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Memoranda of the Field Experiments at Rothamsted: May 1880



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Experiments on Potatoes; Hoos Field

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EXPERIMENTS ON POTATOS.—HOOS FIELD—continued.

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 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 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. 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 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 after weighed samples 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.	MANURES PER ACRE, PER ANNUM. (For Produce, see facing page.)	Specific Gravity of the Tubers.	Composition of the "Good" Tubers.				
			Dry Matter.	Mineral Matter (Ash).		Nitrogen.	
				In Fresh Tubers.	In Dry Matter.	In Fresh Tubers.	In Dry Matter.
FIRST SEASON, 1876.							
1	Unmanured	1.097	Per cent. 23.9	Per cent. 0.84	Per cent. 3.53	Per cent. 0.273	Per cent. 1.14
2	Farmyard Manure (14 tons)	1.091	23.4	0.96	4.11	0.226	0.97
3	Farmyard Manure (14 tons), and 3½ cwt. Superphosphate (¹)	1.097	23.5	1.00	4.27	0.193	0.83
4	Farmyard Manure (14 tons), 3½ cwt. Superphosphate, and 550 lbs. Nitrate of Soda	1.085	21.2	0.83	3.92	0.239	1.41
5	400 lbs. Ammonia-salts (²)	1.087	22.1	0.81	3.67	0.337	1.52
6	550 lbs. Nitrate of Soda	1.091	22.0	0.79	3.59	0.332	1.51
7	400 lbs. Ammonia-salts, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.090	20.9	0.98	4.71	0.270	1.29
8	550 lbs. Nitrate of Soda, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.088	21.9	0.98	4.46	0.296	1.35
9	3½ cwt. Superphosphate	1.103	23.5	1.10	4.72	0.201	0.86
10	3½ cwt. Superphosphate, 300 lbs. Sulphate Potass., 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia	1.102	22.9	1.06	4.64	0.173	0.76
SECOND SEASON, 1877.							
1	Unmanured	1.119	Per cent. 33.0	Per cent. 1.05	Per cent. 3.17	Per cent. 0.302	Per cent. 0.91
2	Farmyard Manure (14 tons)	1.109	26.5	1.06	4.00	0.212	0.80
3	Farmyard Manure (14 tons), and 3½ cwt. Superphosphate (¹)	1.103	26.0	1.11	4.26	0.207	0.80
4	Farmyard Manure (14 tons), 3½ cwt. Superphosphate, and 550 lbs. Nitrate of Soda	1.112	27.2	1.06	3.90	0.301	1.11
5	400 lbs. Ammonia-salts (²)	1.107	22.0	0.67	3.07	0.281	1.28
6	550 lbs. Nitrate of Soda	1.116	25.9	0.74	2.85	0.301	1.16
7	400 lbs. Ammonia-salts, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.103	28.4	1.23	4.33	0.270	0.95
8	550 lbs. Nitrate of Soda, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.112	27.3	1.16	4.26	0.268	0.98
9	3½ cwt. Superphosphate	1.109	26.5	1.18	4.44	0.203	0.76
10	3½ cwt. Superphosphate, 300 lbs. Sulphate Potass., 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia	1.109	26.8	1.21	4.52	0.208	0.78
THIRD SEASON, 1878.							
1	Unmanured	1.107	Per cent. 26.0	Per cent. 0.85	Per cent. 3.26	Per cent. 0.228	Per cent. 0.88
2	Farmyard Manure (14 tons)	1.100	24.4	1.02	4.20	0.209	0.86
3	Farmyard Manure (14 tons), and 3½ cwt. Superphosphate (¹)	1.090	23.8	1.03	4.35	0.205	0.86
4	Farmyard Manure (14 tons), 3½ cwt. Superphosphate, and 550 lbs. Nitrate of Soda	1.078	21.9	0.97	4.45	0.269	1.23
5	400 lbs. Ammonia-salts (²)	1.099	24.9	0.78	3.12	0.310	1.25
6	550 lbs. Nitrate of Soda	1.105	25.5	0.67	2.64	0.326	1.28
7	400 lbs. Ammonia-salts, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.093	23.6	1.08	4.57	0.223	0.95
8	550 lbs. Nitrate of Soda, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.097	24.4	1.08	4.41	0.228	0.94
9	3½ cwt. Superphosphate	1.097	24.1	1.14	4.74	0.165	0.68
10	3½ cwt. Superphosphate, 300 lbs. Sulphate Potass., 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia	1.098	23.7	1.16	4.90	0.167	0.71
FOURTH SEASON, 1879.							
1	Unmanured	1.103	Per cent. 24.3	Per cent. 0.96	Per cent. 3.95	Per cent. 0.242	Per cent. 0.90
2	Farmyard Manure (14 tons)	1.103	23.7	0.99	4.16	0.220	0.93
3	Farmyard Manure (14 tons), and 3½ cwt. Superphosphate (¹)	1.099	24.0	1.02	4.26	0.218	0.91
4	Farmyard Manure (14 tons), 3½ cwt. Superphosphate, and 550 lbs. Nitrate of Soda	1.102	24.6	0.91	3.69	0.254	1.04
5	400 lbs. Ammonia-salts (²)	1.103	24.6	0.76	3.06	0.270	1.10
6	550 lbs. Nitrate of Soda	1.104	25.0	0.76	3.05	0.300	1.20
7	400 lbs. Ammonia-salts, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.098	23.1	0.95	4.13	0.241	1.05
8	550 lbs. Nitrate of Soda, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.	1.102	23.9	1.04	4.36	0.272	1.14
9	3½ cwt. Superphosphate	1.099	23.6	1.10	4.65	0.219	0.93
10	3½ cwt. Superphosphate, 300 lbs. Sulphate Potass., 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia	1.099	23.5	1.15	4.89	0.211	0.90
FIFTH SEASON, 1880.							
1	Unmanured		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
2	Farmyard Manure (14 tons)						
3	Farmyard Manure (14 tons), and 3½ cwt. Superphosphate (¹)						
4	Farmyard Manure (14 tons), 3½ cwt. Superphosphate, and 550 lbs. Nitrate of Soda						
5	400 lbs. Ammonia-salts (²)						
6	550 lbs. Nitrate of Soda						
7	400 lbs. Ammonia-salts, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.						
8	550 lbs. Nitrate of Soda, 3½ cwt. Superphos., 300 lbs. Sulph. Potass., 100 lbs. Sulph. Soda, 100 lbs. Sulph. Mag.						
9	3½ cwt. Superphosphate						
10	3½ cwt. Superphosphate, 300 lbs. Sulphate Potass., 100 lbs. Sulphate Soda, and 100 lbs. Sulphate Magnesia						

(¹) "Superphosphate of Lime"—in all cases made from 200 lbs. Bone-ash, 150 lbs. Sulphuric acid, sp. gr. 1.7 (and water).
 (²) "Ammonia-salts"—in each case equal parts Sulphate and Muriate Ammonia of Commerce.