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Memoranda of the Field Experiments at Rothamsted: May 1880



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Experiments on Potatoes; Hoos Field

Rothamsted Research

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EXPERIMENTS ON POTATOS.—HOOS FIELD; commencing 1876.

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 Ammonia-salts alone every year for the Wheat, as Plot 5 now receives for potatos: Plot 6 now receiving the same amount of nitrogen, but as Nitrate of Soda, instead of Ammonia-salts. Plots 7 and 8 received the same amount of complex mineral manure, and Ammonia-salts, for the Wheat, as Plot 7 now receives for potatos; and Plot 8 now receives the same complex mineral manures, and the same amount of nitrogen, but as Nitrate of Soda instead of Ammonia-salts. Plots 9 and 10 received the same complex mineral manures alone for the Wheat as Plot 10 now receives for potatos; Plot 9 now receives superphosphate only (3). Description of Potatos, in 1876, 1877, 1878, and 1879, the "Rock;" and in those years the rows were 25 inches apart; with 12 inches from plant to plant in the rows. In 1880, the description was the "Champion;" and the rows were 25 inches apart; with 14 inches from plant to plant in the rows.

PLOTS.	The state of the s	PRODUCE PER ACRE.						
		Tubers.						
		Good.	Small.	Diseased.	TOTAL.	Tops,		
	First Season, 1876. Potatos planted, June 10-13; Crop taken up,	Oct. 30-31						
1 2 3 4 5 6 7 8 9	Unmanured Farmyard Manure (14 tons) Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (') Farmyard Manure (14 tons), 3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts (*) 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate 3½ cwts. Superphosphate 3½ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia	Tons. cwts. 3 614 3 1844 4 1444 5 914 2 2 6 1214 6 1734 4 1834 5 334	$\begin{array}{cccc} \text{Tons. cwts.} & & & & \\ 0 & 5\frac{1}{4} & & \\ 0 & 4 & & \\ 0 & 6\frac{2}{4} & & \\ 0 & 5\frac{2}{4} & & \\ 0 & 6\frac{2}{4} & & \\ 0 & 9\frac{1}{2} & & \\ 0 & 10 & & \\ 0 & 6\frac{2}{4} & & \\ \end{array}$	$\begin{array}{cccc} \text{Tons. cwts.} & 0 & \delta_{3}^{3} \\ 0 & 3 \\ 0 & 5 \\ 4 \\ 0 & 19 \\ 2 \\ 0 & 6 \\ 0 & 97 \\ 1 & 0 \\ 1 & 81 \\ 0 & 133 \\ 4 \\ 0 & 131 \\ \end{array}$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Withered not weight each lot spread or its own Pl and ploughed in.		
	Second Season, 1877. Potatos planted, April, 27-28; Crop taken up	o, Oct. 8-1	0.		-			
1 2 3 4 5 6 7 8 9	Unmanured Farmyard Manure (14 tons) Farmyard Manure (14 tons), and 3½ cwts. Superphosphate (*) Farmyard Manure (14 tons), 3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts, 3½ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 400 lbs. Ammonia-salts, 3½ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate 3½ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	Tons. cwts. 2 111 5 02 4 131 6 183 3 93 4 142 6 12 7 81 2 123 3 63	Tons. cwts. 0 $6\frac{3}{4}$ 0 $7\frac{1}{4}$ 0 $7\frac{1}{4}$ 0 $7\frac{1}{4}$ 0 $6\frac{3}{4}$ 0 $11\frac{1}{4}$ 0 $8\frac{3}{4}$ 0 $11\frac{1}{4}$ 0 $7\frac{1}{2}$	$\begin{array}{cccc} \text{Tons. cwts.} \\ 0 & 2\frac{1}{2} \\ 0 & 6 \\ 0 & 4 \\ 0 & 17\frac{1}{2} \\ 0 & 4 \\ 0 & 5\frac{5}{4} \\ 0 & 14\frac{1}{4} \\ 0 & 16\frac{2}{4} \\ 0 & 1\frac{1}{2} \\ 0 & 1\frac{1}{4} \\ \end{array}$	Tons. cwts. 3 $0\frac{1}{2}$ 5 18 5 $4\frac{3}{4}$ 4 1 7 $17\frac{1}{2}$ 8 $13\frac{3}{4}$ 3 6 3 $15\frac{1}{2}$	Withered not weighe each lot spread or its own Ple but high with (Oct. 14th blew all of before ploughing		
	THERD SEASON, 1878. Potatos planted, April 29. Crop taken up, Sept. 18-21; Tops we	eighed, and	spread or	the Plots.				
1 2 3 4 5 6 7 8 9	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. Ammonia-salts (3½ cwts. Superphosphate, and 550 lbs. Nitrate of Soda (400 lbs. Ammonia-salts (3½ cwts. Superphosphate, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphosphate, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate 3½ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	Tons. cwts. 2 63 4 11 5 181 6 113 6 116 7 63 7 111 3 53 3 8	Tons. cwts. $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccc} \text{Tons. cwts.} & 0 & 2 \\ 0 & 8\frac{1}{2} \\ 0 & 13\frac{1}{4} \\ 1 & 6\frac{1}{4} \\ 0 & 5\frac{3}{4} \\ 0 & 9\frac{1}{2} \\ 1 & 1 & 3\frac{3}{4} \\ 0 & 3\frac{1}{2} \\ 0 & 4\frac{3}{4} \\ \end{array}$	Tons, cwis. 2 17½ 5 11¾ 7 6 8 9¼ 3 10½ 4 13¼ 8 17¼ 9 4¼ 3 18¾ 4 1¾	Tons. cwts. 0 334 0 624 0 11 1 6 0 7 0 11 0 1334 1 0434 0 434		
	Fourth Season, 1879. Potatos planted, May 2; Crop taken up, Oc	ct. 13-16.						
7 8		Tons, cwts. 0 11½ 1 13½ 1 13½ 2 16 0 17½ 0 14¼ 2 4½ 1 18¼ 0 17½ 0 16¾	Tons. cwts. 0 4 0 4½ 0 6 0 5¾ 0 4 0 4½ 0 5 0 4½ 0 5 0 4½ 0 5 0 3½ 0 3	Tons. cwts. $ \begin{array}{ccccccccccccccccccccccccccccccccccc$	Tons. cwts. $\begin{array}{ccc} 0 & 16\frac{1}{4} \\ 2 & 8\frac{1}{2} \\ 2 & 10\frac{1}{4} \\ 3 & 14\frac{1}{2} \\ 1 & 0\frac{3}{4} \\ 2 & 15\frac{1}{2} \\ 2 & 9 \\ 1 & 2 \\ 1 & 1\frac{1}{2} \\ \end{array}$	Withered, not weigher each lot spread on its own Plo and ploughed in.		
V s	FIFTH SEASON, 1880. Potatos planted, April 13; Crop taken to	up.	-	-				
3 4 5 6 7 8	Unmanured Farmyard Manure (14 tons) Farmyard Manure (14 tons), and $3\frac{1}{2}$ cwts. Superphosphate (1) Farmyard Manure (14 tons), $3\frac{1}{2}$ cwts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts (2) 550 lbs. Nitrate of Soda, $3\frac{1}{2}$ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, $3\frac{1}{2}$ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. $3\frac{1}{2}$ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	Tons. cwts.	Cons. cwts,	Tons. cwts.	Tons. cwts.	Tons, cwts.		

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EXPERIMENTS ON POTATOS.—HOOS FIELD—continued.

SUMMARY OF THE COMPOSITION OF THE "GOOD" TUBERS.

Summary of the Composition of the "Good" Tubers.

As it will be some time before we shall be able to report fully the results obtained, or to be yet obtained, illustrating the influence of different manures, and of different seasons on the composition of Potatos, an abstract of some of the analytical results at present at command is given below. The specific gravity of the tubers is also given. Besides the results obtained relating to the composition of the tubers themselves, the dry matter, the sugar, the ash, and the nitrogen in the expressed juice has in many cases been determined. 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 the majority of cases, the small potatos have been submitted to the same methods of analysis as the good potatos. With regard to these latter results, it may be observed, that whilst the juice of the white portion of the diseased potatos contained approximately the normal amount of nitrogen, that of the discoloured portion contained very much less. On the other hand, the washed, or exhausted "mark" 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 and its mineral matter, in the development of the fungus. There was an increased amount of sugar found in the diseased potatos, 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" potatos 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 but after weighed samples had been ke

	Manures per Aure, per Annum. (For Produce, see facing page.)	Specific Gravity of the Tubers.				he "Good" Tubers.		
PLOTS.			Dry Matter,	Mineral Matter (Ash).		Nitrogen.		
-				In Fresh Tubers.	In Dry Matter,	In Fresh Tubers,	In Dr Matte	
	FIRST SEASON, 1876.		157	-				
1 2 3 4 5 6 7 8 9	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. Ammonia-salts (²) 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts, 3½ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos, 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate 3½ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	1.097 1.091 1.097 1.085 1.087 1.091 1.090 1.088 1.103 1.102	Per cent. 23 · 9 23 · 4 23 · 5 21 · 2 22 · 1 22 · 0 20 · 9 21 · 9 23 · 5 22 · 9	Per cent. 0·84 0·96 1·00 0·83 0·81 0·79 0·98 0·98 1·10 1·06	Per cent. 3 · 53 4 · 11 4 · 27 3 · 92 3 · 67 3 · 59 4 · 71 4 · 46 4 · 72 4 · 64	Per cent. 0·273 0·226 0·193 0·299 0·337 0·332 0·270 0·296 0·201 0·173	Per cer 1:1- 0·9 0·88 1·4- 1·55 1·2- 1·3: 0·86	
	SECOND SEASON, 1877.							
3 4 5 6 7 8	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. Ammonia-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate 3½ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	1·119 1·109 1·103 1·112 1·107 1·116 1·103 1·112 1·109 1·109	Per cent. 33·0 26·5 26·0 27·2 22·0 25·9 28·4 27·3 26·5 26·8	Per cent. 1.05 1.06 1.11 1.06 0.67 0.74 1.23 1.16 1.18 1.21	Per cent. 3:17 4:00 4:26 3:90 3:07 2:85 4:33 4:26 4:44 4:52	Per cent, 0·302 0·212 0·207 0·301 0·281 0·301 0·270 0·268 0·203 0·208	Per cen 0 · 91 0 · 80 0 · 80 1 · 11 1 · 28 1 · 16 0 · 95 0 · 98 0 · 76 0 · 78	
	Third Season, 1878.						7	
6 7 8	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. Ammonia-salts (2) 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate 3½ cwts. Superphosphate. 3½ cwts. Superphosphate. 3½ cwts. Superphosphate.	1·107 1·100 1·090 1·078 1·099 1·105 1·093 1·097 1·097 1·098	Per cent. 26·0 24·4 23·8 21·9 24·9 25·5 23·6 24·4 24·1 23·7	Per cent. 0 · 85 1 · 02 1 · 03 0 · 97 0 · 78 0 · 67 1 · 08 1 · 14 1 · 16	Per cent. 3 · 26 4 · 20 4 · 35 4 · 45 3 · 12 2 · 64 4 · 57 4 · 41 4 · 74 4 · 90	Per cent. 0·228 0·209 0·205 0·269 0·310 0·326 0·223 0·228 0·165 0·167	Per cer 0 · 88 0 · 86 0 · 86 1 · 22 1 · 22 0 · 91 0 · 96 0 · 7	
	Fourth Season, 1879.						-	
2 3 4 5 6 7 8 9	Unmanured Farmyard Manure (14 tons) Farmyard Manure (14 tons), and 3½ owts. Superphosphate (') Farmyard Manure (14 tons), 3½ owts. Superphosphate, and 550 lbs. Nitrate of Soda 400 lbs. Ammonia-satts (7'). 550 lbs. Nitrate of Soda 400 lbs. Ammonia-satts, 3½ owts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ owts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ owts. Superphosphate 3½ owts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	1·103 1·103 1·099 1·102 1·103 1·104 1·098 1·102 1·099 1·099	Per cent. 24 · 3 23 · 7 24 · 0 24 · 6 24 · 6 25 · 0 23 · 1 23 · 9 23 · 6 23 · 5	Per cent, 0·96 0·99 1·02 0·91 0·76 0·76 0·95 1·04 1·10	Per cent. 3 · 95 4 · 16 4 · 26 3 · 69 3 · 06 3 · 05 4 · 13 4 · 36 4 · 65 4 · 89	Per cent, 0·242 0·220 0·218 0·254 0·270 0·300 0·241 0·272 0·219	Per cer 1 · 0 · 9 · 0 · 9 · 0 · 1 · 10 · 1 · 10 · 1 · 10 · 10	
	Fifth Season, 1880.							
3 4 5 6 7 8	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. Ammonia-salts (²) 550 lbs. Nitrate of Soda 400 lbs. Ammonia-salts, 3½ cwts. Superphos., 300 lbs. Salph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 550 lbs. Nitrate of Soda, 3½ cwts. Superphos., 300 lbs. Sulph. Potass, 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag. 3½ cwts. Superphosphate. 3½ cwts. Superphosphate, 300 lbs. Sulphate Potass, 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia.	÷	Per cent.	Per cent.	Per cent.	Per cent.	Per cer	