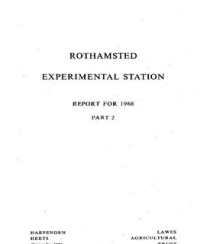


Thank you for using eradoc, a platform to publish electronic copies of the Rothamsted Documents. Your requested document has been scanned from original documents. If you find this document is not readable, or you suspect there are some problems, please let us know and we will correct that.



ROTHAMSTED
RESEARCH

Rothamsted Experimental Station Report for 1968 - Part 2



[Full Table of Content](#)

Index

Rothamsted Research

Rothamsted Research (1969) *Index* ; Rothamsted Experimental Station Report For 1968 - Part 2, pp 211 - 215 - DOI: <https://doi.org/10.23637/ERADOC-1-2>

INDEX

- Acrasiae in soils, 176
Actinomycetes in soil, 176, 183
Agriculture, Lawes definition of, 14
Algae in soil, 175
Alopecurus myosuroides. *See* Blackgrass
Ammonium fertilisers
 compared with complete mineral fertiliser, 31
 compared with farmyard manures, 30
 compared with nitrate, 30, 34, 35
 effect of increasing amounts, 32
 history of application, 23
 on first crop in 1844, 27
 residual effect, 28, 36
 time of application, effect on yield, 30, 32, 34, 35
Amoeba. *See* Protozoa
Analytical methods
 direct-count method for soil organisms, 176
 for chemical analysis of crops, 50
 for chemical analysis of mineralogical samples, 76–79
 for chemical analysis of surface soil, 93–112
 for nitrogen in soil, 98
 for organic matter in soil, 97, 111
 for particle-size distribution, 76, 82
 for phosphorus in soil, 101–105, 112
 for potassium in soil, 101, 102, 105, 112
 for soil mineralogy, 81, 82
 on representative profiles, 76–80
Aphis, corn aphid, 117
Bacteria in soil
 Azotobacter chroococcum, 178
 Clostridium pasteurianum, 178
 nitrifiers, 177
 Nitrobacter winogradskyi, 178
 nitrogen-fixing, 178–179
 Nitrosomonas europaea, 178
 partial sterilisation, effect of, 175
Blackgrass (*Alopecurus myosuroides*)
 biology of, 206
 effect of fallow on, 207
 effect of fertilisers on, 207
 effect of 'twist' on, 208
 effect of Wheat Bulb fly, 207
 herbicides on, 187
 surveys of, 188
Boussingault, J. B., 12, 13, 14
Brenchley, W. E., 187–207
Brick-earth, 69
Broadbalk Wilderness
 Azotobacter in, 178
 Fusarium sp. in soil, 134
 mineralogy of soil, 81
 nematodes in, 157
 nitrifying bacteria in, 177
 shelter from, effect on midges, 144
Brown earths, 80
Brown footrot, 134
Calcium
 carbonate content of soil, 95
 uptake by wheat, 60–61
Castor meal
 use since 1941, 22, 38
 See also Rape Cake
Cephalosporium gramineum, 117, 134
Cercospora herpotrichoides. *See* Eyespot
Chalk, additions of, 66, 67, 80, 83, 92, 95
Clay
 origin and development of soil clays, 91
 translocation of, 69, 70, 76, 90, 91
 See also Soil mineralogy
Clay fraction of soil
 cation-exchange capacity of, 80, 86
 expanding minerals in, 86, 92
 of surface soils, 87
 origin and development of, 91–93
Clay mineralogy. *See* Soil mineralogy
Clay-with-flints
 mineralogy of, 85, 86, 87, 90, 91, 92
 nature and origin of, 63, 69, 90
 potassium in, 89
Combine harvesting
 effect on distribution of weed seeds, 202
 straw and chaff in, 202
 weed seeds in, 202
'Complete minerals', use of phrase by Lawes and Gilbert, 27
Composition of crops, 50, 55–62
Continuous wheat
 effect on nitrogen content of soil, 100
 end of, in 1926, 15, 29
 herbicides used on, 24, 40
 middle period 1852–1925, 28
 preliminary period 1844–1851, 27
 re-introduction of, 15, 40
 slow changes in yield, 41
 take-all, decline of, 133, 138
 weeds in, 191
 yields compared with fallow system, 40
Crop samples taken on Broadbalk, 50
Cropping, history of 1844–1967, 24–25
Crops other than wheat, introduction of, 9, 148
Cultivation, history of, on Broadbalk, 23, 186–187
Drainage on Broadbalk, 7, 22, 63, 66, 67, 102
Dyer, B., 94, 98, 101, 104, 106, 108
Endogone spores in soil, 183
Ergot, 117, 135
Experiments in agriculture
 design of, on Rothamsted farm, 15
 early views on need for, 13
Eyespot (*Cercospora herpotrichoides*)
 date of sowing wheat, effect of, 121
 edge effects, 123
 fallow, effect of, 119–122, 130
 fertilisers, effect of, 122–123
 first recorded in Britain 1935, 118
 lodging, effect on, 8, 118, 125, 130
 susceptibility of varieties, 118
 watering, effect of, 120
 weather, effect of, 118, 120, 124
 year-to-year variation, 119–120
 yield, effect on, 8, 123–125
Fallowing
 cycles 1931–1964, 23, 38
 effect of nitrogen fertiliser on, 40
 effect on amount of Na, Ca and Mg removed by crop, 60

INDEX

- Fallowing (contd.):**
 effect on eyespot, 119, 121, 125
 effect on lodging, 127, 129
 effect on nematodes, 164
 effect on nitrogen content of soil, 9, 100
 effect on nitrogen fixation, 178
 effect on nitrogen removed by crop, 52, 54
 effect on phosphorus content of wheat, 56
 effect on potassium content of wheat, 58
 effect on straw numbers, 125
 effect on take-all, 131, 132
 effect on weeds, 8, 23, 187, 190, 191, 192, 193, 197, 198, 207
 effect on Wheat Blossom midges, 146, 149
 effect on Wheat Bulb fly, 9, 10, 39, 125, 149
 effect on yield, 9, 10, 39, 51
 history of, on Broadbalk, 15, 23, 26, 29
 yields compared with continuous wheat, 41
- Farm notebooks**
 Mr. Keenan's Notebook 1867, 116, 126
 records of fungus diseases in, 116
 'White Books' 1843-1957, 16, 116, 141
- Farmyard manure (FYM), 12, 15, 22**
 comparison with inorganic fertilisers, 30
 effect on fallowing cycle, 39
 effect on lodging, 129
 effect on N content of soil, 98, 100
 effect on nematodes, 174
 effect on soluble-K content of soil, 105
 effect on soluble-P content of soil, 104
 nitrogen content of, 22
 NPK content of, 31, 106
 on first crop 1844, 27
- Felspar**
 determination of, 82
 in soil fractions, 82, 84, 86, 87, 88
 potassium in, 82, 87
- Fertiliser**
 applications 1844-1967, 19-20, 23
 comparison on Broadbalk with other farms, 29
 comparison with farmyard manure, 30
 'complete minerals', 27
 decisions on, by Lawes and Gilbert, 15, 26
 effect on weeds, 190, 207
 effect on Wheat Blossom midge, 146
 effect on Wheat Bulb fly, 150-154
 history of application, 15, 16, 19, 23, 28, 29
 'mineral manures', 27
 See also names of individual fertilisers
- Fisher, R. A., 46**
- Fluorine content of soil, 112**
- Fungi**
 numbers in soil, 176
 of rhizoplane and rhizosphere, 181
- Fungus diseases, 116-140**
 records from farm notebooks, 116
 surveys 1938-1967, 117
 See also Eyespot, Take-all and names of other diseases
- Fusarium spp., 134**
- Gall midges (Cecidomyiidae), 141, 154**
- Gibellina cerealis, 134**
- Gilbert, J. H., 14, 28, 50, 126**
 See also Lawes and Gilbert
- Grain-straw ratio, 34**
- Grey, E., 17, 23, 29**
- Hall, A. D., 28, 30, 57, 64, 66, 102**
- Hapludalfs, 81**
- Harvesting**
 effect of methods on K content of straw, 59
 history of, on Broadbalk, 24
- Herbicides**
 effect on nodule bacteria in soils, 181
 effect on take-all of wheat, 137
- Herbicides (contd.):**
 effect on weeds, 10, 192, 193, 194, 195, 197, 199
 history of, on Broadbalk, 10, 24, 26, 40
 on continuous wheat, 40, 187, 191
- Hessian fly (*Mayetiola destructor*), grain lost by, 141**
- Highfield, numbers of rhizobia on, 181**
- Hoosfield**
 design of experiments, 15
 effect of manures and fertilisers on wheat, 29
 effect of superphosphate on barley, 45
 silica content of wheat on, 56
- Hutchinson, H. B., 175, 176**
- Iron oxides in soil, 80, 86, 92**
- Keenan, A., 116**
- 'Land', definition of, 14**
- Lathyrus pratensis* (meadow vetchling), host of *Rhizobium leguminosarum*, 181**
- Lawes, J. B., 7, 10, 12, 13, 14, 15**
- Lawes, J. B. and Gilbert, J. H., 7, 15, 16, 26, 27, 28, 50, 51, 54, 64, 93, 94, 101, 106, 126**
- Leaf miner (*Domomyza ambigua*), 141**
- Leaf spot, 135**
- Liebig, H., von, 101**
- Liebig, J., 7, 13, 16, 27**
- Liming, history of, on Broadbalk, 22**
- Lodging**
 effect of eyespot on, 118, 125, 126, 130
 effect of fallow on, 127-129
 effect of farmyard manure on, 127-129
 effect of fertilisers on, 31, 127-129
 effect of straw length on, 128, 129
 effect of straw weight on, 126, 130
 effect of weather on, 125, 130
 effect of weeds on, 129
 effect of wheat variety on, 128
 effect on yield, 126, 130
 measured areas 1938-1967, 129
 records 1852-1937, 116, 126-128
- Loess, 69, 79, 85, 87, 89, 90, 91, 92**
- Loose smut, 135**
- Lotus corniculatus*, for testing presence of *Rhizobium lupini*, 180**
- Magnesium**
 as fertilisers 1844-1967, 21
 early analyses for, in crops, 55, 60
 effect on yield, 37
 uptake by grain and straw, 61
- Manurial history of winter-wheat plots, 10, 19**
- Medicago lupulina* (Black medick)**
 effect of combine harvester on, 204-205
 effect of fallow on, 198
 effect of fertiliser on, 189
 effect of herbicides on, 198, 199
 effect of in blank rows, 206
 nodule bacteria on, 181
- Medicago sativa*, for testing presence of *Rhizobium meliloti*, 180**
- Melanospora damnosa*, 134**
- Mica, 83-87, 92**
- Mildew, 134-135**
- 'Mineral manures', use of phrase by Lawes and Gilbert, 27**
- Mycorrhiza, vesicular-arbuscular, 183**
- Myxobacteria in soils, 176**
- Nematodes**
 cereal cyst, surveys of, 157
 distribution at depth in soil, 169
 effect of fallow on, 164
 effect of farmyard manure on, 157, 174
 effect of fertilisers on, 163
 in Broadbalk drains, 174

INDEX

- Nematodes (contd.):**
in Broadbalk Wilderness, 157
migratory, 157, 158, 164
numbers in roots, 163
numbers in soil, fluctuation in, 159–173
plot populations of genera 1960, 158
root-lesion, species found, 158
- Nitrogen fertiliser**
amounts applied, 21, 54
comparison of nitrate with ammonium, 34
early applications, 7, 16, 28
effect of, in first year after fallow, 40
effect on lodging, 129
effect on nitrogen content of soil, 98
effect on weeds, 189–207
grain-straw ratio with, 34
recovery of, by grain and straw, 53
time of application, 23, 32, 34, 35,
- Nitrogen fixation**, 178–181
- Nitrogen in crops**, 52–54
- Nitrogen in soil**
accumulation in a fallow year, 54
changes in content 1936–1966, 100
effect of castor meal on, 98
effect of continuous wheat on, 100
effect of cropping on, 96.
effect of fallowing on, 9, 100
effect of farmyard manure on, 98, 100, 101
methods of analysis, 98
- Nodule bacteria**, symbiotic nitrogen fixation by, 179
- Odonites verna***
dormancy of seeds, 189
effect of combine harvester on, 206
effect of fallow on, 189
effect of nitrogen fertilisation, 190
- Ophiobolus graminis***. See Take-all
- Ophiobolus herpotrichus***, 134
- Organic manures**. See Castor meal, Farmyard manure, Rape cake
- Paleudalfs**, 81
- Partial soil sterilisation**, 175
- Paths**, introduction of, on Broadbalk, 15
- Phosphorus fertiliser**
details of application, 21
effect on grain and straw yield, 37
reversion of superphosphate to apatite, 112
- Phosphorus in crops**
content, 55–57
early analyses for, 57
no change in, 56
- Phosphorus in soil**
analytical methods, 101–104
early analyses for, 101
fractionation of, 112
- Plant nutrients**
in crops, 50, 55–62
in soils, 93–112
- Plant residues**, effect on N content of soil, 98
- Ploughing**, history of, 1844–1967, 23
- Podzolic soils**, grey-brown and red-yellow, 81
- Potassium fertiliser**
details of application, 21, 108
amount removed in grain and straw, 89, 108
effect on grain and straw yield 1852–1967, 37
effect on Wheat Bulb fly, 39
- Potassium in crops**
content, 58, 59, 89, 108
early analyses for, 55, 58–61
effect of fallow on, 58
effect of harvesting technique on, 59
- Potassium in soil**
analytical methods, 101–102, 105–111
balance sheet for, 106
content of soil, 92, 101–102, 104–111
- Potassium in soil (contd.):**
early analyses for, 55–58
in Clay-with-flints, 89
in feldspar, 87–88
in mica, 87–88, 92
in soil fractions, 87–89, 92
loss in drainage, 102
- Protozoa in soil**
effect of partial sterilisation on, 175
Leptomyxa reticulata, 177
method of counting amoebae, 176
numbers, 175, 176
Pythium sp., 134
- Rape cake**
compared with ammonium salts, 38
compared with complete fertilisers, 16, 38
details of use 1852–1967, 19, 22
effect on nitrogen content of soil, 98
- Reading Beds**, 63, 74, 84, 90, 91, 92
- 'Red gum' (*Cecidomyia tritici*)**, 117
- Rhizobium* in soil**, 179–181
- Rhizoctonia solani***. See Sharp eyespot
- Row spacing**, history of, 1844–1967, 24
- Russell, E. J.**, 28, 30, 34, 175
- Rusts**, 117, 134
- Saussure, T. de**, 12
- Sawyers Field**, numbers of rhizobia on, 181
- Sections of plots**, introduction of, 15, 23
- Seed dressings used**, 25
- Seed rates used**, 24
- Sharp eyespot (*Rhizoctonia solani*)**, 134
- Silica in wheat-straw and grass**, 56
- Silicate test on winter wheat 1862–1879**, 22
- Sodium**
as fertiliser 1852–1967, 21
early analyses for, in crops, 55, 58, 60, 61
effect on yield, 37
uptake by grain and straw, 61
- Soil**
acid leaching of, 92, 93
amorphous materials in, 82, 86
available-water capacity, 64
bulk density, 64
cation-exchange capacity, 80, 86
chemical analyses, (mineralogical samples), 76, 79
chemical analyses (surface soils), 93–112
ferrimanganiferous concentrations in, 75, 76, 91
origin of, on Broadbalk, 89–91
particle-size distribution, 64, 69, 76, 77, 88
plasmic fabrics in, 75, 81
stoniness, 64
working qualities, 64
- Soil acidity**, 80, 95
- Soil base-saturation**, 80
- Soil classification**, 67, 80, 90
- Soil erosion**, 67, 90
- Soil fertility**, early views on, 13
- Soil mineralogy**
analytical methods, 81–82
clay minerals, development of, 91
expanding minerals in clay fraction, 86, 87, 92
interstratified clay minerals, 85, 86, 87, 92, 93
of clay fractions, 85–87, 91
of coarse silt fraction, 84
of fine-sand fraction, 82
of fine-silt fraction, 85
- Soil morphology**, 63–81
micro-morphology, 70, 75, 76, 81, 90
profile morphology, 67, 70, 91
- Soil organic matter**
analytical methods, 79, 97, 111
biochemistry of, 111

INDEX

- Soil organic matter (*contd.*):
content of soil, 67, 80, 96
effect of cropping on, 97
effect of manuring on, 97
radiocarbon dating, 97
- Soil profile
analytical data, 76
variants, 67, 85
- Soil samples
methods of taking, 93, 98
preparation of, 94
variation between samples, 95
years when taken, 93
- Soil series
Batcombe, 69, 81–85, 89–91
Hook, 69
Nettleden, 70
Park Gate, 76
- Soil structure, 66, 67–76
- Soil texture, 64, 67–76
- Sol lessivé*, 69, 80, 90, 91
- 'Stragglings' of wheat, 116, 117, 131
- Symbiotic nitrogen fixation. *See* Nitrogen fixation
- Take-all (*Ophiobolus graminis*)
at Woburn, continuous wheat, 117, 133, 138
decline of, in intensive cereal growing, 8, 133–134
development of, 131, 138
effect of fallow on, 131, 132
effect of fertilisers on, 132, 137
effect of herbicides on, 137
effect of soil acidity on, 132
factors inimical to, 133, 138
rhizosphere and rhizoplane fungi and, 181
surveys, 131–134
- Thrips, 141
- Tractors, first use of, 23
- Trifolium pratense* for testing presence of
Rhizobium trifolii, 180
- Udalfs, 81
- Upper Chalk, 63, 83, 90
- Varieties of wheat
effect of lodging on, 128
straw length of, 128
used in 1844–1967, 9, 25
- Vicia hirsuta* for testing presence of *Rhizobium leguminosarum*, 180
- Vicia sativa* (common vetch)
dormancy of, 199–200
effect of blank rows, on, 206
effect of combine harvester on, 203–205
effect of fallow on, 198, 199
effect of fertiliser on, 189
effect of herbicides on, 197, 199
effect of lodging of wheat, 129
host of *Rhizobium leguminosarum*, 181
- Virus, striate mosaic on wheat, 117
- Warrington, K., 187–208
- Warrington, R., 102
- Weather
effect on eyespot, 118, 120, 124
effect on lodging, 125, 128
effect on midge emergence, 146
effect on weeds, 189, 197, 199
effect on Wheat Bulb fly, 154
effect on yields, 9, 46, 124
- records 1892–1967, 209
- Weeds
abundance of, 194, 195
contamination of grain and straw by seeds of, 200–205
dormancy of seeds, 189, 190, 191, 199, 200, 206
- Weeds (*contd.*):
effect of fallow on, 8, 23, 187, 190–193, 197, 198, 207
effect of fertiliser on, 190, 207
effect of herbicides on, 192–195, 197
effect of weather on, 197, 199
effect on grain yield, 192, 193
effect on lodging, 129
first record 1854, 117, 186
history of control, 23, 28
hoeing for, 23, 186, 187
in blank rows, 205
plot-by-plot surveys, 187
routine visual surveys, 188, 194
species present in stubble, 1869, 186
survey methods, 188
weed-seed content of grain, 200, 201
weed-seed content of soil, 191, 193, 195, 196, 197, 198
weed-seed content of straw, 201
- Wheat Blossom midges (*Contarinia tritici* and *Sitodiplosis mosellana*)
annual census, need for, 154
cycle of outbreaks, 144
damage on Broadbalk compared with commercial fields, 147
dormancy of pupae, 144
effect of Broadbalk Wilderness on, 144
effect of fallow on, 146, 149
effect of fertilisers on, 146
effect of weather on emergence, 145, 146, 147
effect on wheat yield, 147
fluctuations from year to year, 143, 147
larvae numbers 1927–1964, 143
life histories of, 141
parasites of, 144, 146
percentage grain attacked by, 1927–1964, 143
populations during 38 consecutive years, 144, 145
prediction of outbreaks, 146
'pre-sampling', 145
sampling methods, 145
- Wheat Bulb fly (*Leptophlemyia coarctata*)
annual census, need for, 154
comparison of population on Broadbalk with commercial fields, 157
effect of fallow on, 9, 10, 125, 149
effect of manuring on, 149
effect of potassium on, 39, 154
effect of sowing date of wheat, 149, 154
effect of weather on, 149, 154
effect on blackgrass, 207
effect on yield, 149
fluctuations from year to year, 154
in first crop after fallow, 39, 125
life history of, 148
relation of larval population to shoots attacked, 148
- White books, 16, 116, 141
- Wild oats (*Avena ludoviciana* and *A. fatua*)
biology of, 206
hand pulling of, 187
history of control, 23, 187
surveys of, 188
- Wireworms, 117, 141
- Woburn
comparison of yields with Broadbalk, 29
continuous wheat at, 31, 117
fungus diseases at, 117
take-all at, 117, 133, 138
- Wojnowicia graminis*, 134
- Yields
effect of eyespot on, 123, 125
effect of lodging on, 126, 130
effect of numbers of straws on, 124
effect of rainfall on, 46, 128

INDEX

Yields (*contd.*):

effect of weather on, 9, 46, 124, 128
effect of Wheat Blossom midges on, 147
effect of Wheat Bulb fly on, 149
first wheat crop on Broadbalk, 27
from different varieties, 123
in 1966–1967, 51
long-period means, (tables), 42–45
on Broadbalk compared with other farms,
29

Yields (*contd.*):

on newly established continuous wheat, 41
recorded in 1844–1851, 26
recorded in 1852–1967, 28–30, 43, 44
rubbish in grain, 200
slow changes in, 42
ten-year means of grain and straw 1852–1967,
43, 44
under fallowing system, 39, 43–46, 51
weed seeds in grain, 200