
Index

- accessions, 142, 145
 acetaldehyde, 185
 acids
 2-chlorethyl phosphonic, 164
 3-indolylacetic, 112, 174
 4-dihydrophaseic, 174, 182, 185
 1,3,4-pentane tricarboxylic, 69
 amino, 96, 106
 carbonic, 222
 chromic, 89
 citric, 185, 191
 fumaric, 185, 195
 lactic, 185, 191
 malic, 144, 164, 185, 191
 malonic, 185
 nonanoic, 186
 nucleic, 120
 organic, 99
 phaseic, 174, 185
 pyruvic, 185, 191
 salicylhydroxamic, 173
 succinic, 185
 adaptation, 3, 158–9, 168
 adenosine-tri-phosphate, 98, 116, 173, 205
 Aegilops, 4, 64
 Aegilops cylindrica, 12
 kotschyii, 12, 75, 79, 112, 133, 187
 floret and spikelet, 64
 ovata, 12, 64
 truncialis, 12
 Aegopogon, 5
 Aeluropodeae, 5
 aestivation, 43
 after-ripening, 41, 46, 62, 75, 81–2, 85–6,
 92–3, 96–101, 103–4, 108–12, 115–16,
 125, 128–32, 134, 136–8, 141–5, 154–6,
 160–4, 167–9, 171–5, 181, 187, 195–6,
 199, 204
 Ageratum conyzoides, 33, 35
 Agropyron, 4
 Agropyron cristatum, 11, 146, 176
 elongatum, 11, 87, 89–90, 133, 137
 intermedium, 11, 186
 lehmanniana, 146
 pauciflorum, 117, 138, 146, 176
 repens, 12, 75, 146
 smithii, 11, 87, 146, 154–5, 176, 183
 spicatum, 11
 Agrostideae, 66
 Agrostis, 4
 Agrostis alba, 11
 capillaris, 11, 147
 gigantea, 11, 147, 176
 nebulosa, 166
 pahustris, 11, 147
 spp., 176
 tenuis, 11, 147, 176
 air temperature, 119
 Aira, 4
 Aira caryophylla, 10
 flexuosa, 9
 praecox, 10
 aleurone, 51, 85, 90–1, 95, 100, 104–6, 111,
 181, 203, 222, 227
 barley, 174
 energy reserves, 223
 protoplasts, 174
 alleles
 dominant and recessive, 108
 allelopathy, 70, 170, 185–7
 Allolepis, 5
 Alopecurus, 4

Index

- Alopecurus aequalis*, 10
geniculatis, 10
myosuroides, 10
pratensis, 147
pratensis, 10, 176
 alternate pathway, 98–9, 173
 aluminium phosphide, 84, 164
Amaranthus retroflexus, 33, 35
spinosus, 33, 35
viridis, 46
 Ammophila, 4
 Amphicarpum, 4
 α -amylase, 100–1, 109–12, 115
 amylase, 94, 106
 activity, 109
 secretion, 105, 109–10
 synthesis, 109
 anabiosis, 43
 anaerobiosis, 129, 165–6, 168, 230
 anaesthetics, 141, 165, 169
 Andropogon, 5
Andropogon diastachyus, 16
furcatus, 137
gayanus, 16
gerardii, 16, 176
hallii, 191
scoparius, 16, 137
tener, 16
 Andropogoneae, 5, 15, 30, 37, 42, 66
 anemophily, 36
 annuals, 40, 132
 anoxia, 129–32, 161–4, 168–9, 203, 205
 Anthaenantia, 4
 anthesis, 97, 103, 116, 121, 174, 194
 post, 104
 time to, 157
 Anthophora, 4
 Anthoxanthum, 4
Anthoxanthum odoratum, 10
puelli, 10
 Apera, 4
Apergula arvensis, 33
 apogamy, 67
 Aristida, 5
Aristida armata, 117
contorta, 75, 79, 176
 Aristideae, 5, 42
 Arrhenatherum, 4
Arrhenatherum elatius, 10, 147, 176
Artemisia vulgaris, 33
 Arthraxon, 5
 Arundinaria, 5
 Arundineae, 5
 Arundinoidea, 5
 Arundo, 5
 asynchronism, 228
 holonic, 230
 of physiological functions, 204
 Avena, 4, 19, 95, 107
Avena abyssinica, 107
barbata, 62, 160
fatua, 29–30, 33–5, 38–9, 47, 59–62, 64,
 67, 69–70, 83, 91–2, 94–108, 115–6,
 120–32, 141–4, 156–65, 169–75, 184–6,
 188–93, 197–8, 200, 204, 218, 224–9
 genotypes, 62
 inflorescence, 60
ludoviciana, 97, 100, 125, 128, 132, 157,
 171, 174, 191
sativa, 28–9, 62, 69, 82, 102, 105, 107–8,
 117, 124, 126, 138, 144, 147, 171–6,
 184, 186
sterilis, 160, 174
 Aveneae, 4
 awns, 65, 69–70
 Axonopus, 4
Axonopus compressus, 13, 147, 166, 176
 azide, 98–100, 169, 199
 sodium, 109, 172, 185, 192, 204
 Bajra, 15, 25
 bamboos, 7, 36, 94
 Bambuseae, 5, 42, 66
 Bambusoideae, 5
 barley, 26, 47, 78, 103, 111, 113, 141, 181
 brewing and malting, 27
 British, 28
 cuticular membranes, 89
 embryo, 27
 European, 28, 64
 foxtail, 11
 glumes, 26
 hulless, 134
 Indian, 28
 Japanese, 28
 little, 11
 pre-harvest sprouting, 28
 primary and secondary dormancy, 27
 vivipary, 28
 water dormancy, 27
 Beckmannia, 4
 behaviour
 determinate, 215–7
 of sub-systems, 208–10

Index

- behavioural cycle and states, 211–3
 benzyladenine, 173–4, 183
Bidens pilosa, 35
 black box perspective, 210
 Blepharidachne, 5
 Blepharoneuron, 5
Boerhaavia diffusa, 35
 Bothriochloa, 5
Bothriochloa intermedia, 16
 ischaemum, 16, 75
 macra, 16, 147, 176, 183
 spp., 78
 Bouteloua, 5
Bouteloua curtipendula, 18, 75, 87, 137–8, 187
 eriopoda, 18, 147
 gracilis, 17
 Brachiaria, 4
Brachiaria decumbens, 13, 71, 75, 79
 humidicola, 13, 158
 mutica, 13
 ruziziensis, 13, 75, 79
 Brachyelytreae, 4
 Brachyelytrum, 4
 Brachypodium, 4
 bracts, 37
Brassica campestris, 35
 breeding, 161
 Briza, 4
 Bromus, 4
Bromus anomalus, 117
 catharticus, 8, 148
 commutatus, 8, 148, 176
 diandrus, 8
 inermis, 8, 137, 148, 176
 japonicus, 8, 158
 mollis, 8, 148, 158, 176
 ramosus, 148, 177
 secalinus, 8
 sterilis, 8, 137, 148, 153, 158
 tectorum, 8, 137, 177
 Bronze Age, 25, 39
 Buchloe, 5
Buchloe dactyloides, 87, 89–90
 bzp-methyl, 194
 Calamagrostis, 4
Calamagrostis canadensis, 10
 Calamovilfa, 5
 carbamate
 iso-propyl-N-phenyl-, 192
 S-(2,3-dichloroallyl) di-*isopropylthio*l-, 192
 S-(2,3,3-trichloroallyl) N,N-
 diisopropylthio-, 193
 S-ethyl diisobutylthio-, 192
 carbon dioxide, 69, 144, 161–2, 164, 168–9
 monoxide, 98
 caryopsis, 37, 45, 65–6, 72, 74, 78, 83, 86,
 89, 104, 112, 130, 134, 141, 144
Avena fatua, 68
 de-hulled, 164
 dehydration of, 92, 114, 116
 dormant, 85, 105
 excised, 60
 maturity, 96
 non-dormant, 105, 113
Oryza sativa, 63
Panicum maximum, 71
 pierced, 143, 157
 position, 60
 primary, secondary and tertiary, 62
 proximal end, 106
 wetting, 92
 wheat, 89
 Catabrosa, 4
 Catapodium, 4
 Cathestecum, 5
 Cenchrus, 4
Cenchrus ciliaris, 15
 echinatus, 33
 longispinus, 15
 setigereus, 15
 Centothecae, 5
 cfp-methyl, 194
 Chasmanthium, 5
Chenopodium album, 33, 35
 chilling, 128, 136, 138, 141, 196
 (2-chloroethyl)trimethyl ammonium
 chloride, 97, 172
 Chlorideae, 5, 17, 37, 42, 66
 Chloris, 5
Chloris gayana, 5, 17, 148
 orthonothon, 87, 137, 148
 truncata, 17
 virginata, 17
 chloroform, 165
 Chrysopogon, 5
Chrysopogon fallax, 16, 75, 137, 177
 latifolius, 16, 75, 137
 Cinna, 4
cis,trans-abscisic acid, 100, 110–13, 174–5,
 182, 184–5, 226
 climate, 3
 Mediterranean, 160
 micro-, 143, 160

Index

- climate (*cont.*)
 temperate, 7, 160
 tropical, 160
 coat, 83, 86, 89, 93, 103, 106, 108, 111, 126,
 136, 141–3, 154, 161–2, 175, 191, 197,
 199, 203, 205, 210, 217, 222–5, 227
 and fungal hyphae, 91
 colour, 20
 damage, 29, 86
 gas exchange, 92
 impermeability, 39
 permeability, 103–4, 111, 114, 162–3
 pierced, 84–5, 91–3, 101, 162, 165,
 section of, 90
 sorghum, 23
 Coix, 5
 cold, 119
 tolerance, 29
 Coleanthus, 4
 coleoptile, 218
 coleorrhiza, 45
 compounds
 volatile organic, 162
Convolvulus arvensis, 33, 35
 Cortaderia, 5
 Coryenphorous, 4
 Cottea, 5
 coumarin, 186
 crop rotations, 188
 cross-fertilization, 107–11
 Crypsis, 5, 83
 cryptobiosis, 43
 Ctenium, 5
 cuticle, 83, 90
 cyanamide, 189–90
 cyanide, 98–9, 169, 192
 Cynodon, 5
Cynodon dactylon, 17, 30, 33–5, 75, 148,
 166, 177
diploidium, 17
plectostachyus, 17
 Cynosurus, 4
Cynosurus cristatus, 9, 148
Cyperus difformis, 33–4
esculentus, 33
rotundus, 33–5
 cytokinins, 173–4, 181–3, 226
 Dactylis, 4
Dactylis glomerata, 9, 75, 77–8, 87, 117,
 133, 135, 137, 145, 148, 155, 161, 177,
 187
Dactyloctenium, 5
Dactyloctenium aegyptium, 35
sindicum, 17
 Danthonia, 5
Danthonia californica, 18, 76, 87
cericea, 137
linkii, 18
pedicillata, 18
sericea, 18, 136, 149
spicata, 18
 spp., 149, 177, 183
 Danthoneiae, 5, 18
Datura stramonium, 33, 35
 daylength, 141–2, 145, 157–8
 dehulling, 100
 dehydration and viability, 29
 Deschampsia, 4
Deschampsia caespitosa, 10
 desiccation, 103, 114, 126, 128, 154,
 169, 181, 205
 development
 asynchronism in, 199–201
 integrated, 199
 phases, 200
 plasticity in, 198
 sequential, 196
 synchronism in, 199–200, 202
 timing of, 223
 diapause, 43
 Diarrhena, 4
 Diarrheneae, 4
 Dichanthium, 5
Dichanthium annulatum, 16
cerisium, 76
linkii, 76
 Digitaria, 4, 112
Digitaria adscendens, 13, 87
ciliaris, 13, 149
didactyla, 13
milanjiana, 13, 87, 137, 177
pentzii, 13, 87, 177
sanguinalis, 13, 33–5, 87, 93,
 187
 spp., 177
 Dinochloa, 83
 Dioecism, 37
 diseases, 41
 dispersal unit, 55, 60, 70, 187
 Dissanthelium, 4
 Distichlis, 5
Distichlis spicata, 87, 112, 177,
 183

Index

- DNA, 97, 156
- dormancy
- absence of, 135
 - adaptive trait, 47
 - anaerobic induction, 131, 225
 - and herbicide resistance, 194
 - and latitude, 158
 - and light, 225
 - and low power, 209
 - and temperature, 120
 - blocks, 160, 164, 172
 - caryopsis, 72–3, 77
 - coat-imposed, 86
 - configurations, 197
 - control, 43–4, 50
 - dark, 169
 - deep, 46, 123, 161, 172, 202
 - definitions, 43–4, 50, 230
 - depth of, 43–4, 50, 107, 129, 112, 157, 160–6, 202, 230
 - diversity in, 229
 - duration, 108, 121
 - eco-, 43–4, 46
 - embryo, 28, 51, 72, 82, 84, 95–6, 100–5, 109–11, 184, 203–5, 223–4, 230
 - endo-, 43–6
 - enforced, 46, 123, 197
 - environmental, 46, 51
 - genes for, 108
 - genetic linkage, 46, 225
 - genetic loci, 109
 - genetic origin, 47
 - heritability, 95, 110–1, 123
 - induction, 27, 40, 46, 52, 55, 115, 117, 119, 121, 129–31, 133, 137–8, 144, 153, 156, 162, 164–5, 170, 185, 197, 199, 202, 204, 216, 229
 - innate, 46, 72, 105, 197
 - long-term, 106–7
 - loss-of, 135–6, 144, 155–6, 161, 164, 168, 184, 202, 216, 218
 - maintenance of, 52, 55, 115–16, 118, 185, 197, 229
 - maternal influence, 108
 - mechanisms, 160–1
 - metabolic, 46
 - modelling, 207, 217
 - multiple states of, 230
 - occurrence, 3
 - of embryos, 47
 - origin, 43–4, 50,
 - para-, 43–6
 - persistence, 115–16, 121, 125–6, 129, 132, 137, 158, 163, 187
 - physiological, 46
 - positional, 51
 - post-harvest, 103, 116, 132
 - prediction, 116
 - primary, 20, 23, 25, 27, 29, 41, 46, 49, 79, 84, 86, 99, 115, 121, 131, 128–31, 135–7, 145, 157–8, 162–3, 171, 188, 196–7, 199
 - prolonged, 126, 131, 224
 - promotion of, 121–2, 134
 - reduction of, 117, 122, 128
 - secondary, 22, 25, 27, 29, 40, 46, 49, 82, 84, 99, 104, 114–16, 119, 121, 128–30, 132, 136–8, 142, 144–5, 157–8, 162–5, 171, 173, 186, 188–9, 196–7, 199, 201–2, 204, 218
 - sequential loss, 47, 142, 200
 - shallow, 46, 111, 134, 139, 161, 203
 - stages of, 53
 - states, 72, 196, 226, 230
 - structural, 46, 51
 - termination of, 52, 55, 115–16, 118, 120, 123, 125–6, 128, 130, 153, 157, 160, 162, 156–70, 172, 175, 181–2, 185–6, 189, 191, 197, 199, 204–5, 229
 - terminology, 49
 - tertiary, 201
 - theory of, 228
 - thermo-, 123, 130–6, 155, 225
 - timing of, 43–4, 49–50, 106, 108, 111, 195–7, 205
 - ‘water’, 27, 186
 - wheat, 111
 - winter-persistent, 108
- dormoat, 29, 108, 171
- drying, 93, 103, 106, 115–16, 118, 189, 204–5
- dwarfing, 172
- Echinochloa*, 4
- Echinochloa colona*, 30, 33–5
- crus-galli*, 26, 30, 33–5, 88, 117, 137, 149, 166, 168, 177, 189, 226
 - crus-galli frumentacea*, 23, 26
 - frumentacea*, 26, 133
 - spp., 42
 - turnerana*, 26, 76, 88, 92, 148, 154, 158, 166
 - utilis*, 133
 - colona*, 26
- ecotypes, 133, 141, 145, 225
- Eichhornia crassipes*, 33, 35
- electron transfer, 98, 173

Index

- Eleusine, 5
Eleusine compressa, 17, 25
 coracana, 17, 24, 137, 145, 148, 160
 indica, 17, 25, 33–5, 149
 spp., 83
 Elymus, 4
Elymus canadensis, 177
 caput-medusae, 187
 triticoides, 149
 Elyonurus, 5
 embryo, 34, 37, 39, 49, 81, 91, 93–4, 107–8,
 110–1, 113, 136, 143–4, 153–4, 165,
 169, 171, 173, 184, 186, 195
 assay, 181
 barley, 104, 112
 cereal, 101
 culture, 101
 desiccation, 119
 development, 49, 104, 107, 112, 203, 230
 diploid, 106–7
 dormancy, 51, 97–8, 101, 103, 106–7,
 110, 115–16
 energy reserves, 223
 excision, 49, 84, 86, 95–8, 101–4, 108,
 112, 116, 136, 141–2, 155, 163–4, 171,
 181, 195
 expansion, 105
 genesis, 104
 hormone secretion, 109
 immature, 104
 metabolism of, 132
 non-dormant, 97–8, 100–1, 104, 108, 110,
 112, 174
 respiration, 227
 sac, 106
 swelling, 91
 viability, 49
 endosperm, 37, 51, 90–1, 93, 95–6, 98, 100–
 1, 103–13, 136, 141, 163, 165, 171,
 173, 175, 181, 184, 203, 208, 222, 225,
 227
 autonomous, 109–10
 barley, 112
 energy reserves, 106, 223
 hydrolysis, 27, 106, 108–9, 112–13, 115,
 171
 non-autonomous, 110
 nuclei, 36
 relic, 83
 stability, 110
 energy
 circuit symbols, 220–1
 flow, 209, 231
 flow diagram, 220–1
 webs, 209
 Enneapogon, 5
 entomophily, 36
 enzymes
 α -amylase, 171, 173–4, 181, 184
 α -glucosidase, 171, 173
 amylases, 203
 cytochrome oxidase, 98, 173
 hydrolases, 94, 171, 203
 peroxidase, 81–2, 169
 phosphatase, 205
 protein kinase, 205
 synthesis of, 181
 epidermis, 90
 Eragrosteae, 5, 16, 37, 42
 Eragrostis, 5
Eragrostis abyssinica, 16
 ciliaris, 16
 curvula, 17, 149, 177, 191
 ferruginea, 16, 137, 149, 166, 169
 lehmanniana, 16, 88, 93, 187
 leptostachya, 16
 spp., 137
 tef, 158
 tremula, 16
 trichodes, 16
 Eragrostoideae, 5, 16
 Eremochloa, 5
Eremochloa ophiuroides, 16, 149, 177
 Erianthus, 5
 Eriochloa, 4
 Erioneuron, 5
 ethanol, 99–100, 154, 164–5, 168–9, 173,
 185, 199
 ethyl ether, 141, 165, 169

 fallowing, 189, 191–3
 fatuoids, 107
 fertilization
 cross and self, 37
 Festuca, 4
Festuca arundinacea, 8, 133, 149, 178,
 183–4
 octoflora, 149
 ovina, 8, 150, 177
 pratensis, 8, 150, 178
 rubra, 8, 150, 177
 spp., 178
 Festuceae, 4, 8, 42
 Festucoidea, 8

Index

- Festucoideae, 5, 192
Fimbristylis miliacea, 33
 flooding, 41
 floret, 60, 74, 78–9, 103, 143, 154–5, 162, 164, 167
Avena fatua, 61, 67–8
 dehulled, 115, 165
 desiccation, 118
 diagram, 66
 intact, 86
 mature, 168
Panicum turgidum, 71
 primary, 60, 174
 secondary, 60, 69, 174
 sterile, 70
 tertiary, 60, 69
 flowering, 141
 early, induction, 157
 timing of, 157
 fluoride
 sodium, 192
 foxtail grasses, 14–5, 25
 freezing, 126
 fructose, 110, 112, 171
 fruit, 37
- Galinsoga parviflora*, 36
 gas, 161, 188, 203
 1,2-dibromo-3-chloropropane, 170
 air, 164, 168
 ammonia, 84, 110, 164, 190
 carbon dioxide, 169–70, 188, 222, 225
 carbon monoxide, 169, 192
 ethylene, 161, 164–5, 170
 ethylene bromide, 170
 ethylene chlorhydrin, 170
 exchange, 73, 78, 86, 92–3, 154, 161
 hydrogen, 163, 165
 hydrogen cyanide, 186
 nitrogen, 163–4, 167
 nitrogen dioxide, 170
 oxygen, 164, 167–70, 195, 204, 225
 diffusion, 222
 uptake, 210, 214–5
 pressure, 161, 165
 Gastridium, 4
 gene banks, 6, 70, 170
 pool, 20
 generations:gametophytic, 36
 genes, 111
- genetic
 adaptation, 123
 determinants of dormancy, 107, 110
 diversity, 3, 6, 28, 121, 159, 192
 loci, 110, 224
 selection, 41
 strains, 74, 123
 template, 202
 uniformity, 72
 variation, 74, 119, 136, 174, 199
 genetics
 of oat dormancy, 29
 genome, 107
 genotypes, 38, 49, 84–6, 96–9, 103, 107, 109, 111, 115, 119, 121–2, 125–7, 129, 131–2, 134, 136, 142–5, 155, 160–5, 169, 171–3, 175–6, 181, 192, 197–8, 224–5, 229
 dormant, 110, 123–4, 195, 204
 late-flowering, 111
 non-dormant, 110, 123, 204
 germinability, 123
 germination, 47
 anaerobic, 166
 and humidity, 20
 and temperature, 20
 dark-inhibition, 158
 inhibition, 156
 precocious, 20, 95, 104, 184
 promotion, 156
 timing, 119
 gibberellic acid, 27, 96–7, 110, 112, 170
 gibberellin, 27–30, 39, 77, 94, 96, 98, 100–1, 104, 106, 111–12, 164, 170, 173, 175–6, 181–2, 199–200, 203, 205, 226
 A₁, 170, 175
 A₃, 171–5, 184
 A₄, 170, 174–5
 A₇, 170
 A₉, 175
 endogenous, 109, 175, 181, synthesis, 109, 172
 gibberellin-like substance, 96–7
 glucose, 98, 101, 110, 112, 171–2, 186
 glumes, 37, 51, 65, 70, 182, 186, 217, 222–3, 227
Avena fatua, 61
Brachiaria decumbens, 71
Panicum maximum, 71
 Glyceria, 4
Glyceria maxima, 12
 glycolysis, 168, 173

Index

- glycoside
 triterpenoid, 69
 grain, 37, 60, 62
 Gramineae, 3–4, 7
 grasses
 African feather, 15
 alang-alang, 15
 annual, 30, 34
 aquatic, 29
 Astoria bent, 11
 Bahia, 13
 barnyard, 26
 Bengal, 15
 Bermuda, 17, 30, 34
 big bluestem, 16
 black grama, 18
 blue, 9
 blue grama, 17
 blue joint, 10
 bluestem, 16
 buffalo, 18
 Buffel, 15, 26
 carpet, 13
 centipede, 6
 cereal, 158
 chess, 8
 cogan, 15
 colonial bent, 11
 coloured Guinea, 14
 couch, 12
 crab, 13
 creeping bent, 11
 crested dogstail, 9
 crowfoot, 17
 cultivated forage, 159
 Dallis, 13
 Darnel, 9
 Deenanath, 15
 deetongue, 14
 downy brome, 8
 downy oat, 18
 drop seed, 17
 Elephant, 15, 26
 fall panic, 14, 24
 feather, 12
 feather finger, 17
 fescue, 8
 forage, 7, 25–6, 116, 132, 158
 Goose, 17, 25
 Guinea, 14, 24
 hairy chess, 8
 Harding, 10
 Highland bent, 11
 Indian, 15
 jointed goat, 12
 Johnson, 15
 Kikuyu, 15
 Klein, 14, 24
 knot, 13
 Lehman love, 16
 little bluestem, 16
 manna, 12
 meadow foxtail, 10
 millet, 13
 orchard, 9
 perennial, 30, 34
 plains bristle, 15
 quack, 12
 red top, 11
 reed canary, 10
 rescue, 8
 Rhodes, 17
 sand love, 16
 satin tail, 15
 short awn foxtail, 10
 side-oats grama, 18
 silver, 18
 silver hair, 10
 smooth brome, 8
 soft chess, 8
 spear, 12
 star, 17
 sweet vernal, 10
 switch, 14, 24
 tall oat, 10
 teosinte, 22
 timothy, 10
 tufted hair, 10
 Vine mesquite, 14, 24
 water foxtail, 10
 weed, 30–2, 158–9
 wheat, 11
 wild, 6
 Yorkshire fog, 10
 growth regulators, 170, 217–18, 226
 Gymnopogon, 5
 gynoecium, 65–6

 habitat, 168
 Hackelochloa, 5
 hairs, 70
 heat, 119
 units, 135
 Helictotrichon, 4

Index

- herbicides, 31, 41, 188, 192
 heteroblasty, 64
 Heteropogon, 5
 hierarchy
 functional, 54, 57–8, 200
 of energy transformations, 209
 of structures, 54–6
 sequentially ordered, 228
 Hierochloa, 11
 Hilaria, 5
 Holcus, 4
Holcus lanatus, 10, 150, 178
 holism, 55
 holon, 54, 199–202, 223
 Hordeae, 42, 66
 Hordeum, 4, 19
Hordeum agriocrithon, 11, 28
 distichum, 11
 glaucum, 76, 178
 jubatum, 11, 28
 leporinum, 11, 28
 murinum, 11, 178
 nodosum, 117
 pusillum, 11, 28
 spontaneum, 11, 28, 178
 vulgare, 26, 28, 81, 88, 91, 102, 104–5,
 112, 116–17, 133–4, 137–8, 141, 150,
 155–6, 168–9, 178, 184, 186, 191
 hormones, 94, 107, 109, 164, 170, 202–3
 hulls, 28, 72, 78, 82, 86, 100, 103, 112, 126,
 130, 134, 136, 141–4, 154, 161–2, 169,
 175, 181, 184, 186, 191, 197, 199, 203,
 205, 225, 227
 and inhibitors, 68
Avena fatua, 70
 barley, 81
 effect of removal, 69, 143, 154
 of forage grasses, 70
 influence on germinability, 73
 permeability, 79, 162–3
 physiological effect of, 73
 rice, 81
 humidity, 69, 95, 114, 116
 high, 115, 136
 relative, 126, 129, 138, 155
 storage, 116
 hyaline layer, 90
 hydration
 diurnal, 114
 Hydrochloa, 5
 hydrogen peroxide, 79, 84
 hydrolysis
 of protein and starch, 20
 hydrophytes, 42, 165, 168, 187
 hydroxylamine, 98, 189
 chloride, 185
 Hyparrhenia, 5
 Hystrix, 4
 Imperata, 5
Imperata cylindrica, 15, 33–5
 inflorescence, 94
 formation, 36
 influence on dormancy, 60
 Oryza sativa, 63
 inhibition
 by oxygen, 167
 dark, 144, 154
 inhibitors, 22, 29, 54, 71, 78, 98, 112, 170,
 172, 174, 181, 185–7, 216
 chemical, 73
 ether-soluble, 78
 in *Aegilops ovata*, 64
 in coats, 93
 in hulls, 69
 of respiration, 169
 oxygen gas, 168
 proteinaceous, 69
 seed coat, 89
 water-soluble, 104, 181
 integument, 89, 91, 106
 interaction
 of light and temperature, 144–6
 ions
 nitrate, 222, 226
 potassium 222
 irradiance, 156
 high, 144–6, 153, 155, 157–8, 223, 225
Ischaemium rugosum, 33
 isopentenyl adenine, 173, 183
 kinetin, 112, 173, 183
 Koeleria, 4
 Krebs cycle, 99, 168, 173
 Lagurus, 4
 Lamarckia, 4
Lantana camara, 33
 Lasiacis, 4
 latitude, 120, 141–2, 156, 158–61, 225
 Leersia, 5
 lemma, 37, 51, 65–6, 71, 74, 78–9, 86, 104,
 154, 217, 224
 Avena fatua., 68

Index

- lemma (*cont.*)
Brachiaria decumbens, 71
 colour, 69
 hairiness, 69
Panicum turgidum, 71
 removal, 75
 Leptochloa, 5
 Leptoloma, 4
 Leucopoa, 4
 light, 22–3, 25, 37, 40–1, 69, 71, 73, 104,
 119, 135, 141–2, 145–6, 154–5, 161,
 164, 169, 175, 188, 195, 201, 208
 attenuation, 119
 blue, 120, 143–4, 156
 far-red, 41, 143, 156
 high intensity, 155
 inhibition by, 142, 146, 154, 164,
 intensity, 41, 120, 145, 158
 low energy, 158
 near infra-red, 120
 promotion, 146, 154
 quality, 41, 223
 red, 41, 120, 143, 155–6
 red/far-red, 120, 144–5
 requirement for embryo, 78
 sun, 142
 ultra-violet, 120
 wavelength, 120
 white, 142–4, 156, 164
 Limondea, 4
 lipid
 layer, 82
 reserve, 105
 lodicules, 65
 Lolium, 4
Lolium multiflorum, 9, 150, 178
perenne, 8, 89–91, 150, 178
persicum, 9
rigidum, 9, 150
 spp., 133, 150
temulentum, 9
 Luziola, 5
 Lycurus, 5

 magnetism, 119
 maize, 22, 112
 male sterility
 cytoplasmic, 23
 maltose, 101, 110, 112, 171, 186
 manganese deficiency, 191
 Manisuris, 5
 mannitol, 143

 matric potential, 92, 114
 maturation
 stages of, 116
 mechanical restraint, 73, 78
 Melanocanna, 95
Melanocanna bambusoides, 83
 Melica, 4
 Meliceae, 4, 12
 Melinideae, 42, 66
 Melinus, 4
 Melocalamus, 83
 Melocanna, 83
Melocanna baccifera, 7
 membrane
 breakage, 84
 damage, 85
 integrity, 97, 156
 permeability, 92
 repair, 105
 semi-permeable, 89
 swelling, 91
 membranes, 97, 132, 141, 169, 208
 and lipids, 89
 mesocotyl, 188
 mesophyte, 42
 metabolism, 115, 120, 130, 154, 162
 anaerobic, 164
 carbohydrate, 171
 measurement of, 105
 methanol, 169
 methylene blue, 98
 Mibora, 4
 micropyle, 36, 89, 91
 microwaves, 119–20, 156
 Milium, 4
 millets
 African, 141
 barnyard, 23
 Broomcorn, 23
 brown top, 14
 brown corn, 24
 bullrush, 25
 cat-tailed, 25
 finger, 24
 foxtail, 23, 141
 hog, 24
 Japanese, 23
 Japanese barnyard, 26
 Koracan, 24
 pearl, 23
 proso, 23–4
 spiked, 25

Index

- Mimosa invisa*, 33
 Mirochloa, 5
 Mirostegium, 5
 Miscanthus, 5
 mitochondria, 168
 model
 of autonomous seed, 219
 of energy flow, 218–19
 of oxygen flow, 219–22
 of water flow, 219
 topological, 57
 modelling
 the ‘black box’ approach, 218
 seed behaviour, 228
 Molinia, 5
 Monanthochloe, 5
 monoecism, 37
 monosaccharides, 95
 mucilage, 83, 91
 Muhlenbergia, 5
 Munroa, 5
- Nardeae, 4
 Nardus, 4
 Nasella tussock, 12
 Neeragrostis, 5
 Neostaphia, 5
 night
 length, 120
 nitrate, 100, 155, 170, 192, 199
 ammonium, 185, 190
 calcium, 190
 calcium ammonium, 190
 ion, 39, 71, 189
 potassium, 85, 144, 164, 173, 185, 190
 salts, 189
 sodium, 99, 185, 190
 nitrite
 sodium, 185, 190
 nitrogen
 fertilizer, 189
 gas, 129, 131
 oxidized, 185
 Nonerma, 4
 Nonermeae, 4
 nutrients
 inorganic, 222
 medium, 96, 164
 solution, 102
- oat, 28, 95, 141, 190
 autumn-sown, 29
 hulls, 28
 late-maturing, 28
 wild, 30, 59, 78
 Ochlandra, 83
 Olmeca, 83
 Oplismenus, 4
 Orcuttia, 5
 Orcuttieae, 5
 organic acids, 99
 Oryza, 5, 11, 19, 118
Oryza glaberrima, 20, 161
 perennis, 167
 punctata, 76
 sativa, 20, 42, 63, 76, 81, 88, 92, 102,
 104–5, 111–2, 117, 119, 133, 137, 141,
 150, 153, 155, 161, 166–7, 169, 178,
 183–4, 187, 191–2
 Oryzaceae, 5, 42, 66
 Oryzoideae, 5
 Oryzopsis, 4
Oryzopsis hymenoides, 13, 76–7, 113, 117,
 137, 150, 178, 183–4
 miliacea, 150, 155
 osmotic potential, 181–2
 oxidizing agents, 79
 oxidation pathways, 168
 oxygen, 21, 69, 78–81, 93, 98, 104, 129,
 161–3, 167, 186, 213
 atmospheric, 81, 162
 availability, 83, 188
 diffusion, 71
 enrichment, 93
 partial pressure, 39, 83, 93, 112, 162,
 164–5, 168, 192
 solubility, 130
 uptake, 79, 81–2, 162–4, 168,
- palea, 37, 51, 65–6, 71, 74, 78–9, 86, 104,
 217, 224
Avena fatua, 68
Brachiaria decumbens, 71
Panicum turgidum, 71
 removal, 75
 Paniceae, 4, 37, 42, 66
 panicle
 Avena fatua, 60–1
 development, 122
 emergence, 62
 excision, 171
 maturation, 110
 morphology, 62
 Oryza sativa, 63

Index

- Poa pratensis*, 63
 Panicoideae, 4, 13, 192
 Panicum, 4, 19
Panicum anceps, 14, 24, 88
antidotale, 14, 24, 191
capillare, 169
clandestinum, 24
coloratum, 14, 24
crusgalli frumentaceum, 14
dichotomiflorum, 14, 24, 150, 169
fasciculatum, 151
maximum, 14, 19, 24, 33, 35, 71, 102,
 117–18, 137, 151, 158, 161, 179
mesquite, 14
miliaceum, 14, 23–4
obtusum, 24
philopogon, 14, 24
ramosum, 14, 151, 179
repens, 33
 spp., 165
texanum, 14
turgidum, 14, 24, 71, 151
virgatum, 14, 24, 151, 179
 Pappophoreae, 5
 Pappophorum, 5
 parameters
 of root behaviour, 210
 Parapholis, 4
 Paspalidium, 4
 Paspalum, 4
Paspalum anceps, 13
conjugatum, 33
dilatatum, 13, 179
distichum, 13, 33, 35
notatum, 13, 88, 179
 Pennisetum, 4, 135
Pennisetum americanum, 25
ciliare, 15, 26
clandestinum, 15
glaucum, 24–5, 151
macrourum, 15
pedicellatum, 15, 25
polystachyon, 15
purpureum, 15, 26
 spp., 133
typhoides, 15, 24–5, 88, 179
 pentose phosphate pathway, 98, 172
 perennials, 132
 pericarp, 37, 45, 51, 72–4, 78, 83, 87, 89–91,
 141
 pH, 99
 Phalarideae, 42, 66
 Phalaris, 4
Phalaris arundinacea, 10, 88, 118, 151,
 179
minor, 10
 spp., 179
tuberosa, 10, 151, 179
 Phareae, 5, 42, 66
 Pharus, 5
 phenolics, 23
 phenotype, 107
 Phippsia, 4
 Phleum, 4
Phleum pratense, 10, 133, 151, 166, 179
 phospholipid
 turnover, 97
 phosphorous, 222
 phosphorylation
 oxidative, 168
 photoperiod, 62, 68, 142–3, 157–60, 222–5
 cyclical, 156
 short, 156–7
 photoperiodism, 119, 156–9
 photosynthesis, 222
 Phragmites, 5
 phthalimides, 109
Phyllanthus niruri, 35
 phytochrome, 41, 120, 143–6, 153, 155–8,
 205, 208, 223, 225
 Piptochaetium, 4
 Pleuropogon, 4
 ploidy
 di, 51, 107
 hexa, 107
 penta, 37, 51
 poly, 37
 tetra, 107
 tri, 51, 107
 Poa, 4, 118
Poa annua, 9, 33–5, 118, 136–8, 151, 158–9
capillata, 118, 151
compressa, 9, 151, 166
fertilis, 9
nemoralis, 179
palustris, 9
pratensis, 9, 63, 86, 88, 138–40, 152, 155,
 179
secunda, 118
trivialis, 9, 152, 179
 plantlet, 67
 pollination, 107, 224, 227, 229
 polygamy, 37
Polygnum aviculare, 33

Index

- convolvulus*, 33, 36
lapathifolium, 33, 36
 polymorphism, 3, 62, 69, 77, 121, 141, 144, 160
 Polypogon, 4
 population, 40–1, 72, 97, 121, 132, 138, 156, 158, 160, 162–6, 175, 188, 191–2, 198, 200, 202
 genetically heterogeneous, 95
 non-dormant, 128
 triallate resistant, 193
Portulaca oleracea, 33, 35
 potassium hydroxide, 169
 promoters, 54, 164, 170, 185, 216
 protein
 synthesis, 97, 173, 181, 202
 turnover, 97, 105, 199
 protoplasts, 100
 Puccinellia, 4

 quiescence, 43, 97

 radiation, 119, 156
 gamma, 156
 incident, 119
 magnetic, 156
 nuclear, 120
 sun, 114, 119
 X-ray, 156
 raji, 24
Raphanus raphanistrum, 33, 35
 Redfieldia, 5
 reductionism, 48
 Reimarochloa, 4
 respiration, 39, 83, 122, 144, 164–5, 168, 172, 192, 199, 205, 217, 222–3
 aerobic, 167
 anaerobic, 167, 169
 C₃ and C₄, 159
 cyanide sensitive, 168
 feed-back loops, 223
 pathways, 172
 residual, 99
 SHAM-sensitive, 168
 Rhynchelytrum, 4
 rice, 20, 47, 78, 95, 182
 and moisture, 21
 and oxygen, 21, 165
 and temperature, 21
 Chinese, 21
 cultivars, 39
 dehulled, 167–8

 dryland, 20
 glaberrima, 165, 178
 hulls, 21
 Indian, 21
 indica, 21, 165–8, 178
 Japanese, 21
 japonica, 21, 165, 167–8, 178
 javanica, 165, 178
 jungle, 26
 North American, 21
 paddies, 20
 panicle, 21
 perennis, 165
 peroxidase, 82
 pre-harvest sprouting, 21
 RNA, 173
 messenger, 174
 synthesis, 97
 turnover, 105, 109
Rottboellia exaltata, 33
Rumex acetosella, 35
 rye
 pre-harvest sprouting, 29
 ryegrass
 Italian, 9
 perennial, 8
 Wimmera, 9

 Saccharum, 5, 19
Saccharum aegyptiacum, 30
 Sacciolepis, 4
 salicylhydroxamic acid (SHAM), 98–9
 salts
 neutral, 99
 scarification, 39, 93, 118, 141, 224
 acid, 71, 74, 188, 191
 chemical, 29, 84–7, 154
 mechanical, 29, 74, 85–7
 Schedonnardus, 5
 Schismus, 5
 Schizachne, 4
 Schizachyrium, 5
 Sclerochloa, 4
 Scleropogon, 5
 Scolochloa, 4
Scolochloa festucacea, 9, 166
 Scribneria, 4
 scutellum, 91–5, 100, 106, 181, 218, 227–8
 expansion, 85
 papillae, 85, 94–5, 101
 role of, 105
 Secale, 4

Index

- Secale cereale*, 29, 102, 112, 179, 184
silvestre, 12
 sedges, 34
 seed
 abscission, 49, 196, 198, 204–5, 229–30
 air-dried, 126
 autolysis, 115
 bank, 40–1
 buried, 119, 129, 188, 219, 222
 desiccation, 45, 51
 development, 121, 123, 131, 133–6, 141–2, 168
 dormant, 121, 136, 164
 freshly harvested, 125, 128, 136, 138, 162, 171
 hydration, 114, 126, 132
 maturation, 100, 110, 115, 123, 135, 138, 155, 157, 163, 196
 modelling, 208–9
 moisture content, 115, 129, 136, 156, 168
 mortality, 188
 non-dormant, 115, 121, 136, 142
 secondary, 62
 viability, 188
 selection pressure, 161, 188
Senecio vulgaris, 36
 senescence, 156
 sequential changes, 204
 Setaria, 4
Setaria anceps, 15
 chevalieri, 14, 25
 faberii, 14, 25, 118, 138, 152, 192
 glauca, 33, 35, 187
 italica, 15, 23, 25
 lutescens, 15, 25, 76, 88, 102, 112, 161, 179
 macrostachya, 15, 25
 spp., 133
 verticillata, 36
 viridis, 14, 25, 152, 179
Sida rhombifolia, 35
 Sieglingia, 5
Sinapis arvensis, 33, 35
 Sitanion, 4
 sleep, 43
 sodium dodecyl sulphate, 97
 sodium hypochlorite, 84
 soil, 187, 195
 acid, 191
 additives, 190
 and seed viability, 70
 basic, 191
 clay, 40
 composition, 187, 189
 cultivation, 191
 daily maximum temperature, 119
 density, 223
 drying, 115, 222
 heavy, 115
 loamy, 189
 microorganisms, 187
 moisture, 39, 115–16, 222
 excessive, 189
 neutral, 191
 oxygen, 187
 pH, 187, 191
 sandy, 189
 surface, 40, 114, 119–20, 143, 158, 221–2
 temperature, 119, 187
 texture, 187
 transmissivity, 119
 type, 189
Solanum nigrum, 33, 35
 solute
 penetration, 89
 permeability, 91
 potential, 85, 91–2, 106
Sonchus arvensis, 33, 35
 Sorghastrum, 5
Sorghastrum nutans, 5, 15, 137, 152, 154
 Sorghum, 5, 19, 22, 111, 118
Sorghum bicolor, 22, 88, 112, 118, 137–8, 179, 183
 guineensa, 15
 halapense, 15, 19, 23, 33–5, 88–9, 91, 152, 154, 180
 intrans, 15
 nutans, 180
 plumosum, 76, 137, 180
 stipoides, 15, 76, 137, 180
 vulgare, 88, 186
 characteristics, 22–3
 Spartina, 5
 Sphenophlis, 4
 spikelet, 37, 60, 66, 112, 182
Aegilops, 64
Avena fatua, 60–1
 barley, 64
Oryza sativa, 63
Poa pratensis, 63
 structure, 65
Triticum aestivum, 63–4
 Sporoboleae, 42
 Sporobolus, 5, 37, 83

Index

- Sporobolus contractus*, 152
cryptandria, 137
elongatus, 17
flexuosus, 153
giganteus, 153
vaginiflorus, 17
wrightii, 153
- sprouting
 pre-harvest, 20–3, 28–9, 51, 95, 103, 116, 181
 resistance to, 104
- starch
 granules, 171
 hydrolysis, 101
 reserves, 105, 173, 203
- state
 parameters, 208
 variables, 208–10, 213, 217–19, 223, 227–8
- states
 light-dark, 227
 metabolic, 199
 of dormancy, 224, 226
 of mind, 209
 potentially observable, 215–16
 stable sub-, 209
- Stellaria media*, 35
- Stenotaphrum*, 4
- Stipa*, 4
- Stipa bigeniculata*, 12, 153, 180, 183
capillata, 12
columbiana, 118
joannis, 12
lettermani, 118
leucotricha, 12
neaei, 12
poaceae, 12
 spp., 42
stenophylla, 12
trichotoma, 12
variabilis, 12
viridula, 12, 76, 79–80, 118, 153, 180, 187
- Stipeae, 4, 42
- stratification, 77, 81, 196, 217
- sucrose, 95, 101, 104, 110, 112, 171
- sugar, 96, 98, 104, 106, 181
 cane fuzz, 30
 reducing, 109
- sugarcane, 30
- sulphate
 ammonium and potassium, 190
- Swallenia, 5
- symbols
 energy circuit, 223
- synchronism, 230–1
 in development, 203–4
- synchronization
 by environment, 205
 of physiological units, 229
- synergism
 sugar-gibberellin, 171
- systems
 adaptability, 208
 analysis, 53–4, 57, 206
 attitude, 197
 biological, 209
 concepts, 48
 constraint, 212
 dormant, 215
 energy flow of, 223
 hierarchy of, 53
 language, 218
 modelling, 223
 network, 198
 non-dormant, 215
 perspective, 197, 202, 207
 plant-environment, 49, 55
 seed, 199, 217–18, 230
 seed-environment, 197, 206, 224, 227–8, 231
 determinate, 213
 stability, 207
 sub-units, 231
- Taeniatherum, 4
- Teff, 16
- temperature, 25, 39–41, 62, 68, 114, 121, 125–6, 133, 142, 157, 160, 195, 201, 218, 228–30
 alternating, 23, 71, 74, 134–41, 154–5, 161, 163, 204–5
 and metabolism, 227
 constant, 136, 155, 161, 204
 cyclical, 158
 day/night, 123, 125
 diurnal variation, 204, 222
 extremes, 203
 fluctuating, 106, 188
 high, 81–2, 100, 104, 110–11, 116, 119, 121, 123, 126, 128–32, 135–8, 143–5, 154–5, 204, 222, 225, 229–30
 inhibitory action, 124
 lethal, 132

Index

- temperature (*cont.*)
 low, 22–3, 69, 74, 100, 104, 109–10, 115, 119, 121, 123–4, 126, 128–9, 132, 134–5, 137, 141, 155, 158, 164, 196, 204–5, 223, 225, 229
 night, 121
 of seed storage, 138
 optimum, 45, 114–15, 121, 128,
 prior to anthesis, 122
 regimes, 136
 seasonal variation, 204
 soil, 153
 sub-zero, 143
 synchronizing influence of, 229
 testa, 51, 72, 83, 87, 89–90, 118
 tetrazolium, 39, 163
Themeda australis, 76, 137, 153, 180, 183
triandra, 181–2
 thiourea, 174, 182, 185, 190
 Trachypogon, 5
 Tragus, 5
 traits
 co-adaptive, 109
 heritable, 98, 103
 triallate, 193–4
 Trichloris, 5
 Trichoneura, 5
 Tridens, 5
 Triplasis, 5
 Tripogon, 5
 Tripsacaceae, 42
 Tripsacum, 5
 Trisetum, 4
 triterpenoid glycoside, 186
 Triticale, 133–4, 156, 183
 Triticeae, 4, 11
 Triticum, 4, 19, 95
Triticum aestivum, 19, 63, 89, 102, 112, 116, 118, 133–4, 137–8, 153, 156, 180, 182, 184, 187
durum, 102
 florets, 64
vulgare, 180
 turkey manure, 186

 Uniola, 5
Uniola paniculata, 89, 112, 187
 Uniolaeae, 5
 urea, 185, 190

 Vaseyochloa, 5
 Ventenata, 4

 vernalization, 141, 157–8, 205
 viability, 38–9, 106
 vitamins, 96
 vivipary, 7, 28, 39, 67, 103, 184, 224
 Vulpiea, 4

 water, 40, 45, 89, 102, 142, 195, 201, 203–4, 213, 222, 228–9
 aerated, 93
 availability, 85–6, 217
 capacity of soil, 115
 deficit, 116
 free energy of, 120
 liquid phase, 114–19
 -logging, 188
 movement, 54
 penetration, 85, 89
 potential, 85, 91, 116, 164, 181, 199, 219
 status, 116, 210
 stress, 28, 41, 114–5, 143, 225, 229
 table, 188–9
 temperature interaction, 114
 transport, 78
 uptake, 68, 71, 73, 78–9, 82, 86, 91–3, 97, 105, 112, 114–15, 121, 143, 162, 173, 197, 205, 224
 weeds, 25–6, 34, 141
 global, 33–5, 39
 ranking of, 35
 wetting, 93, 103, 106, 115–16, 118, 129, 189, 204–5
 wheat, 19, 47, 59, 95, 103, 111–12, 135, 141, 181
 American, 64
 European, 63
 wild rice, 29
 Willkommia, 5
 wounding, 85

 xerophytes, 42

 Zea, 5, 19, 95
Zea mays, 22, 37, 102, 105, 134, 180–1, 183–4, 187, 192
perennis, 22, 180
 and inhibitors, 22
 and light, 22
 pre-harvest sprouting, 22
 secondary dormancy, 22
 zeatin, 173–4, 183
 glucoside, 181

Index

- riboside, 173, 181
- Zizania, 5, 95
- Zizania aquatica*, 29, 37, 42, 77, 89, 92, 102, 113, 166, 180, 183–4, 188
- Zizaniopsis, 5
- zones
 - Africa, 160
 - alpine, 42
 - Americas, 159
 - Australasia, 159
 - Australia, 160–1
 - climatic, 42
 - cool temperate, 42
 - Denmark, 161
 - England, 160
 - Eurasia, 159
 - Europe, 160–1
 - geographic, 31, 42, 145
 - India, 160
 - Israel, 160
 - Japan, 160
 - latitudinal, 157
 - Mediterranean, 19, 34, 159–60
 - meso-America, 19
 - monsoon, 42
 - Russia, 160
 - Scotland, 136
 - semi-arid, 42
 - southern Africa, 159
 - sub-tropical, 7, 42
 - temperate, 119, 158–9
 - tropical, 7, 34, 42, 119, 158–60
 - USA, 161
 - West Africa, 161
 - Western Australia, 160
- Zoysia, 5
- Zoysia japonica*, 153, 180
- Zoysieae, 5, 42, 66
- zygote, 36–7, 39, 46, 49, 107