

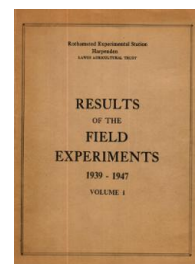
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BA/3 Four-course Rotation

Rothamsted Research

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Ba/3.1

FOUR COURSE ROTATION EXPERIMENT

Great Hoos (begun in 1930)

Residual Values of Humic and Phosphatic Fertilizers

The five treatments compared in this experiment are dung, Adco compost, straw with artificials, superphosphate and rock phosphate (Gafsa), the cropping following a Norfolk Rotation (potatoes, barley, ryegrass, wheat). There are four series (one for each crop in any particular year), each consisting of twenty-five plots.

Dung and Adco each supply 50 cwt. per acre of organic matter. The quantity of straw applied is equal to that used in making the Adco. The nutrient content of the three humic fertilizers is equalized by adding sulphate of ammonia, muriate of potash and superphosphate, to raise the applications to 1.8 cwt. N per acre, 1.2 cwt. P₂O₅ per acre and 3.0 cwt. K₂O per acre. The phosphatic fertilizers are applied at the rate of 1.2 cwt. P₂O₅ per acre, together with sulphate of ammonia and muriate of potash at the above rates.

Any given plot receives always the same treatment, but the treatment is applied to the plot only once in five years (except that the sulphate of ammonia and muriate of potash accompanying the phosphatic fertilizers are applied one fifth annually.) Thus each treatment is applied to one plot of each series every year, according to a Latin square scheme. In this way the residual effects of fertilizers are measured in every crop, and the period of the manurial cycle differs from that of the crop rotation.

Area of each plot, 0.024 acre.

Details of the experiment are as given in the 1932 Report, pp. 127-8, with the following alterations:-

1. From 1935 onwards, clover ryegrass ley was replaced by ryegrass alone, sown in autumn after ploughing barley stubble, with fertilizers applied as on wheat.
2. From 1942 onwards, each plot of the potato crop was split, a random half of each receiving an additional 0.4.cwt. N per acre as sulphate of ammonia each year.

Ba/3.2

Nutrients provided by organic fertilizers: cwt. per acre

Year	Manure as F.Y.M.			Manure as Adco			Manure as Straw			
	N	P ₂ O ₅	K ₂ O	N	P ₂ O ₅	K ₂ O	Organic Matter	N	P ₂ O ₅	K ₂ O
1939	1.782	1.344 [‡]	4.503	1.646	1.520 [‡]	1.189	123.75	0.862	0.480	2.652
1940	1.520	0.830	2.155	1.562	1.240 [‡]	1.330	139.88	1.008	0.520	2.699
1941	1.775	0.471	1.802	1.260	0.877	0.538	106.74	0.573	0.183	1.526
1942	1.410	0.700	2.373	1.378	0.890	0.506	118.96	0.615	0.208	1.229
1943	1.526	0.645	2.193	1.282	0.840	0.474	133.23	0.832	0.270	1.506
1944	1.202	0.409	1.925	1.313	0.706	0.572	100.00	0.657	0.178	0.765
1945	1.524	0.492	2.712	0.995	0.555	0.622	82.00	0.297	0.088	0.684
1946	1.802	0.710	2.418	1.461	1.031	0.892	124.00	0.683	0.379	1.447
1947	1.588	0.748	1.560	1.585	1.169	0.911	123.00	0.849	0.261	1.546

[‡] No application of artificials necessary.

Crop Notes

Crop year	1939	1940	1941	1942	1943	1944	1945	1946	1947
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Potatoes. Variety: 1939-41, Ally; 1942-47, Majestic. Previous crop: Wheat

Planted	Apr. 17	Apr. 26	Apr. 30	Apr. 21	Apr. 8	Mar. 25	Mar. 30	Mar. 30	Apr. 29
Harvested	Sept. 19	Sept. 24	Oct. 3	Oct. 3	Sept. 15	Sept. 28	Sept. 25	Oct. 4	Sept. 30

Barley. Variety: Plumage Archer. Previous crop: Potatoes

Sown	Mar. 7	Mar. 11	Mar. 18	Mar. 25	Mar. 2	Mar. 6	Mar. 27	Mar. 20	Apr. 12
Harvested	Aug. 23	Aug. 6	Sept. 2	Aug. 17	Aug. 7	Aug. 12	Aug. 14	Aug. 21	Aug. 14

Ryegrass. Variety: Western Wolths. Previous crop: Barley

Sown	Sept. 13	Apr. 13 ¹	Oct. 30	Nov. 1	Sept. 24	Sept. 30	Sept. 13	Sept. 17	Apr. 12 ³
Harvested	June 6	June 22	Failed ²	June 20	June 14	June 14	June 13	June 14	Aug. 21

Wheat. Variety: 1939-45 Yeoman. 1946⁷ Squareheads Master. Previous crop: Ryegrass

Sown	Oct. 24	Oct. 21	Oct. 29	Oct. 27	Oct. 10	Oct. 4	Oct. 26	Oct. 15	Oct. 24
Harvested	Aug. 14	Aug. 6	Aug. 22	Aug. 12	Aug. 3	Aug. 12	Aug. 13	Aug. 21	Aug. 18

- (1) First sowing of ryegrass failed.
- (2) Barley sown to replace ryegrass, which failed.
Sown: Apr 22. Cut for hay: July 23. Variety: Kenia.
- (3) Wet season prevented autumn sowing of ryegrass.

Four Course Rotation Experiment

Ba/3.3

Potatoes. Total tubers: tons per acre

Manure	Year of	1939	1940	1941	1942	1943	1944	1945	1946	1947
	cycle									
Manure as F.Y.M.	1	5.28	4.95	3.02	9.08	6.90	10.68	9.60	7.29	6.13
	2	3.52	4.34	2.53	6.12	6.20	7.85	8.14	7.03	5.47
	3	4.03	3.01	2.69	6.56	5.48	11.69	7.27	5.54	5.84
	4	2.82	4.80	1.92	6.77	5.38	8.05	8.87	5.06	5.05
	5	4.16	3.79	2.42	3.82	5.46	8.97	6.11	6.38	4.30
Manure as Adco	1	4.14	4.87	1.86	7.77	8.34	12.49	11.82	9.24	6.05
	2	3.70	2.91	2.38	5.39	4.77	9.66	7.72	7.26	5.59
	3	2.25	2.91	2.04	4.28	4.72	8.55	6.80	6.60	4.56
	4	3.12	2.93	1.30	4.57	5.13	7.97	7.01	7.04	5.21
	5	2.46	2.05	1.75	5.15	5.26	9.63	7.08	6.18	5.13
Manure as Straw	1	3.59	7.18	4.42	10.22	7.13	12.60	12.83	9.13	6.57
	2	4.07	5.11	2.77	6.85	5.97	8.21	9.00	6.37	4.36
	3	4.23	3.45	3.00	7.93	6.62	6.88	8.43	7.20	4.55
	4	4.22	2.51	1.88	4.07	5.81	8.80	8.15	6.19	5.66
	5	3.48	3.50	2.76	6.73	4.92	10.02	7.79	6.64	5.07
Super- Phosphate	1	5.63	5.66	4.03	6.90	8.51	9.98	9.27	9.19	6.48
	2	5.72	4.58	4.14	4.46	6.29	10.86	9.45	7.58	5.63
	3	4.45	4.67	2.24	9.14	7.28	9.53	9.27	7.39	6.36
	4	3.98	3.56	2.76	7.23	8.40	11.06	9.84	8.41	5.98
	5	4.76	4.98	2.64	7.31	6.85	8.03	10.01	8.02	6.17
Gafsa Rock Phosphate	1	3.37	2.44	2.41	4.06	5.30	8.62	9.31	7.18	4.04
	2	2.22	3.37	2.26	5.57	6.58	9.60	7.67	6.41	5.41
	3	3.59	4.58	2.45	5.83	7.01	6.63	8.13	6.85	5.26
	4	3.81	2.29	2.85	4.13	5.88	8.72	7.93	6.24	5.47
	5	2.90	3.28	1.93	7.52	5.55	5.27	8.48	8.35	4.90

Ba/3.4

Potatoes. Total tubers: tons per acre. Effect of additional nitrogen

Manures	Year of Cycle	1942			N Effect	1943			N Effect
		Additional N Without	With	Mean		Additional N Without	With	Mean	
Manure as F.Y.M.	1	9.08	10.34	9.71	1.26	6.90	7.28	7.09	0.38
	2	6.12	8.31	7.22	2.19	6.20	7.99	7.10	1.79
	3	6.56	8.04	7.30	1.48	5.48	6.15	5.82	0.67
	4	6.77	7.08	6.92	0.31	5.38	7.99	6.68	2.61
	5	3.82	4.65	4.24	0.83	5.46	7.72	6.59	2.26
Manure as Adco	1	7.77	7.16	7.46	-0.61	8.34	9.20	8.77	0.86
	2	5.39	7.81	6.60	2.42	4.77	6.59	5.68	1.82
	3	4.28	4.61	4.44	0.33	4.72	6.62	5.67	1.90
	4	4.57	6.09	5.33	1.52	5.13	4.83	4.98	-0.30
	5	5.15	5.24	5.20	0.09	5.26	6.68	5.97	1.42
Manure as Straw	1	10.22	11.73	10.98	1.51	7.13	9.31	8.22	2.18
	2	6.85	9.67	8.26	2.82	5.97	7.63	6.80	1.66
	3	7.93	7.52	7.72	-0.41	6.62	8.03	7.32	1.41
	4	4.07	4.02	4.04	-0.05	5.81	7.95	6.88	2.14
	5	6.73	7.16	6.94	0.43	4.92	6.43	5.68	1.51
Super-Phosphate	1	6.90	8.31	7.60	1.41	8.51	10.41	9.46	1.90
	2	4.46	5.65	5.06	1.19	6.29	8.22	7.26	1.93
	3	9.14	10.04	9.59	0.90	7.28	8.58	7.93	1.30
	4	7.23	7.85	7.54	0.62	8.40	9.10	8.75	0.70
	5	7.31	7.19	7.25	-0.12	6.85	7.48	7.16	0.63
Gafsa Rock Phosphate	1	4.06	3.74	3.90	-0.32	5.30	5.63	5.46	0.33
	2	5.57	7.81	6.69	2.24	6.58	5.80	6.19	-0.78
	3	5.83	4.98	5.40	-0.85	7.01	8.19	7.60	1.18
	4	4.13	6.52	5.32	2.39	5.88	6.14	6.01	0.26
	5	7.52	5.64	6.58	-1.88	5.55	6.31	5.93	0.76

Ba/3.5

Four Course Rotation Experiment

Potatoes. Total tubers: tons per acre. Effect of additional nitrogen

Manures	Year of Cycle	1944			N Effect	1945			N Effect
		Additional N Without	With	Mean		Additional N Without	With	Mean	
Manure as F.Y.M.	1	10.68	12.72	11.70	2.04	9.60	12.77	11.18	3.17
	2	7.85	8.03	7.94	0.18	8.14	12.27	10.20	4.13
	3	11.69	12.09	11.89	0.40	7.27	10.50	8.88	3.23
	4	8.05	8.80	8.42	0.75	8.87	10.71	9.79	1.84
	5	8.97	11.90	10.44	2.93	6.11	8.03	7.07	1.92
Manure as Adco	1	12.49	10.96	11.72	-1.53	11.82	13.69	12.76	1.87
	2	9.66	11.10	10.38	1.44	7.72	9.62	8.67	1.90
	3	8.55	9.54	9.04	0.99	6.80	8.92	7.86	2.12
	4	7.07	8.69	8.33	0.72	7.01	9.27	8.14	2.26
	5	9.63	10.13	9.88	0.50	7.08	8.07	7.58	0.99
Manure as Straw	1	12.60	13.90	13.25	1.30	12.83	9.95	11.39	-2.88
	2	8.21	9.25	8.73	1.04	9.00	8.39	8.70	-0.61
	3	6.88	7.11	7.00	0.23	8.43	11.60	10.02	3.17
	4	8.80	9.14	8.97	0.34	8.15	9.52	8.84	1.37
	5	10.02	10.29	10.16	0.27	7.79	10.49	9.14	2.70
Super-Phosphate	1	9.98	10.99	10.48	1.01	9.27	9.82	9.54	0.55
	2	10.86	11.90	11.38	1.04	9.45	10.83	10.14	1.38
	3	9.53	10.80	10.16	1.27	9.27	10.49	9.88	1.22
	4	11.06	12.09	11.58	1.03	9.84	10.52	10.18	0.68
	5	8.03	9.03	8.53	1.00	10.01	10.56	10.28	0.55
Gafsa Rock Phosphate	1	8.62	9.34	8.98	0.72	9.31	8.46	8.88	-0.85
	2	9.60	12.05	10.82	2.45	7.67	7.88	7.78	0.21
	3	6.63	8.60	7.62	1.97	8.13	8.99	8.56	0.86
	4	8.72	8.13	8.42	-0.59	7.93	8.09	8.01	0.16
	5	5.27	7.42	6.34	2.15	8.48	6.98	7.73	-1.50

✓

Ba/3.6

Potatoes, Total tubers: tons per acre. Effect of additional nitrogen

Manures	Year of Cycle	1946			N Effect	1947			N Effect
		Additional N Without	With	Mean		Additional N Without	With	Mean	
Manure as F.Y.M.	1	7.29	8.65	7.97	1.36	6.13	8.06	7.10	1.93
	2	7.03	8.80	7.92	1.77	5.47	6.55	6.01	1.08
	3	5.54	8.00	6.77	2.46	5.84	6.36	6.10	0.52
	4	5.06	8.63	6.84	3.57	5.05	5.97	5.51	0.92
	5	6.38	6.79	6.58	0.41	4.30	5.39	4.84	1.09
Manure as Adco	1	9.24	9.18	9.21	-0.06	6.05	6.01	6.03	-0.04
	2	7.26	8.78	8.02	1.52	5.59	5.42	5.50	-0.17
	3	6.60	8.58	7.59	1.98	4.56	5.89	5.22	1.33
	4	7.04	7.09	7.06	0.05	5.21	5.94	5.58	0.73
	5	6.18	7.53	6.86	1.35	5.13	4.65	4.89	-0.48
Manure as Straw	1	9.13	9.93	9.53	0.80	6.57	6.35	6.46	-0.22
	2	6.37	10.66	8.52	4.29	4.36	5.80	5.08	1.44
	3	7.20	9.09	8.14	1.89	4.55	6.74	5.64	2.19
	4	6.19	7.26	6.72	1.07	5.66	6.43	6.04	0.77
	5	6.64	8.52	7.58	1.88	5.07	6.34	5.70	1.27
Super-Phosphate	1	9.19	10.08	9.64	0.89	6.48	7.41	6.94	0.93
	2	7.58	9.78	8.68	2.20	5.63	5.59	5.61	-0.04
	3	7.39	7.99	7.69	0.60	6.36	6.40	6.38	0.04
	4	8.41	8.18	8.30	-0.23	5.98	5.34	5.66	-0.64
	5	8.02	7.51	7.76	-0.51	6.17	5.62	5.90	-0.55
Gafsa Rock Phosphate	1	7.18	6.17	6.68	-1.01	4.04	4.70	4.37	0.66
	2	6.41	6.01	6.21	-0.40	5.41	5.65	5.53	0.24
	3	6.85	6.61	6.73	-0.24	5.26	5.21	5.24	-0.05
	4	6.24	6.20	6.22	-0.04	5.47	5.18	5.32	-0.29
	5	8.35	7.02	7.68	-1.33	4.90	4.79	4.84	-0.11

Ba/3.7

Four Course Rotation Experiment

Manure	Year of Cycle	Barley Grain: cwt. per acre									
		1939	1940	1941	1942	1943	1944	1945	1946	1947	
Manure as F.Y.M	1	26.3	27.6	18.4	35.0	27.4	35.8	29.8	26.9	22.6	
	2	25.9	32.5	14.6	24.1	23.3	29.4	21.8	24.2	16.2	
	3	22.8	24.2	12.5	21.6	17.9	25.2	19.0	25.1	15.3	
	4	23.7	20.7	15.3	22.0	19.6	23.0	19.2	22.5	13.3	
	5	21.5	22.6	12.2	16.3	16.1	27.2	17.6	23.8	14.6	
Manure as Adco	1	31.5	36.5	17.3	28.4	32.4	31.6	31.5	30.2	19.0	
	2	26.1	28.1	13.8	18.6	22.7	30.3	22.4	25.2	13.8	
	3	20.6	24.3	12.6	18.9	16.4	24.9	18.1	21.6	15.3	
	4	20.5	18.5	10.4	17.0	20.9	27.6	16.6	24.5	13.4	
	5	22.4	27.5	11.0	13.9	16.3	27.5	14.8	21.8	14.5	
Manure as Straw	1	23.7	34.5	25.5	32.0	32.2	34.8	38.4	34.3	24.0	
	2	24.5	27.3	15.1	26.6	23.1	28.2	24.8	27.2	16.5	
	3	20.8	27.1	12.0	19.2	20.8	28.1	19.6	25.6	19.1	
	4	23.8	26.0	12.6	17.2	21.6	26.0	16.8	24.3	14.1	
	5	26.3	24.2	12.6	21.4	13.4	25.1	20.0	24.8	15.8	
Super- phosphate	1	32.2	30.2	25.1	25.4	27.8	29.2	26.2	28.6	23.7	
	2	32.3	30.8	24.8	27.2	25.3	28.6	26.3	22.8	22.6	
	3	31.7	31.1	25.9	26.4	30.0	26.7	24.2	27.2	22.6	
	4	31.7	31.3	22.0	28.6	28.3	27.5	22.7	29.1	22.0	
	5	33.0	29.7	21.7	29.2	22.7	29.4	26.6	29.2	20.4	
Gafsa Rock Phosphate	1	29.0	33.2	18.7	13.1	23.7	28.8	20.0	29.3	20.6	
	2	29.8	34.5	15.0	27.7	24.6	28.0	21.4	28.9	17.4	
	3	32.9	31.0	17.3	27.9	24.1	28.8	26.2	23.3	20.6	
	4	31.5	30.4	22.3	22.8	20.9	28.1	21.2	30.3	19.9	
	5	26.5	32.1	16.9	30.4	26.1	29.9	23.4	27.4	19.4	

Ba/3.8

Barley Straw: cwt. per acre

Manure	Year of Cycle	1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F. Y. M.	1	32.2	28.5	23.0	37.5	30.1	33.3	33.8	29.6	21.9
	2	28.8	25.3	23.2	22.2	23.8	29.1	23.7	28.4	17.5
	3	26.1	24.7	19.8	20.4	19.4	23.5	21.0	26.4	16.0
	4	27.6	22.0	20.8	20.7	19.0	22.8	20.9	28.4	13.5
	5	28.2	24.7	18.4	16.5	15.8	25.0	17.2	29.5	16.6
Manure as Adco	1	39.7	35.7	27.0	31.0	34.0	31.4	37.4	40.0	20.5
	2	32.0	29.2	21.2	23.9	21.8	26.4	25.6	29.4	14.3
	3	24.6	24.5	23.0	22.3	16.7	23.5	21.1	22.8	15.6
	4	26.5	27.7	17.0	23.6	21.8	26.4	21.8	33.2	14.3
	5	24.7	28.2	20.5	15.8	17.6	23.1	18.7	28.2	16.3
Manure as Straw	1	27.2	37.8	32.1	35.8	33.9	34.1	34.4	42.0	23.8
	2	29.0	27.7	21.6	25.6	22.6	26.8	27.8	34.0	17.7
	3	24.4	27.8	20.0	19.7	22.4	25.9	28.4	30.5	18.7
	4	27.8	26.4	18.9	21.1	20.7	23.6	25.4	30.0	15.7
	5	27.6	24.7	21.3	16.9	14.9	22.1	20.7	26.9	16.3
Super-phosphate	1	35.9	35.2	30.6	30.6	28.3	26.9	31.6	36.4	24.7
	2	39.6	32.3	30.8	26.5	28.0	28.2	25.4	28.2	22.6
	3	34.1	33.4	29.8	20.4	28.7	25.5	29.4	34.4	23.7
	4	33.7	32.9	29.7	28.0	27.6	24.0	29.4	32.5	22.7
	5	34.7	30.3	31.8	27.3	26.0	24.9	29.3	38.2	21.1
Gafsa Rock Phosphate	1	33.3	37.9	29.1	22.8	26.0	25.6	26.5	36.5	24.0
	2	36.8	39.8	29.2	31.3	27.4	26.2	25.1	34.7	18.9
	3	37.1	37.5	28.5	29.5	26.3	26.5	27.8	29.1	22.8
	4	37.3	32.3	* 32.0	23.4	24.1	25.1	29.4	35.5	22.6
	5	36.2	34.8	32.0	29.9	26.7	28.2	25.1	36.4	23.0

* Recorded yield obviously incorrect.

Four Course Rotation Experiment

Ryegrass: cwt. per acre dry matter

Manure	Year of Cycle	1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F.Y.M.	1	20.4	19.4	7.0	18.8	16.5	19.4	17.3	33.3	6.7
	2	10.9	11.4	9.7	9.5	12.7	10.2	13.1	22.8	3.2
	3	10.8	7.1	5.5	7.3	10.5	11.4	11.5	20.8	3.3
	4	8.5	9.1	6.5	9.0	8.9	8.2	11.8	12.3	3.2
	5	9.5	9.1	5.8	5.6	8.6	9.6	9.6	16.2	3.2
Manure as Adco	1	14.4	16.9	10.1	9.4	17.8	18.7	25.3	31.9	6.7
	2	10.2	9.9	6.7	5.8	10.6	13.3	14.0	27.6	3.5
	3	8.8	7.6	5.6	9.0	9.6	9.0	11.5	18.9	3.5
	4	7.2	8.9	5.4	6.1	8.3	9.1	8.1	16.5	1.2
	5	8.1	8.5	3.6	6.2	8.8	9.8	10.4	15.5	3.9
Manure as Straw	1	40.5	28.1	14.3	21.5	29.3	16.4	39.2	59.1	12.4
	2	11.0	8.8	4.4	8.6	9.4	10.7	13.2	21.7	3.7
	3	9.2	12.1	6.6	11.4	11.4	10.6	12.5	23.5	5.0
	4	9.3	9.8	7.0	9.6	8.3	11.8	10.6	15.5	4.4
	5	9.2	9.3	6.9	7.1	8.1	9.6	8.5	14.0	3.1
Super-phosphate	1	22.5	18.4	10.0	13.5	14.2	12.6	22.0	39.7	11.2
	2	23.3	12.9	10.0	15.6	18.1	12.0	20.0	33.7	7.8
	3	17.0	14.8	9.4	10.8	15.1	14.3	22.3	34.0	4.3
	4	20.2	10.9	11.6	7.1	13.7	15.4	19.2	36.7	6.9
	5	20.5	13.3	7.5	11.0	17.1	12.6	18.3	35.9	6.6
Gafsa Rock Phosphate	1	17.7	7.8	9.0	6.2	16.6	12.8	20.8	31.6	7.2
	2	16.1	12.0	9.3	9.7	17.7	8.5	18.7	31.4	5.8
	3	16.1	10.7	8.4	3.6	14.8	10.4	19.2	32.3	8.4
	4	18.5	11.5	6.7	10.2	15.4	11.2	16.9	37.1	5.4
	5	24.9	10.4	5.4	15.6	11.8	8.9	18.3	29.0	7.2

In 1941 the ryegrass failed and the plots were resown with barley, which was cut for hay.

Ba/3.10

Wheat Grain: cwt. per acre

Manure	Year of Cycle	1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F.Y.M.	1	23.9	26.0	18.0	19.9	24.9	14.1	24.6	22.5	12.7
	2	19.3	20.1	16.4	17.8	20.0	7.8	22.2	17.3	11.2
	3	15.4	16.3	15.4	19.0	15.6	12.1	17.9	12.0	10.4
	4	16.2	17.4	12.5	14.6	15.0	8.2	19.4	14.6	7.8
	5	14.6	18.1	14.1	14.9	14.0	7.9	18.1	17.3	8.9
Manure as Adco	1	19.3	26.3	17.7	22.9	24.0	14.1	27.5	22.7	12.8
	2	17.0	18.9	15.1	18.5	14.9	10.4	19.4	19.1	11.1
	3	16.4	16.3	15.6	17.4	15.9	9.2	19.3	14.4	9.1
	4	12.6	16.3	13.7	23.4	15.8	11.6	16.9	12.2	9.2
	5	17.4	16.8	12.1	15.1	12.7	9.9	15.6	12.6	7.3
Manure as Straw	1	23.9	28.7	24.4	16.9	28.4	18.9	30.3	28.7	11.3
	2	17.4	19.1	13.7	13.9	17.0	6.4	20.0	14.1	11.2
	3	15.8	18.2	14.0	18.2	16.1	12.1	20.8	16.4	10.6
	4	17.4	25.7	16.2	18.1	16.2	7.3	17.7	12.6	10.3
	5	14.3	18.8	11.9	18.4	14.0	7.6	17.4	14.7	8.9
Super-Phosphate	1	22.7	18.8	16.5	20.6	21.4	9.4	22.1	15.9	8.6
	2	21.4	19.3	17.4	17.8	17.9	10.2	21.0	12.0	11.3
	3	19.4	21.8	17.9	20.1	22.2	11.0	22.1	16.0	9.0
	4	19.2	21.9	18.1	19.5	21.6	11.3	22.6	16.2	10.9
	5	21.3	21.4	18.9	21.0	21.4	9.5	23.4	17.9	10.2
Gafsa Rock	1	19.6	24.7	16.1	18.9	20.4	12.8	19.2	15.7	9.0
	2	22.5	21.6	14.5	19.9	20.2	17.1	21.2	17.7	7.5
	3	16.9	23.6	19.1	19.9	19.6	15.5	21.1	20.5	6.7
	4	21.7	21.6	18.0	22.0	21.0	15.9	21.9	16.1	2.4
	5	19.8	22.2	18.2	18.8	18.2	12.6	16.9	15.8	9.2

Ba/3.11

Four Course Rotation Experiment

Manure	Year of Cycle	Wheat Straw: cwt. per acre								
		1939	1940	1941	1942	1943	1944	1945	1946	1947
Manure as F. Y. M.	1	33.6	36.7	22.2	32.7	38.0	27.5	35.9	43.1	16.8
	2	26.9	25.7	20.1	24.6	28.5	12.1	31.2	35.3	13.4
	3	20.9	21.5	17.3	26.5	20.3	16.5	24.7	27.4	15.8
	4	26.3	24.9	14.4	20.9	26.1	11.7	25.7	34.3	10.0
	5	27.2	21.0	15.8	23.2	18.3	10.8	25.7	32.4	10.8
Manure as Adco	1	36.4	36.2	24.4	32.1	36.6	23.6	41.4	43.5	22.2
	2	23.3	22.4	17.4	25.0	25.3	14.7	27.1	36.4	17.7
	3	25.0	21.4	19.5	22.6	29.7	13.2	26.2	28.7	12.2
	4	26.6	21.3	16.9	32.5	22.2	13.7	22.1	24.9	13.3
	5	25.8	21.1	13.9	21.9	22.5	13.9	20.2	25.5	10.0
Manure as Straw	1	35.8	40.9	34.7	25.1	44.6	29.8	49.8	50.7	24.6
	2	23.7	21.6	16.9	20.4	29.9	8.8	27.4	28.2	13.2
	3	35.6	23.2	17.0	24.9	22.4	16.5	29.7	32.3	13.4
	4	24.4	31.7	18.1	24.4	22.5	10.3	26.1	27.0	14.5
	5	20.9	22.0	15.2	24.5	19.3	10.8	23.9	28.9	11.3
Super-phosphate	1	33.0	24.3	20.4	27.8	33.2	12.9	30.3	30.1	15.1
	2	33.2	25.8	22.2	26.0	31.0	12.7	30.3	23.9	16.4
	3	34.5	28.2	21.1	32.3	30.4	14.7	30.6	31.3	13.0
	4	27.7	30.5	22.0	26.6	32.7	13.9	33.2	30.7	14.4
	5	32.3	27.1	22.6	31.8	28.7	12.7	32.1	37.2	14.9
Gafsa Rock Phosphate	1	27.3	31.3	20.7	23.6	30.3	16.9	30.1	30.5	16.1
	2	29.9	27.3	18.0	28.1	35.7	20.8	29.6	35.4	9.5
	3	35.9	29.5	22.8	26.3	28.7	16.7	31.3	39.3	9.8
	4	30.3	28.7	21.4	28.8	33.4	18.4	32.4	32.5	4.5
	5	32.6	31.7	21.2	25.8	26.7	14.7	24.0	31.1	12.8

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