

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

Report for 1978 - Part 1

[Full Table of Content](#)



Index

Rothamsted Research

Rothamsted Research (1979) *Index* ; Report For 1978 - Part 1, pp 339 - 352 - DOI:
<https://doi.org/10.23637/ERADOC-1-135>

Ammonium nitrate, development of VA mycorrhiza in, 235
 Ammonium sulphate, development of VA mycorrhiza in, 235
Angasia kuehnelii, pheromones of, 137 in, 235
 Analytical methods, 297
 Animal Virus Research Institute, 79
 Antisera, to bean yellow mosaic virus isolates, 220
 Aphidides
 effect on barley yield, 212
 phorate, 211
 poisoning of honeybees by, 134
 pirimicarb, 98, 113, 132
 resistance to, 92, 126, 127, 130-133
 See also: Insecticides; Pesticides
Aphidius spp., 96
 alarm pheromones in, 136
 carboxylesterase activity of, 132
 caught in traps, 86, 103, 104, 210, 211
 'chemoprining' of, 295
 effect of phorate on, 211
Entomophthora spp. on, 96, 97
 genetic structure of, 92
 migrations, 86, 87, 206, 210
 on cereals, 95, 96, 206, 210, 211
 on potatoes, 88
 on sugar beet, 59, 67, 68
 overwintering, 68, 87, 88
 parasitism of, 96
 pathenogenesis in, 92
 predators, 95, 96
 rearing of cereal aphids, 148
 resistance to insecticides, 92, 126, 127
 suppression with short wavelength light, 88
 symbiotes of, 92
 transmission of barley yellow dwarf virus by, 210, 211
 Aphids, scientific names of
Acyrtosiphon pisum, 97, 120, 218
Aphis fabae, 68, 87, 97
Macrosiphum avenae, 210, 211
Megoura viciae, 136
Metopolophium dirhodum, 86, 87, 210
Myzus persicae, 67, 68, 86-88, 92, 130-133, 136, 218, 227
Rhopalosiphum insertum, 86, 87
Rhopalosiphum maidis, 87
Rhopalosiphum padi, 86, 87, 92, 210, 211
Sitobion avenae, 295
Sitobion fragariae, 86, 87
 'Aphox'. See Pirimicarb
 Arthropods
 effect of direct drilling on, 94
 effect of pesticides on, 93, 94
 Arthur Rickwood Experimental Husbandry Farm, 170
 Asparagus, breakdown of, 23
Aspergillus glaucus group, in hay, 207, 209
 Atomic Energy Authority, 80
Aureobasidium spp., on ripening grain, 209
 Axenic conditions, germination of spores in, 233
Azotobacter spp., interaction with mycorrhiza, 231, 235
 Bacteria
 in ripening grain, 209, 210
 potato diseases caused by, 222, 223

Acaricides, 145
Acaulospora laevis
 effects on P uptake, 238, 239
 in field inoculation trial, 238, 239
 Acetyl salicylic acid, resistance to tobacco mosaic virus induced by, 207, 208
 Acetylene reduction, 235, 242
 ADAS Nitrogen Index system, 305
 Adenosine 5'-triphosphate, measurement of in soil, 289, 290
 Adhesion, of powders to seeds, 143, 144
 Aerial pollutants, effect on barley growth, 43, 44
Agonum dorsale, as aphid predator, 96
 Agriculture Development and Advisory Service, 138, 239, 246, 249, 256-258, 261, 263, 264, 304-308
 Agricultural meteorology, 192-195
Agropyron repens (couch grass), on Broadbalk, 51
Agrostis gigantea (bent couch), on Broadbalk, 51
Agrostis segetum
 caught in traps, 89, 90
 diseases of, 97, 98
 See also: Cutworms
 Aldicarb
 as nematocide, 92, 168, 171, 172, 178
 degradation in soil, 148, 149
 effect on VA mycorrhiza, 236
 for beans, 117-121
 for herbage crops, 123
 for leafless peas, 91, 92
 to control *Sitona*, 91
 to reduce bird damage to sugar beet, 63
 Aliphatic acids, degradation of, 209
 Alkali metals, co-ordination chemistry of, 157-162
 Alkane earth metals, 157-162
 Allantoin, as measure of nitrogen fixation, 241, 242
Allotobopora caliginosa, inoculation of soil with, 94, 95
Allotobopora chlorotica, inoculation of soil with, 94, 95
 Alopeurus myosuroides (blackgrass)
 on Broadbalk, 50
 effect of N and S fertilisers on, 28, 29
 cysteine, 29
 biosynthesis of, 23, 24
 arginine, 239
 Amino acids
 Amino acid analyser, 30
Alternaria spp., on ripening grain, 209, 210
 percentage of in soil samples, 52
 on Broadbalk, 50
 Amino acid analysis of nitrification of, 304, 305
 production of during photosynthesis, 40, 41
 mobility of, 279
 assimilation and reassimilation by plants, 22, 23
 aqueous, 277, 279
 Ammonia
 threonine, 24, 29
 proline, 283
 methodology, 30
 methionine, 23, 29, 138, 139, 239
 lysine, 23, 24, 27, 29, 138, 139, 283
 isoleucine, 239
 in xylem exudate, 241, 242
 in cereal seeds, 28, 29
 in barley grain, 283
 homoserine, 138
 glycine, 40, 41
 glutamic acid, 283
 effect on *Rhizobium* spp., 239, 240
 effect of N and S fertilisers on, 28, 29
 cysteine, 29
 biosynthesis of, 23, 24
 arginine, 239
 Amino acids

The General Report by the Director (pp. 9-17) has not been indexed.

SUBJECT INDEX

INDEX

- Bactericides, potential, for potato, 223
- Barley
- analysis of leaves for fluoride, 43, 44
 - aphids on, 206, 212
 - barley yellow dwarf virus, 87, 210–212
 - biochemical mutants of, 29
 - brown rust on, 212
 - chlorophyll measurements for, 42
 - continuous, on Hoosfield, 110
 - drought-induced yield loss in, 195, 196
 - effect of aerial pollutants on, 43, 44
 - effect of manuring on amino acid composition of grain, 282, 283
 - effect of subsoiling on, 112, 123, 124
 - effect of times and amounts of nitrogen and fungicides on, 281, 282, 305
- Erysiphe graminis* on, 140–142
- factors determining grain size, 43, 44
 - fertilisers for, 123, 124
 - growth retardants for, 150
 - high-lysine lines, 26, 27
 - hordein fraction of, 24–27
 - irrigation on, 193
 - leaf water potential for, 42
 - micrometeorological records for, 195
 - nematodes on, 173, 178, 185
 - photosynthesis in, 195–197
 - response to nitrogen, 305
 - soil temperature for, 42
 - soil water potential for, 42
 - sowing date, 212
 - storage proteins, 255, 26
 - stubble, *Rhynchosporium secalis* spores on, 212, 213
 - tridemorph on, 211, 212
 - VA mycorrhiza on, 236, 237
 - variety experiment, 111, 112
 - volunteers, as source of *Rhynchosporium secalis* infection, 212, 213
 - water stress in, 41, 42, 195, 196
 - wilting, 42
 - yields, 111, 112, 116, 195
- See also: Cereals; *Erysiphe graminis*; Take-all
- Basal medium, growth of mycorrhiza on, 234
- Beans (*Vicia faba*)
- Acyrtosiphon pisum* on, 120
 - aldicarb on, 117, 119
 - benomyl for, 112
 - Botrytis fabae* (chocolate spot) on, 112, 120, 207, 220
 - Ditylenchus dipsaci* on, 116
 - effect of nitrogen on yields, 241
 - fungal diseases of, 120, 220
 - irrigation for, 112, 193, 194, 220
 - micrometeorological records for, 194, 195
 - nematodes on, 120
 - nitrogenase activity in, 241, 242
 - nodulation and N fixation in, 120, 121, 240, 241,
 - permethrin for, 117, 119
 - pirimicarb for, 117, 119
 - root diseases of, 220
 - Sitona* populations on, 91, 119
 - spread of mycorrhiza on, 256
 - ureide exudation, 242
 - Uromyces fabae* on, 120
 - virus diseases of, 220, 221
 - weeds on, 51
 - yields, 116, 117, 119, 220
- See also: *Phaseolus vulgaris*
- Bees. See Honeybees
- Beetles
- carabid, as predators of aphids, 95, 96
 - fungal pathogen of, 91
 - Sitona* spp., 91, 119
- See also: Carabids
- Beidellite, nature of, 294
- Bendiocarb, as nematicide, 168
- Benodanil
- as fungicide for barley, 281, 282
 - as fungicide for potato, 225, 226
- Benomyl
- as fungicide on beans, 112, 117, 119–121
- Benomyl (*contd.*)
- as fungicide on herbage crops, 122
 - as fungicide on lupins, 219
 - as fungicide on oilseed rape, 221, 222
 - as fungicide on potatoes, 225, 226
 - effect on *Entomophthora* spp., 97
 - effect on soil fauna, 93
 - effect on VA mycorrhiza, 236, 237
- Benzoic acid, induction of resistance to tobacco mosaic virus by, 208
- Biochemical mutants, selection of, 29, 30
- Bioresmethrin, selectivity of, 135
- Bird repellents, persistence of, 145, 146
- Birds
- bud damage caused by, 146
 - grazing of sugar-beet seedlings by, 62, 63
- Blackgrass. See *Alopecurus myosuroides*
- Blackleg (on potato). See *Erwinia carotovora*
- Bond valences, for alkali and alkaline earth metal cations, 162
- Botrytis* spp., on lupin roots, 219
- Botrytis cinerea*, on lupins, 219
- Botrytis fabae* (chocolate spot), on beans, 112, 120, 207, 220
- British Sugar Corporation, 63, 66, 70, 308
- Broadbalk
- crop rotation on, 116
 - effect of rotations on weeds, 50, 51
 - Gibellina cerealis* on, 217
 - weeds on, 50–52
 - wheat yields on, 38
 - yields, 110, 111, 116, 118
- Broom's Barn Farm
- livestock on, 71
 - weather, 328
- Cabbage
- clubroot (*Plasmiodiophora brassicae*) of, 138, 139
 - nematodes on, 185
- Caesium, co-ordination chemistry of, 162
- Calcium, co-ordination chemistry of, 162
- Cambridgeshire, soil survey in, 247, 248
- Canker. See *Leptosphaeria maculans*,
- Captafol
- as fungicide on barley, 213
 - as fungicide on wheat, 210
 - effect on *Entomophthora* spp., 97
- Captan, effect on *Entomophthora* spp., 97
- Carabids, biological and behavioural control of, 96
- Carbamate insecticides, resistance of *Myzus persicae* to, 131, 132
- Carbendazim
- as fungicide on barley, 210
 - as fungicide on potato, 226
 - as nematicide, 168
 - effect on soil fauna, 93
 - in 'Delsene M', 210
- Carbofuran, effect on VA mycorrhiza, 236
- Carbon dioxide enrichment, effect on growth and yield of wheat, 39
- Carbon flux, in water-stressed plants, 304
- Carboxylase, in wheat leaves, 40
- Carrots
- nematodes on, 171
 - yields, 171
- Cartography, automated, 260
- Cations, redistribution of within the zeolite, 286
- CCC. See Chlormequat chloride
- Cellulysin, treatment of leaf tissue with, 41
- Central Veterinary Laboratory, 308
- Centrosema, nodulation of *Rhizobium* strains from, 240
- Cereals
- aphids on, 95, 96, 98
 - cereal seed proteins, 24–29
 - control of slugs in, 135
 - cultivation systems, 289
 - direct drilling, 94, 95
 - eyespot disease of, 206, 207
 - fungus diseases of, 210

INDEX

- Cereals (*contd.*)
 fungus infections on roots of, 210
 gibberellins in germinating grain, 44, 45
 integrated pest control in, 98
 irrigation for, 36
 measuring nitrogen response in, 305
 microflora of ripening grain, 209, 210
 nematodes on, 167, 168, 172, 185
 new fungicides for, 211
 protein in grain, 282, 283
 respiration rates for, 39
 take-all on, 206
 variety experiments at Rothamsted and Woburn, 111, 112
See also: Barley; *Erysiphe graminis*; Maize; Oats; Take-all; Wheat
- Cerenkov counting, effects of Fe (III) on ³²P estimations, 296, 297
 'CGA 48988', 211, 219, 220
 Chalky boulder clay, soils in, 294
 Chemical Liaison Unit, 126, 148-151
 Chemical methods, for prediction of nitrogen response by cereals, 305
 Chemicals in plants
 chlormequat chloride, 150
 uptake and movement of, 150
 Chemicals in soils
 adsorption of, 149
 diazinon, 150
 fate of, 148, 149
 permethrin, 149
 Chemoprints, for study of insect populations, 295, 296
Chenopodium amaranticolor, infection of with bean yellow mosaic virus and clover yellow vein virus, 219
Chenopodium quinoa, infection of with bean yellow mosaic virus and clover yellow vein virus, 219
 Chilopoda, effect of nitrogen on, 95
 Chlorfenvinphos, effect on VA mycorrhiza, 236
 Chlorflurecol, effect on *Plasmodiophora brassicae*, 139
 Chlorine dioxide, effect on soft-rotting of potatoes, 223
 Chlormequat chloride (CCC)
 as growth regulator for wheat, 45, 122, 150, 210
 on oats, 112
 Chloroneb, effect on mycorrhiza, 236, 237
 Chloroplasts
 ammonia assimilation in, 21, 22
 enzymes in, 21, 22
 Chlorpyrifos, as pesticide on cereals, 98
 Chlortoluron
 as herbicide on Broadbalk, 110
 effect on VA mycorrhiza, 236
 Chocolate spot. *See Botrytis fabae*
Chrysopa carnea, as predator of aphids, 96
 Cismethrin, housefly resistance to, 133
 Clay mineralogy, X-ray spectra of clays, 292, 293
 Clay minerals in soils
 beidellite, 294
 illite, 293, 294
 synthesis, 277, 293
See also: Soil mineralogy
- Clay soils
 air-entry into, 291
 effect of water pressure and mechanical loading on, 200
 in chalky boulder clay, 294
 mercury porosimetry for, 291
 pore size distribution in, 290, 291
 shrinkage potential of, 258, 290
 structures of, 291
 X-ray spectra of, 292, 293
 Climatic classification, of England and Wales, 261
 Clinoptilolite zeolite, cation exchange properties of, 286
³⁶Cl⁻ions, movement of in soils, 143
 Clover
 breeding red clover for high effectiveness with *Rhizobium* strains, 242, 243
 (*contd.*)
 clover rot (*Sclerotinia trifoliorum*), 207, 217, 218
 on Park Grass, 53
 spread of VA mycorrhizal endophytes in, 235, 236, 238, 239
 transmissible cryptic virus in crimson clover, 221
 virus diseases of, 207, 218, 221
 See also: Legumes
- Clubroot. *See Plasmodiophora brassicae*
 Cobalt, as activator for microbial fertiliser, 232
 Coccinellids, as predators of aphids, 96
 Cockroach (*Periplaneta americana*)
 neurotoxicity of insecticides to, 130
 Coconuts, mass pollination of, 146
 Coleopterous larvae, effect of nitrogen on, 95
 Collembola, effect of nitrogen on, 95
 Computer programs
 DÉCODE, for soil survey, 79
 FAMULUS, for bibliographic data, 79
 for analysis of 1979 drought experiment, 197
 for apple rootstock breeding, 80
 for automated cartography, 260
 for micrometeorological records, 194
 for processing data from microcalorimeter measurements, 165
 for scanning intensity data from CAD4 diffractometer, 165
 for seed store management, 83
 for simulation of pesticide degradation and movement in soil, 149
 for structured soils, 288, 289
 for suction trap records, 87
 FORTRAN standards, 80
 G-EXEC for soil survey, 79
 languages, 80, 314
 model of nematode population dynamics, 167, 168
 model to simulate effects of Oomycetous fungus, 167, 168
 Rothamsted General Survey Program, 80, 307, 314
 TAXIR, 80
 See also: Statistical programming
- Computers
 applications, 79-81
 ARC Advisory Committee on Computing, 76
 CDC, 314
 computer graphics, 80
 Computer Users' Group, 79
 data management systems, 79, 80, 260
 database systems, 76, 80
 Experimental Packet Switching Service, 83
 front end processors, 82
 IBM 370, 311, 314
 ICL System 4-70, 76, 78, 309, 311
 ICL System 4-72, 78
 management services section, 83
 mass spectral search, 79
 microtechnology, 76
 network, 81
 operations section, 76-79
 performance, 77-78
 telecommunications section, 81-83
 training, 81
 See also: Computer programs; Statistical analysis; Statistical programming
- Coordination chemistry of alkali and alkaline earth metal cations, 157, 159, 160
 Copper
 complexing of, 286, 287
 concentration of in natural soil solutions, 287
 Copper-diketonates, chelated complexes with, 163
 Cornwall, soil survey in, 255
 Corrosion properties of soils, 261, 262
 Coverloam, distribution of, 258
 Cowpea rhizobia, nodulation of Malayan soyabean by, 240
 Crop patterns, 260
 Cypermethrin, 127
 Crystal structure, determination of, 161
 Crystalline complexes
 of alkali metal salts, 160, 162

Erwinia carotovora on potato (*contd.*)
 mother tuber as source of infection, 223
 pattern of spread of, 222, 223
 spread of from inoculated tubers, 222, 223
 var. *atroseptica*, 206, 222, 223
 var. *carotovora*, 222, 223
Erysiphe graminis (powdery mildew)
 competitive ability of ethirimol resistant strain, 142
 fungicides for, 141, 142
 growth of in axenic culture, 140, 141
 on barley, 141, 142, 211, 212, 281, 282
 Essex, soil survey in, 253, 254
 Ethiofencarb, effectivity of against resistant aphids
 132
 Ethionine
 effect on *Phytophthora infestans*, 138
 effect on *Plasmodiophora brassicae*, 139
 effect on *Streptomyces scabies*, 138
 Ethirimol
 effect on *Entomophthora* spp., 97
 strains of mildew resistant to, 142
 to control *Erysiphe graminis*, 141, 142, 281
 Ethionophos, as nematocide, 168
 Ethyl mercury phosphate (EMPP), for steeping sugar-
 beet seeds, 63
 Ethylene dibromide, effect on tobacco, 315
 Ertidiazole, effect on mycorrhiza, 236, 237
Euxoa nigricans, caught on traps, 89, 90
 Experimental Husbandry Farms, 306
 Eyespot (*Pseudocercospora herpotrichoides*)
 epidemiology of, 206, 207
 exposing bait seedlings, 216, 217
 properties of spores, 216
 spore production and dispersal, 215, 216
 spore samplers for, 216
 spread of in wheat, 216, 217
 Falkland Islands
 sward production on, 316
 trace elements in soils of, 316
 Farmyard manure
 effect on amino-acid composition of barley grain,
 282, 283
 effect on soil fauna, 95
 yields obtained on Broadbalk with, 116
 Far-red light, effect on growth of sugar beet, 46, 47
Fasciola hepatica (liver fluke), potential of soil maps
 to identify areas with hazard from, 261
 Fenarimol, as fungicide for potatoes, 226
 Fenvalerate, 127
 Fertiliser Manufacturers' Association, 304
 Fertilisers
 for sugarcane, 316
 for sunflowers, 316
 for tobacco, 315
 microbials, 232, 233
 naturally occurring radionuclides from P and K
 fertilisers, 297
 organic, effect on soil fauna, 95
 Survey of Fertiliser Practice, 307
See also: Nitrogen fertilisers; Phosphorus
 fertilisers
Festuca rubra, spread of VA mycorrhizal endophytes
 in, 236
 Field beans. *See* Beans
 Field experiments, on behaviour of pesticides in
 soil, 143
 Filming techniques, for nematodes, 184, 185
 Flour Milling and Baking Research Association, 210
 Fluormeturon, distribution of in soil aggregates, 143
 Flurecoils, effect on *Plasmodiophora brassicae*, 139
 Fonofos
 for removal of carabids, 96
 on beans, 117, 119, 120
 to control cereal pests, 98
 to control pea and bean weevils, 91
 Formalin, effect on nematodes, 177, 178
 Formaldehyde, effect on damp hay, 209

Crystalline complexes (*contd.*)
 potassium chloride complex, 160
 Cultivation, effect on mineralisation of soil
 nitrogen, 290
 Culture media, for endomycorrhizal fungi, 234
 Cumbria, soil survey in, 246, 247, 262, 263
 Caught in traps, 89
 Cutworms
 natural incidence of diseases in, 97, 98
 sex ratios of, 89, 90
Cylindrocarpum spp., on field bean roots, 220
 Dalapon, on oilseed rape, 221
 Dandelion. *See Taraxacum* spp.
 Daminozide, control of potato common scab by, 139
 Day length, extension of for sugar beet, 46
 Dazomet
 as nematocide, 178
 effect on VA mycorrhiza, 236
 'D-D', as nematocide, 178
 DDT, housefly resistance to, 133, 134
 Decamethrin, 127, 135, 149
 'Deisene M', as fungicide for wheat, 210
 Department of Agriculture, Northern Ireland, 83
 Diazinon, degradation of in soil, 150
 Dicotyledons, cyst-nematode host ranges among, 181
 Direct drilling, effect on organic matter in soil, 289
 Drag coefficient, in micrometeorology, 194
 Drainage
 Soil Survey and Drainage Service Joint Project, 261
 theory of, 201
 Drazoxolon, on lupins, 219
 Drought
 1979 drought experiment, 197
 effect on barley, 195, 196
 model for yield response to, 195, 196
 Dyeid, soil survey in, 256
 Dyonate, as pesticide on cereals, 98
 Earthworms
 effect of direct drilling on, 94, 95
 effect of pesticides on, 94, 95
 East Malling Research Station, 80
 Electrostatic valence, Pauling's concept of, 162
Endogone spp., effect of new fungicides on, 211
 Endophytes, mycorrhizal
 comparative efficiency of, 238, 239
 effect of pesticides on, 236
 factors affecting spread of, 235, 236
 interactions with phosphate, 238, 239
 Enthalpy, of calcium-potassium exchange, 285
 Enzyme-linked immunosorbent assay (ELISA), 207
 Enzymes
 adenosine deaminase, 142
 aspartaginase, 23
 aspartate kinase, 23, 24
 carboxymethylcellulase, 21
 effect of ethirimol on enzymes involved in purine
 metabolism, 141, 142
 enzymic cytochemistry of soil micro-organisms, 232
 from *Pyricularia oryzae*, 24
 glutamate dehydrogenase, 22, 23
 glutamine synthetase, 23
 nitrate reductase, 22
 nitrite reductase, 22
 nitrogenase, 22
 of lysine synthesis, 24
 proteinase-K, 26
 resistant to insecticides, 131-133
Ephesia kühniella, in pesticide selectivity trials,
 134, 135
 Epidemiology, of cyst nematodes compared with
 leaf and soil-borne pathogens, 175
Equisetum, on Broadbalk, 50
Erwinia carotovora on potato, 113
 bactericides for, 223
 in soil, 222
 342

INDEX

- Gigaspora margarita* (cont'd)
 effects on P uptake, 238
 germination of, 234
 in field inoculation trial, 238, 239
 Glasshouse Crops Research Institute, 96
Glomus calledonius
 enzymic lysis of, 235
 field inoculation trial with, 238
 germination of spores of, 233, 234
Glomus fasciculatus
 development of in host and 'non-host' plants, 237
 effect of fungicides on, 237
 effect on P uptake, 238, 239
 field inoculation trial with, 238, 239
Glomus microcarpus, effect of fungicides on, 236, 237
Glomus mossavae
 effect on baking quality of wheat, 210
 effect on *Entomophthora* spp., 97, 98
 effect on fungal infections of cereal roots, 211
 effect on *Puccinia pouturni*, 138
 effect on *Rhynchosporium secalis*, 212, 213
 effect on seed germination in wheat, 210
 effect on *Stereomyces scabies*, 138
 for barley, 212, 213, 281-283
 for beans, 220
 for control of *Erysiphe graminis*, 140-142
 for control of rust, 281, 282
 for lupins, 219
 for oilseed rape, 221, 222
 for potatoes, 151, 206, 225, 226
 for seed treatment of sugar beet, 63
 LS 74783, 211, 219
 new, for root-infecting fungi on cereals, 211
 'NF 48', 226
 organomercury, 63
 safety of, 63
 systemic activity, 226
 thiophanate methyl, 213
 triadimefon, 213
 tricyclazole, 226
 Fungus diseases
 brown rust, of barley, 281, 282
 clover root, 217, 218
 club-root (*Plasmodiophora brassicae*), 139, 140
 of field beans, 120, 220
 of potatoes, 138, 139
 of wheat, 140
 root rot, of lupins, 218, 219
 seedlings blackleg, of sugar beet, 63
Fusarium spp.
 on field bean roots, 220
 var. *avenae*, 21
 var. *graminis*, 21, 213
 var. *tritici*, 21
 See also: Take-all
Gaumannomyces-Phialophora complex cell wall
 degrading enzymes of, 21
 comparison of isolates, 21
 isolates from site with little take-all, 213, 214
 Gamma spectrometry, of soils, 297
 Gas-mixing apparatus, portable, 192, 197
 Gelatin, for treatment of eyespot in wheat, 140
 Germination, of VA mycorrhizal spores, 233, 234
 Gibberellins
 analysis of by GLC, 44, 45
 in cereal grain, 44, 45
 in sugar-beet leaves, 47
Gibberella cerealis, on Broadbalk 217
 effects of host species on, 237
 genetic analysis of, 26
 effect of S and N fertilisers on, 29
 Hordens
 wheat and fallow experiment on, 217
 trials of 'microbial fertiliser' on, 232
 reversal, to continuous barley on 110
 Hoosfield
 Hoos Permanent Barley experiment, 116
 virus diseases of, 99, 100
 queen rearing, 101
 pollen collection by, 101
 poisoning of, by pesticides, 134
 pheromones of, 100, 101, 136, 137
Nosema apis, 99
 Nasorov gland, 100, 136-137
 mechanisms of queen influence in colonies, 101
Apis cerana from India, 100
 Honeybees (*Apis mellifera*)
 Herford and Worcester, soil survey in, 249, 250
 propyzamide, 113
 phenmedipham, 58
 on Broadbalk, 110
 methabenzthiazuron, 111
 for sugar beet, 58, 60
 effect on *Rhynchosporium secalis*, 212, 213
 distribution among soil aggregates, 143
 diquat, 113
 dalapon, 113
 cynazine, 111
 behaviour of in soil, 143
 Herbicides
 Herbage crops, factors affecting yield, 122, 123
Hemiptera, effect of nitrogen on, 95
Hemihohortium solani (silver scurf on potato), 226
 Heat flux, in soils, 199
 spontaneous heating of, 208, 209
 effect of 8-hydroxyquinoline on, 209
 damp, chemical preservation of, 207-209
Aspergillus glaucus in, 207, 209
 Hay
Harpalus rufipes, as aphid predator, 96
 Guazatine, as fungicide for potato, 226
 triacantanol, 47, 48
 chlormequat chloride, 45, 122, 150, 210
 Growth control substances
 Grassland Research Institute, 92
 virus diseases of, 207
 pests of, 92, 93
 nitrification inhibitors for, 277, 278, 280
 Ca grasses, 44
 effect of temperature on growth of Ca and
 critical K potentials for crop growth, 285, 286
 at Rothamsted and Woburn, 113
 Grass
 Grain size, factors determining, 42, 43, 45, 46
 barley, 212, 213
 Glyphosate, effect on *Rhynchosporium secalis* on
 Glycine, conversion of to serine, 40, 41
 Glutamine synthetase, in wheat leaves, 40, 41
 field inoculation trial with, 238, 239
 enzymic lysis of, 235
 effect on P uptake, 238, 239
 effect of fungicides on, 237
Glomus mossavae
 effect on baking quality of wheat, 210
 effect on *Entomophthora* spp., 97, 98
 effect on fungal infections of cereal roots, 211
 effect on *Puccinia pouturni*, 138
 effect on *Rhynchosporium secalis*, 212, 213
 effect on seed germination in wheat, 210
 effect on *Stereomyces scabies*, 138
 for barley, 212, 213, 281-283
 for beans, 220
 for control of *Erysiphe graminis*, 140-142
 for control of rust, 281, 282
 for lupins, 219
 for oilseed rape, 221, 222
 for potatoes, 151, 206, 225, 226
 for seed treatment of sugar beet, 63
 LS 74783, 211, 219
 new, for root-infecting fungi on cereals, 211
 'NF 48', 226
 organomercury, 63
 safety of, 63
 systemic activity, 226
 thiophanate methyl, 213
 triadimefon, 213
 tricyclazole, 226
 Fungicide
 parasitism of *Heterodera avenae*, 176, 177
 Oomycetous, 176, 177
 on ripening grain, 209, 210
 on lupins, 219
 on cereal roots, 211
 mycorrhizal, 233-239
 model of attacks by, 177
Langendiales spp. of, 177
 effect of formalin on, 177
 Fungi
 soils, 285
 Free energy, of K-Ca exchange in Saxmundham

International Crops Research Institute for the Semi-Arid Tropics, Hyderabad, 316
 International Livestock Commission for Africa, 308
 Nigeria, 240, 316
 International Rice Research Institute, 208
 Ionophores
 relation of flight activity to age, 147
 resistance of to insecticides, 131, 133, 134
 Humberside, soil survey in, 246, 247
Hyalodendron spp., on ripening grain, 209
 Hydraulic conductivity cell, for study of soil water movement, 200
 8-hydroxyquinoline
 effect on soft-rotting of potatoes, 223
 for preservation of damp hay, 209
 Hypthal development, effect of growth factors on, 234
 Illite, nature of, 293, 294
 Imazali, as fungicide on potato, 226
 Inoculants, of *Rhizobium*, testing of, 239
 Inoculum density, effect on rate of infection by VA mycorrhiza, 236
 Insect traps
 aphids caught in, 86
 computer program for, 87, 89
 cutworms caught in, 89, 90
 light traps, 86, 89
 pheromone traps, 88, 89
 pitfall traps, 96
 Insecticides
 action of on insect nervous systems, 130
 anti-cholinesterase, 134
 aphid resistance to, 92, 126, 127, 130-133
 application methods, 126, 144-147
 bioassay methods, 135
 bird repellents, 145, 146
 cismethrin, 133, 135
 controlled droplet application, 126, 144, 145
 cyclopropylphenylacetates, 127-129
 cypermethrin, 127
 DDT, 133
 decamethrin, 127, 135, 149
 diazinon, 150
 dimethylphosphate esters, 131, 132
 drift spraying, 145
 efficacy of seed treatments, 144
 electrostatic application, 126, 146, 147
 enzyme responsible for resistance in *Myzus persicae*, 131, 132
 ethiofencarb, 132
 fenvalerate, 127, 129
 for pea and bean weevils, 91
 HCH, 134
 housefly resistance to, 130, 131, 133, 134
 malathion, 133
 microencapsulation, 145, 146
 NRD compounds, 129, 135
 organophosphates, 131, 132
 permethrin, 91, 93, 117, 119, 121, 127, 135, 149, 150
 pithimicarb, 93, 132
 placement spraying, 144, 145
 poisoning of honeybees by, 134
 PP 199, 145, 146
 pyrethroids, 126-131, 133-135
 selectivity of, 134, 135
 tetrachlorophos, 133
 triazophos, 134
 trichlorophos, 133
 Insects
 action of insecticides in nervous system of, 130
 beneficial, 126
 chemoprinting of, 295, 296
 elemental analysis of individuals, 295, 296
 flight activity of, 147
 neuroanatomical techniques for, 146
 rearing of, 147, 148
 selective insecticides for, 134, 135
See also: Insect traps; names of individual insects
 Interaomic distances, 162
 344

INDEX

- L-Valine* determinations, seed P effects in, 296
of habitats of, 261
Lysimeter experiments
to measure leaching of nitrogen from sugar-beet
fields, 66
with nitrate inhibitors, 279, 280
Lysis, enzymic, of mycorrhiza, 234, 235
Macerases, treatment of leaf tissue with, 41
Macrocyclic crown compounds, 159
Macrocyclic polyethers, synthesis of, 157
Magnesium
coordination chemistry of, 162
effect of calcining process on availability of, 293
Maize
for sugar-beet, 58, 66, 67
effect of calcining process on availability of, 293
inoculation of with VA mycorrhiza, 235, 236
protein in seeds of, 25, 26
Malawi, tobacco experiment in, 315
Malaysia, oil-palm variety trial in, 316
Maleic hydrazide (MH), effect on *Plasmodiophora brassicae*, 139
Malonic acid, chelated complexes with, 162
Mancozeb, effect on *Entomophthora* spp., 9
Maneb
effect on *Entomophthora* spp., 97
in 'Delseine M', 210
Manganese, for sugar beet, 61
Mercury porosity, application of to clay soils, 291
Metarrhizium anisopliae, infection of *Sitona* larvae with, 91
Meteorological Office, 79
Mice, damage to sugar beet caused by, 62
Microbial 'fertiliser', evaluation of, 232, 233
Microcalorimeter, 160
Microecological records, 194, 195
Micromorphometry of soils, 259
Mildew. See *Erysiphe graminis*
Milk
effect of progesterone-release device on yields, 306
feasibility of production index for, 306, 307
National Milk Quality Survey, 308
'Millipore' filters, 233, 234
'Milstem'. See Ethirimol
Ministry of Agriculture, Fisheries and Food, 134, 263, 264, 304
Fisheries Laboratory, 83
Ministry of Overseas Development, 146, 304, 308
315, 316
Mitochondria, conversion of glycine to serine in, 22, 40, 41
Molybdenum, in chelated complexes, 163
Morphactin, effect on potatoes, 49
Mortierella rammanniana, enzymic lysis of, 235
Moths
chemopopting of, 90, 295, 296
moth trapping kit, 138
pea moth monitoring, 86, 88, 89, 126, 138
pheromone trap spacing, 88, 89, 304
population dynamics of, 89, 304
sex attractant lures for pea moth, 138
spray trial for pea moths, 88
statistical analysis of flight behaviour of male
pea moth, 304
Mucus, role of in aggregation behaviour of slugs, 96
Musca domestica. See housefly
Mycorrhiza
barriers to infection by, 237
comparative efficiency of various endophytes, 238, 239
development of in host and 'non-host' plants, 237
effect of aeration on spread of in soil, 236
effect of cropping on, 237
effect of nutrient solution on, 235
effect of pesticides on, 236, 237
enzymic lysis of, 234, 235
effect on soil analysis for phosphorus, 284
Aphelenchoides ritzemabozzi, 182
Aphelenchoides fragariae, 182
Aphelenchoides blattophilus, 186
Aphelenchoides spp., 182
Nematodes, scientific names of
treatment of with penicillin, 176
stunt nematodes, 172, 185
stubby-root nematodes, 185
spiral nematodes, 171, 172
sex determination of cyst-nematodes, 185, 186
spermatogenesis and sperm structure in, 183
self-dispersal of, 174, 175
scanning electron microscope studies of, 182, 183
round-cyst nematodes, 180
root-knot nematodes, 174
population ecology of, 167
pathotypes of, 179, 180
osmotic pressure for, 186, 187
on tobacco, 315
on sugar beet, 58, 69
on potatoes, 168-170, 176, 178-180, 305
on oilseed rape, 185
on cereals, 167, 168
on carrots, 171
on beans, 120
morphology and function of, 182-184
latent period for, 175
Mendelian inheritance in, 182
Hardy-Weinberg equilibrium, of genotypes, 182
hatching of, 186, 187
host ranges for cyst nematodes, 180, 181
genes for resistance to by potatoes, 180
gene-for-gene relationship in, 182
fungal parasites of, 176, 177
function of feeding pump in stem nematodes, 184
from South America, 180, 181
from North America, 180, 181
from Bolivia, 176, 180
fossil records of, 182
filming techniques for, 184, 185
epidemiology of, 174, 175
Entomophthora-like fungus on, 176
effect of micro-organisms on, 176
cyst, 167, 168, 173-182
creation of a 'domain' by, 174, 175
control, 167
contiguous spread of, 175
computer model for population dynamics of, 167, 168, 173, 174
competition between species of potato cyst-nematode, 175, 176
co-evolution and phylogeny of cyst-nematodes, 181, 182
biology of, 167
Nematodes
thiophanate, 168
terbufos, 168
'Telone', 172
potential, assessment of, 168
methods of incorporation in soil, 168, 170
in a foliar spray, 170, 171
for sugar beet, 69
ethoprophos, 168
degradation of, in soil, 148, 149
carbendazim, 168
bendiocarb, 168
Nematicides
Natural Environmental Research Council, 79, 260
National Institute of Agricultural Engineering, 94
National College of Agricultural Engineering, 112
Nasonov gland, of honeybee, 100, 136-137
protoplast formation, 235
interaction with *Azotobacter*, 231
in nutrient film culture of *Phaseolus vulgaris*, 235
germination and growth of spores, 233, 234
field inoculation trials with, 237-239
factors affecting spread of endophytes, 235, 236
Mycorrhiza (contd)

Nitrogen fertilizers (cont.)
 effect on ureides and nitrate content in xylem exudate, 242
 for sugar beet, 59, 61, 65, 66
 in conjunction with microbial fertilizer treatments, 232, 233
 measuring response of cereals to, 305
¹⁵N fertilizer used to determine nitrogen fixation in legumes, 241, 242
 on barley, 42, 43, 112, 211, 212, 281, 282
 on beans, 120
 on wheat, 36-38, 111, 121, 277
 percentage of recovered in leachate, 279
 ratio of ammonium to nitrate-N in, 276
 relationship of yield and % N in grain to, 282
 varietal response of wheat to, 37
See also: Fertilizers; Urea and individual crops
Nitrogen fixation
 assimilation of ammonia produced by, 22
 by field beans, 241
 by VA mycorrhiza, 235
 ureides as a measure of in legumes, 241, 242
Nitrogen in soil
 effectiveness of chemical methods for measurement of, 305
 leaching of nitrate, 276, 280
 persistence of NH₄ nitrogen in soil, 277, 279
 Nitrogenase activity, 120, 121
 in field beans, 241
 in legumes, 241, 242
 5-nitro-8-hydroxyquinoline, effect on soft-rotting of potatoes, 223
NMR spectra, for cyclopropane based pyrethroids, 129, 130
Nervous activity, of insects in free-walking preparations, 130
Noctua pronuba, caught in traps, 89, 90
Nodulation
 by field beans, 240, 241
 by mycorrhiza on plants grown in nutrient film cultures, 235
 of lucerne by mycorrhiza, 238
 of soybean by cowpea rhizobia, 240
 of *Spylosanthes capitata* and *S. hamata*, 240
 Norfolk, soil survey in, 248
 North Yorkshire, soil survey in, 247, 263
 NRDC compounds, 129, 135
 'N-serve' *See:* nitrapsyrin
 Nuarimol, as fungicide for potatoes, 226
 Nuclear magnetic resonance spectroscopy, 159
Nutrient elements
 representative soil sampling of nutrient status, 307, 308
 routine analysis of, 297
Oats
 chlormequat chloride on, 112
Heierodera avenae on, 185
 residual effects of cultivars, formalin and nematodes on, 177, 178
Oidium sp., fungicides for control of, 226
 nematodes on, 177, 178
Oleifer rapé (*Brassica napus* spp. *oleifera*)
 diseases of, 221, 222
 effect of benomyl on, 221, 222
 extracellular leaf protein from, 295
Leptosphaeria maculans on, 221
 nematodes on, 185
Ferrospora parasitica on, 221
 polyphenol in leaves of, 295
Pyrenopeziza brassicae on, 221
 weed control on, 113
Oplidium spp., effect of new fungicides on, 211
Onion
 field trial for inoculation of with mycorrhiza, 237, 238
 spread of mycorrhiza on, 236
Omycetus spp., on sugar beet, 99
 effects of, 167, 168
 Omycetus fungus, computer model to simulate

Nematodes, scientific names of (cont.)
Criconeoides spp., 173
Cryptaphelenchoides spp., 182, 183
Ditylenchus dipsaci, 178, 184
Globodera pallida, 175, 176, 178-182, 185, 187, 305
Globodera rososchistenis, 168-170, 174-176, 178-180, 185, 186, 305
Globodera solanacearum, 180
Globodera tabacum, 180
Globodera vitifoliae, 180
Helicotylenchus vulgaris, 171, 172
Hemicylophora spp., 173
Heierodera spp., 173, 181, 183
Heierodera avenae, 176-178
Heierodera carotae, 171
Heierodera cruciferae, 181, 185
Heierodera schachtii, 69, 99, 176, 181, 186
Hemaphysenchoides spp., 182
Lamphelenchus spp., 182
Longidorus spp., 58, 173
Meloidogyne spp., 183
Meloidogyne incognita, 183
Merlinus microrodorus, 173
Paraphelenchus spp., 182
Paratylenchus spp., 120, 172, 185
Punctodera spp., 181
Radopholus similis, 174
Seturia spp., 182, 183
Telotylenchus ventralis, 173
Tylenchodorus spp., 58, 173
Tylenchorhynchus spp., 172, 173
Tylenchorhynchus dubius, 185
Tylenchus spp., 120
Nephotylenchus vitivorus, as vector of rice tungro disease, 208
Net assimilation rate, for grasses, 44
 NF 48, as fungicide for potato, 226
 Nitrapyrin, 277, 280
 Nitrate, in xylem exudate of wheat, 23
 Nitrate reduction, 22, 23
 rates of, 40
Nitrification
 measurement of in soils, 277, 279
 statistical analysis of nitrification of aqueous ammonia, 304, 305
Nitric acid
 analytical procedure for, 280
Nitrification inhibitors
 CS₂, 280
 effect on leaching losses, 279, 280
 efficacy trials of, 149
 for grass, 277, 280
 for wheat, 277
 lysimeter experiments with, 279, 280
 nitrapyrin, 277, 279, 280
 on direct drilled soil, 277, 279
 sodium trithiocarbonate, 277, 279, 280
 testing of neem oil, cake and kernel materials as, 281
 trithiocarbonates as, 276
 with aqueous N fertilizers, 277
Nitrifiers, NH₃ oxidizing, 149
Nitrifying bacteria, in Rothamsted and Woburn soils, 149
'Nitro-Chalk', effect on VA mycorrhiza, 236
Nitrogen
 assimilation of in shoots, 23
 concentration of in sugar-beet leaves, 65
 extraction of from wheat, 25
 leaching of, 66
 mineral, in soil, 65
Nitrogen fertilizers
 amount and time of application to cereals, 281, 282
 application on Broadbalk, 116, 119
 control of VA mycorrhizal infection in the field
 aqueous, applied with nitrification inhibitors, 277
 by, 235
 effect on amino acids of grain, 28, 29
 effect on photosynthate distribution, 38
 effect on proteins of wheat and barley, 28, 29
 effect on soil invertebrates, 95

INDEX

- Phoma exigua* var. *foveata* (gangrene on potato)
 (contd)
 infected seed tubers, 224
 infection of stems by, 224
 pycnidia of on dying potato stems, 224
 sources of inoculum, 224
 Phorate
 as aphicide on winter cereals, 211
 effect on soil fauna, 93, 94
 effect on VA mycorrhiza, 236
 effect on VA mycorrhiza, 236
 for herbage crops, 123
 on barley, 212
 on control *Stroma*, 91
 Phosphorus fertilisers
 Phosphorus in mycorrhizal inoculation trials,
 use on controls in mycorrhizal inoculation trials,
 prediction of phosphorus requirements for crops, 276
 238, 239
 See also: Fertilisers; and individual crops
 Phosphorus in soil
 effect of mycorrhiza on soil analysis for, 284
 mycorrhizal infections in soils deficient in, 236
 organic P in Rothamsted and Saxmundham soils,
 283, 284
 rate of mineralisation of, 283, 284
 seed P effects in L-value determinations, 296
 uptake of by mycorrhiza, 236
 Photorrespiration
 and ammonia, 40, 41
 effect on net photosynthesis by wheat leaves, 39, 40
 rate on ammonia release in, 22
 Photosynthetic, distribution of in wheat, 38
 effect of drought on in individual leaves, 195, 196
 equipment for measurement of, 196, 197
 field studies of, 196, 197
 gross and net rates of, 39
 in water-stressed cereals, 42
 individual leaf, 195
 laboratory studies of, 197
 leaf chamber for measuring, 197
 portable chamber for measurement of, 192
 portable gas mixing apparatus for field studies
 of, 197
 rate of, 197
Phytolacca americana L., as a virus inhibitor, 208
Phytophthora infestans (blight), on potato, 113, 138
 Pigs, breeding systems for, 307
 Pirimicarb
 as aphicide, 98, 132
 effect on soil fauna, 93
 for beans, 117, 119, 120
 Plant Breeding Institute, 83, 179
 Plant proteins
 associated with resistance, 20
 virus induced, 20
Plasmodiophora brassicae (clubroot)
 effect of fungicides on, 139
 host response to, 139, 140
 of cabbage, 139
 of swede, 139
Plusta gamma, deposits in the West Midlands, 258
Plutella maculipennis larvae, statistical
 analysis of damage done on turnips by, 304
 Pollination, of coconuts, 146
 Polyacrylic acid, induction of resistance to tobacco
 mosaic virus by, 207, 208
 Polypeptides, 'B' and 'C' groups of, 26-28
 Polyphenol, measurement of in leaves of crops, 295
Polysciasium pustulans, fungicides for, 226
 Porometer
 calibration of, 196
 types of, 196
 Potassium
 coordination chemistry of, 161
 critical K potentials for crop growth, 286
 release of in soils, 286
 See also: individual crops
 Potatoes
 application of fungicides to sprouts, 225
 effect of seed treatment on, 225
 control during storage, 226
Phoma exigua var. *foveata* (gangrene on potato)
 var. *radicola*, 21, 213
 var. *graminicola*, 21, 213
 comparison of isolates of, 21, 213
 carboxymethylcellulase activity of, 21
Phialophora radicola
Phialophora spp., new species of, 206, 213, 214
 secretion of sex pheromones by slugs, 96
 pheromone traps, 88, 89, 304
 pea moth pheromone monitoring system, 86,
 88, 126, 138
 of honeybees, 100, 101, 136, 137
 of *Angastia kuehniella*, 137
 alarm pheromones, in aphids, 136
 Pheromones
 Pheromone traps. See Insect traps
 Phenyl mercuric acetate, effect on damp hay, 209
 Phenol, effect on damp hay, 209
 Phenmedipham, for sugar beet, 58
 measurement of nitrogen fixation in, 241, 242
 inoculation with VA mycorrhiza, 235
Phaseolus vilgarts
 pyretroids on, 129
Phaedon cochleariae (Mustard beetle), effect of
 of sugar-beet seedlings, 98, 99
 of leafless peas, 91, 92
 of grass and forage crops, 92, 93
 integrated control of in cereals, 98
 detection and surveying of, 86-90
 cultural control of, 94, 95
 biological control of, 94, 95
 Pests
 octanol/water partition coefficients of, 149
 leaching of, 58
 for, 143
 field experiment to evaluate simulation models
 effect on VA mycorrhiza, 236, 237
 effect on soil fauna, 93, 94
 degradation of in soil, 148-150
 behaviour of in soil, 143
 adsorption of by soil, 149
 Pesticides
 in seed treatments, 135, 144
 for control of pea and bean weevils, 91
 for beans, 117, 119, 120
 foliar sprays of, 144, 145
 effect on soil fauna, 93
 development of, 127
 degradation of in soil, 149, 150
 Permethrin
Periplaneta americana. See Cockroach
 Pesticides, fingerprinting of, 30
 Pennines, soil survey in the, 247
 Peat, survey of in Somerset, 255, 256
 protein in seeds of, 25, 26
 polyphenol in leaves of, 295
 aspartate kinase of, 23, 24
 Peas
 pea moth. See Moths
 Pea, leafless, pests of, 91, 92, 124
 Particle-size distribution of soil samples, 262
 weeds on, 52, 53
 effect of nitrogen on invertebrates on, 95
 Park Grass
 Paraquat, effect on *Rhynchosporium secalis*, 212, 213
 Patosols, 258
Paeclomyces varioti, in hay, 209
 Oxygenase, in wheat leaves, 40
 Oximecarbamate nematocides, degradation of in
 effect on soil fauna, 93
 degradation of in soil, 148, 149
 as nematocides, 168-172
 Oxamy
 Organophosphorus insecticides, 131-133
 Open-topped chambers, modification of, 43, 44

INDEX

- Potatoes (*contd.*)
 bacterial diseases of, 222, 223
 bactericidal and fungicidal seed treatments for, 223, 225
 black dot, 225
 black scurf (*Rhizoctonia solani*) on, 151
 blight (*Phytophthora infestans*) on, 113, 138
 common scab (*Streptomyces scabies*) on, 138
 cyst nematodes on, 168–170, 175, 176, 178, 179
 diseases of, 206, 222–227
 dry rot (*Fusarium* spp.) on, 226
 effect of morphactin on, 48, 49
 effect of varying haulm structure, 49
Erwinia caratovota on, 206, 222, 223
 fungicides on, 225, 226
 gangrene (*Phoma exigua* var. *foveata*) on, 151, 206, 222–225
 genes for nematode resistance in, 180
 glandular hairs and insect resistance of wild potatoes, 226, 227
 grafting techniques for, 49
 irrigation on, 193
 leaf stolon and tuber growth in pots, 50
 micrometeorological records for, 194, 195
 mother tuber as source of bacterial infection, 223
 potential bactericides for, 223
 powdery mildew (*Oidium* sp.) on, 226
 rate of tuber bulking, 49
 silver scurf (*Helminthosporium solani*) on, 225, 226
 skin spot (*Polyscytalum pustulans*) on, 226
 soft rotting of, 222, 223
Solanum spp., susceptibility of to nematodes, 179, 180
 source/sink relationships in, 49
 statistical analysis of cyst nematode decline on, 305
 stolon pruning on, 222, 225
 tecnazene as sprout suppressant for, 151
 tuber-borne pathogens, 225, 226
 VA mycorrhiza on, 236
 varietal susceptibility to nematodes, 175, 179, 180
 viruses of, 20, 21
 yields, 113, 116
- Protein bodies, of cereal seeds, 25, 26
 Poultry, statistical data on, 306
 Powys, soil survey in, 256
 Processors and Growers Research Organisation, 138
 Propionaldehyde, 209
 Propionic acid, for preservation of damp hay, 208, 209
 Propyzamide, as herbicide on oilseed rape, 221
- Proteins
 barley hordeins, 24–29
 effect of N and S fertiliser treatments on, 28, 29
 in cereal seed, 24–29
 interaction with lipid, 25
 isolation of from plant viruses, 21
 synthesis of in developing seeds, 25, 26
 synthesis of *in vitro*, 26
 wheat gliadins, 24
- Protoplasts, isolation of from wheat leaves, 41
Pseudocercospora herpotrichoides. See Eyespot
Pseudomonas spp., on roots infected with *Gaeumannomyces graminis*, 233
Pterostichus melanarius, as aphid predator, 96
Puccinia hordei (brown rust on barley), 281, 282
Pyrenopeziza brassicae, on oilseed rape, 221
- Pyrethroids
 action on *in vivo*, 130
 aphid resistance to, 127
¹³C-NMR Spectra, 129, 130
 effect of *super-kdr* on, 133
 'FMC 16388', 135
 housefly resistance to, 133
 in seed treatments against wheat bulb fly larvae, 135
 molecular structure and insecticidal activity of, 127–130
 new compounds, 127–129
 NRDC compounds, 129, 135
 photostable, 135
 selectivity of, 134, 135
 toxicity of, 126
- Pyricularia oryzae*, enzymes extracted from, 24
Pythium spp.
 effect of new fungicides on, 211
 on lupin roots, 218, 219
 on sugar-beet seeds, 60
- Radionuclides, routine analysis of, 297
- Rain
 at Broom's Barn, 328
 at Rothamsted, 109, 110, 326
 at Saxmundham, 329
 at Woburn, 109, 110, 327
- Rhizobium* spp.
 cowpea strains of, 240
 effect of amino acids on, 239
 effect of delayed inoculation, temperature and day length on, 243
 effect of lysozyme on, 240
 effectiveness in red clover, 242, 243
 inoculation of clover with, 238, 239
 inoculation of legumes with, 242
 large bodies of, 239, 240
 L-phase growth in, 240
Rhizobium japonicum, nodulation of Malayan soyabean by, 240
Rhizobium trifolii, breeding for high symbiotic effectiveness in red clover, 243
 Rothamsted *Rhizobium* collection, 239
Rhizoctonia spp. (stem canker on potatoes), 151, 222, 225
Rhizopogon spp., interaction with *Azotobacter* spp., 235
- Rhynchosporium secalis*
 effects of herbicides and fungicides on, 206, 212, 213
 spore viability, 213
- Ribulose biphosphate, in wheat leaves, 40
 Rice, tungro disease of, 208
 River catchment study, in South West Wales, 261
 Root-infecting fungi, 211
 Root nodules, nitrogen fixation in, 22
 Root systems, observation of, 197, 198
 Rotavation, for incorporating nematicides in soil, 168, 170
- Rothamsted Farm
 barley yields on, 111, 112
 bean yields on, 112, 113
 cereal aphids on, 87
 cereal variety experiment, 111, 112
 classical experiments, 115–117
 Cultivation-Weedkiller experiment, 110
 irrigation experiment, 192, 193
 light traps on, 89
 nitrifying bacteria in soils at, 149
 organic P in soils on, 283, 284
 potato yields on, 123
 rain at, 109, 110, 326
 weather, 326
 wheat yields on, 111
- Rothamsted Insect Survey, 227, 304
 Roughness length, in micrometeorology, 194
 Ryegrass. See Grass
- Salicylic acid, induction of resistance to tobacco mosaic virus by, 207, 208
 Samsum NN protein, 20
- Saxmundham
 free energy and enthalpy of K-Ca exchange in soil at, 285
 organic P in soils at, 283, 284
 porosity of soil carbonate at, 285
 weather at, 329
- Scottish Plant Breeding Station, 179
 'SD 740823AX', effect on soft-rotting of potatoes, 223
- Seed treatments
 adhesion of powders to seeds, 143, 144
 apparatus for, 147
 efficacy of, 144
 EMP steep for sugar-beet seeds, 63
 for field beans, 220
 for lupins, 219

INDEX

- Seed treatments (*contd.*)
 for potatoes, 223
 for slug control, 135
 fungicidal, 63
 pyrethroid, 135
- Seeds
 adhesion of powders to, 143, 144
 boiled, effect of on mycorrhizal growth, 234
- Seepage analysis, of horizontal groundwater flow, 201
- Serine, conversion of glycine to, 40, 41
- Sewage sludge, effect on soil fauna, 95
- Sex pheromones, secretion of by slugs, 96
- Shrinkage potential, of clayey soils, 258
- Silver staining of insects, 146
- Simazine
 distribution of among soil aggregates, 143
 on beans, 113
- Simulation models, of behaviour of pesticides in soil, 143
- Sitona* spp. *See* Beetles
- Slugs
 control of in cereals, 135
 copulatory and aggregation behaviour of, 96
 in direct drilled fields, 94
 response of *Deroceras reticulatum* to food plant volatiles, 96
- Snail, use of digestive juices from for lysis of mycorrhiza, 235
- Sodium
 co-ordination chemistry of, 157
 for sugar beet, 66
- Sodium dodecylsulphate-PAGE, use of in virus studies, 20, 25-27
- Sodium nitrate, development of VA mycorrhiza in, 235
- Soil aggregates, herbicide distribution in, 143
- Soil biomass, adenosine 5'-triphosphate (ATP) content of, 289
- Soil classification, 259, 260
- Soil cores, assaying of, 215
- Soil data bank, 260
- Soil erosion, 261
- Soil fauna
 cutworms, 89, 90
 earthworms, 93-95
 effect of direct drilling on, 94, 95
 effect of farmyard manure on, 95
 effect of fertilisers on, 95
 effect of pesticides on, 93, 94
- Soil hydraulic conductivity, measurement of, 201
- Soil mapping, 260, 262-265
- Soil micro-organisms, enzyme cytochemistry of, 232
- Soil mineralogy
 of Saxmundham soils, 285
 weathering of clay soils, 294
 X-ray fluorescence spectrometry of, 276
 X-ray spectra of clays, 292, 293
- Soil organic matter
 adsorption of organic chemicals by, 149
 effect of direct drilling on, 289, 290
 loss of during cultivation, 276
 measurement of adenosine 5' triphosphate in soil, 289
 sorption of by clay, 287
- Soil physics, 198-202
- Soil structure
 aggregate size, 60, 291
 effect of repeated wetting and drying on stability of soil aggregates, 231, 232
 effect of tillage on, 199, 200
 gaseous diffusion in compacted soils, 198, 199
 gaseous diffusion within crumbs, 198
 ion diffusion in structured soil, 288, 289
 measurement of diffusion coefficients and tortuosity factors, 232, 288
 of clay soils, 290-292
 pore-size distribution of clay soils, 291
 porosity, 198, 232
 Soil Structure Working Group, 198
- Soil surveys
 Cambridgeshire, 247, 248
 Cornwall, 255
 Cumbria, 246, 247, 262, 263
 Dyfed, 256
 Essex, 253, 254
 Hereford and Worcester, 249, 250
 Humberside, 246, 247, 263
 Lake District, 247
 Lincolnshire, 248, 249
 Norfolk, 248
 Pennines, 247
 Powys, 256
 Staffordshire, 250-252
 Suffolk, 248, 263
 Surrey, 254, 255
 Warwickshire, 252, 253
 Yorkshire, 247, 263
- Soil temperature, for barley, 42
- Soil water
 chemical composition of groundwaters, 288
 Darcy's Law, 200
 hydraulic conductivity measurements, 201, 202
 hydrodynamic dispersion of, 200, 201
 in clay soils, 200, 290, 291
 in heterogeneous soils, 200
 in swelling soils, 200
 land drainage theory, 201
 limiting soil moisture deficits, 193, 194
 movement of, 191, 200
 retention of, 262
 seepage analysis of horizontal groundwater flow, 201
 soil moisture deficits on four Lincolnshire soils, 265
 water content, 42, 193
 water content and water potential relationships, 202
 water content measurement, 202
 water potential, 42, 193
 water stability, 231, 232
- Solomon Islands, sweet potato yields in, 315, 316
- Sorbic acid, effect on damp hay, 209
- South West Wales River Division, 261
- Soyabean, Malayan, nodulation of by cowpea rhizobia, 240
- Spartina townsendii*, growth of, 44
- Spatial analysis, in soil surveys, 260
- Spores
 adherence to plastics, 216
 dispersal of, 195, 215, 216
 effect of pesticides on mycorrhizal spores, 236, 237
 germination and growth of mycorrhizal spores, 233, 234
 germination of in axenic conditions, 233
 of *Rhizosporium secalis*, 213
 properties of, 216
 samplers for, 216
 splash-dispersed, 215, 216
 viability of, 213
- Staffordshire, soil survey in, 250-252
- Standards, FORTRAN, 80
- Statistical analysis
 for ADAS experiments, 305, 306
 for comparing insoluble forms of phosphate on grassland, 306
 for livestock experiments, 306, 307
 for Small Ruminants Programme in Nigeria, 308
 intercropping survey, 316
 National Milk Quality Survey, 308
 National survey of grass weeds, 308
 of anthelmintic use, 308
 of attacks by oomycetous fungus on nematodes, 177
 of break-crop trials, 306
 of carbon flow through leaves, 304
 of carcass data, 307
 of damage done by *Plutella maculipennis* larvae, 304
 of flight behaviour of male pea moth, 304
 of nitrogen response measured by soil chemical methods, 305
 of nutrient status, 307, 308

Sugar beet (*cont.*)
 rust on, 59
 seedling establishment, 60, 61
 seed taking by mice, 62
 seed-treatment fungicides, 63
 sodium form, 66
 storage root anatomy, 47
 Sugar Beet Research and Education Committee, 59
 TCMTB steep for, 63
 thiram seed steep for, 63
 time of sowing, 64
 virus diseases of, 58, 59, 67, 68
 water uptake by seeds, 60
 weed control on, 58
 yields, 58, 64
 deficiency of, in wheat, 28
 effect on wheat and barley proteins, 28, 29
Super-kdt, as mechanism of pyrethroid resistance in houseflies, 133
 survey, soil survey in, 254, 255
 Sutton Bridge Experimental Station, 225
 Swede, clubroot (*Plasmodiophora brassicae*) of, 139
 Symbiotic effectiveness, breeding of red clover for with rhizobia, 242, 243
 Sympyha, effect of nitrogen on, 95
 Syphids, as predators of aphids, 96
 Take-all on cereals
 assaying of inoculum, 215
 distribution of on root systems of winter wheat, 214, 215
 effect of breaks on, 214
 epidemiology of, 215
 fungicides for, 140
 profiles of, 214, 215
 validity of visual diagnosis of, 206, 207
 See also: *Gaeumannomyces graminis*
 Tanzania, effects of planting time and fertilisers on sugarcane in, 316
Taraxacum spp., survey of on Park Grass, 52
Telone, as a nematocide, 172
 Tecazene, as sprout suppressant for potatoes, 151
 Terbutol, as nematocide, 168
 Thermal conductivity in soils, 200
 Thiabendazole
 as fungicide on beans, 220
 effect on VA mycorrhiza, 236
 for seed treatment of potatoes, 225, 226
 Thiophanate methyl, as nematocide, 168
 Thiophanate methyl
 as fungicide on barley, 213
 as nematocide, 168
 Thiram
 as steep for sugar beet seeds, 63
 on lupins, 219
 Tillage, 1977 tillage experiment, 199, 200
 Time-lapse cinematography, 168
 Tobacco
 effect of benzoic acid on, 208
 effect of ethylene dibromide on, 315
 effect of phytoalexin inhibitor on, 208
 effect of polyacrylic acid on, 207, 208
 effect of salicylic acid on, 207, 208
 growth of in Malawi, 315
 induced virus resistance in varieties of, 207, 208
 viruses of, 20, 207, 208
 Tomato, nematodes on, 185
 Transpiration, effect of ionophores on, 164, 165
 Triadimefon
 as fungicide on barley, 213
 effect on mycorrhiza, 236
 Triazolophos, poisoning of honeybees by, 134
Trichoderma harzianum, 235
 Triclosazole, systemic activity of, 226
 Tridemorph
 as fungicide on wheat, 122, 226
 effect on *Entomophthora* spp., 97
 foliar spraying of, 144, 145
 on winter barley, 211, 212

Statistical analysis (*cont.*)
 of overseas data, 315, 316
 of potato cyst eelworm decline rate, 305
 of spring nitrogen requirements of winter wheat, 306
 of weed-beet in 1978 sugar-beet crop, 308
 Rothamsted Insect Survey, 304
 routine analysis, 308, 309
 Survey of Fertiliser Practice, 307
 Statistical programming
 cluster analysis program, 314
 documentation, 312, 313
 Generalised Linear Interactive Modelling, 313, 314
 Genkey, 314
 GENSTAT, 194, 242, 311-313
 Maximum Likelihood Program, 312, 314
 STAB, 314
 Statistical theory
 combination of estimates of non-linear parameters, 310
 confidence regions in non-linear models, 310
 covariance analysis, 316, 317
 6 σ design, 1/6th replicate of, 309
 diagnostic keys, 310, 311
 multidimensional unfolding, 311
 screening algorithm for fractional replicate designs, 309
 Stockbridge House Experimental Horticulture Station, 263
 Stomata, effect of ionophores on, 165
 Stomatal resistance of plants, 196
Stylosanthes capitata, nodulation of, 240
Stylosanthes hamata, nodulation of, 240
 Suction traps. See Insect traps
 Suffolk, soil survey in, 248, 263
 Sugar beet
 aphids on, 59, 67, 68
 as a rotational crop, 68-70
Atomaria spp. on, 99
 availability of calcined magnesite for, 293
 bird damage to, 62, 63
 boiling of, 59, 69, 70
 British Sugar Corporation, 63, 66, 70
 causes of seedling damage, 58
 conversion of seedling damage, 58
 conversion of radiant energy, 64
 crop productivity, 64-67
 Docking disorder, 58
 effect of far-red light on, 46, 47
 effect of light quality and duration on, 46, 47
 effect of seedbed soil structure, 60
 effect of temperature on leaf growth in, 46
 effect of triacetonol on, 47, 48
 effect of wood mice on, 62
 EMP steep for, 63
 endogenous gibberellins in, 47
 field performance of seed, 61
 frost damage, 57, 58
 herbicides for, 58
 irrigation for, 59
 leaf area production, 64
 leaf area persistence, 59
 leaf diseases, 59
 leaf persistence, 65
 magnesium for, 58, 66, 67
 manganese deficiency, 61
 nematodes on, 58, 69, 171, 172, 175, 185
 nitrogen concentration in leaves of, 65
 nitrogen fertiliser for, 59, 61, 65
 pelleted seed, 61
 pesticides for, 58
 pests of seedlings, 98, 99
Phoma betae on, 63
 plant establishment, 59, 60
 PMA steep for, 63
 poor root systems in, 58
 powdery mildew, 59
 radiation interception, 64
 ring numbers in, 47
 root growth and sugar accumulation in, 47
 rotation experiments, 68-70

INDEX

- Trifolium dubium*, effect of foliar application of fungicide on mycorrhizal uptake of P, 236
 Turnip, damage to by *Plutella maculipennis* larvae, 304
- Unit of Developmental Botany, 127
 Unit of Nitrogen Fixation, 163, 164
 Unit of Systemic Fungicides, 127
 Upper Greensand soils, 257, 258
 Urea, aqueous, applied on grass, 277
 Urea inhibition, efficacy of xanthates for, 280, 281
 Ureides, as measure of nitrogen fixation in legumes, 241, 242
Uromyces fabae (rust) on beans, 120
- Venturia canescens*
 in pesticide selectivity trials, 134, 135
 oviposition by, 137
 Vertical Band-Rotter technique, 168, 170
Verticillium spp., on ripening grain, 209
Vicia faba. See Beans
Vigna unguiculata, nitrogen fixation in, 242
- Viruses
 aphid-transmitted, 210, 211
 effect of phytoalexin inhibitor on tobacco mosaic virus, 208
 inactivation of, 207
 induced resistance to tobacco mosaic virus in tobacco by acetyl salicylic acid, 207, 208
 of beans, 207, 218, 221
 of clover, 207, 218, 221
 of cutworms, 98
 of grasses, 207
 of honeybees, 99, 100
 of lupins, 207, 219, 220
 of potatoes, 20, 21
 of rice, 207
 of sugar beet, 58, 59, 67
 of tobacco, 20, 207, 208
 proteins isolated from, 20, 21
 resistance to, soil transmission, 207, 218
 transmission of RCNMV by cutting, 218
 transmission of RCNMV in crimson clover, 221
 names of
 acute bee paralysis, 100
 barley yellow dwarf virus, 87, 207, 210-212
 bean yellow mosaic, 207, 219, 220
 bee virus X, 99
 beet yellows, 58, 67, 68
 black queen-cell virus, of bees, 99, 100
 chronic bee paralysis, 99
 clover yellow vein, 207, 219, 220
 cloudy wing, of bees, 99
 cucumber mosaic, 218
 granulosus virus, 98
 Kashmiri bee virus, 99, 100
 nuclear polyhedrosis virus, 98
 potato leaf roll virus, 227
 potato virus X, 20, 21
 potato virus Y, 227
 red clover necrotic mosaic, 207, 218
 rice tungro viruses, 207, 208
 ryegrass mosaic, 207, 218
 sacbrood, of bees, 100
 tobacco mosaic virus, 20, 207, 208
 vicia cryptic, 207, 220, 221
- Warwickshire, soil survey in, 252, 253
 Water Research Centre, 276, 287
 Water stress, in barley, 41, 42, 195, 196
 Weather
- at Broom's Barn, 328
 at Rothamsted, 326
 at Woburn, 327
 Weed Research Organisation, 70, 143, 308
- Weeds
 as host plants for potato aphids, 87, 88
 control of, 111
 germination of, 52
 National survey of, 308
 on Broadbalk, 50-52
 on Park Grass, 52, 53
 seedlings in pans, 52
 Weevils. See Beetles
 West Midlands, Pleistocene deposits in, 258, 259
- Wheat
 activity of RuBP carboxylase/oxygenase in leaves of, 40
Alternaria spp. on, 210
 aphids on, 98
 baking quality of wheat flour, 25, 207
 carbon dioxide enrichment in, 39
 critical K potentials for crop growth, 286
 deflating of, 25
 extractability of leaf protein from, 295
 extraction of nitrogen from, 25
 eyespot (*Pseudocercospora herpotrichoides*) on, 140, 215-217
 fungicides for, 140
Fusarium spp. on, 210
 gibberellins in developing grain, 45
Gibberina cerealis on, 217
 gliadin fraction of, 24
 grain growth in, 45, 46
 growth retardants for, 150
 inoculation of with VA mycorrhiza, 235
 integrated pest control in, 98
 lodging of, 38, 210
 microbials fertilizers on, 232
 microflora of grain during ripening, 209, 210
 milling and baking tests on grain from, 210
 nematodes on, 171
 nitrogen fertilizer for, 36-38, 306
 photosynthate distribution in, 38
 polyphenol in leaves of, 295
 Professor Laloux's method of growing, 121, 122
 protein in developing seeds, 25, 26
 protoplasts from flag leaves of, 41
 rate of photosynthesis in, 39, 40
 semi-dwarf varieties of, 39
 sugar concentrations in, 38
 take-all on, 140, 213-215, 233
 use of N, P and K on, 307
 varietal response to carbon dioxide enrichment, 39
 varietal response to nitrogen, 37
 variety experiments, 111
 weeds on, 50, 51, 111
 wheat and fallow experiment on Hoosfield, 217
 yields, 36-39, 111, 116
 See also: Cereals; Eyespot; Take-all
 wheat bulb fly, seed treatments for controlling, 135, 147
 Wild Oats, on Broadbalk, 50, 51
 Wind tunnel, acceptance trials in, 192
- Woburn
 barley yields at, 112
 degradation of pesticides in soils at, 149
 effect of pesticides on VA mycorrhiza at, 236, 237
 irrigation experiments on, 192, 193
Nitrosomonas spp. in soils at, 149
 rain at, 109, 110, 327
 weather, 109, 327
 wheat on, 111
 Wood mice. See Mice
 Wye College, 112
- X-ray fluorescence analysis
 for chemoprint studies, 295, 296
 for soil mineralogy, 276, 277
 Xylem exudates
 reduced N fraction of, 23
 ureides in, as measure of nitrogen fixation in legumes, 241, 242
- Yeasts, in ripening grain, 209, 210

INDEX

- Zambia, fertiliser and variety trials on sunflowers
in, 316
Zeolites, cation exchange properties of, 286
Zero plane displacement, in micrometeorology, 194
Zineb
effect on damp hay, 209
Zineb (*contd.*)
effect on *Entomophthora* spp., 97
Zoospores
biflagellate, 177
matric potentials of, 177
motile, 168, 177