

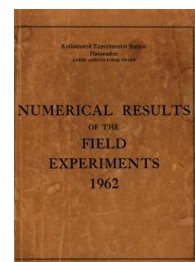
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Yields of the Field Experiments 1962

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62/W/B/4 Ley and Arable Rotations

Rothamsted Research

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62/B/4.1

LEY AND ARABLE ROTATIONS

Woburn Stackyard 1962 - the 25th year.

For history, treatments etc., see "Details of the Classical and Long Term Experiments" 1956.

Corrective K dressings (in cwt K_2O per acre, applied to sugar beet as muriate of potash half in autumn before ploughing and half broadcast on the plough furrow in February - commencing autumn 1961):-

Continuous rotations

| <u>Rotation</u> | Fertiliser plots | Dung plots |
|-----------------|------------------|------------|
| Arable | 3.6 | 3.2 |
| Arable with hay | 3.6 | 3.2 |
| Lucerne | 3.6 | 3.2 |
| Grazed ley | 1.3 | 0.0 |

Alternating rotations

| <u>Last two rotations in order</u> | Fertiliser plots | Dung plots |
|------------------------------------|------------------|------------|
| Arable with hay/Ley | 2.9 | 2.3 |
| Ley/Arable with hay | 3.6 | 3.2 |
| Lucerne/Arable | 3.6 | 3.2 |
| Arable/Lucerne | 3.6 | 3.2 |

Revised PK basal dressings (in cwt P_2O_5 and K_2O per acre, for all crops, commencing 1962):-

Treatment crops:

| | Fertilisers* and time of application | P_2O_5 | K_2O |
|-------------|-----------------------------------------------------------------------------------------------|----------|--------|
| Potatoes. | Superphosphate and muriate of potash, before ridging. | 0.9 | 1.8 |
| Rye. | 0/14/28, combine drilled. | 0.3 | 0.6 |
| Carrots. | Superphosphate and muriate of potash, in seedbed. | 0.6 | 1.8 |
| Hay. | 0/14/28, in spring, plus muriate of potash, after first cut. | 0.6 | 1.2 |
| Lucerne. | | | |
| 1st year | Superphosphate and muriate of potash, in seedbed. | 1.5 | 1.0 |
| 2nd year | Muriate of potash, in spring. | - | 1.5 |
| 3rd year | Muriate of potash, in spring. | - | 1.5 |
| Grazed ley. | | | |
| 1st year | Superphosphate and muriate of potash, in seedbed | 1.5 | 1.0 |
| 2nd year | 16/0/16, $\frac{1}{3}$ in spring, $\frac{1}{3}$ in early summer, $\frac{1}{3}$ in late summer | - | 0.55 |
| 3rd year | as second year | - | 0.55 |

*Granular compound fertilisers are described thus - 0/14/28 etc. to show percentages of N, P_2O_5 and K_2O in order.

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Test crops:-

| | Fertilisers and time of application | P ₂ O ₅ | K ₂ O |
|------------------|----------------------------------------------------------------|-------------------------------|------------------|
| Sugar beet | | | |
| Fertiliser plots | Muriate of potash ploughed in, superphosphate on plough furrow | 0.9 | 3.0 ⁺ |
| Dung plots | superphosphate and muriate of potash on plough furrow | 0.3 | 0.9 |
| Barley | Superphosphate in winter | 0.3 | - |

⁺Basal K₂O to sugar beet fertiliser plots to be equivalent to K₂O applied in dung in future.

Sub-plot fertiliser tests (in addition to basals) in cwt per acre:-

Sugar beet

All combinations of:-

'Nitro-Chalk': None; 0.72 N Magnesium sulphate: None;

Muriate of potash: None; 0.9 K₂O 500 lb per acre

Muriate of potash at 0.9 K₂O is applied in winter for barley to the sub-plots which did not receive the "test" potash for sugar beet.

Barley variety: This is now Proctor, and not Herta as hitherto.

Cultivations, etc.,

Treatment crops

Ley rotations

Ley 1st year. Ploughed twice: Aug 15 and Dec 22, 1961. Seedbed fertilisers applied: Mar 28, 1962. Seed sown at 40 lb per acre: Apr 10. Sprayed with MCPB/MCPA at 4 pints in 40 gallons per acre: May 30. 'Nitro-Chalk' applied: July 19 and Aug 16. Grazed 4 circuits: July 17 - Oct 8.

Ley 2nd year. Compound fertiliser applied: Mar 29, June 18, Aug 16, 1962. Grazed 5 circuits: May 15 - Sept 22.

Ley 3rd year. Compound fertiliser applied: Mar 29, June 20, Aug 16, 1962. Grazed 5 circuits: May 23 - Sept 30.

Lucerne 1st year. Ploughed: Aug 15, 1961. Treated for control of stem eelworm by injection of "D.D" soil fumigant at 800 lb per acre: Oct 31. Ploughed: Dec 22. Fertilisers applied: Mar 28, 1962. Seed drilled at 15 lb per acre: Apr 13. Cut twice: Aug 14 and Oct 1.

Lucerne 2nd year. Muriate of potash applied: Mar 29, 1962. Cut 3 times: June 27, Aug 14, Oct 1.

Lucerne 3rd year. Muriate of potash applied: Mar 29, 1962. Cut 3 times: June 27, Aug 14, Oct 1.

Arable rotations

Potatoes. Ploughed twice: Aug 15 and Dec 22, 1961. Fertilisers applied, potatoes machine planted: Mar 16, 1962. Earthed up: June 15. Sprayed twice with copper oxychloride fungicide at 2.3 lb Cu in 40 gallons per acre: July 23 and Aug 9. Haulm burnt off with diquat at 3 pints in 40 gallons per acre: Sept 22. Lifted: Oct 3.

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Rye. Ploughed: Sept 23, 1961. Seed combine drilled at $2\frac{1}{2}$ bushels per acre with PK compound: Oct 10. 'Nitro-Chalk' applied: Mar 30, 1962. Seeds hay mixture undersown on 4 plots: Apr 10. Combine harvested: Aug 31.
 Seeds hay. Seeds undersown at 30 lb per acre in rye: Apr 11, 1961. PK compound and 'Nitro-Chalk' applied: Mar 29, 1962. Cut once: June 13. Muriate of potash and 'Nitro-Chalk' applied: June 14.
 Carrots. Ploughed twice: Sept 4 and Dec 22, 1961. Fertilisers applied: Apr 24, 1962. Seed drilled at $4\frac{1}{2}$ lb per acre: Apr 27. Sprayed twice with demeton methyl at 12 fluid oz in 40 gallons per acre: May 29 and June 23. Thinned: June 29 - July 6. Lifted: Sept 19.

Test crops

Sugar beet. Dung equivalent K and half corrective K applied: Oct 23, 1961. Dung applied, all plots ploughed: Oct 25. Half corrective K, basal superphosphate and muriate of potash applied: Feb 22, 1962. 'Nitro-Chalk', "test" muriate of potash and magnesium sulphate applied, seed drilled at 7 lb per acre: Mar 21. Singled: May 30. Lifted: Sept 24.
 Barley. Ground chalk applied at 40 cwt per acre: Nov 3, 1961. Ploughed: Nov 4. "Balancing" muriate of potash and basal superphosphate applied: Feb 19, 1962. Seed drilled at $2\frac{1}{2}$ bushels per acre: Feb 20. 'Nitro-Chalk' applied: Feb 23. Plots re-drilled at 1 bushel per acre (because of bird damage): Mar 21. Combine harvested: Aug 25.

Standard errors per plot. Test crops.

| | | |
|----------------------------|----------------------|------------------------------------------|
| Sugar beet. Roots (washed) | Whole plot: | 1.112 tons per acre or 7.7% (4 d.f.) |
| | $\frac{1}{2}$ plot: | 0.590 tons per acre or 4.1% (4 d.f.) |
| | $\frac{1}{8}$ plot: | 0.987 tons per acre or 6.9% (24 d.f.) |
| | $\frac{1}{16}$ plot: | 0.900 tons per acre or 6.3% (32 d.f.) |
| Total sugar | Whole plot: | 4.27 cwt per acre or 9.2% (4 d.f.) |
| | $\frac{1}{2}$ plot: | 1.81 cwt per acre or 3.9% (4 d.f.) |
| | $\frac{1}{8}$ plot: | 3.39 cwt per acre or 7.3% (24 d.f.) |
| | $\frac{1}{16}$ plot: | 3.06 cwt per acre or 6.6% (32 d.f.) |
| Tops | Whole plot: | 0.615 tons per acre or 2.7% (4 d.f.) |
| | $\frac{1}{2}$ plot: | 1.484 tons per acre or 6.4% (4 d.f.) |
| | $\frac{1}{8}$ plot: | 1.290 tons per acre or 5.6% (24 d.f.) |
| | $\frac{1}{16}$ plot: | 2.225 tons per acre or 9.6% (32 d.f.) |

62/B/4.4

Standard errors per plot. Test crops.
Barley. Grain (at 85% dry matter) Whole plot: 1.10 cwt per acre or
2.6% (4 d.f.)
 $\frac{1}{2}$ plot: 1.58 cwt per acre or
3.7% (4 d.f.)

62/B/4.5

Summary of Results

Treatment crops

Ley, sheep days of grazing per acre

| 1st year | 2nd year | 3rd year |
|----------|----------|----------|
| 1265 | 1211 | 1397 |

Lucerne, dry matter: cwt per acre

| | 1st cut | 2nd cut | 3rd cut | Total |
|-----------------------------|---------|---------|---------|-------|
| <u>1st year</u> | | | | |
| Dung in 1960: tons per acre | | | | |
| None | 9.0 | 10.0 | | 19.0 |
| 15 | 12.8 | 13.0 | | 25.8 |
| Difference | +3.8 | +3.0 | | +6.8 |
| Previous rotation | | | | |
| Lucerne | 8.4 | 9.0 | | 17.4 |
| Arable with hay | 13.2 | 14.0 | | 27.2 |
| Mean | 10.8 | 11.5 | | 22.3 |
| <u>2nd year</u> | | | | |
| Dung in 1959: tons per acre | | | | |
| None | 17.3 | 16.3 | 14.7 | 48.3 |
| 15 | 26.8 | 18.3 | 16.4 | 61.5 |
| Difference | +9.5 | +2.0 | +1.7 | +13.2 |
| Previous rotation | | | | |
| Lucerne | 19.8 | 18.9 | 14.7 | 53.4 |
| Arable with roots | 24.2 | 15.7 | 16.4 | 56.3 |
| Mean | 22.0 | 17.3 | 15.6 | 54.8 |
| <u>3rd year</u> | | | | |
| Dung in 1958: tons per acre | | | | |
| None | 13.6 | 10.6 | 7.3 | 31.5 |
| 15 | 22.4 | 12.2 | 5.8 | 40.4 |
| Difference | +8.8 | +1.6 | -1.5 | +8.9 |
| Previous rotation | | | | |
| Lucerne | 15.2 | 10.6 | 5.9 | 31.7 |
| Arable with hay | 20.8 | 12.2 | 7.2 | 40.2 |
| Mean | 18.0 | 11.4 | 6.6 | 36.0 |

62/B/4.6

| | <u>Treatment crops</u> | | Rye | |
|---------------------|------------------------|----------------------------|---------------|--------|
| | Potatoes | Percentage | Grain: | Straw: |
| | Total tubers: | ware | (at 85% D.M.) | |
| | tons per acre | ($1\frac{5}{8}$ " riddle) | cwt per acre | |
| Dung: tons per acre | | | | |
| None | 9.45 | 94.8 | 36.7 | 44.2 |
| 15* | 11.86 | 94.8 | 34.8 | 45.3 |
| Difference | +2.41 | 0.0 | -1.9 | +1.1 |
| Previous rotation | | | | |
| Ley | 12.84 | 95.2 | 35.3 | 45.0 |
| Lucerne | 10.84 | 95.2 | 40.0 | 52.5 |
| Arable with hay | 10.64 | 94.7 | 31.1 | 36.3 |
| Arable with roots | 8.32 | 94.0 | 36.4 | 45.2 |
| Mean | 10.66 | 94.8 | 35.7 | 44.7 |

Hay

Yield, dry matter: cwt per acre

| | 1st and only cut |
|-----------------------------|------------------|
| Dung in 1958: tons per acre | |
| None | 52.5 |
| 15 | 55.5 |
| Difference | +3.0 |
| Previous rotation | |
| Lucerne | 54.6 |
| Arable with hay | 53.4 |
| Mean | 54.0 |

Carrots

| | Roots washed: | Tops: |
|-----------------------------|---------------|---------------|
| | tons per acre | tons per acre |
| Dung in 1958: tons per acre | | |
| None | 14.58 | 7.67 |
| 15 | 15.86 | 8.36 |
| Difference | 1.28 | 0.69 |
| Previous rotation | | |
| Ley | 16.37 | 8.10 |
| Arable with roots | 14.07 | 7.94 |
| Mean | 15.22 | 8.02 |

*Dung applied: Potatoes for test crop sugar beet in 1960.
Rye for test crop sugar beet in 1959.

Mean dry matter % as harvested: Rye, Grain: 82.0
Straw: 76.8

62/B/4.7

| | | 1st Test crop | | | | Mean |
|----------------------------------------------------------|-----------|--------------------------------------|----------|-----------------|-------------------|----------|
| | | Sugar beet | | | | |
| | | Previous rotation | | | | |
| | | Ley | Lucerne | Arable with hay | Arable with roots | |
| | | <u>Roots (washed): tons per acre</u> | | | | |
| Mean | (±1.112) | 14.45 | 14.54 | 14.09 | 14.45 | 14.39 |
| Dung: tons per acre | | | | | | |
| None | (±1.188)* | 13.68 | 13.73 | 13.32 | 13.45 | 13.55 |
| 15 | | 15.22 | 15.35 | 14.87 | 15.45 | 15.22 |
| Difference | (±0.834) | +1.54 | +1.62 | +1.55 | +2.00 | +1.67 |
| Response to additional 0.72 cwt N per acre | | | | | | |
| | | | (±0.987) | | | (±0.494) |
| No dung | | -0.54 | -0.78 | +1.36 | +0.15 | +0.05 |
| Dung 15 tons per acre | | -0.03 | +0.29 | +0.30 | +0.22 | +0.19 |
| Response to additional 0.9 cwt K ₂ O per acre | | | | | | |
| | | | (±0.987) | | | (±0.494) |
| No dung | | +0.18 | +1.32 | +0.58 | -0.38 | +0.43 |
| Dung 15 tons per acre | | +1.47 | -0.01 | -0.38 | -0.16 | +0.23 |
| | | <u>Sugar Percentage</u> | | | | |
| Mean | | 15.7 | 15.8 | 16.6 | 16.3 | 16.1 |
| Dung: tons per acre | | | | | | |
| None | | 15.9 | 15.9 | 17.0 | 16.8 | 16.4 |
| 15 | | 15.5 | 15.7 | 16.2 | 15.8 | 15.8 |
| Difference | | -0.4 | -0.2 | -0.8 | -1.0 | -0.6 |
| Response to additional 0.72 cwt N per acre | | | | | | |
| No dung | | -1.1 | -0.2 | -0.8 | -0.7 | -0.7 |
| Dung 15 tons per acre | | -0.7 | -0.7 | -1.0 | -0.7 | -0.8 |
| Response to additional 0.9 cwt K ₂ O per acre | | | | | | |
| No dung | | 0.0 | +0.6 | -0.4 | -0.2 | 0.0 |
| Dung 15 tons per acre | | -0.2 | +0.1 | +0.1 | -0.1 | 0.0 |

*For use in horizontal and diagonal comparisons only.

62/B/4.8

| | | 1st Test Crop | | | | Mean |
|----------------------------------------------------------|-----------|----------------------------------|----------|-----------------|-------------------|----------|
| | | Sugar beet | | | | |
| | | Previous rotation | | | | |
| | | Ley | Lucerne | Arable with hay | Arable with roots | |
| | | <u>Total sugar: cwt per acre</u> | | | | |
| Mean | (±4.27) | 45.4 | 45.8 | 46.7 | 46.9 | 46.2 |
| Dung: tons per acre | | | | | | |
| None | (±4.46)* | 43.6 | 43.6 | 45.2 | 45.2 | 44.4 |
| 15 | | 47.2 | 48.0 | 48.2 | 48.7 | 48.0 |
| Difference | (±2.56) | +3.6 | +4.4 | +3.0 | +3.5 | +3.6 |
| Response to additional 0.72 cwt N per acre | | | (±3.39) | | | (±1.70) |
| No dung | | -4.7 | -2.9 | +2.5 | -1.4 | -1.7 |
| Dung 15 tons per acre | | -2.1 | -1.2 | -1.9 | -1.6 | -1.7 |
| Response to additional 0.9 cwt K ₂ O per acre | | | (±3.39) | | | (±1.70) |
| No dung | | +0.5 | +5.9 | +1.0 | -2.0 | +1.4 |
| Dung 15 tons per acre | | +4.1 | +0.2 | -1.0 | -0.7 | +0.7 |
| | | <u>Tops: tons per acre</u> | | | | |
| Mean | (±0.615) | 23.96 | 23.82 | 22.16 | 22.64 | 23.15 |
| Dung: tons per acre | | | | | | |
| None | (±1.216)* | 22.60 | 22.40 | 19.30 | 21.14 | 21.36 |
| 15 | | 25.33 | 25.24 | 25.02 | 24.14 | 24.93 |
| Difference | (±2.098) | +2.73 | +2.84 | +5.99 | +3.00 | +3.57 |
| Response to additional 0.72 cwt N per acre | | | (±1.290) | | | (±0.645) |
| No dung | | +4.20 | +1.61 | +5.46 | +5.22 | +4.12 |
| Dung 15 tons per acre | | +0.55 | +3.42 | +2.44 | +3.02 | +2.36 |
| Response to additional 0.9 cwt K ₂ O per acre | | | (±1.290) | | | (±0.645) |
| No dung | | +2.50 | +1.29 | -0.05 | +0.32 | +1.02 |
| Dung 15 tons per acre | | +3.10 | +1.33 | -0.32 | +0.41 | +1.13 |

* For use in horizontal and diagonal comparisons only.

62/B/4.9

1st Test Crop

Sugar beet

Plots receiving no additional N or K

| Dung: tons per acre | | Previous rotation | | | Mean | |
|--------------------------------------|-----------|-------------------|---------|-----------------|-------|-------------------|
| | | Ley | Lucerne | Arable with hay | | Arable with roots |
| <u>Roots (washed): tons per acre</u> | | | | | | |
| Mean | (±1.035) | 14.29 | 14.38 | 14.14 | 14.52 | 14.33 |
| None | (±1.380)* | 14.26 | 13.94 | 12.75 | 13.50 | 13.61 |
| 15 | | 14.33 | 14.82 | 15.53 | 15.54 | 15.05 |
| Difference | (±1.469) | +0.07 | +0.88 | +2.78 | +2.04 | +1.44 |
| <u>Sugar percentage</u> | | | | | | |
| Mean | | 16.2 | 15.8 | 17.0 | 16.7 | 16.4 |
| None | | 16.7 | 15.6 | 17.7 | 17.1 | 16.8 |
| 15 | | 15.7 | 16.0 | 16.2 | 16.3 | 16.1 |
| Difference | | -1.0 | +0.4 | -1.5 | -0.8 | -0.7 |
| <u>Total sugar: cwt per acre</u> | | | | | | |
| Mean | (±3.78) | 46.4 | 45.4 | 47.7 | 48.4 | 47.0 |
| None | (±5.03)* | 47.8 | 43.5 | 45.1 | 46.1 | 45.6 |
| 15 | | 45.1 | 47.3 | 50.3 | 50.6 | 48.3 |
| Difference | (±4.88) | -2.7 | +3.8 | +5.2 | +4.5 | +2.7 |
| <u>Tops: tons per acre</u> | | | | | | |
| Mean | (±1.167) | 21.40 | 21.78 | 20.93 | 20.20 | 21.08 |
| None | (±1.557)* | 18.94 | 21.11 | 17.17 | 18.62 | 18.96 |
| 15 | | 23.86 | 22.46 | 24.69 | 21.78 | 23.20 |
| Difference | (±2.626) | +4.92 | +1.35 | +7.52 | +3.16 | +4.24 |

*For use in horizontal and diagonal comparisons only.

62/B/4.10

1st Test Crop

Sugar beet

Previous rotation

| Magnesium sulphate: lb per acre | Previous rotation | | | | Mean |
|--------------------------------------|-------------------|---------|-----------------------|-------------------------|-------------------|
| | Ley | Lucerne | Arable with hay | Arable with roots | |
| <u>Roots (washed): tons per acre</u> | | | | | |
| (±0.840)* | | | | | |
| None | 14.28 | 14.47 | 14.01 | 14.44 | 14.30 |
| 500 | 14.63 | 14.61 | 14.18 | 14.46 | 14.47 |
| Difference (±0.318) | +0.35 | +0.14 | +0.17 | +0.02 | +0.17 (±0.159) |
| <u>Sugar percentage</u> | | | | | |
| None | 15.7 | 15.8 | 16.6 | 16.4 | 16.1 |
| 500 | 15.6 | 15.7 | 16.6 | 16.2 | 16.1 |
| Difference | -0.1 | -0.1 | 0.0 | -0.2 | 0.0 |
| <u>Total sugar: cwt per acre</u> | | | | | |
| (±3.14)* | | | | | |
| None | 45.1 | 45.6 | 46.4 | 47.1 | 46.0 |
| 500 | 45.8 | 46.0 | 47.0 | 46.8 | 46.4 |
| Difference (±1.08) | +0.7 | +0.4 | +0.6 | -0.3 | +0.4 (±0.54) |
| <u>Tops: tons per acre</u> | | | | | |
| (±0.860)* | | | | | |
| None | 24.16 | 23.93 | 22.55 | 22.54 | 23.29 |
| 500 | 23.77 | 23.72 | 21.77 | 22.74 | 23.00 |
| Difference (±0.787) | -0.39 | -0.21 | -0.78 | +0.20 | -0.29 (±0.393) |

* for use in horizontal and diagonal comparisons only.

62/B/4.11

2nd Test Crop

Barley

Previous rotation

| Dung in 1961: tons per acre | Ley | Previous rotation | | | Mean |
|--------------------------------|-----|-------------------|-----------------------|-------------------------|------|
| | | Lucerne | Arable with hay | Arable with roots | |

Grain (at 85% dry matter): cwt per acre

| | | | | | | |
|------------|----------|------|------|------|------|-----------------|
| None | (±1.11)* | 43.5 | 41.2 | 40.0 | 40.0 | 41.2 |
| 15 | | 42.7 | 43.4 | 44.9 | 43.9 | 43.7 |
| Mean | (±0.77) | 43.1 | 42.3 | 42.4 | 42.0 | 42.4 |
| Difference | (±1.58) | -0.8 | +2.2 | +4.9 | +3.9 | +2.5 (±0.79) |

Straw (at 85% dry matter): cwt per acre

| | | | | | | |
|------------|--|------|------|------|------|------|
| None | | 31.8 | 28.9 | 23.7 | 29.2 | 28.4 |
| 15 | | 35.6 | 36.2 | 32.0 | 32.3 | 34.0 |
| Mean | | 33.7 | 32.5 | 27.8 | 30.7 | 31.1 |
| Difference | | +3.8 | +7.3 | +8.3 | +3.1 | +5.6 |

* For use in horizontal and diagonal comparisons only.

Mean dry matter % as harvested: Grain 80.0
Straw 85.0