda, 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. (') Sodo lbs. Nitrate of Soda, 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. (') Sodo lbs. Nitrate of Soda, 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. (') Sodo lbs. Nitrate of Soda, 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. (') Sodo lbs. Nitrate of Soda, 39 ovts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Soda, 100 lbs. Sulph | Pı | Tut | Small. | | | | |
| There per Acke per Hampard Manured (14 tons), and 3½ cwts. Superphosphate (1) Farmyard Manure (14 tons), and 3½ cwts. Superphosphate, and 550 400 lbs. Ammonium-salts (2) | | | Good. | Oct. 30-31 | cwts. 61 1844 1144 20 11723 1848 1888 1888 334 | Oct. 8-10. | |
| 1004000 100400Lx00 | | | | SEASON, 1876. | Parmyard Manure (14 tons), and 34 cwts. Superphosphate (1) Farmyard Manure (14 tons), and 35 cwts. Superphosphate, and 550 lbs. Nitrate of Soda Farmyard Manure (14 tons), 35 cwts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts, 35 cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Manure of Soda, 35 cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Manure of Soda, 35 cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Magnesia 35 cwts. Superphosphate 35 cwts. Superphosphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 1877. | Unmanured Farmyard Manure (14 tons) Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1) Farmyard Manure (14 tons), 3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (2) 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. 3½ cwts. Superphosphate |

| Soda, 100 lbs. Sulph. Mag. 7 6 6 9 6 9 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Sulph. Mag. 5 111 0 65 0 54 3 Sulph. Mag. 5 194 0 64 0 194 7 7 Magnesia 3 4½ 0 63 0 44 3 3 |
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| 2; Crop taken up, Oct. 13-16. 1 134 0 64 0 94 0 0 174 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | Sulph. Ma Sulph. Ma Magnesia |
| 2 64 0 84 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 124 111 0 111 0 124 | Sulph. Ma Sulph. Ma Magnesia |
| 100 lbs. Sulph. Mag. 7 6 6 9 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | Sulph. Ma Sulph. Ma Magnesia |
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| 2 2 5 5 5 5 5 5 5 5 | Sulph. Ma Sulph. Ma Magnesia |
| 100 lbs. Sulph. Mag. 100 lbs. Sulph. Mag. 2; Crop taken up, Oct 2; Crop taken up, Oct life lbs. Sulph. Mag. 100 lbs. Sulph. Mag. 110 lbs. Sulph. Mag. | Sulph. Ma Sulph. Ma Magnesia |
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| te (') und 550 lbs. Nitrate of Soda ulph. Potash, 100 lbs. Sulph. lbs. Sulphate Soda, and 100 ox, 1879. Potatoes planted ox, 1879. Potatoes planted ox, 1879. Potatoes planted ulph. Potash, 100 lbs. Sulph. ulph. Potash, 100 lbs. Sulph. ate (') ate (') ate (') and 550 lbs. Nitrate of Soda ate (') and 550 lbs. Nitrate of Soda sulph. Potash, 100 lbs. Sulph. lbs. Sulphate Soda, and 100 sand 550 lbs. Nitrate of Soda and 550 lbs. Nitrate of Soda sate (') ate (') ate (') ate (') ate (') ate (') | Sulph. Potash, 100 lbs. Sulph. Soda, 10 ulph. Potash, 100 lbs. Sulph. Soda, 10 lbs. Sulphate Soda, and 100 lbs. Sulptate Iso lbs. Sulpharia scid, sp. gr. 1.7 (and water) monoils of Commerce. |
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| | 1000-100 1000-100 1000-100 |

(80

FIELD -continued. -Summary of the Composition of the "Good" Tubers, in each of the first 5 Seasons, 1876-1880; also the average composition over those first 5 Seasons. For the composition in 1881 and since, see pp. 84-5, 88-9, 92-3, and 96-7. EXPERIMENTS ON POTATOES.—HOOS

An abstract of the analytical results obtained, illustrating the influence of different manures, and of different seasons, on the composition of Potatoes, is given below. The specific gravity of the tubers is also given. In the tubers the dry matter, mirrogen, and ash have been determined; and in some cases complete analyses of the ash have been made. Besides the results obtained relating to the composition of the tubers themselves, the dry matter, in some cases the amount of the nitrogen existing as albuminoids has been determined; in some cases the amount of the nitrogen existing as albuminoids has been determined; by in the larger proportion of both the mineral matter, and the nitrogen, is found to exist in the juice; and of the nitrogen in the juice, as a rule, not much more than half exists as albuminoids. In the majority of cases, the small potatoes have been submitted to the same methods of analysis as the good potatoes. And in a large number of cases, similar methods of examination have been applied to the still white, and also to the separated discoloured portions of the diseased potatoes. With regard to these latter results, it may be observed, that whilst the juice of the white portion of the diseased potatoes contained approximately the normal amount of nitrogen, that of the diseased potatoes contained very much less. On the other hand, the washed, or exhausted

"mare" of the white portion, contained very little nitrogen, whilst that of the discoloured portion contained very much more. The distribution of the mineral matter was much in the same order as that of the nitrogen. It was obvious that the juice had suffered exhaustion of much increased amount of sugar found in the discased potatoes, the result of diseased action, and it probably also contributed to the development of the fungus. There was an increased action, and it probably also contributed to the development of the fungus.

The results given in the Table relate to the "good" potatoes only. In interpreting the figures it must be borne in mind that in each year, the seed was planted on all the plots at the same time,

The results given in the Table relate to the "good" potatoes only. In interpreting the figures it must be borne in mind that in each year, the seed was planted on all the plots at the same time, and that all the crops were taken up at the same time; and as there was several times as much produce in some cases as in others, it is obvious that the crops would not each be at its best, and all in the same condition of maturity, when taken up. Then, again, the analyses were not performed immediately after taking up the crops, but some time afterwards, in weighed samples which had been kept in a cool place for some weeks or months; and in the following only preliminary statement of results, no correction is made for any change from the original weight of the samples, the results being calculated upon the fresh weights as finally taken for analysis.

| PLOTS. | | Specific | | 3.6.1 | | | |
|--------|---|-------------------|----------------|---------------------|-----------------------|---------------------|-------------------|
| rious. | MANURES PER ACRE, PER ANNUM. | Gravity | - | Mineral Ma | Mineral Matter (Ash). | Nitrogen. | gen. |
| | (For Produce, see pp. 78–9.) | of the Tubers. | Dry Matter, | In Fresh Tubers. | In Dry Matter. | In Fresh Tubers, | In Dry Matter, |
| | First Season, 1876. | | | | | | |
| | | | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| | Unmanured | 1.097 | 23.9 93.4 | 48.0 0.98 | 3.53 4.11 | 0.269 | 1.13 |
| 1 65 | Faulty and Manne (Ar 1001s) | 1.097 | 23.5 | 1.00 | 4.27 | 0.191 | 0.81 |
| | e. and 550 | 1.085 | 21.2 | 0.83 | 3.92 | 0.295 | 1.39 |
| | 400 lbs. Ammonium-salts (*) | 1.087 | 22-1 | 0.81 | 3.67 | 0.332 | 1.50 |
| | 550 Ibs. Nitrate of Soda | 1.091 | 22.0 | 0.79 | 3.59 | 0.327 | 1.49 |
| 7 | 400 lbs. Ammonium-salts. 3‡ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 1.090 | 20-9 | - 86-0 | 4.71 | 0.266 | 1.27 |
| | 550 lbs. Nitrate of Soda, 33 cwts. Superphos., 300 lbs. Sulph. Potssh, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 1.088 | 21.9 | 86.0 | 4.46 | 0.292 | 1.33 |
| 6 | 33 cwts. Superphosphate | 1.103 | 23.5 | 1.10 | 4.72 | 0.199 | 0.84 |
| 10 | 3½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 1.102 | 22-9 | 1.06 | 4.64 | 0.171 | 0.74 |
| | Second Season, 1877. | | | | | | |
| ı | Unmanured | 1.119 | 33.0 | 1.05 | 3.17 | 0.302 | 16.0 |
| 72 | Earmyard Manure (14 tons) | 1.109 | 26-5 | 1.06 | 4.00 | 0.212 | 08.0 |
| |), and 3½ cwts. Superphosp | 1.103 | 26-0 | 1.11 | 4.26 | 0.207 | 08.0 |
| - | Farmyard Manure (14 tons), 33 cwts. Superphosphate, and 550 lbs. Nitrate of Soda | 1:112 | 27.2 | 1.06 | 3.90 | 0.301 | 11:11 |
| | 400 lbs. Ammonium-salts (2) | 1.107 | 22.0 | 29.0 | 3.07 | 0.281 | 1.28 |
| 9 | 550 lbs. Nitrate of Soda | 1:116 | 25.9 | 0.74 | 2.82 | 0.301 | 1.16 |
| - | 400 lbs. Ammonium-salts, 3‡ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 1.103 | 28.4 | 1.23 | 4.33 | 0.270 | 0.95 |
| - | 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 1:112 | 27.3 | 1.16 | 4.26 | 0.268 | 86.0 |
| 6 | 33 cwts. Superphosphate | 1.109 | 26.5 | 1.18 | 4.44 | 0.203 | 92.0 |
| 10 | $3\frac{1}{2}$ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 1.109 | 26.8 | 1.21 | 4.52 | 0.208 | 0.78 |

| Third Deficiency Third Defic | | 98.0 | - | | - | H | _ | | _ | _ | 1.04 | | - | | | _ | | _ | _ | | 0.91 | - | | | | - | 5 1-32 6 1-10 | _ | H | | |
|--|---------|--------------|-------|-----------------|-------|--|----------------------------|----------------------|-------|-------|-----------------|--------------------------|--|---|---------|-----------|-------|-------|-----------------------------|--------------|---|--|--|-------|---------------|-----------------|---|---|--|--|--|
| Permand Name (14 tons) 34 ovt. Superphosphate () 12 Nittete of Soda 17 Nittete of Sod | | 0.209 | 0.205 | 0.310 | 0.326 | 0.228 | 0.165 | | 0.990 | 0.218 | 0.254 | 0.300 | 0.272 | 0.21 | | 0.385 | 0.27 | 0.357 | 0.41 | 0.32 | 0.24 | 67.0 | | 0.53 | 0.22 | 0.35 | 0.26 | 0.27 | 0.19 | | |
| Permyted Manuer (14 tons) and 39 over. Superpicuphate (1) Permyted Manuer (14 tons), and 39 over. Superpicuphate (2) Permyted Manuer (14 tons), and 39 over. Superpicuphate (2) Permyted Manuer (14 tons), and 39 over. Superpicuphate (2) Permyted Manuer (14 tons), and 39 over. Superpicuphate (2) Permyted Manuer (14 tons), 30 over. Superpicuphate (2) Permyted Manuer (2) Permyted Manuer (2) Permyted Manuer (2) Permyted Manuer (3) Permyted Manuer (2) Permyted Manuer (3) Permyted Manuer (2) Permyted Manuer (3) Permyted Manuer (4) Permyted Ma | | 3·26 4·20 | 4.35 | 3.12 | 2.64 | 4.41 | 4·74 4·90 | | 3.95 | 4.26 | 90.8 3.00 | 3.05 | 4.36 | 4.89 | | 2.66 | 3.52 | 3.48 | 3.06 | 3.73 2.73 | 8 6 6 | 00.0 | | 4.01 | 4 13 3 89 | 3.17 | 3.04 4.29 | 4.22 | 4.56 | | |
| Unmanured Otherward Manne (14 tons), 34 overs. Superphosphate (1) Engrand Manne (14 tons), 34 overs. Superphosphate (2) Sign Nitters of Soda, 100 lbs. Sulph. Rotash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1-197 Sign Nitters of Soda, 100 lbs. Sulphate Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1-198 Sig overs. Superphosphate. 300 lbs. Sulphate Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia. 1-198 Sola Nitters of Soda, 29 overs. Superphosphate (2) Enganged Manne (14 tons), 34 overs. Superphosphate (3) Framyard Manne (14 tons), 35 overs. Superphosphate (3) | | 0.85 | 1.03 | 0.78 | 29-0 | 1 08 | 1.14 | | 96.0 | 1.02 | 0.91 | 0.76 | 1.04 | 1.15 | | 77.0 | 86.0 | 88.0 | 88.0 | 0.97 | 1.03 | 7.00 | | 1.00 | 1.03 | 0.77 | $\frac{0.77}{1.04}$ | 1.04 | 1.13 | | |
| Unmanured Otherward Manne (14 tons), 34 overs. Superphosphate (1) Engrand Manne (14 tons), 34 overs. Superphosphate (2) Sign Nitters of Soda, 100 lbs. Sulph. Rotash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1-197 Sign Nitters of Soda, 100 lbs. Sulphate Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1-198 Sig overs. Superphosphate. 300 lbs. Sulphate Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia. 1-198 Sola Nitters of Soda, 29 overs. Superphosphate (2) Enganged Manne (14 tons), 34 overs. Superphosphate (3) Framyard Manne (14 tons), 35 overs. Superphosphate (3) | | 26.0 | 23.8 | 24.9 | 25.5 | 24.4 | 24.1 | | 24.3 | 24.0 | 24.6 24.6 | 25·0 | 23.0 | 23.5 | | 28.8 | 27.8 | 25.2 | 28.5 28.5 28.5 | 25.9 | 27.5 | 6 12 | | 27.2 | 25·0 24·0 | 24.4 | 25.4 24.4 | 24-8 | 24.8 | (and water). | |
| Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1) Farmyard Manure (14 tons), ab owts. Superphosphate, and 55 farmyard Manure (14 tons), 3½ cwts. Superphosphate, and 55 fol bis. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. fol bis. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. fol bis. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. fol bis. Ammonium-salts, 3½ cwts. Superphosphate, 101 lbs. Signer with a sulph su | | 1.107 | 1.090 | 660-1 | 1.105 | 1.095 | 1.097 | | 1.103 | 1.099 | 1.102 1.103 | 1.104 | 1.102 | 1.099 | | 1-123 | 1.117 | 1.102 | 1.114 | 1.097 | 1.114 | | | 1.103 | 1.101 | 1-102 | 1 · 107 1 · 096 | 1.103 | 1.104 | , вр. gr. 1.7 | |
| | SEASON, | | | Nitrate of Soda | | Potash, 100 lbs. Sulph. Soda, 100 lbs. | Soda and 100 lbs. Sulphate | FOURTH SEASON, 1879. | | | Nitrate of Soda | 550 lbs. Nitrate of Soda | 400 lbs. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 3½ cwts. Superphosphate. 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | SEASON, | Unmanured | :: | : : : | 400 lbs. Ammonium-salts (²) | | Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. F Superphosphate | Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | GE OF 5 SEASONS, 1876 '77, '78, '79, and | | Milke of Code | Nitrate of Soda | 550 lbs. Nitrate of Soda Superphos 300 lbs. Sulph. Potash. 100 lbs. Sulph. Soda. 100 lbs. Sulph. Mag. | 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 34 cwts. Superphosphate 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | (1) "Superphosphate of Line"—in all cases made from 200 lbs. Bone-ash, 150 lbs. Sulphuric ac (2) "Ammoniun-salts"—in each case equal parts Sulphate and Muriate Ammonia of Commerc | |

EXPERIMENTS ON POTATOES.—HOOS FIELD—continued.

Below are given the particulars of the Manures and Produce of the Sixth, Seventh, Eighth, Ninth, and Tenth Seasons, 1881, 1882, 1883, 1884, and 1885. For the Manures and Produce of the 5 preceding years, see pp. 78-9, and of succeeding years, 1886 and since, see pp. 86-7, 90-1, and 94-5.

The Land had been under experiments with Wheat, differently manured, from 1856 to 1874; and was fallowed in 1875.

Plots 1, 2, 3, and 4 had been unmanured for the Wheat. Plots 5 and 6 had received the same quantity of Ammonium-salts alone every year for the Wheat, as Plot 5 now receives for potatoes: Plot 6 now receiving the same amount of nitrogen, but as Nitrate of Soda, instead of Ammonium-salts. Plots 7 and 8 received the

(Area under experiment, 2 acres.)

same amount of complex mineral manure, and Ammonium-salts, for the Wheat, as Plot 7 now receives for potatoes; and Plot 8 now receives the same complex mineral manures, and the same amount of nitrogen, but as Nitrate of Soda instead of Ammonium-salts. Plots 9 and 10 received the same complex mineral manures alone for the Wheat as Plot 10 now receives for potatoes; Plot 9 now receives superphosphate only. Description of Potatoes, in 1876, 1877, 1878, and 1879, the "Rock" (White); and in those years the rows were 25 inches apart, with 12 inches from plant to plant in the rows. In 1881, 1882, 1883, 1884, and 1885, the description was the "Champion" (White); and the rows were 25 inches apart, with 14 inches from plant to plant in the rows.

| | | ` | |
|------------------|---------|-----------|--|
| | Tone | iedot de | Withered, not weighed, each lot spread on its own Plot and ploughed |
| ACRE. | | TOTAL. | Tons. cwts. 2 0,2 0,2 0,2 0,2 0,2 0,2 0,2 0,2 0,2 0, |
| PRODUCE PER ACRE | ers. | Diseased. | Tons. cows. 0 0 0 0 0 11 12 24 14 15 15 15 15 15 15 15 15 15 15 15 15 15 |
| Pre | Tubers. | Small. | > 0 0 0 4 10 4 0 0 4 0 0 1 5 1 4 2 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 |
| | | Good. | Tons. cwts. Tons. cwts. 1 1774 1 17 |
| | | | Unmanured, in 1876, and each year since Farmyard Manure (14 tons) and 3½ ewts. Superphosphate (1) Farmyard Manure (14 tons), 3½ ewts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (2) 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (3) 50 lbs. Nitrate of Soda 50 lbs. Nitrate of Soda 50 lbs. Nitrate of Soda 51 lbs. Nitrate of Soda 52 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 53 ewts. Superphosphate 54 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 55 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 56 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 57 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 58 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 59 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 50 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 51 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 52 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 53 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 54 lbs. Nitrate of Soda, 3½ ewts. Superphosphate 55 lbs. Nitrate of Soda, 3½ ewts. Superphosphate, 300 lbs. Sulphate Soda, 100 lbs. Sulphate Magnesia |
| | PLOTS. | | 1004005000 |
| | | | |

| _ | Unmanured, in 1876, and each year since | 1 15 | 0 | 3 | 0 | $0^{\frac{1}{4}}$ | 1 1 | 6 |
|----|---|-------------------|---|------------------|---|-------------------|-----|-----------------|
| 21 | Unmanured in 1882. Previously Farmyard Manure (14 tons) | 3 15 | 0 | 2 | 0 | 2 | 4 | 0 |
| က | Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1) | 5 8 | 0 | 41 | 0 | 00 Hg | 5 1 | 의4 |
| 4 | Farmyard Manure (14 tons), 34 cwts. Superphosphate. In 1881, and previously, 550 lbs. Nitrate of Soda also. | 4 7 | 0 | ယ လ 4 | 0 | | 4 1 | 23 44 |
| 5 | 400 lbs. Ammonium-salts (²) | 1 184 | 0 | လ လ လ | 0 | 4 | 2 | 24 |
| 9 | | 1 183 | 0 | က | 0 | 04 | 67 | 01 + |
| 7 | rphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma | 7 153 | 0 | 3 3 3 3 | 0 | 113 | 8 1 | S4 24 |
| 00 | 300 lbs. Sulph. Potash, 100 lbs. Sulph. | $6 16\frac{1}{2}$ | 0 | $3\frac{1}{2}$ | 0 | C7 614 | 7 | 22 884 |
| 6 | | 4 12 | 0 | 22 | 0 | rki H | 4 1 | 34 34 |
| 0 | 3½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 4 73 | 0 | 24 | 0 | 04 | 4 1 | 0 |

d, t t lot

September 25–27

Crop taken up,

Potatoes planted, March 21.

SEASON, 1882.

SEVENTH

| phosphate, and in 1881, and because in Soda, 100 lbs. Sulph. Mag. 1986, 1987, 1988, | red, thed, or on Plot | red, hot lot lot lot lot lot lot lot lot lot l | reed, on on Plot |
|--|--|---|---|
| ## Superphosphate also (*) **Superphosphate also (*) **Superphosphate also (*) **Superphosphate also (*) **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.** **Sulphate Soda, and 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.** **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Sulphate Soda, and 100 lbs. Sulphate Magnesia **Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnesia **Sulphate Soda, and 100 lbs. Sulphate Magnesia | Withered, not weighed, each lot spread on its own Plot and ploughed in. | Withered, not weighed, each lot spread on its own Plot and ploughed in. Withered, not weighed, each lot spread on its own Plot and its own Plot and ploughed ploughed ploughed ploughed ploughed | Withered, not weighted, each lot spread on lisown Plot and ploughed in. |
| ## Catabababate also(') ## Sulpribate Soda, and 100 lbs. Sulph. Mag. ## Sulpribate Soda, and 100 lbs. Sulph. Mag | 12 13 13 14 14 14 15 15 15 15 15 15 15 15 15 15 | 11 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | 27 C C C C C C C C C C C C C C C C C C C |
| nure (14 tons) 1. Scherphosphate also (*) 1. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 2. 134 0 74 0 1 4 0 1 0 1 0 1 0 1 0 1 0 1 0 1 0 1 | 2700 4 888844 | 000 4 000400 HH44 | H 4 10 10 00 10 0 4 4 |
| nue (14 tons) S. Superphosphate also (') S. Superphosphate also (') S. Superphosphate also (') Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. S. Sulphate Soda, and 100 lbs. Sulphate Magnesia Potatoes planted, March 21. Crop taken up, September 24-26. The corner of the construction of the constr | 4 4 C C I O C C C I | 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | -1000 OUGUE 0000 OUGUE |
| ## Control 1988 198 | 00000000 | 000 0 00000 | 000 0 00000 |
| a. Sulperphosphate also (') S. Superphosphate also (') E. Superphosphate and in 1881, and E. Superphosphate and in 1881, and E. Superphosphate and in 1881, and E. Sulphate Soda, 100 lbs. Sulphate Magnesia E. Sulphate Soda, and 100 lbs. Sulphate Magnesia E. Potatoes planted, March 21. Crop taken up, September 24-27 Totatoes planted, March 21. Crop taken up, September 24-27 Totatoes planted, March 17 and 18. Crop taken up, September 24 lbd. E. Sulphate Soda, and 100 lbs. Sulphate Magnesia E. Sulphate Soda, and 100 lbs. Sulpha | 2000 111 8 18 4 4 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 | | 16.21 a.02 a.045.244 |
| s. Superphosphate also (') b. Potash, 100 lbs. Sulph. Soda, 100 c. Potash, 100 lbs. Sulph. Soda, 100 c. Potash, 100 lbs. Sulph. Soda, 100 c. Sulphate Soda, and 100 lbs. Sulph b. Potatoes planted, March 21. C nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatosh, 100 lbs. Sulph. Soda, 100 c. Sulphate Soda, and 100 lbs. Sulph ce of 5 Seasons, 1881, '82, '83 nure (14 tons) sly 3½ cwts. Superphosphate also (') sly 3½ cwts. Superph | 010 0 00000 | 2,000 0 000000 4,000 0 0000 | |
| s. Superphosphate also (') b. Potash, 100 lbs. Sulph. Soda, 100 c. Potash, 100 lbs. Sulph. Soda, 100 c. Potash, 100 lbs. Sulph. Soda, 100 c. Sulphate Soda, and 100 lbs. Sulph b. Potatoes planted, March 21. C nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatosh, 100 lbs. Sulph. Soda, 100 c. Sulphate Soda, and 100 lbs. Sulph ce of 5 Seasons, 1881, '82, '83 nure (14 tons) sly 3½ cwts. Superphosphate also (') sly 3½ cwts. Superph | 44.00 13.00 14.13.00 | 10 % 10 % 10 % 10 % 10 % 10 % 10 % 10 % | NOVIKA I |
| s. Superphosphate also (') b. Potash, 100 lbs. Sulph. Soda, 100 c. Potash, 100 lbs. Sulph. Soda, 100 c. Potash, 100 lbs. Sulph. Soda, 100 c. Sulphate Soda, and 100 lbs. Sulph b. Potatoes planted, March 21. C nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatoes planted, March 17 and 18. nure (14 tons) c. Sulphate Soda, and 100 lbs. Sulph otatosh, 100 lbs. Sulph. Soda, 100 c. Sulphate Soda, and 100 lbs. Sulph ce of Seasons, 1881, '82, '83 nure (14 tons) sly 3½ cwts. Superphosphate also (') sly 3½ cwts. Superphos | M410 4 0201-1-44 | | |
| | nure (14 tons) S. Superphosphate also (') eviously, 3½ cwts. Superphosphate, and D. Potash, 100 lbs. Sulph. Soda, 100 lbs. Rolphate Soda, and 100 lbs. Sulphate | Unmanured, in 1876, and each year since Unmanured, in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons). Farmyard Manure (14 tons), alone 1883-4. In 1882, and previously, 3½ cwts. Superphosphate also (1). Farmyard Manure (14 tons) alone 1883-4. In 1882, and previously, 3½ cwts. Superphosphate, and in 1881, a previously, 550 lbs. Nitrate of Soda also previously, 550 lbs. Nitrate of Soda also 150 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (2) 150 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (3) 150 lbs. Superphosphate, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma 150 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma 2½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma 2½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Magnesia TENTH SEASON, 1885. Potatoes planted, March 17 and 18. Crop taken Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since; previously 3½ cwts. Superphosphate also (1). Farmyard Manure (14 tons) alone 1883 and since, In 1882, and previously, 350 lbs. Nitrate of Soda also 400 lbs. Ammonium-salts, 3½ cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Ma 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Ma 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Soda, | los in in i |

EXPERIMENTS ON POTATOES. HOOS FIELD -continued. Summary of the Composition of the "Good" Tobers, in the Sixth, Seventh, Eighth, Ninth, and Tenth Seasons, 1881, 1882, 1883, 1884, and 1885. For the particulars of the composition in the first 5 years, 1876-1880, see pp. 80-1, and for those in succeeding years, 1886 and since, see pp. 88-9, 92-3, and 96-7.

An abstract of the analytical results obtained, illustrating the influence of different manures, and of different seasons, on the composition of Potatoes, is given below. The specific gravity of the tubers is also given. In the tubers the dry matter, introgen, and sah have been determined; and is some cases complete analyses of the ash have been made. Besides the results obtained relating to the composition of the tubers themselves, the dry matter, the sugar, the nitrogen, and the ash, in the expressed juice have in many cases been determined; in some cases the amount of the nitrogen existing as albuminoids has been determined; and in some cases the amount of the nitrogen existing as albuminoids has been determined; and in some cases the introgen in the juice, as a rule, not much more than half exists as albuminoids. In many cases, the introgen in the juice, as a rule, not much more than half exists as albuminoids. In many cases, the small potatoes have been submitted to the same methods of analysis as the good potatoes. And in some cases, similar methods of examination have been applied to the still white, and also to the separated discoloured portions of the diseased potatoes. With regard to these latter results, it may be observed, that whilst the juice of the white per portion of the diseased potatoes contained approximately the normal amount of nitrogen, that of the discoloured portion contained very much less. On the

other hand, the washed, or exhausted "mare" of the white portion, contained very little nitrogen, whilst that of the discoloured portion contained very much more. The distribution of the mineral matter was much in the same order as that of the nitrogen. It was obvious that the juice had suffered exhaustion of much of both its nitrogen and its mineral matter, in the development of the fungus. There was an increased amount of sugar found in the diseased potatoes, the result of diseased action, and it probably also contributed to the development of the fungus.

The results given in the Table relate to the "good" potatoes only. In interpreting the figures it must be borne in mind that in each year, the seed was planted on all the plots at the same time, and that all the crops were taken up at the same time; and as there was several times as much produce in some cases as in others, it is obvious that the crops would not each be at its best, and all in the same condition of maturity when taken up. Then, again, the analyses were not performed immediately after taking up the crops, but sometime afterwards, in weighed samples which had been kept in a cool place for some weeks or months; and in the following only preliminary statement of results, no correction is made for any change from the original weight of the samples, the results being calculated upon the fresh weights as finally taken for analysis.

| Sixth Season, 1881. Sixth Season, 1881. Shate (') Se and 550 lbs. Nitrate of Soda Se Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. Se Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. Se Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. Seynate (') Seventh Season, 1882. Seynate (') Seynate (| | | - | บั | omposition | of the "Go | Composition of the "Good" Tubers. | |
|--|--------|---|---------------------|----------------|---------------------|-------------------|-----------------------------------|-------------------|
| Sixth Season, 1881. Tubers | į | MANURES PER ACRE, PER ANNUM. | Specific Fravity | | Mineral Ma | tter (Ash). | Nitrogen. | gen. |
| Farmyand Manure (14 tons) Per cent. | FLOTS. | (For Produce, see pp. 82–3.) | | Dry fatter. | In Fresh Tubers. | In Dry Matter. | In Fresh Tubers. | In Dry Matter. |
| Transpard Manure (14 tons) | | SEASON, | | | | | | |
| Transpart Manue (14 tons) Transpart | | | P. | er cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| Farmyard Manure (14 tons) | 1 | | 1.125 | 30.5 | 98.0 | 7.87 | 0.886 | 1.28 |
| Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (1) Farmyard Manure (14 tons), and 3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda 1-117 26-0 0-91 | 2 | Farmward Manure (14 tons) | 1.116 | 29.1 | 66-0 | 3.41 | 0.294 | 1.01 |
| Farmyard Manue (14 tous), 3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda 1.115 27.9 0.84 | 00 | Remyand Manne (14 tons), and 34 cwts. Superplosphate (1) | 1:113 | 28.1 | 1.07 | 3.81 | 0.295 | c0.1 |
| 400 lbs. Ammonium-salts (*) 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (*) 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (*) 550 lbs. Nitrate of Soda 400 lbs. Ammonium-salts (*) 550 lbs. Nitrate of Soda 550 lbs. | 9 4 | 550 lbs. | 1-107 | 26.0 | 0.91 | 3.51 | 0.359 | 1.39 |
| 1-114 28-0 0-76 | 4 10 | | 1.115 | 27.9 | 0.84 | 3.03 | 0.375 | 1.35 |
| ts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.112 25.3 1.14 1.122 28.3 1.17 1.123 29.0 1.14 1.123 29.0 1.14 1.124 28.3 1.17 Seventh Season, 1882. 1.127 29.5 1.17 Seventh Season, 1882. 1.127 29.5 1.17 Seventh Season, 1882. 1.127 29.5 1.17 1.127 29.5 1.17 30.3 0.93 sky Farmward Manue (14 tons) 1.127 28.7 1.13 30.3 0.93 sky Farmward Manue (14 tons) 1.127 28.7 1.17 1.127 28.7 0.97 1.128 28.7 0.97 3.4 owts. Superphosyhate. In 1881, and previously, 550 lbs. Nitrate of Soda also 1.116 2.5 owts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.128 1.128 29.3 1.08 1.138 29.3 1.08 1.138 29.3 1.08 1.138 28.2 1.08 1.138 29.3 1.08 1.148 29.3 1.08 1.158 29.3 1.08 1.158 29.3 1.08 1.158 29.3 1.08 | 9 4 | FKO Use Nitrate of Section | 1-114 | 28.0 | 92.0 | 2.70 | 0-379 | 1.36 |
| Trs. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Boda, 100 lbs. Sulph. Mag. 1-123 1-124 1-125 1-14 1-125 1-14 1-155 1-17 SEVENTH SEASON, 1882. 1-127 SEVENTH SEASON, 1882. 1-127 Seventhate Manue (14 tons) 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-127 1-129 1-127 1-120 | 10 | S. Snlph. Potash. 100 lbs. Sulph. | 1.110 | 26.7 | 1.06 | 3.97 | 908-0 | 1.15 |
| 1-123 29-0 1-14 | - ox | Sulph. Potash, 100 lbs. Sulph. | 1-107 | 25.3 | 86.0 | 3.89 | 0.341 | 1.35 |
| 1-122 28-3 1-17 1-18. Sulphate Potash, 100 lbs. Sulphate Magnesia 1-122 28-3 1-17 1-18. Seventh Season, 1882. 1-187 29-5 0-88 1-187 | 0 0 | | 1-123 | 29.0 | 1.14 | 3.92 | 0.242 | 0.83 |
| Seventh Season, 1882. 1.127 29.5 0.83 1.131 30.3 0.91 1.132 28.7 0.97 1.132 28.7 0.97 1.133 cwts. Superphosphate. In 1881, and previously, 550 lbs. Nitrate of Soda also 1.119 27.9 0.77 1.119 27.9 0.77 1.119 27.9 0.77 1.120 28.7 0.98 28.8 30.1 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.128 28.2 0.98 1.128 29.3 1.08 1.128 29.3 1.08 | 10 | 300 lbs. Sulphate Potash, | 1-122 | 28.3 | 1.17 | 4.13 | 0-225 | 08.0 |
| sty Farmyard Manure (14 tons) sty Farmyard Manure (14 tons) and 34 cwts. Superplosphate. In 1881, and previously, 550 lbs. Nitrate of Soda also 1.122 28.7 1.122 28.7 0.97 3.28.7 0.97 1.119 27.9 0.79 3.08.8 Superplos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.128 27.9 0.79 1.128 28.2 0.98 1.08 28.2 1.08 28.2 1.08 28.2 1.08 28.2 1.08 28.2 1.08 | | | | | | | | |
| sky Farmyard Manue (14 tons) 1.131 30.3 0.91 and 34 cwts. Superplosphate. 1.122 28.7 0.97 35 cwts. Superplosphate. 1.118 27.9 0.77 1.119 27.9 0.77 1.119 27.9 0.77 wts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.120 27.5 0.96 rts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.123 28.2 0.96 rts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.128 29.3 1.08 | - | Transmirred in 1876 and each vest since | 1.127 | 29.5 | 0.83 | 2.85 | 0.296 | 1.00 |
| nd 34 ewts. Superphosphate (*) 1-122 28.7 0.97 1-132 28.7 0.97 1-13 20.4 1.116 27.9 0.77 1-14 27.9 0.77 1-15 28.7 0.98 1-15 28.7 0.98 1-15 28.7 0.98 1-15 28.7 0.98 1-15 27.9 0.77 1-15 27.9 0.77 1-15 27.9 0.77 1-15 27.9 0.98 1-15 28.2 0.98 1-15 28.2 0.98 1-15 28.2 0.98 1-15 29.3 1.08 1-15 29.3 1.08 | 10 | Transaction 1889. Previously Farmward Manue (14 tons) | 1:131 | 30.3 | 0.91 | 3.01 | 0.260 | 98.0 |
| Signates. Superphosphate. In 1881, and previously, 550 lbs. Nitrate of Soda also 1116 26.6 0.93 1719 2779 0.77 1719 2779 0.77 1719 1719 2779 0.79 1719 1710 2779 0.79 1710 1710 1710 1710 1710 1710 1710 17 | a on | Farmward Wanne (14 tons) and 34 cwis. Superphosphate (1) | 1.122 | 28.7 | 0.97 | 3-39 | 0.261 | 0.91 |
| 1-119 27-9 0-77 1-119 27-9 0-77 1-119 27-9 0-77 1-119 27-9 0-77 1-119 27-9 0-79 1-119 27-9 0-79 1-119 27-9 0-79 1-119 27-9 0-79 1-119 27-9 0-79 1-119 27-9 0-79 1-119 27-9 1-119 27-9 1-198 1-09 1-198 | 4 | Formward Manne (14 tons), 34 cwis. Superplosphate. In 1881, and previously, 550 lbs. Nitrate of Soda also | 1.116 | 9.97 | 0.93 | 3.48 | 0.313 | 1.18 |
| 1.119 27.9 0.79 wts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.123 28.2 0.98 rts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.128 29.3 1.03 https://doi.org/10.100/100 lbs. Sulphate Magnetia 1.125 29.3 1.03 | 1 10 | 400 lbs Ammonium-safts 2 | 611:1 | 27.9 | 0.77 | 2.78 | 0.372 | 1.34 |
| vets. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1123 28.2 0.98 1.08 strs. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulphate Magnetical 1128 29.3 1.08 11.08 11.08 11.08 11.08 11.08 | 9 (4 | | 1-119 | 6.72 | 6.79 | 2.83 | 0.408 | 1.46 |
| rts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 1.123 28.2 0.98 1.03 1.03 1.03 1.03 1.03 1.03 1.03 1.03 | 2 (| 100 he Ammonium coltes Sunernhos 300 hs. Sulph. Potash 100 lbs. Sulph. Soda. 100 lbs. Sulph. Mac. | 1.120 | 27.5 | 96.0 | 3.49 | 0.305 | 1.11 |
| 1.128 29.3 1.03 The Salabate Potesh 100 lbs Salabate Macmesia 1.125 99.1 1.08 | - or | 550 hs Nitrate of Soda 34 cwts. Smerphs. 300 lbs. Sulph. Potash, 100 lbs. Sulph. Mag. | 1-123 | 28.5 | 86.0 | 3.46 | 0.336 | 1.19 |
| The Sulphate Potash 100 Hz Sulphate Soda and 100 Hz Sulphate Macmesia 1-125 99-1 1-08 | 00 | | 1-128 | 29.3 | 1.03 | 3.53 | 0.209 | 0.71 |
| TOO TOO. DUIDING DOLD, WILL IN THE TOO TOO. | 10 | lbs. Sulphate Potasi | 1-125 | 29.1 | 1.08 | 3.71 | 0.229 | 62.0 |

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| 1.09 1.09 1.09 1.47 1.47 1.37 0.73 | 1.33 1.34 1.59 1.77 1.77 1.78 1.85 0.98 0.98 1.38 1.39 1.39 1.39 1.49 1.49 1.76 1.77 | 1.53 1.147 1.019 1.019 1.23 1.23 1.23 1.23 1.24 1.21 1.21 1.21 1.23 1.23 1.24 1.25 1.23 1.23 1.24 1.25 1.25 1.25 1.25 1.25 1.25 1.25 1.25 |
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EXPERIMENTS ON POTATOES.—HOOS FIELD—continued.

Below are given the particulars of the Manures and Produce, of the Eleventh, corps. Twelfth, Thirteenth, Fourteenth, and Fifteenth Seasons, 1886, 1887, 1888, 1889, and 1890. For the Manures, description of Potatoes grown, and the Produce, in the of Su 10 preceding years, see pp. 78–9, and 82–3, and in succeeding years, pp. 90–1, and 94–5. The arrangement of the plots is precisely the same as for the 10 preceding potato 14 in

crops. The manures are the same as for the crops of 1883, 1884 and 1885, excepting that for the crop of 1887 Sulphate Ammonia was applied instead of equal parts of Sulphate and Muriate Ammonia, as in former years and since (see foot-note No. 2). Description of Potato, "The Champion" (White). Rows 25 inches apart; 14 inches from plant to plant in the rows.

(Area under experiment, 2 acres.)

| | | | Pr | PRODUCE PER ACRE. | R ACRE. | | |
|--|--|--|---|--|--|--|---|
| PLOTS. | MANURES PER ACRE PER ANNUM. | | Tubers. | ers. | | | E |
| | | Good. | Small. | Diseased. | TOTAL. | ų | robs. |
| | Eleventh Season, 1886. Potatoes planted, April 10. Crop taken up, September 30, and October 1 and | 30, and Oct | ober 1 an | 1d 2. | | | |
| 100 4 20 20 10 10 10 10 10 10 10 10 10 10 10 10 10 | Unmanured in 1876, and each year since Unmanured in 1878, and since. Previously Farmyard Manure (14 tons). Farmyard Manure (14 tons) alone 1883 and since. previously 3½ cwts. Superphosphate also (7). 1881, and previously, 550 lbs. Nitrate of Soda also 400 lbs. Ammonium-salts (2) 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag., 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag., 3½ cwts. Superphosphate 35 cwts. Superphosphate 36 cwts. Superphosphate 37 cwts. Superphosphate 38 cwts. Superphosphate 39 cwts. Superphosphate 300 lbs. Sulphate Potash, 100 lbs. Sulphate Magnesia | Tons. cwts. T 0 133 2 15 2 124 1 22 1 125 1 1 22 3 10 3 10 3 64 1 174 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | Tons. cwts. | Tons. cwts. 0 0,4,6 0 1 1 0 1 1 0 0 1 1 0 0 0 1 1 0 0 0 0 0 | 1982000000000000000000000000000000000000 | 0wts. 18 194 164 104 104 528 | Withered, not weighed each lot spread on its own Plot and ploughed ploughed in. |
| | TWELFTH SEASON, 1887. Potatoes planted, March 24. Crop taken up, | October 17-19. | 9. | | | | |
| 1 2 3 3 5 7 7 7 10 | Unmanured in 1876, and each year since. Unmanured in 1882, and since. Previously Furnyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate also (1). [Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate, and in 1881, and previously, 550 lbs. Nitrate of Soda also 550 lbs. Sulphate Ammonia (3) 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphosphate 3½ cwts. Superphosphate 3½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Magnesia. | 2 C C C C C C C C C C C C C C C C C C C | 000 0 00000 0004 4 00044400 44884 884 4844844 884 | 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 104 ro 104ro00 | 14 0 C C C C C C C C C C C C C C C C C C | Withered, not weighed each lot spread on its own Plot and ploughed in. |

| Withered, not weighed, each lot spread on its own Plot and ploughed in. | Withered, not weighed, each lot spread on its own Plot and ploughed in. Withered, not weighed, each lot spread on its own Plot and ploughed, in. | Withered, not weighed, each lot spread on its own Plot and ploughed in. |
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| | also (¹) Superphosphate, da, 100 lbs. Sulph Sulphate Magne iil 3. Crop take salso (¹) salso (¹) Superphosphate, also (¹) Superphosphate, salso (²) Superphosphate, salso (²) Superphosphate, salphate Magne | also (') |
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| Manure (14 tons). riously 3½ cwts. Superphos 1882, and previously, 3½ Sulph. Potash, 100 lbs. Su ulph. Potash, 100 lbs. Suli | rd Manure (14 tons) reviously 3½ cwts. Superphosphate also In 1882, and previously, 3½ cwts. Supe S. Sulph. Potash, 100 lbs. Sulph. Soda, 1 Sulph. Potash, 100 lbs. Sulph. Soda, 1 O0 lbs. Sulphate Soda, and 100 lbs. Sulp ox, 1890. Potatoes planted, April 3. rd Manure (14 tons) reviously, 3½ cwts. Superphosphate also In 1882, and previously, 3½ cwts. Sulp S. Sulph. Potash, 100 lbs. Sulph. Soda, 1 Sulph. Potash, 100 lbs. Sulph. Soda, 1 Sulph. Potash, 100 lbs. Sulph. Soda, 1 Of lbs. Sulphate Soda, and 100 lbs. Sulph. | reviously 3½ owts. Superphospha In 1882, and previously, 3½ owt In 1882, and previously, 3½ owt In 1882, and previously, 3½ owt Is. Sulph. Potash, 100 lbs. Sulph. |
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Thirteenth, Fourteenth, and Fifteenth Seasons, 1886, 1887, 1888, 1889, and 1890. For particulars of the composition in the first 10 years, 1876-1885, see Twelfth, THE "GOOD" TUBERS, in the Eleventh, THE COMPOSITION OF pp. 80-1, and 84-5, and for those in succeeding years, 1891 and since, see pp. 92-3, and 96-7. EXPERIMENTS ON POTATOES.—HOOS FIELD—continued.—STEMARY OF

An abstract of the analytical results obtained, illustrating the influence of different manures, and of different seasons, on the composition of Potatoes, is given below. The specific gravity of the tubers is also given. In the tubers the dry matter, nitrogen, and ash have been determined; and in some cases complete analyses of the ash have been made. Besides the results obtained relating to the composition of the tubers themselves, the dry matter, the sugar, the nitrogen, and the ash, in the expressed juice have in many cases been determined; in some cases the amount of the nitrogen existing as albuminoids has been determined; and in some, complete analyses of the ash of the juice have been made. It may be remarked, that by far the larger proportion of both the mineral matter, and the nitrogen, is found to exist in the juice; and of the nitrogen in the juice, as a rule, not much more than half exists as albuminoids. In many cases, the small potatoes have been submitted to the same methods of analysis as the good potatoes. And in some cases, similar methods of examination have been applied to the still white, and also to the separated discoloured portions of the diseased potatoes. With regard to these latter results, it may be observed, that whilst the juice of the white portion of the diseased potatoes contained approximately the normal amount of nitrogen, that of the discoloured portion contained very much less. On the other hand, the

washed, or exhausted "marc" of the white portion, contained very little nitrogen, whilst that of the discoloured portion contained very much more. The distribution of the mineral matter was much in the same order as that of the nitrogen. It was obvious that the juice had

suffered exhaustion of much of both its nitrogen and its mineral matter, in the development of the fungus. There was an increased amount of sugar found in the diseased potatoes, the result of diseased action, and it probably also contributed to the development of the fungus.

The results given in the Table relate to the "good" potatoes only. In interpreting the figures it must be borne in mind that in each year, the seed was planted on all the plots at the same time, and that all the crops were taken up at the same time; and as there was several times as much produce in some cases as in others, it is obvious that the crops would not each be at its best, and all in the same condition of maturity when taken up. Then, again, the analyses were not performed immediately after taking up the crops, but sometime afterwards, in weighed samples which had been kept in a cool place for some weeks or months; and in the following only preliminary statement of results, no correction is made for any change from the original weight of the samples, the results being calculated upon the fresh weights as finally taken for analysis.

| PLOTS. | | 2 | | A Property | A A A TO | Composition of the "Good " Lubers. | ro. |
|---------------------|---|-------------------|----------------|---------------------|-----------------------|------------------------------------|-------------------|
| | MANURES PER ACRE, PER ANNUM. | Gravity | 6 | Mineral Ma | Mineral Matter (Ash). | Nitr | Nitrogen. |
| | (For Froduce, see pp. 00-(.) | or the Tubers. | Dry Matter. | In Fresh Tubers. | In Dry Matter | In Fresh Tubers. | In Dry Matter. |
| | Eleventh Season, 1886. | | | | | | |
| 1 10 | Unmanured in 1876, and each year since | 1.195 | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| 2 Ur | - | 1.125 | 29.1 | 0.87 | 3.00 | 0.420 | 1.44 |
| S Fa | previously 33 cwts. Superphosphate also (1) | 1.112 | 26.4 | 86.0 | 3.69 | 0.385 | 1.44 |
| 4 (18 | earmyard Manure (14 tons) alone 1885 and since. In 1882, and previously 52 cwts. Superphosphate, and in 1881, and previously, 550 lbs. Nitrate of Soda also | 1.115 | 26.7 | 0.93 | 3.47 | 0.423 | 1.59 |
| 5 40 | | 1.118 | 28.7 | 0.75 | 2.62 | 0.468 | 1.63 |
| 6 55 | 550 lbs. Nitrate of Soda | 1.119 | 28.6 | 0.77 | 2.68 | 0.468 | 1.64 |
| 7 40 | 400 lbs. Ammonium-salts, 32 ewts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 1.111 | 27.4 | 1.01 | 29-8 | 0.401 | 1.46 |
| 8 55 | dewits, Superphos., 300 lb | 1.116 | 28.5 | 0.98 | 3-48 | 0.395 | 1.40 |
| - | Superphosphate | 1.123 | 28.4 | 0.97 | 3.41 | 0.328 | 1.16 |
| $10 3\frac{1}{2}$ | 300 lbs. Sulphate Potash, 100 lbs. Sulphate | 1.122 | 28.5 | 1.08 | 3.79 | 0.599 | 1.05 |
| | Tweifth Season, 1887. | | | | | | |
| 1 Ur | Unmanured in 1876, and each year since | 1.121 | 28.0 | 0.83 | 2.97 | 0.434 | 1.55 |
| 2 Ur | | 1.121 | 28.5 | 18.0 | 3.07 | 0.424 | 1.50 |
| S Fa | reviously 32 cwts. Superphosphate also (1) | 1.106 | 25.1 | 1.00 | 3.98 | 0.396 | 1.58 |
| 4 (Fa | garmyard Manure (t. 4 tons) atone 1.555 and since. In 1552, and previously, 52 cwts. Superphosphate, and military and merionely 550 lbs. Nitrate of Soda also | 1-107 | 25.2 | 16.0 | 3.85 | 0.374 | 1.48 |
| 5 45 | nia (*) | 1.115 | 27.3 | 82.0 | 2.85 | 0.475 | 1 74 |
| 6 55 | | 1.115 | 27.4 | 22.0 | 2.80 | 0.460 | 1.68 |
| 7 450 | $\overline{}$ | 1.106 | 26.3 | 1.12 | 4.23 | 0.409 | 1.55 |
| 8 55(| 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 bs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 1.108 | 25.5 | 66.0 | 3.90 | 0.431 | 1.69 |
| | | 1.118 | 27.6 | 1.08 | 3.92 | 0.370 | 1.34 |
| 10 34 | 34 cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 1.111 | 26.3 | 1.12 | 4.27 | 0.353 | 1.35 |

| OHIMAHUICU IN 1992, AND SINCE, A 16 YOURS V SAME STANDARD (12 WOLD) | 1.119 | 27.9 | 0.85 | 3.05 | 0.345 | 1.94 |
|---|------------|--|------|--------------|-------|--------|
| uperphosphate also (') | 1.105 | 25.3 | 1.03 | 4.09 | 0.390 | 1.54 |
| .882, and previously, 3½ cwts. Superphosph | m 1.104 | 25.4 | 1.04 | 4.10 | 0.362 | 1.43 |
| 10-51, auth Previously, 500 10s. Intrave of Soura and | 1.110 | 26.8 | 84.0 | 2.92 | 0.440 | 1.64 |
| | - | 56.6 | 0.83 | 3.13 | 0.431 | 1.63 |
| 400 lbs. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | | 25.5 | 1.00 | 06.60 | 0.340 | 1.33 |
| Sulph. Soda, 100 lbs. | 1.109 | 20.02 | /B.O | 8.79 | 0.332 | 62.1 |
| 22 cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 1.112 | 26.8 | 1.11 | 4.14 | 0.313 | 1.17 |
| FOURTEENTH SEASON, 1889. | III O JIII | | | | | |
| Unmanured in 1876, and each year since | 611.1 | 28.4 | 0.81 | 2.84 | 0.453 | 1.49 |
| Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) | 1.119 | 6.77 | 72.0 | 2.94 | 0.394 | 1.41 |
| Farmyard Manure (14 tons) alone 1883 and since; previously 34 cwts. Superphosphate also (') | 1.109 | 76.0 | co.T | c0.4 | 168.0 | 1.50 |
| Farmyard Manuve (14 tons) alone 1885 and a since. In 1882, and previously, 24 cwts. Superprospliate, and | 1.114 | 26.5 | 1.05 | 3.98 | 0.387 | 1.46 |
| and previously, 500 105, retained of 500m and | 1.120 | 28.1 | 0.84 | 3.00 | 0.392 | 1.40 |
| | | 27.7 | 94-0 | 2.74 | 0 405 | 1.46 |
| s, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, | | 26.1 | 66.0 | 3.78 | 0.364 | 1.40 |
| Sulph. Soda, 100 lbs. | | 26.5 | 66-0 | 3.74 | 0.382 | 1.44 |
| | 1.118 | 27.5 | 1.05 | 300 | 0.360 | 1.31 |
| os. Sulphate | CIT.I | 6.07 | 7.10 | 4.00 | ene.n | 61.1 |
| FIFTEENTH SEASON, 1890. | 200 | 0.00 | 10.0 | 00.00 | 0.003 | 00. |
| : | 1.125 | 30.0 | 0.85 | 2.75 | 0.380 | 1.97 |
| oerphosphate also (') | 1.117 | 26.8 | 1.00 | 3.75 | 0.293 | 1.09 |
| 1882, and previously, 32 cwts. Superph | in 1.116 | 27.5 | 1.06 | 3.84 | 0.284 | 1.03 |
| LOSAI, and previously, 500 to South also | 1.118 | 28.5 | 0.81 | 2.84 | 0.405 | 1.42 |
| | | 28.4 | 0.85 | 2.88 | 0.430 | 1.51 |
| nium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | _ | 25.6 | 0.97 | 3.78 | 0.369 | 1.44 |
| Soda, 100 lbs. | | 27.3 | 0.98 | 3.59 | 0.348 | 1.27 |
| St owks. Superphosphate | 1.122 | 7.00 7.00 7.00 7.00 7.00 7.00 7.00 7.00 | 1.13 | 3.93 4.00 | 0.238 | 1.04 |
| '87, 88'. | 1890. | | | | 277 | 5 |
| | 1.121 | 28.4 | 0.81 | 2.86 | 0.400 | 1.41 |
| re (14 tons) alone 1883 and since: previously 34 cwts. Superphosphate also (1) | 1.110 | 26.0 | 1.01 | 3.91 | 0.371 | 1.43 |
| Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 34 cwts. Superphosphate, and | in) 1.111 | 26.3 | 1.01 | 3.85 | 0.366 | 1.40 |
| | 1.116 | 6.26 | 0.79 | 9.85 | 0.436 | 1.57 |
| ±00 tos. Armenonium-saus () | | 27.8 | 0.79 | 2.85 | 0.439 | 1.58 |
| Sulph. Soda, 100 lbs. | | 26.2 | 1.01 | 3.87 | 0.377 | 1.44 |
| 550 lbs. Nitrate of Soda, 3½ čwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | _ | 26.6 | 86.0 | 3.70 | 0.878 | 1 - 42 |
| nd 100 lbs Sulphate | 1.119 | 27.8 | 1.04 | 3·74 4·06 | 0.335 | 1.20 |

EXPERIMENTS ON POTATOES.—HOOS FIELD—continued.

Below are given the particulars of the Manures and Produce, for the Sixteenth, | crops. The manures are the same as for the crops of 1883, and since. Description 1894, and 1895. For the Manures, description of Potatoes grown, and the Produce, Seventeenth, Eighteenth, Nineteenth, and Twentieth Seasons, 1891, 1892, 1893, of the 15 preceding years, see pp. 78-9, 82-3, and 86-7, and of the succeeding years, pp. 94-5.

The arrangement of the plots is precisely the same as for the 15 preceding potato

of Potato, "Sutton's Abundance" (White). Rows 25 inches apart; 14 inches from plant to plant in the rows.

In the spring of 1894 permanent division paths were laid out between plot and plot.

(Area under experiment, 2 acres.)

| | £ | robs. | | Withered weighed, weighed, lot spreas its own I and ploug | | |
|------------------|------------------------------------|------------------|--|--|--|--------------------------------------|
| ACRE. | | TOTAL. | | Tons. cwts. 1 1644 6 8 8 6 6 6 7 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 | | |
| PRODUCE PER ACRE | ers. | Small. Diseased. | | Tons. cwts. 10 0.1 0 10 13 0 13 0 0.5 0 0.5 0 0.5 0 1.5 0 1.5 | 7 and 8. | |
| PR | Tubers. | Small. | -30. | Tons. cwts. 0 17 0 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | , October | |
| | | Good. | ember 28- | Tons. cwts. Tons. cwts. Tons. cwts. Tons. cwts. 0 13 0 | tember 29 | 1 |
| | PLOTS. MANURES PER ACRE PER ANNUM. | | SIXTEENTH SEASON, 1891. Potatoes planted, April 1. Crop taken up, September 28-30. | Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since: previously 3½ cwts. Superphosphate asko (¹). [Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate, and in 1881, and previously, 550 lbs. Nitrate of Soda also Mol lbs. Ammonium-salts (²) 50 lbs. Nitrate of Soda 400 lbs. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphosphate 8 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Magnesia. | SEVENTEENTH SEASON, 1892. Potatoes planted, April 4 and 5. Crop taken up, September 29, October 7 and 8. | Thmanned in 1878 and each more cires |

| | Withered, not weighed, each lot spread on its own Plot and ploughed in. |
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| 104 | hate, and Sulph. N Salph. M |
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| | - D. H So - 성. |
| To Take | Osphate also \$\frac{3}{2}\$ cwts. Super Sulph. Soda, 10 ulph. Soda, 10 1 100 lbs. Sull |
| - | 4 tons) cwts. Superphospha I previously, 3½ cwt ash, 100 lbs. Sulph. sch, 100 lbs. Sulph. bate Soda, and 100 lbs. |
| - come t mineri monte come | |
| | 4 tons) cwts. Superp previously, ish, 100 lbs. sh, 100 lbs. sh, 100 lbs. |
| 4 | d Manure (14 tons) reviously 34 owts. Supe In 1882, and previousl s. Sulph. Potash, 100 lbs Sulph. Potash, 100 lbs On lbs. Sulphate Soda, |
| | i Manure eviously n 1882, s Sulph. I Sulph. P |
| 1 | rd M previce In 1 in 1 in 1 in 1 in 1 in 1 in 1 in 1 i |
| 70 | armyard nre: pre nre. Ir a also 300 lbs. tash, 100 |
| 1 | sly Farand sin and sin of Soda |
| | coh year since nec. Previously Fi 3 alone 1883 and si 3 alone 1883 and si 1 bs. Nitrate of Sod) z cwts. Superphos., cwts. Superphos., ovts. Superphos., ovts. Superphos., |
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| | in 1876, an in 1882, an in 1882, an fanure (14 fanure (14) previously, monium-sal rate of Soda monium-sal rate of Soda erphosphate |
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| | Unmanured in 1876 Unmanured in 1882 Farmyard Manure (Farmyard Manure 1881, and previou 400 lbs. Ammonium 550 lbs. Nitrate of 8 600 lbs. Ammonium 550 lbs. Nitrate of 8 7250 lbs. Nitrate of 8 7350 lbs. Nitrate of 8 7450 lbs. Nitrate of 8 7550 lbs. Nitrat |
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| 11 9 9 | 1 1 4 4 2 2 2 4 4 4 4 4 4 4 4 4 4 4 4 4 | | 1 4 184 8 114 Withowed not | 00 814 | 1 144 its process | | | | $6 10\frac{2}{4}$ Withered, not | | - | 1 16 2 123 | | 0 19‡ 1 17\$ 6 7\$ Withered not 6 18\$ weighed, each | 1 74 lot spread on 2 35 its own Plot 5 22 and ploughed 5 13 in. | |
|---|---|-------------------|---|--|---|---|--|---|---|-------------------------------|--|--|--|---|---|--|
| 1123 0 124 0 225 2 0 9 834 0 9 9 | ##-142 % ## 42 ## 1 | | 14 0 44 14 0 44 14 2 6 | | 13 0 44 1 0 54 13 1 104 | 14 0 41 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 2. | D3H4H -11C9 | 4 0 14 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 | 00 | 24 0 24 34 0 5 2 | 0 | | 24 0 14 24 0 38 24 0 17 28 0 17 | 22 0 12 22 0 22 23 0 92 24 0 92 24 92 25 0 92 26 0 92 27 0 92 28 0 0 92 28 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 | 00 |
| sphate, and in) 6 2 0 | 1 12 2 0 0 1 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 1 2 2 1 2 2 1 2 2 1 2 2 2 1 2 | September 2] | 0 18‡ 0 1 12‡ 0 6 3‡ 0 | 6 6 | 1 2 2 1 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 3 | ର ଦା ଦା | September 10-1 | 0 164 0 1 5 0 | # TO | 1 13 0 | 3 C 4 1 2 1 C 4 1 2 1 C 4 1 C | 7 7 | 15. | 0 164 0 1 116 0 5 74 0 5 134 0 | 1 3\frac{5}{8} | 01 01 |
| Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since: previously 3½ cwts. Superphosphate also (') Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate also (') 1881, and previously, 550 lbs. Nitrate of Sodu also | 5 400 lbs. Ammonium-salts (2) 6 550 lbs. Nitrate of Soda 7 400 lbs. Nitrate of Soda, 100 lbs. Superplos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superplos, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 9 3½ cwts. Superplosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Macnesia | r, 1894. Potatoes | Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since: previously 33 cwts. Superphosphate also (17 Farmyard Manure (14 tons) alone 1883 and since; previously 33 cwts. Superphosphate also (17 Farmyard Manure (14 tons) alone 1883 and since; previously 33 cwts. Superphosphate also (17 Farmyard Manure (14 tons) alone 1883 and since; previously 33 cwts. Superphosphate also (17 Farmyard Manure (14 tons) alone 1883 and since; previously 33 cwts. Superphosphate also (17 Farmyard Manure (14 tons) alone 1883 and since; previously 34 cwts. | 4 [188], and previously, 550 lbs. Nitrate of Soda also | | 3½ cwts. Superphosphate 3.5 cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate | TETH SEASON, 1895. Potatoes planted, April 6. Crop taken up, | Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Ramyard Manure (14 tons) alone 1883 and since: mericants 34 certs Smeatheashest also (1) | (Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. S. 1881, and previously, 550 lbs. Nitrate of Soda also | 5 400 lbs. Ammonium-salts (*) | 7 400 lbs. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 3½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate | AVERAGE OF 5 SEASONS, 1891, '92, '93, '94, and 1895, | | 400 lbs. Ammonium-salts (*) 550 lbs. Nitrate of Soda 7 400 lbs. Ammonium-salts, 32 cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 32 cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 510 lbs. Sulph. Mag. 510 lbs. Sulph. Soda, 100 lbs. Sulph. Soda, 1 | 32 cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate |

SUMMARY OF THE COMPOSITION OF THE "GOOD" TUBERS in the Sixteenth, Seventeenth Eighteenth, Nineteenth, and Twentieth Seasons, 1891, 1892, 1894, and 1895. For particulars of the composition in the first 15 years, 1876-1890, see pp. 80-1, 84-5, and 88-9, and for those in succeeding seasons, see pp. 96-7. EXPERIMENTS ON POTATOES.—HOOS FIELD—continued.—

An abstract of the analytical results obtained, illustrating the influence of different manures, and of different seasons, on the composition of Potatoes, is given below. The specific gravity of the tubers is also given. In the tubers the dry matter, nitrogen, and ash have been determined; and in some cases complete analyses of the ash have been made. Besides the results obtained relating to the composition of the tubers themselves, the dry matter, the sugar, the nitrogen, and the ash, in the expressed juice have in many cases been determined; in some cases the amount of the nitrogen existing as albuminoids has been determined; and in some, complete analyses of the ash of the juice have been made. It may be remarked, that by far the larger proportion of both the mineral matter, and the nitrogen, is found to exist in the juice; and of the nitrogen in the juice, as a rule, not much more than half exists as albuminoids. In many cases, the small potatoes have been submitted to the same methods of analysis as the good potatoes. And in some cases, similar methods of examination have been applied to the still white, and also to the separated discoloured portions of the diseased potatoes. With regard to these latter results, it may be observed, that whilst the juice of the white portion of the diseased potatoes contained very much less. On the other hand, the washed or exhausted "marc" of the white portion,

contained very little nitrogen, whilst that of the discoloured portion contained very much more. The distribution of the mineral matter was much in the same order as that of the nitrogen. It was obvious that the juice had suffered exhaustion of much of both its nitrogen and its mineral matter, in the development of the fungus. There was an increased amount of sugar found in the diseased potatoes, the result of diseased action, and it probably also contributed to the development of the fungus.

tributed to the development of the fungus.

The results given in the Table relate to the "good" potatoes only. In interpreting the figures it must be borne in mind that in each year, the seed was planted on all the plots at the same time, and that all the crops were taken up at the same time; and as there was several times as much produce in some cases as in others, it is obvious that the crops would not each be at its best, and all in the same condition of maturity when taken up. Then, again, the analyses were not performed immediately after taking up the crops, but some time afterwards, in weighed samples which had been kept in a cool place for some weeks or months; and in the original weight of the samples, the results, no correction is made for any change from the original weight of the samples, the results being calculated upon the fresh weights as finally taken for analysis.

| | | | ဘိ | mposition | of the "Go | Composition of the "Good" Tubers. | 7 | |
|--------|---|---------------------|----------------|----------------------|-------------------|-----------------------------------|-------------------|----|
| ģ | MANURES PER ACRE, PER ANNUM. | Specific Gravity | | Mineral Matter (Ash) | tter (Ash). | Nitrogen. | gen. | (|
| PLOTS. | S. (For Produce, see pp. 90-1.) | of the Tubers. M | Dry Matter. | In Fresh Tubers. | In Dry Matter, | In Fresh Tubers. | In Dry Matter. | 92 |
| | SIXTEENTH SEASON, 1891. | | | | | | | |
| | | - | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. | |
| - | II manning in 1876 and each year since | .107 | 25.5 | 0.79 | 3.11 | 0.379 | 1.49 | |
| 10 | Umanurad in 1889, and since Previously Farmward Manure (14 tons) | .111 | 56.6 | 08.0 | 3.02 | 0.356 | 1.34 | |
| 1 00 | Formward Mannie (14 fond) alone 1883 and since: previously 34 owts. Superphosphate also (1) | 260-1 | 55.6 | 1.01 | 4.46 | 0.311 | 1.38 | |
| , 4 | (Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously 3½ cwts. Superphosphate, and in) | 660 | 23.4 | 0.95 | 4.08 | 0.286 | 1.22 | |
| H | 1 1881, and previously, 550 lbs. Nitrate of Soda also | | 1 | . (| 1 | | | |
| ıc | 400 lbs Ammonium-salts (2) | .095 | 25.7 | 08.0 | 3.10 | 0.434 | 1.69 | |
| 9 | | 102 | 24.5 | 0.73 | 5.96 | 0.417 | 1.70 | |
| 7.0 | s 31 owts Smernios, 300 lbs Sulph, Potash, 100 lbs, Sulph, Soda, 100 lbs. | -092 | 22-7 | 0.95 | 4.15 | 0.365 | 1.61 | |
| - o | | 1.095 | 23.0 | 0.93 | 4.05 | 0.345 | 1.50 | |
| | | 0110 | 26.2 | 66.0 | 3.78 | 0.300 | 1.15 | |
| 10 | 3. cwcs. Superpression of the Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 001.1 | 25.4 | 1.14 | 4.48 | 0.252 | 66.0 | |
| | Seventeenth Season, 1892. | | | | | | | 1 |
| | Themanisal in 1972 and sook weer since | 104 | 25.9 | 0.83 | 3.55 | 0.385 | 1.48 | , |
| 4.0 | alv Farmyard Manure (14 tons) | 1.108 | 26.5 | 0.75 | 2.83 | 0.361 | 1.36 | |
| 4 00 | uperphospate also (1) | 101.1 | 23.8 | 1.05 | 4.37 | 0.279 | 1.17 | |
| 7 | (Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 32 owts. Superphosphate, and in) | 1.100 | 23.5 | 1.05 | 4.47 | 0.352 | 1.49 | |
| H . | [1881, and previously, 550 lbs. Nitrate of Soda also | 601. | 0.50 | 0.04 | 2.99 | 0.419 | 1.60 | |
| iO (| 400 lbs. Ammonium-salts (*) | 101. | 25.0 | 10.0 | 2 6 | 0.437 | 1.75 | |
| 91 | 550 198. Nitrate of Soda | .096 | 98.9 | 0.03 | 4.09 | 0.346 | 1.40 | |
| _ | s. Sulph. Folish, 100 lbs. Sulph. Soda, 100 lbs. | 700. | 1000 | 96:0 | 4.17 | 0.369 | 1.50 | |
| 00 | 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Suppr. rotash, 100 lbs. Suppr. Soda, 100 lbs. Suppr. Mag. | 1.111 | 0.00 | 200 | 2.50 | 0.301 | 00.1 | |
| 50 (| 34 owts. Superphosphate | 110 | 9.20 | 1.09 | 4.26 | 0.253 | 0.98 | |
| 10 | 3½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate magnesia. | T ATT | 0 07 | 35 | H 20 | 007 0 | 00 0 | Ī |

| each year since Previously Farnyard Manne (14 tons) state of Soda also NINETERNTE SEASON, 1894. state of Soda also NINETERNTE SEASON, 1894. state of Soda also state of Soda also NINETERNTE SEASON, 1894. state of Soda also state of Soda also state of Soda also state of Soda also NINETERNTE SEASON, 1894. state of Soda also state of | 14-1 | 1.51 | 1.56 | 1.55 | 1.65 | 1.69 | 00.1 | 1.13 | | 1:31 | 1.15 | 1.17 | 1.60 | 1.68 | 1.35 | 1.3.1 | 0.98 | | 1.30 | 1.32 | 1.44 | 1.40 | 1.60 | 1.45 | 1.56 | $\frac{1.19}{1.10}$ | | 1.40 | 1.35 | 1.38 | 1.59 | 1.68 | 1.46 | 1.13 | 1.04 |
|--|--|-------|--------------|---------------------------------|--------------------------|---|---|--|------------|-------|--|-------|--------------------------|---|--|---|---|-----------|--|--|-------|-------|---------------------------------------|-------------------------|--|-------------------------|--|-------|--------------|---------------|-------|-------|-----------------------|--|--|
| 1.117 28.0 0.81 | 0.396 | 0.358 | 998-0 | 0.438 | 0.443 | 0.360 | 0.550 | 0.304 | | 0.343 | 0.279 | 0.530 | 0.433 | 0.437 | 0.338 | 0.831 | 0.247 | | 0.375 | 0.387 | 0.336 | 0.494 | 0.424 | 0.366 | 0.380 | 0.333 | | 0.876 | 0.368 | 0.326 | 0.430 | 0.434 | 0.355 | 0.307 | 0.268 |
| sphate, and in 1.117 28.0 1.116 27.9 23.5 1.108 22.8 23.5 1.108 22.8 23.5 23 | 2.31 | 4.59 | 4.48 | 2.88 | 2.99 | 81 4 51 5 | 74.4 | 3 62 4 42 | | 3.13 | 4.46 | 4.33 | 2.75 | 2.91 | 3.98 | 56. 66. 66. | 3.66 4.49 | | 3.00 | 3.01 4.53 | 4.50 | 1 G | 20.0 | 4.27 | 4.36 | 3.85 4.60 | | 3.07 | 2.95 4.48 | 4.37 | 3.01 | 2.94 | 4.12 | 3.70 | 4.45 |
| bb. Sulph. Mag. | 0.81 | 1.09 | 1.05 | 0.81 | 08.0 | 1.07 | 07.1 | 1.19 | | 0.82 | 80.1 | 1.07 | 0.74 | 0.75 | 66.0 | 96.0 | 1.13 | | 0.87 | 0.83 | 1.05 | 9 6 | 20.0 | 1.07 | 1.06 | 1.08 | | 0.83 | 08.0 | 1.04 | 0.81 | 92.0 | 1.00 | 35 | 1.15 |
| osphate, and in bas. Sulph. Mag. | 28.0 | 23.7 | 23.5 | 28.3 | 26.8 | 25.7 | 24.0 | 26.9 | | 26.3 | 2.72 | 8.45 | 0.2.6 | 25.9 | 24.9 | 24.1 | 25.3 25.3 | | 59.0 | 29.4 93.9 | 93.3 | 2 6 | 200 | 25.1 | 24.3 | 28.1 26 0 | | 6.97 | 27.5 | 23 .7 | 27.0 | 25.9 | 24.3 | 23.8 24.5 25.5 25.5 25.5 25.5 25.5 25.5 25.5 | 25.8 |
| osphate, and in bas Sulph. Mag. | 1.117 | 1.097 | 1.096 | 1.115 | 1.108 | 1.104 | 660.1 | 011-1 | | 1:110 | 001.1 | 1.101 | 1:109 | 1.106 | 1.103 | 1.100 | 1.113 | | 1.121 | 1.124 | 1.101 | 707 7 | 1.126 | 901.1 | 1.104 | 1.117 | | 1.112 | 1.115 | 1.099 | 1.110 | 1.106 | 1.100 | 1.099 | 1.108 |
| PART 404000 PART 404000 PART 4040000 PART 4040000 | Unmanured in 1876, and each year since | : : | osphate, and | TOS. IN INITIACE OF EXPLORATION | 550 lbs. Nitrate of Soda | 400 lbs. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potasii, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 550 lbs. Nitrate of Soda, 3½ cwts. Superplos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 3½ cwts. Superphosphate 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | NINETEENTH | | Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) | and | bs. Nitrate of Soda also | #UV IDS. Ammontum settle () #ACA The Vittoria of Sordia | 400 lbs. Ammonium-salts, 3½ owts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. | 3½ cwts. Superphosphate 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia 35, cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | TWENTIETH | Unmanured in 1876, and each year since | Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) | and | : | · · · · · · · · · · · · · · · · · · · | 550 Ds. Nitrate of Soda | 400 Ibs. Ammonium-saits, 32 cwts. Superphos., 300 Ibs. Sulph. Potash, 100 Ibs. Sulph. Soda, 100 Ibs. Sulph. Mag. 550 Ibs. Nitrate of Soda, 33 cwts. Superphos., 300 Ibs. Sulph. Potash, 100 Ibs. Sulph. Boda, 100 Ibs. Sulph. Mag. | 34 cwts. Superphosphate | AVERAGE OF 5 SEASONS, 1891, '92, '93, '94, and 189 | : | | losphate, and | | | Sulph. Soda, 100 lbs. | Sulph. Soda, 100 lbs. | 33 cwts. Superplassphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia |

EXPERIMENTS ON POTATOES.—HOOS FIELD—continued.

Below are given the particulars of the Manures for the Twenty-first, Twenty-second, and Twenty-third Seasons, 1896, 1897, and 1898; and of the produce of the Twenty-first and Twenty-second Seasons, 1896 and 1897. For the Manures, description of Potatoes grown, and the Produce, of the 20 preceding years, see pp. 78–9, 82–3, 86–7, and 90–1.
The arrangement of the plots is precisely the same as for the 20 preceding potato crops.

The manures are the same as for the crops of 1883, and since; excepting that for the crops of 1897, and since, Basic Slag has been used instead of Superphosphate. Description of Potato, in 1896, "Bruce" (White); in 1897, and in 1898, "Beauty of Hebron" (White). Rows 25 inches apart; 14 inches from plant to plant in the rows. In the spring of 1894 permanent division paths were laid out between plot and plot.

(Area under experiment, 2 acres.

| Twenty-piece per Annum. The initial i | e per Acre. | E | sed. TOTAL. | | cwts. Tons. cwts. 0 4 4 1 1 5 4 4 1 1 1 5 4 1 1 1 5 4 1 1 1 1 | | 0 11 |
|--|-------------|-------------|-------------|---|---|--|---|
| Twenty-first Season, 1896. Potatoes planted, April 10. Twenty-first Season, 1896. Potatoes planted, April 10. Twenty since The in 1876, and each year since In 1882, and since. Previously Farmyard Manue (14 tons) Amonium-salts (1) Amonium-salts (2) Amonium-salts (3) Nitrate of Soda also Superphose Sulph. Potash, 100 lbs. Sulph. Potash, 100 lbs. Sulphate Superphosphate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulphate Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Twenty-second Season, 1897. Potatoes planted, April 8. Ted in 1876, and each year since Tred in 1882, and since. Previously Farmyard Manue (14 tons) That (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate also (1) Amonium-salts (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate of Soda also Nitrate of Soda. Amonium-salts (2) Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. | PRODUCE PER | Tubers. | | 3-30. | CWIS, TOOS. 100.2240.00 100.424.00 110.424.00 110.424.00 110.424.00 110.424.00 110.424.00 110.424.00 110.424.00 110.424.00 110.424.00 | 13-15. | ට ටෙ ට යු 4 4 4 70 4 'බකය.< 'බක නත 4 4444 |
| Twenty-first Season, 1896. Potatoes planted, April 10. Twenty-first Season, 1896. Potatoes planted, April 10. Twenty since Twenty since in 1882, and since. Previously Farmyard Manue (14 tons) d Manue (14 tons) alone 1883 and since. In 1882, 3½ cwts. Superphosphate also (1) and previously, 550 lbs. Nitrate of Soda also Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulphate Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Twenty-second Season, 1897. Potatoes planted, April 8. red in 1876, and each year since red in 1882, and since. Previously Farmyard Manue (14 tons) and previously, 550 lbs. Nitrate of Soda also Nitrate of Soda. Ammonium-salts, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lb | | | Good. | , October 23 | Cwts. 1123 1123 1123 1123 1123 1123 1123 112 | September | |
| PLOTS. 4 22 2 1 1 2 2 2 2 4 2 2 2 2 2 2 2 2 2 | | MANURES PER | | Ason, 1896. Potatoes planted, April 10. | Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since; previously 3½ cwts. Superphosphate also (1) (Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosp 1881, and previously, 550 lbs. Nitrate of Soda also 550 lbs. Ammonium-salts (2) 550 lbs. Ammonium-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. 3½ cwts. Superphosphate 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate 18½ cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Islands and 100 lbs. Sulphate Islands and 100 lbs. Sulphate Islands | Ason, 1897. Potatoes planted, April 8. | Unmanured in 1876, and each year since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since; previously 3½ cwts. Superphosphate also (¹) Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate, [1881, and previously, 550 lbs. Nitrate of Soda also 550 lbs. Ammonium-salts (²) 550 lbs. Ammonium-salts 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph 550 lbs. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph 550 lbs. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. |

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| | | e phosphate. |
| BLURAD LUBY | | ore, of solub |
| . : : (a) : : : : (a) : : (a) : : (a) : : (a) : | | r cent., or m |
| osphate, an se. Sulph. I Sulph. I | | taining 37 pe |
| s. Superpho Soda, 100 lb da, 100 lbs | | ates, and con |
| erphosphat ily, 3½ cwt ily, 3½ cwt bs. Sulph, 6 Sulph, 8 | | ineral phospi |
| Unmanured in 1876, and each year since. Unmanured in 1887, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since: previously 3½ cwts. Superphosphate also (¹). Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate, and in) Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate, and in) Farmyard Manure (14 tons) alone 1883 and since. Farmyard Manure (18 tons) alone 1883 and since. Farmyard Manure (18 tons) alone 1883 and since. Farmyard Manure (18 tons) and since | | (1) "Superphosphate of Line," made from high percentage mineral phosphates, and containing 37 per cent., or more, of soluble phosphate. |
| I Manure (eviously 33 In 1882, an Sulph, Pc Sulph, Pot | | de from high |
| Farmyard I since; pr of since; | | of Lime," ma |
| ar since Previously et 1883 am et 1883 am et 1883 am Nitrate of s. Basic Slag. Basic Slag. | | erphosphate o |
| nd each ye und since. In toms) alon to the ye 550 lbs. In the ye 550 lbs. In the ye 600 lb alts (*) In the ye 600 lbs. In the ye 600 lbs. In the ye 600 lbs. | | dns (p) |
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and "Good" Tubers in the Twenty-first, Twenty-second Seasons, 1896 and 1897. For particulars of the composition in the first 20 years, 1876-1895, see pp. 80-1, 84-5, 88-9, and 92-3. THE 0F COMPOSITION THE O.F. -continued.—Summary ON POTATOES.—HOOS EXPERIMENTS

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contained very little nitrogen, whilst that of the discoloured portion contained very much more. The distribution of the mineral matter was much in the same order as that of the nitrogen nitrogen. It was obvious that the juice had suffered exhaustion of much of both its nitrogen and its mineral matter, in the development of the fungus. There was an increased amount of sugar found in the diseased potatoes, the result of diseased action, and it probably also contributed to the development of the fungus.

sugar found in the diseased potatoes, the result of diseased action, and it probably also contributed to the development of the fungus.

The results given in the Table relate to the "good" potatoes only. In interpreting the figures it must be borne in mind that in each year, the seed was planted on all the plots at the same time, and that all the crops were taken up at the same time; and as there was several times as much produce in some cases as in others, it is obvious that the crops would not each be at its best, and all in the same condition of maturity when taken up. Then, again, the analyses were not performed immediately after taking up the crops, but some time afterwards, in weighed samples which had been kept in a cool place for some weeks or months; and in the following only preliminary statement of results, no correction is made for any change from the original weight of the samples, the results being calculated upon the fresh weights as finally taken for analysis.

| | | |) | comboning of one of the control | | 1000 | |
|------|---|---------------------|----------------|---------------------------------|-----------------------|---------------------|-------------------|
| Реди | MANURES PER ACRE, PER ANNUM. | Specific Gravity | | Mineral Ma | Mineral Matter (Ash). | Nitr | Nitrogen. |
| 2 | (For Produce, see pp. 94-5.) | of the Tubers. | Dry Matter. | In Fresh Tubers. | In Dry Matter. | In Fresh Tubers. | In Dry Matter. |
| | TWENTY-FIRST SEASON, 1896. | | | | | | |
| , | | 90 | Per cent. | Per cent. | Per cent. | Per cent. | Per cent. |
| - G | • | | 95.7 | 07.0 | 96.6 | 0.876 | 1.47 |
| 3 00 | Farmward Manure (14 tons) alone 1883 and since: previously 3½ exts. Sincerphosphate also (*) | 960-1 | 22.0 | 0.99 | 4.49 | 0.339 | 1.54 |
| 4 | In 1882, and previously, 3½ cwts. Superphosphate, and | 060-1 | 21.6 | 86.0 | 4.53 | 0.322 | 1.49 |
| ıc | | 1.102 | 24.8 | 0.74 | 5.99 | 0.405 | 1.63 |
| 9 | | -082 | 23.2 | 0.78 | 3.36 | 0 416 | 1.79 |
| 1 | s. 34 cwts. Superphos 300 lbs. | 1.092 | 22.0 | 66.0 | 4.51 | 0.372 | 1.69 |
| 00 | | 1.095 | 21.5 | 96.0 | 4.46 | 0.356 | 1.65 |
| 6 | Superphosphate | -109 | 25.8 | 0.91 | 3.53 | 0.356 | 1.38 |
| 10 | 34 cwts. Superphosphate, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 1-107 | 23.3 | 1.08 | 4.62 | 0.312 | 1.34 |
| | TWENTY-SECOND SEASON, 1897. | | | | | | |
| - | Unmanured in 1876, and each year since | 1.100 | 23.7 | 0.74 | 3.13 | 0.344 | 1.45 |
| 2 | ily Farmy | 1.109 | 25-7 | 92 - 0 | 2.95 | 0.381 | 1.48 |
| co | previously 3½ cwts. Superphosphate also (1) | 1.101 | 23.4 | 26-0 | 4.14 | 0.369 | 1.58 |
| 4 | Furnyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3g cwts. Superphosphate, and in) | 1.098 | 23.5 | 1.00 | 4.26 | 0.385 | 1.64 |
| 10 | | 1.109 | 9.4.6 | 0.75 | 3.05 | 0.451 | 1.83 |
| 2 30 | | 103 | 24.5 | 0.73 | 2.96 | 0.475 | 1.94 |
|) [- | 400 lbs. Basic Slag. 300 lbs. | 1.094 | 23.0 | 96-0 | 4.19 | 0.423 | 1.84 |
| - 00 | 550 lbs. Nitrate of Soda. 400 lbs. Basic Slag. 300 lbs. Sulph. Potash. 100 lbs. Sulph. Soda. 100 lbs. Sulph. Mag. | 860-1 | 23.0 | 0-95 | 4.12 | 0.441 | 1.91 |
| 6 | Basic Slag | 1.112 | 26.5 | 68.0 | 3.37 | 0.325 | 1.23 |
| 10 | 400 lbs. Basic Slag. 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | 108 | 25.2 | 1.06 | 4.51 | 0.594 | 1.17 |

| | e phosphate. |
|--|--|
| | or more, of solubi |
| Supp. Mag. Sulph. Mag. Sulph. Mag. | () "Superphosphate of Lime," made from high percentage mineral phosphates, and containing 37 per cent,, or more, of soluble phosphate. |
| hate also (†) wts. Superphosph state also (†) state also (†) state also (†) state also (†) Soda, 100 lbs. Si Soda, 100 lbs. Si Sulphate Magne | phosphates, and con |
| Unmanured in 1876, and each year since Unmanured in 1882, and since. Previously Farmyard Manure (14 tons) Farmyard Manure (14 tons) alone 1883 and since: previously 3½ cwts. Superphosphate also (¹) Farmyard Manure (14 tons) alone 1883 and since. In 1882, and previously, 3½ cwts. Superphosphate, and in 1881, and previously, 550 lbs. Nitrate of Soda also (10 lbs. Ammonium-salts (²) 550 lbs. Nitrate of Soda, 400 lbs. Basic Slag, 300 lbs. Sulph. Potash, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 400 lbs. Basic Slag, 300 lbs. Sulphate Soda, and 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 400 lbs. Basic Slag, 300 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia 400 lbs. Basic Slag, 300 lbs. Sulphate Potash, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia | percentage mineral |
| yard Manure (14) Previously 3½ of In 1882, and So ibs. Sulph. Potas Ss. Sulph. Potas Ss. Sulph. Potas Ibs. Sulphate So | each case equal par |
| since Teviously Farm 1883 and since: 1883 and since: Irate of Soda al Basic Slag, 300 asic Slag, 300 ll ate Potash, 100 | rphosphate of Lim |
| 6, and each year 2, and since F (14 tons) alone (14 tons) alone saly, 550 lbs. No results (**) Soda 400 lbs. F (**) 300 lbs. E (**) | (1) "Sup |
| manured in 187 manured in 188 manured in 188 myard Manure myard Manure 881, and previor 1bs. Ammoniu 1bs. Nitrate of 1 bs. Nitrate of 1 bs. Nitrate of 1 bs. Nitrate of 1 bs. Basic Slag 1 bs. Basic Slag | |
| | H 198 4 196 1 |