# Index

acacia 62, 250
acidity 2, 20, 23, 35, 36, 51, 59, 66, 153, 154,165
Acrisol 6, 98, 105
*Actinomycetes* 58, 64
African Fertilizer Summit 1, 15, 23, 68
  agricultural production 53, 139
  agricultural value chain 11, 210
agro-dealers 140, 186, 204
agroforestry options 75
agro-industrial by-products 43, 44, 254
agro-mineral 31-39
  mining 38
  processing 38
  sources 31-36
agronomic efficiency (AE) 18-21, 49-51
alley farming 6, 7, 40
aluminum 153
anectic feeding 55, 59
Arbuscular Mycorrhizal Fungi (AMF) 54, 62

banana 62, 109-111
Benin 10, 32, 44, 48, 61, 93, 104
best bet technologies 68, 92, 136, 162, 163
best management 38, 81, 158, 210
biological nitrogen fixation (BNF) 52-54
boron (B) 122, 123, 125, 127
*Bradyrhizobium* 53, 61, 153
bunds 83
Burkina Faso 8, 32, 79-85, 87, 89, 159, 193
burning 42, 76, 83, 98, 114, 116, 119, 125, 154
bush fallow 98, 99, 100, 111

calcium (Ca) 22, 24, 34, 35, 104, 122, 123, 124, 125, 152, 180, 213
calcium ammonium nitrate (CAN) 24, 30, 35, 136, 156, 159
Cameroon 32, 79, 98, 100, 111, 206
capacity building 5, 141, 184-189, 191, 192, 194, 196, 197, 200, 216
  farmer 143, 189-191
  institutional 141-143, 185-189
  primary school 184
  research system 143
  scientific 187-189
  secondary school 184
  university 188
carbon (C) 13, 16, 47, 49, 52, 53, 83, 98, 113, 117, 122, 129, 131, 132, 153, 157-161, 175, 188, 198, 211
cash crop 4, 11, 24, 26, 27, 89, 90, 94, 105, 109, 134, 136, 142, 159, 167, 168, 173, 206, 207
*Casaurina* 53, 54
cassava 100-105
  management 100-102
  nutrient requirement 102-104
  production 101-102
cation exchange capacity (CEC) 80, 83, 104, 125
Center of Excellence 143, 215, 216
Central Africa 88, 97, 100, 111
clay 80, 83, 97, 110, 124, 153
climate 29, 31, 40, 68, 73,74, 76, 78, 81, 82, 88, 89, 100, 104, 107, 117, 131, 133, 157, 160, 198, 211
cobalt (Co) 122, 123, 127
cocoa 97, 159
coffee 4, 26, 43, 45, 56, 65, 88, 97, 136, 159, 189, 196
Cambisol 79, 97
common bean 53, 102, 103, 115, 154, 179
compost 8, 20, 30, 37, 46-49, 65, 66, 74, 77, 84, 82, 90, 91, 95, 109, 110, 136, 155, 169
  fortified 20, 37, 47, 48
  principles 47
compound fertilizer 65, 66, 134
Conservation Agriculture (CA) 112-120
  advantages 117
  practices 113-116
  principles 113-116
  shortcomings 118-120
  transition to 117, 118
conservation tillage 113, 212
contour structures 82, 152, 155
copper (Cu) 122, 123, 126, 130, 136, 137
Cote D'Ivoire 32, 58, 105 110, 111
cover crops 69, 71, 72, 77, 100, 114
cowpea 43, 53, 68, 81, 89, 91-94, 102-104, 110, 115, 153, 178, 179, 206, 208
crop
  diversification 11
  livestock interactions 71, 90, 94
  productivity 7, 13-15, 37, 66, 81, 83, 85, 102, 111, 123, 156, 161, 179, 206
  residues 44, 45, 49-51
  rotation 58, 74, 77, 106, 112, 114, 118, 119
  sequencing 114, 115

decision-making 133, 167, 168, 169, 180 190, 214
decomposition 47-49, 52
development agendas 27, 105, 175, 186, 196, 197, 211, 215
diagnosis 27, 110, 122, 123, 128, 131, 132, 154, 164, 188, 190
  approaches 127
  field test strips 127-128
  laboratory analysis 129-131
  models 131-132
  non-test factors 131
  soil analysis 128-131
  surveillance 164, 165
  test kits 128-129
diammonium phosphate (DAP) 24, 30, 35, 47, 48, 136, 137, 159, 170, 187
dolomite 30, 31, 34, 35, 147, 159, 213
drought 17, 28, 29, 54, 63, 72, 79-81, 83, 85, 88, 106, 109, 127, 134, 136, 143, 154, 156, 212
drylands 29, 81, 82, 86, 117, 158, 178

earthworms 48, 59, 62, 63
East Africa 26, 33-35, 67, 88-90, 95, 109, 206
economic incentives 195
egusi melon 99

endogeic feeding 55
environmental
benefits 51, 112, 117, 119
degredation 80
impacts 36, 39
epigeic feeding 48, 55, 59, 63, 170
extension agents 131, 172

farm
associations 184, 185
ergonomics 172-174
households 25, 74, 86, 96, 138, 143-145, 156, 174, 177, 182, 192, 194, 195, 206
input supply 13, 14, 16, 23, 24, 33, 65, 67, 69-71, 84, 142, 144, 146, 186, 187, 195, 201, 208, 217
labor 83, 167, 168, 172
occupational safety 174-175
farmer organizations 25, 37, 107, 128, 134, 140, 144-146, 151, 171, 184, 200, 208
farming systems 16, 20 44, 45, 53, 59, 70, 76, 78, 81, 95, 99, 111, 112, 134, 139, 146, 155, 157, 160-162, 174, 179, 197, 199, 211, 214
feeding behavior 55
feldspar 35
Ferralsol 97, 98, 103
fertilizer
adoption 25, 26
adulteration 22
advice 17, 130, 137
application 13, 26, 29, 46, 50, 51, 71, 72, 84-86, 115, 154, 160, 162, 180, 187, 206, 213
blends 84, 137, 146, 182, 187
broadcast 84
cost 136
consumption 22, 23, 81, 89, 134, 150
forms 65
guidelines 131
imports31, 133
inputs 20, 21, 25, 29, 38, 136, 151
management 22, 25, 70, 108, 127, 181, 205
marketing 25, 137, 170, 205
prices 24, 67, 68, 122, 150, 151, 160
quality 27, 28
recommendation 22-30
repackaging 143, 206
response 128, 133, 137, 157, 162
flooding 109, 117, 161
forest margin 76-78, 80, 104
fungi 54, 56, 59, 62, 65, 103, 111, 124, 154

gender equity 174-176
geographic information systems (GIS) 164, 188, 189, 214, 216
Ghana 32, 89, 98, 101, 102, 104, 111, 118, 136, 159, 168, 186
grain legume 44, 53, 68, 70, 73, 93, 110, 193, 196
grassland 22, 44, 79, 88, 158
grazing 40, 44, 71, 72, 77, 90, 94, 95, 119, 194
green manure 24, 44, 46, 48, 49, 53, 72, 73, 100, 106, 109, 114, 125
Green Revolution 17, 133, 139, 167, 199

groundnut 20, 35, 43, 53, 68, 81, 89-92, 99, 102, 104, 110, 115, 142, 146, 169, 179, 180, 208, 212
guano 32, 34, 36, 39, 65, 66
Guinea savanna 50, 58, 88, 93, 94, 159
Guineo-Congolian forest 88, 97
gypsum 31, 34, 35, 126, 137, 147, 213

half moon 29, 82
hand
shelling 42, 148, 173, 204
tools 75
weeding 106, 120, 147, 173
household
food security 203, 211, 227
nutrition 44, 68, 69, 102, 172, 177, 178
highlands 61, 88, 208
hired labor 61, 88, 208
human disease 67
human resource development 38
humid forest zone 78, 97-100, 105-109, 111

improved fallow 15, 29, 44, 77, 90, 95, 99, 109, 111, 112, 115, 120
India 32, 62, 63, 93, 117, 172, 178
indigenous nutrient supply 108, 212
igneous deposits 33, 212
inoculant 37, 54, 57, 58, 60-62, 65-67, 71, 72, 94, 96, 146, 173, 210-212, 217
Integrated Pest Management (IPM) 102, 111
Integrated Soil Fertility Management (ISFM)
adoption 144, 145, 149-152, 197, 211
packages 74, 144, 146, 147, 151, 205
paradigm 15, 16, 217
products 65-78, 96, 151, 216
promotion 146, 151, 178, 197, 201
principles 50, 76, 79, 105, 135, 214, 216
policies 194, 196
strategy 106, 211-217
investment 6, 10, 11, 104, 105, 196
iron (Fe) 34, 57, 107, 126, 129, 130, 181
irrigation 81, 106-108, 133, 195

Kenya 20, 23-26, 32-34, 36, 38, 44, 47, 50, 53, 58, 61, 63, 67, 85, 88-91, 101, 109, 130, 131, 133-137, 147-149, 159, 162, 169, 177, 178, 191, 194, 198, 201-208

*Lablab* 43, 68, 69, 72, 146, 179, 182
land
conservation 13, 150
reclamation 107
laboratory
analysis 129-132
rehabilitation 189
leaching 46, 49, 75, 106, 124-126, 146, 155, 156, 158, 160, 165
legume
intercrop 20, 72, 73, 77, 90, 91, 95, 186, 203, 204, 212
production 52, 70, 73, 88, 95, 211
varieties 53, 93, 95, 96, 193
lignin 40-43, 45-47
limestone 30-32, 34, 38, 63, 96, 73, 117, 134, 137, 147

liming 34, 35, 85, 104, 124-127, 169
litter 43, 46, 55, 63, 73, 83, 169
livestock manure 40, 45, 78, 85, 110, 120, 134, 145, 181, 194, 208
livestock-crop interactions 71, 72
lowland rice 106-109
Luvisol 79, 97, 98, 104

magnesium (Mg) 22, 26, 30, 34, 36, 43, 47, 80, 98, 104, 111, 125, 129, 130, 135-137, 181
Malawi 32, 35, 44, 84, 88, 89, 93, 101, 134, 136, 137, 168, 193, 194, 197, 201, 206
Mali 31-33, 79-81, 84, 87, 92, 105, 159, 162, 206
manganese (Mn) 107, 126, 129, 130, 137
manure
  application 29, 49
  collection 81
  management 46, 74, 81, 154, 155, 173
  quality 72, 77, 95
  storage 95
market
  access 25, 90, 148, 201, 207, 212
  bottlenecks 200, 201
  compartmentalization 199-201
  development 33, 139, 168, 195, 200, 201, 211
  information 200, 202, 207-209
  input-output 195, 198-201, 207
  linkage 86, 140, 167, 194, 195, 201, 205-207, 211, 216
market-led extension 193, 207-208, 215
marketing associations 148, 185
micro-dosing 28, 71, 84, 86, 87, 147, 205, 206, 211, 212
microbial biomass 47, 118, 153
microsymbiont 52, 58, 153
Millenium Development Goals (MDG) 175-176
millet 79-89, 92, 136, 150, 162, 178, 205
millipedes 54, 55, 62, 63
mineralization 18, 40, 52, 54, 76, 110, 113, 117, 119, 188
minimum tillage75, 175
Minjingu mine 34
models 108, 122, 131, 132, 134, 165, 185, 213, 214
molybdenum (Mo) 126, 127, 137, 122, 123
Mozambique 32, 87, 89, 93, 101, 134
*Mucuna* 43, 44, 61, 72, 104, 106, 115
mulch 110, 11, 114, 117, 119, 120
Mycorrhizae 62

Niger 32, 79-87, 92, 107, 139
Nigeria 26, 32, 50, 53, 57, 59, 79, 89, 92-94, 98, 100-105, 111, 136, 168, 172, 195, 198, 206, 208, 212
Nitisol 27, 157
nitrogen (N) 122-124
  availability 85, 123, 146
  deficiency 105, 124, 125, 126
  depletion 53
  fertilizer 28, 36, 56, 66, 74, 106, 146, 155, 156
  management 108, 146
  top-dress 71, 72, 115, 126, 156, 173, 211
nodulation 15, 53, 58, 59, 60, 61, 65, 68-71, 74, 93, 123, 127, 153, 155
no-till 119, 120
nutrient
  acquisition 52, 59, 65, 74
  allocation 97-99
  availability 16, 26, 49, 57, 75, 119, 124
  balance 92, 134, 159, 161, 181, 196, 207
  cycling 15, 16, 104, 129, 198
  concentration 33, 40, 45, 46, 49, 122, 212
  deficiency symptoms 123, 127, 152, 155
  depletion 3, 13, 16, 37, 89, 102, 104, 107, 109, 111, 130, 135, 143, 158, 160, 162, 214
  disorders 123, 136
  elements 122
  loss 17, 19, 37, 71, 77, 83, 95, 100, 102, 103, 108, 156, 170, 213
  management 13, 17, 29, 30, 82, 83, 105, 108, 111, 175, 185, 186, 213
  recycling 5, 42, 55, 71, 72, 76, 77, 90, 94, 95, 95, 104, 110, 111, 119, 120, 153, 154
  replenishment 37, 38, 68, 91, 130, 147
  retention 18, 30, 50, 75, 79, 83, 115
  requirement 18, 19, 27, 38, 49 130
  supply 7, 13, 14, 26, 36, 52, 106, 108, 110, 131, 133, 135, 212
  use efficiency 7, 9, 10, 13, 14, 50,71, 74, 105, 108, 118, 129, 131, 157, 160

operations 46, 76, 83, 144
organic
  farming 76-78, 117
  fertilizer 6, 7, 28, 37, 49, 52, 53, 119, 136, 169, 170, 207
  resource allocation 51
  resource management 13, 25, 40-51, 78, 83, 85, 105, 133, 134, 137, 154
  resource quality 40-42

paradigm 14-16, 211, 217
partnership 67, 94-96, 141, 175, 197
peat 32, 36, 39
pests 17, 52, 61, 62, 68-70, 102, 106, 108, 109, 110, 115, 116, 128, 133, 154, 187
pH 30, 35, 54, 57, 65, 66, 75, 80, 104, 107, 124, 125-127, 129, 147, 152, 153, 159, 213
phosphate rock 31, 33, 36, 37, 38, 85, 212
  sources 31-34
phosphorus (P)
  availability 37, 50, 85, 124
  deficiency 33, 103, 104, 214.
  fertilizer 9, 26, 31, 50, 59, 92, 103, 162
  immobilization 22
pigeon pea 53, 89, 90, 92, 93, 102, 104, 115, 178, 179, 182
plant
  deficiency symptoms 127, 152
  disease 57, 109
  growth promoting bacteria 56, 57
plantain 99, 100, 104, 109, 207
policy
  formulation 189, 193, 196, 197
  platforms 196
  realms 193-195

policymakers 16, 70, 71, 141-143, 187, 192, 193, 198, 214
pollution 13, 49, 158, 160
polyphenol 40, 41, 43, 46, 47
potassium (K) 122-124
  cloride (KCl) 30, 35, 37, 130, 136
  deficiency 35, 124, 125
  fertilizer 106, 109, 110, 111, 125, 136,
poverty reduction 175, 197, 199, 201, 216
project design 144-156
  clients 149-151
  costs 149-151
  impacts 144, 149-151
public-private partnership 95, 96
pumice 32, 36, 65, 66
pyrite 31, 34, 35

quality control standards 147, 189, 193, 201-204, 210

rainfall 8, 10, 22, 23, 46, 72, 73, 79-83, 86, 88, 89, 97, 98, 103, 105, 106, 116, 117, 127, 138, 146, 148, 156, 160
  bimodal 24, 73, 74, 88, 97, 116
  mono-modal 72, 73, 79, 88, 146
recommendation domains 23, 162, 214, 215
resource endowment 13, 15, 17, 24-28, 74, 89, 160-163, 177, 178, 213
relay cropping 106, 114
*Rhizobium* 52, 56, 58, 60
rice 105-109
riparian strips 152, 155
root
  disease 69, 155
  disorders 154
  nodules 52, 53, 56, 58, 60, 109, 123, 127, 153
rural development
  agenda 27, 175, 186, 211, 215
  projects 168, 188
  specialist 3, 34, 134, 167, 174, 192, 216
Sahelian
  countries 81
  drylands 79, 80
  soils 80, 83
salt peter 35, 36
sand dunes 53, 54
savanna 5, 91, 92
sedimentary deposits 33, 34, 38, 85, 212
seed systems 3, 95, 196, 198, 211, 216
semi-arid 79, 80, 81, 86, 87
Senegal 31-34, 53, 61, 79, 80, 83
*Sesbania*
  *rostrata*53, 109
  *sesban* 43
shifting cultivation 94, 97-100
simulation model 108, 122, 131, 132, 214
slash-and-burn 7, 76, 98, 99, 111
slope 5, 75, 76, 83, 155, 174
smallhold farming 3-6, 24, 25, 119, 184
socioeconomics 135, 138, 163, 164

soil
  acidity 5, 19, 22, 34, 35, 50, 65, 66, 152, 153, 155, 164
  aggregation 117
  bacteria 35,57
  biology 40, 51
  biota 21, 52-63, 113, 117, 118, 188
  compaction 55, 113, 116
  conservation 9, 28, 75, 76, 83, 152, 176, 186, 198
  degradation 13, 62, 112, 158, 162, 164, 165, 206
  density 116
  engineers 54, 59, 153
  erosion 16, 21, 34, 52, 75, 83, 102, 111, 114,
  macrofauna 42, 54, 59, 110, 114, 153, 155
  nutrient depletion 16, 89, 130, 192, 214
  restoration 118, 160
  structure 50, 52, 118
solubolization 57-59, 73, 153
sorghum 8, 43, 56, 79, 81, 82, 84, 85, 86, 87, 89, 90, 92, 103, 118, 136, 178
Southern Africa 3, 23, 53, 55, 60, 61, 79, 80, 84, 88, 89, 92, 105, 157, 186, 208
soybean 93-96, 180, 182, 197, 206, 212
*Striga*
  infestation 91, 154, 155
  management 20, 29, 154
stakeholder 67, 184, 185, 191, 195
stone lines 81, 83
stover 42, 43, 47, 48, 72-74, 114, 116
stubble 44, 71-73, 77, 114, 117-119
sub-humid 61, 72-74, 88, 95, 116
Sudan 32, 36, 79-81, 159
sulphur (S) 26, 31, 35, 104, 147
sustainability 10, 16, 17, 45, 63, 113, 140, 175
sylvite 35

Tanzania 24, 31-34, 44, 58, 88, 93, 101, 105, 109, 134, 136, 194
technology
  adoption 99, 143, 146, 174, 207, 215
  dissemination 140, 182, 184, 185, 197, 200, 215
  evaluation 11, 136, 215
  refinement 141
  sparks 211
termite mounds 42, 55, 75, 169
tether grazing 71, 72, 77
tied ridges 9, 72, 82
Togo 10, 32, 34, 37, 206
toxicity 19, 50, 107, 127

Uganda 23, 31, 32, 34, 35, 61, 88, 89, 91, 109, 110, 169, 207
upland rice 105-106
urea 9, 20, 24, 30, 35, 37, 49, 71, 74, 84, 124, 136, 137, 146, 156, 159

value addition 177
vegetable 28, 177-179, 206, 212
vermicompost 48, 49, 63
vermiculite 32, 36, 65, 66
Vertisol 27, 79, 157
vocational training 184

water
conservation 28, 29, 36, 82, 84, 87, 212
harvesting 8, 14, 29, 82, 84, 119, 147, 186, 198
hyacinth 43, 45
holding capacity 5, 80, 83, 117, 153
infiltration 29, 50, 55, 83, 113, 114
quality 16, 152, 175
storage 52, 65, 85
water logging 83, 109, 120, 123, 124, 127, 152, 154
West Africa 8, 9, 22, 23, 41, 44, 68, 83, 85, 87, 88, 89, 91-95, 97, 103-105, 107, 157, 206- 208
women farmers 93, 167, 168, 171, 172
woodlands 88-96, 55, 78, 80, 169

*zai* pits 8, 29, 82, 85-87
Zambia 31, 32, 34, 58, 85, 89, 98, 118, 134, 136, 181
Zimbabwe 22, 32, 34, 35, 44, 50, 51, 58, 84, 86, 87, 89, 94, 119, 134, 137, 169, 172, 181, 198, 206
zinc (Zn) 5, 107, 126, 130, 137, 181