

Brassica information kit

Reprint – information current in 2004



REPRINT INFORMATION – PLEASE READ!

For updated information please call 13 25 23 or visit the website www.deedi.qld.gov.au

This publication has been reprinted as a digital book without any changes to the content published in 2004. We advise readers to take particular note of the areas most likely to be out-of-date and so requiring further research:

- Chemical recommendations—check with an agronomist or Infopest www.infopest.qld.gov.au
- Financial information—costs and returns listed in this publication are out of date. Please contact an adviser or industry body to assist with identifying more current figures.
- Varieties—new varieties are likely to be available and some older varieties may no longer be recommended. Check with an agronomist, call the Business Information Centre on 13 25 23, visit our website www.deedi.qld.gov.au or contact the industry body.
- Contacts—many of the contact details may have changed and there could be several new contacts available. The industry organisation may be able to assist you to find the information or services you require.
- Organisation names—most government agencies referred to in this publication have had name changes. Contact the Business Information Centre on 13 25 23 or the industry organisation to find out the current name and contact details for these agencies.
- Additional information—many other sources of information are now available for each crop. Contact an agronomist, Business Information Centre on 13 25 23 or the industry organisation for other suggested reading.

Even with these limitations we believe this information kit provides important and valuable information for intending and existing growers.

This publication was last revised in 2004. The information is not current and the accuracy of the information cannot be guaranteed by the State of Queensland.

This information has been made available to assist users to identify issues involved in brassica production. This information is not to be used or relied upon by users for any purpose which may expose the user or any other person to loss or damage. Users should conduct their own inquiries and rely on their own independent professional advice.

While every care has been taken in preparing this publication, the State of Queensland accepts no responsibility for decisions or actions taken as a result of any data, information, statement or advice, expressed or implied, contained in this publication.



Queensland Government



INDEX

A

acid soils 160
 action threshold 194
 agricultural booksellers 287
Agrotis spp. 210
 Agsafe 25
 air-blast sprayer 52
Albugo candida 230, 271
 ALGA 258
 alternaria
 thiram treatment 235
Alternaria brassicicola 20, 148, 230
 alternaria seedling blight
 hot water treatment 233
 alternaria spot 19, 20, 230
 amaranthus 48, 242
Apanteles 219
Aphanomyces raphani 271
 aphids 17, 52, 55, 150, 189, 220
 control of 214
 guidelines for spraying 196
 monitoring for 191, 214
 natural enemies 198
 parasitised 219
 turnip mosaic virus 232
 apple of Peru 238
 Approved Supplier Program 30, 107
 AQIS 32, 73
 AQIS Certification Assurance 109
 AQIS offices 284
 AS2507-1998 standard 25
 assassin bugs 198
 Atomic 16
 Australian Centre for Agricultural Health
 and Safety 115, 149

Australian Insecticide Resistance Action
 Committee 216

AUSVEG 113

Avcare 258

B

B. juncea 263
B. napus 263
B. oleracea 263
B. rapa 263
 Babylon 16
Bacillus thuringiensis
 19, 52, 57, 198, 206, 298
 centre grub control 210
 control of cabbage white butterfly 211
 DBM resistance to 216
 bacterial diseases
 monitoring for 191
 bacterial head rot 19, 55
 control 231
 problems 64
 bacterial head rots 57, 189, 231
 bacterial leaf diseases 57
 bacterial leaf scald 136, 149, 227
 hot water treatment 233
 bait stations 58
 ballhead cabbage 127
 packaging 66
 bana grass 41
 barley 44
 bed forming 46
Bemisia tabaci 212
 beneficial insects 218
 suppliers 280
Bidens pilosa 239

- biological control 197
 - diamondback moth 205
 - heliiothis 208
- biological insecticides 198, 206
- birds 53
 - control of heliiothis 208
- bitter cress 119
- black leg 19, 148, 226
 - hot water treatment 233, 235
- black rot 19, 20, 52, 55, 133–137, 139, 141, 149, 150, 174, 188, 227
 - hot water treatment 233
 - monitoring for 191
- blackberry nightshade 238
- bolt tolerant 135
- boom sprayers 245
- boron 51, 156
 - deficiency 158
 - foliar fertiliser rates 165
- Botrytis* 230
- brassica
 - pest handy guide 304
- Brassica oleracea*
 - var. *botrytis* 120
 - var. *capitata* 120
 - var. *italica* 120
- Brassica tournefortii* 238
- Brassicaceae family 119
- brassicas, weed management 239
- Brevicoryne brassicae* 214
- broad-spectrum insecticides 19
- broadleaf weeds 54, 238
 - management of 242
- broccoli
 - average yield 63
 - bacterial head rots 231
 - calculating spacing 40
 - cooling and storage 64
 - ethylene damage 65
 - grading 66
 - gross margin 10
 - growth cycle 126
 - harvesting 61, 63
 - hot water treatment 233
 - ice pack 68
 - marketing 71
 - monitoring nutrients 166
 - packaging 66
 - pest handy guide 298
 - planting/harvesting times 35
 - producing/marketing costs 10
 - quarantine 72
 - seedlings 151
 - tensiometer irrigating 59
 - time to maturity 39, 131
 - transport 69
 - varieties 38, 128, 142
 - water requirements 173
 - yield/prices 8
- water requirements 173
- yield/prices 8
- brown bead 58
- brussels sprouts 120, 264
- buttoning 122
- C**
- cabbage
 - average yield 63
 - calculating spacing 40
 - control of aphids 214
 - control of thrips 212
 - cooling and storage 65
 - ethylene damage 65
 - grading 66
 - green varieties 133
 - growth cycle 126
 - harvesting 61, 63
 - heliiothis control 207
 - hot water treatment 233
 - marketing 71
 - monitoring nutrients 166
 - packaging 66
 - planting/harvesting times 35
 - quarantine 72
 - red varieties 137
 - savoy varieties 136
 - seedlings 151
 - sugarloaf varieties 135
 - tensiometer irrigating 59
 - time to maturity 39, 129
 - transport 69
 - turnip mosaic virus 232
 - varieties 38, 127
 - water requirements 173
 - yield/prices 4
 - zonate leaf spot 228
- cabbage cluster caterpillar 17
 - control 208
 - guidelines for spraying 196
- cabbage white butterfly 17, 55
 - control of 211
 - guidelines for spraying 196
 - monitoring for 191
- calabrese 128
- calcium 45
 - deficiency 157
 - fertigation amounts 164
 - management 154
- calculate the number of plants 41
- calibrating sprayers 252
- capacitance probes 179
- Cape Horn 38
- capital costs 83
- Capsella bursa-pastoris* 238
- carbamate 19, 57, 207, 216
 - control of silverleaf whitefly 213
- carpet grass 42
- cartons
 - in pallets 69
 - labelling 68
 - waxed fibreboard vegetable 66
- caterpillar 17, 55, 188, 220
 - at planting 34
- Cauldron 16
- cauliflower
 - alternaria spot 230
 - average yield 64
 - bacterial head rots 231
 - calculating spacing 40
 - cooling and storage 65
 - disease handy guide 303
 - downy mildew 229
 - grading, packing 66
 - gross margin 90
 - growth cycle 126
 - handy guide 302
 - harvesting 61, 63
 - hot water treatment 233
 - marketing 71
 - monitoring nutrients 166
 - peppery leaf spot 228
 - planting/harvesting times 35
 - quarantine 72
 - tensiometer irrigating 59
 - time to maturity 39, 130
 - transport 69
 - turnip mosaic virus 232
 - varieties 38, 128, 138
 - water requirements 174
 - yield/prices 6
- cauliflower mosaic virus 231
- CDA sprayers 246
- centre grub 17, 52, 205
 - control of 209
 - monitoring for 192
- ChemCert 24, 279
- ChemClear 258
- chemical control 199
 - diamondback moth 207
 - of heliiothis 208
- chemicals
 - application 52
 - safe storage 25
 - spray failure 23
 - suppliers 278
- Chenopodium album* 238
- Chinese broccoli 264
- Chinese cabbage 230, 264
- chloride 44
- Chlorthal-dimethyl 48, 241
- choy sum 264
- clay soils 45

- climate 11
- club root 19, 20, 37, 52, 55, 153, 174, 187, 225
controlling 225
prevent spread of 20
- cluster caterpillar 17, 55
control 208
guidelines for spraying 196
monitoring for 191
- cobbler's peg 239
- codes of practice 112
- 'coffin' ice pack 28, 66
- common sowthistle 239
- container-grown transplants 146
- contour drain 42
- controlled droplet applicator 52
- copper deficiency 161
- copper foliar fertiliser rates 165
- corkiness 158
- corn earworm 207
- Coronopus didymus* 238
- costs
example of total 84
typical production costs 79
- Cotesia* 198, 219
control of heliothis 208
- Cotesia glomerata* 211
- couch 42
- cover crops 44, 154
- Crocidolomia pavonana* 208
- crop
cover 44
direct seeded 48
establishing 50
monitoring 56
rotation 36, 37, 42
scheduling 39
scout 56
time to maturity 39
- crop monitoring 189
action threshold 194
chemical control 199
how to 191
insect traps 192
what is involved? 190
- crop scheduling 128
- curd
discolouration 133
initiation 122
- cutworm 17, 52
control of 210
monitoring for 192
- Cyperus rotundus* 238
- D**
- daikon 265
- Damage Mitigation Permit 53
- damping off 19, 52, 148, 223
- damsel bugs
control of aphids 214
- Dangerous Goods Safety Management Act 116
- Datura* spp. 238
- deadnettle 238
- degree days 130
- Diadegma* 198, 219
centre grub control 210
- Diadegma semiclausum* 205
- Diadegma* wasps 206
- Diadromus collaris* 219
- diagnostic services 279
- diamond back moth
monitoring for 191
pheromone trap 192
- diamondback moth
3, 17, 23, 52, 55, 56, 203, 219
at planting 34
guidelines for spraying 196
insecticide resistance 215
life cycle 204
management 205
monitoring 195, 204
- direct seeding 16, 38, 48, 146
- direct suppliers 105
- discolouration 159
- Discovery 16
- disease management 55, 223
checklist 232
- diseases 17, 57
broccoli handy guide 299
foliar 227
soil-borne 223
virus 231
- dolomite 43, 45, 162
- downy mildew
19, 52, 148, 150, 229
hot water treatment 235
monitoring for 191
- drip irrigation
maintenance of 180
- drumhead 127
- drumMUSTER 258
- ducks 17
- E**
- egg parasitoids 219
- electric fence 53
- Electrical Safety Act 116
- Encarsia* 219
- Endeavour 38
- environmental management
111, 282
- Environmental Management System (EMS) 30
- Enviroscan® 169, 180
- Enviroveg 31, 113
- equipment costs 12
- equity 84
- Eretmocerus* 219
- Erwinia* 20, 231
- Esca* 16
- establishment fertiliser 162
- ethylene 65
- EurepGAP 31, 112
- excessive cultivation 43
- export 32
- export associations 284
- F**
- F.O.R.M. 87, 90, 93
- F1 hybrid varieties 121
- farm hygiene 187
- farm safety 31, 115
- Farmcare Code of Practice 113
- Farmsafe Queensland 115
- FarmsafeAustralia 118
- fat hen 22, 48
- fertigation 164
- fertiliser 25, 59, 161
establishing the crop 50
establishment 26, 47, 162
foliar 164
rates for NPK mix 162
requirements for various soils 51
side dressing 163
suitable for fertigation 164
time of application 163
- fertilising seedlings 149
- field layout 46
- fixed costs 83
- fluorescent dye 249
- foliar diseases 189, 227
- foliar fertilisers 164
- Food Marketing Institute 108
- food safety 102
- Food Safety Standards 105
- forage sorghum 41, 44
- forced-air cooling 28, 64
- Frankliniella occidentalis* 211
- freezing injury 65
- Fremont 16
- Freshcare 29, 30, 107, 113
- frosts 35
- Fumaria* spp. 238
- fumitories 238
- fungal seed infections 149
- fungicides
effective use 235
- fungus 224
- furrow irrigation 171
- Fusarium oxysporum* f.sp. *conglutinans* 226

fusarium yellows
133, 134, 135, 136

G

Galinsoga parviflora 239
glossary of terms 81
government services 286
grading standards 65
grass weeds 21, 54, 242
green cabbage varieties 133
green manure crops 44
green peach aphid
control of 214
insecticide resistance 214, 215
Greenbelt 16
grey mould 19, 230
gross margins 82
winter broccoli 93
winter cabbage 87
winter cauliflower 90
grower associations 277
growth cycle 121
growth stages
sensitivity to pests 196
grubs, controlling 18
gypsum 43, 45, 158, 162
application rates 153

H

H. punctigera 207
HACCP 29, 107, 113, 117
quality assurance schemes 108
hard pans 43, 45
hares 17
harvesting 61
techniques 62
times 35, 131
head rots 20, 133
Helicoverpa armigera 207
heliethis 17, 23, 55, 56,
150, 188, 205, 206
at planting 34
biological control 208
control 207
guidelines for spraying 196
insecticide resistance 215
monitoring for 191
natural enemies 198
pheromone trap 192
Hellula hydralis 209
herbicides
handy guide 306
minimise use of 22
pre-emergent 48, 54
damage 22
strategies for weed manage-
ment 239

hollow stem 133, 158
horseradish 265
hot water seed treatment
149, 233
hoverfly larvae
control of aphids 214
hybrid cultivars 132
hydraulic boom sprayers 23, 52
hydraulic nozzles 247
hydrocooling 28
systems 64

I

ice packs 27
broccoli 8
'coffin' 28
in pallets 69
polystyrene 67
ideal temperature 34
impact sprinklers 35
Indian hedge mustard 119
indirect suppliers 105
insect management in the field
202
insect pests 56
insecticide resistance
managing 214
minimising risk 216
insecticides
impact on pests & natural
enemies 222
internet sites 292
Interstate Certification Assurance
109
interstate movement 285
IPM 18, 21, 56, 184
action level table 196
advantages 186
iron
chelate 161
deficiency 161
foliar fertiliser rates 165
sulphate 161
irrigation 35, 156
drip, trickle 171
furrow 171
management 168
monitoring system 172
overhead 170
scheduling 36, 58
solid-set 49
ISO 14001 31, 112
ISO 9002 109

J

Japanese mustard spinach 264
journals and magazines 292

K

kale 120, 264
Kameron 16, 38
kangaroos 17
kikuyu 42
knots and swellings on roots 52
knotweed 48, 238, 242
kohlrabi 120, 265

L

labour needed 13
lacewings 52, 198
control of aphids 214
lady beetles 198
control of aphids 214
ladybirds 52
Lamium amplexicaule 238
land preparation 41, 46
leaf analysis 26, 60
monitoring nutrients 166
leaf miner 150, 204
leaf scald 19, 20, 52, 228
Leptosphaeria maculans 224, 226
lesser swinecress 238
levies 71
lime 43, 45, 162
application rates 153
Lipaphis erysimi 214
London rocket 238
'Longlife' bags 28
lucerne 42
lures 280

M

machinery requirement costs 12
magnesium 45
deficiency 158
management 154
Malva parviflora 238
Managing Farm Safety program
31, 117
manganese
deficiency 160
foliar fertiliser rates 165
toxicity 161
manure-animal 44
MAP
fertigation amounts 164
market information 282
marketing 32, 34, 70
chain 101
different strategies 98
options 266
overseas 72
plans 96

- markets
 domestic 71
 for profit 78
 volume 78
 wholesale 71
- markets business directory 292
- Maximum Residue Limit (MRL) 24
- melon thrips 211
 insecticide resistance 215
- Metolachlor 48, 240
- mice 58
- Microplitis* 219
 control of heliothis 208
- mist sprayer 52
- mizuna 264
- modified atmosphere packaging 28
- molybdenum 51, 158, 160
 foliar fertiliser rates 165
- monitoring 58
 action threshold 194
 crops 191
 log 196
 system 172
 tensiometer 59
- MRL 24
- mummies 219
- mustard greens 264
- Mycosphaerella brassicicola* 229
- Myzus persicae* 214
- N**
- narrow spectrum insecticides 19
- national associations 277
- natural enemies 198, 218
 effectiveness of 220
 impact of insecticides 222
- nematodes 227
- Neptune 38
- nettles 238
- Nicandra physalodes* 238
- nitrogen 26, 44, 51,
 149, 154, 156
 deficiency 156
 fertigation amounts 164
 sap testing for 167
 side dressing 163
 supplementary requirements 163
- NPK fertilisers 158
- nut grass 238
- nutrients
 availability 153
 leaching 163
 management of 155
 monitoring 166
- optimum leaf levels 166
- removal table 156
- supplementary requirements 163
- total requirements table 162
- nutrition 152
- O**
- oats 44
- Ombudsman 283
- onion thrips 211
- optimum leaf nutrient levels 166
- organic additives 154
- organic grower associations 277
- organic matter-increasing 154
- organochlorine 207, 216
- organophosphates 19, 57,
 207, 216, 222
 control of silverleaf whitefly 213
- overhead sprinkler systems 170
- Oxyfluorfen 48, 239
- P**
- packing 65, 66, 67
 modified atmosphere 28
 two-row arrangement 68
- pak choy 264
- pallets 69
- parasitic wasp 52, 198, 205
- parasitoids 219
 alternative food source 220
 important 221
- pastures 42
- pathogens 220
- Pendimethalin 48, 240
- peppergrass 119
- peppery leaf spot 19, 20, 228
- Peronospora parasitica* 229
- pest and disease management 37, 52, 183
- pest control
 contact details 279
- pesticides
 compatibility 251
 safe disposal 258
 storage 256
- pests 17, 18, 55
 animal 53
 brassica handy guide 304
 broccoli handy guide 298
 cauliflower handy guide 302
 insect 56
 management in the field 202
- pH 45
 soil nutrition 152
- pheromone traps 190, 192
- phosphatic fertilisers 153
- phosphogypsum 45, 153
- phosphorous 26
- phosphorus 51, 154, 162
 deficiency 157
 fertigation amounts 164
- phytosanitary certificate 32, 72
- Pieris rapae* 211
- pigweed 48, 238
- pirate bugs
 control of aphids 214
- plant testing 281
- plant types 119
- planting 16
 arrangement 40
 decisions 186
 times 34, 35, 131
 when to plant 128
- plants
 calculate the number 41
 calculating spacing 17, 40
 irrigation when young 35
 pests and diseases 34
 root system 120
 stunted 19
- Plasmodiophora brassicae* 225
- Plutella xylostella* 203
- Polygonum aviculare* 238
- polystyrene ice pack 67
- Portulaca oleracea* 238
- post-emergence grass herbicides 54
- postharvest weed management 243
- potassium 26, 51, 156, 162
 deficiency 157, 227, 229
 fertigation amounts 164
 sap testing for 167
 side dressing 163
 supplementary requirements 163
- potato weed 239
- pre-emergent herbicides 22, 48
- pre-planting
 weed management 238
- predators 198, 220
 alternative food source 220
 important 221
- predatory bugs
 control of heliothis 208
- problem identification 56
- product identification 106
- production
 designing the system 188
 selecting the right time 188

- production in Queensland 2
profits
 maximising 76
Propachlor 48, 240
Pseudomonas 20
Pseudomonas chichorii 228
Pseudomonas spp. 231
Pseudomonas syringae pv.
 maculicola 228
Pteromalus puparum 211
Pteromalus species 219
publications 292
pumpkin, as cover crop 44
pycindia 226
pycnidia 229
pyrethroid 57, 207
 control of silverleaf whitefly
 213
Pythium 148, 223
 hot water treatment 235
- Q**
- QFVG 113
QRAA 96
quality 16
 assurance 282
 assurance standard 29
 management 29, 71
 of product for profit 77
 variety characteristics 132
quality assurance systems
 102, 104
 costs 109
quarantine, interstate 72
- R**
- radish 265
Raphanus raphanistrum 238
Rapistrum rugosum 238
record keeping 98
red cabbage 127
 packaging 67
 varieties 137
references 289
Registered Export Establishment
 (REE) 32, 72
reports 291
Rhizoctonia 148, 154
 hot water treatment 235
Rhizoctonia solani 223
ricyness 126
ring spot 19, 229
ripping 43
rodenticide 58
root galls 52
roots, swollen 19
rotation crops 42
rows, spacing 40
runoff 42
- S**
- salt levels 36
salt toxicity 161
sap analysis 26, 60, 167
savoy cabbage 127
 packaging 66
 varieties 136
Scerotinia sclerotiorum 224
sclerotinia rot 19, 20, 55, 189
 monitoring for 191
sclerotium base rot 19, 227
Sclerotium rolfsii 227
seed company identification 133
seed, hot water treatment 149
seed suppliers 277
seedling nurseries 278
seedlings
 container-grown 148
 damping off 223
 fertilising 149
 grow your own 146
 hot water treatment 233
 protection 150
 raising mix 148
 ready for planting out 151
 transplanting 49, 150
seeds
 direct seeding 146
Sshepherd's purse 57, 119, 238
side dressings 163
sideshoots 133
silverleaf whitefly
 17, 55, 56, 188, 219
 control of 213
 guidelines for spraying 196
 insecticide resistance 215
 monitoring for 191
single knocker 35
Sisymbrium irio 238
site selection 187
 weed management 237
slope 11
small-flowered mallow 238
sodic soils 45
sodium molybdate 160
soil 11, 34
 analysis at planting 45
 erosion 42
 getting ready 152
 preparation 42
 testing 281
soil-borne diseases 223
soil-borne fungus 227
Solanaceae 240
Solanum nigrum 238
solid-set irrigation 49
Solubor 159
Sonchus oleraceus 239
sowthistle 22
Speedling trays 148
spiders 198, 205, 220
 control of heliothis 208
spinosad 216
Spodoptera litura 208
spray accreditation 24
 records 25
spray application 244
 spray drift 251, 252
sprayers
 boom 245
 calibration of 252
 CDA 246
 cleaning 255
 hydraulic boom 52
 selecting the sprayer 245
spraying 18
 effect on crop 19
 keeping records 25
 selecting insecticides 215
sprinklers
 jet size 35
 young plants 35
SQF 1000CM 108
SQF 2000CM 108
stem girdling
 in transplants 45
stem rot 224
sticky traps 190, 192
 positioning 193
 yellow 193
sugarloaf cabbage 38, 127
 income 4
 packaging 67
 varieties 135
sulphate of ammonia 158
sulphur 156, 158
 fertiligation amounts 164
Sunrise 38
superphosphate 158
sweet corn, as cover crop 44
SWOT 97
SWOT for brassica industry 3
synthetic pyrethroids
 19, 216, 222
- T**
- tachinid fly 219

control of heliothis 208
 taproot 120
 target spot 19, 135, 230
 temperatures 16
 effect on growth 126
 tensiometers 58, 174
 guide for irrigation 59
 installing 176
 reading 177
 troubleshooting problems 178
 testing services 281
 thiram treated seed 235
 thornapples 238
 thrips 17, 55, 188, 205, 220
 control of 211
 guidelines for spraying 196
Thrips palmi 211
Thrips tabaci 211
 tipburn 58, 132, 134, 137, 174
 tomato grub 207
 trace element deficiencies
 foliar fertiliser rates 165
 trace elements 51, 158
 trace-back 106
 transplanting 17
 container-grown plants 146
 decisions 38
 seedlings 49
 transport 69
 traps 280
Trichogramma 198, 219
 control of heliothis 208
Trichogramma pretiosum
 219, 221
 trickle irrigation 35, 171
 Trifluralin 48, 242
 triticale 44
 turnip aphid 214
 turnip mosaic virus 231
 turnip weed 48, 119, 238
 turnips 265

U

under watering 174
 urea 44, 51
 fertigation amounts 164
Urtica spp. 238

V

Australian Centre for Agricultural
 Health and Safety 48
 varieties 127
 broccoli 142
 cauliflower 138
 descriptions 133
 listing 38

selecting 39, 189
 Viper 16
 virus diseases 231
 VMDA 258

W

wallabies 17
 Warrior 16, 38
 wasp parasites 198
 wasp parasitoids 206
 control of aphids 214
 water 174
 conductivity threshold
 12, 168
 for fertigation 164
 logging 160
 quality 26, 36, 149
 requirements 26, 172
 runoff 42
 saline 36
 stress 58
 supply 11
 testing 281
 water sensitive cards 249
 watermelon, as cover crop 44
 waterways 42
 waxed cartons 67
 weed management 237
 in direct-sown plants 241
 postharvest 243
 weed seedbanks 237
 weeds 21
 broadleaf 238
 control 54
 management strategy 36
 pre-emergent herbicides 48
 seed bank 21
 Western flower thrips 56, 211
 insecticide resistance 215
 white blister 230
 whitefly 220
 wholesaler information 283
 wild radish 48, 57, 119, 238
 wild turnip 57, 119, 238
 wilting 65
 wind 41
 wirestem 19, 52, 224
 wireweed 238
 withholding period (WHP) 24
 Woolworths Quality Assurance
 Standard 108
 Woolworths Vendor Quality
 Management Standard 30
 workplace health and safety 279
 obligations 31, 116
 Workplace Health and Safety Act
 116

X

Xanthomonas campestris pv.
campestris 227

Y

Yellow Pages 288
 yellow sticky traps to control
 thrips 212
 yellows 19, 226
 yield range 63
 yields 27

Z

zinc deficiency 160
 zinc sulphate heptahydrate
 159, 160
 zinc sulphate monohydrate 160
 zonate leaf spot 19, 20, 228



Chemical Handy **GUIDES**

The Chemical Handy Guides list common pests and diseases of brassicas and the chemicals registered or on permit for their control in Queensland. A handy guide for brassica herbicides is also included. Withholding periods are indicated for individual chemicals.

The Chemical Trade Name Handy Guide lists the trade names and the registration status in the different states of Australia of chemicals listed in the Chemical Handy Guides.

These registrations and APVMA permits are current in August 2004, but are subject to continuous change. Always check the label or permit before purchase or use of a product to ensure that the product complies with regulations in your state and to ensure it endorses use on your brassica crop. Note that before using a chemical under APVMA permit, you must hold a copy of that permit and follow its directions.

Disclaimer

This is a guide only. The product label is the official authority—use it to confirm all data relating to use of a chemical. In no event shall the authors or their respective organisations be liable for any damages whatsoever resulting from use of the data in this handy guide.

✓ indicates that a trade product containing the active ingredient is registered or under APVMA permit in Queensland.

For a list of trade products and their registration in all states see the Chemical trade name handy guide.

ALWAYS check the label before use, follow the directions and wear protective clothing.

Note that different trade products can have different withholding periods.

* pre-transplant or seedling drench

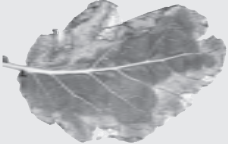
** seedlings in nurseries

NR = not required

NA = not required when used as directed

PH = Postharvest

Chemical handy guide—broccoli diseases

	copper oxychloride	chlorothalonil	mancozeb	metalaxyl	metalaxyl-M	metiram	triadimenol	quintozene	fluzinam*	phosphorous acid**	iodine
WHP	1	7	7	7	7	7	7	28	NA	NA	PH
Alternaria spot			✓								
Bactericide											✓
Black rot								✓			
Club root								✓	✓		
Damping off				✓	✓						
Downy mildew			✓			✓				✓	
Fungi											✓
Papery leaf spot			✓								
Phytophthora soil fungus				✓							
Rhizoctonia rot								✓			
Ring spot		✓	✓			✓	✓				
White blister	✓										
Wirestem								✓			

Chemical handy guide—cauliflower pests

	Withholding period	28-spotted potato ladybird	African black beetle	Aphids	Black field cricket	Budworms (Heliothis)	Cabbage aphid	Cabbage cluster caterpillar	Cabbage white butterfly	Cabbage-centre grub	Caterpillars	Cluster caterpillar	Corn earworm/cotton bollworm	Cutworms	Diamondback (Cabbage) moth	Field crickets	Green peach aphid	Green vegetable bug	Jassids	Leafhoppers	Looper caterpillar	Mole crickets	Native budworm	Redlegged earth mite
phorate	70		✓																✓					
pymetrozine	14						✓										✓							
diazinon	14						✓	✓	✓	✓	✓	✓					✓				✓			
prothofos	7						✓																	
mevinphos	7														✓									
methidathion	7						✓		✓						✓		✓							
indoxacarb (25:75)	7								✓				✓		✓									✓
fipronil	7							✓	✓						✓									
chlorfenapyr	7								✓						✓									
chlorpyrifos	5		✓		✓	✓							✓	✓		✓						✓	✓	
spinosad	3					✓		✓	✓	✓					✓						✓			
maldison	3	✓	✓														✓	✓	✓					✓
emamectin as benzoate	3								✓						✓									
acephate	3				✓	✓							✓											✓
tau-fluvalinate	2				✓				✓				✓		✓									✓
pirimicarb	2						✓										✓							
permethrin 40:60	2						✓	✓	✓			✓			✓	✓								
esfenvalerate	2								✓	✓			✓		✓									✓
endosulfan	2		✓		✓				✓	✓	✓		✓				✓	✓			✓			
deltamethrin	2								✓	✓					✓									
methomyl	1				✓			✓	✓	✓		✓									✓			✓
cypermethrin	1				✓				✓						✓									
alpha-cypermethrin	1				✓				✓			✓	✓		✓									✓
<i>Bacillus thuringiensis</i> var. kurstaki (Btk)	NR							✓																
<i>Bacillus thuringiensis</i> var. aizawai (Bta)	NR							✓	✓	✓					✓									



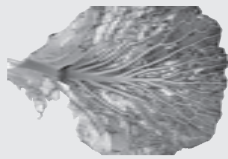
Chemical handy guide—brassica (crucifer *)pests

	<i>Bacillus thuringiensis</i> var. aizawai (Bta)	<i>Bacillus thuringiensis</i> var. kurstaki (Btk)**																
	methomyl	deltamethrin	endosulfan	trichlorfon	chlorpyrifos	dimethoate	imidacloprid	methamidophos	methidathion	prothiofos	thiodicarb	beta-cyfluthrin	chlorpyrifos (grain bait)	fenamiphos				
Withholding period	NR	NR	1	2	2	2	5	7	7	7	7	7	7	7	7	Var	NA	PP
African black beetle							✓											
Aphids					✓			✓			✓							✓
Black field earwig																	✓	
Budworms (Heliiothis)					✓		✓				✓						✓	
Bugs								✓										
Cabbage aphid									✓		✓							
Cabbage cluster caterpillar	✓		✓							✓	✓				✓	✓	✓	
Cabbage white butterfly		✓		✓	✓					✓	✓			✓				
Cabbage-centre grub				✓	✓					✓								
Caterpillars		✓			✓													
Cutworms					✓	✓	✓											
Diamondback (Cabbage) moth		✓		✓						✓	✓					✓		
Field crickets							✓											
Green peach aphid										✓								
Green vegetable bug					✓			✓										
Insects - sucking																		✓
Jassids					✓			✓										
Leafhoppers								✓										
Looper caterpillars		✓			✓													
Mites								✓										
Mole crickets							✓											
Native budworm		✓					✓											
Rutherglen bug					✓													
Silverleaf whitefly																		
Spider mites (Red spider)								✓	✓									
Thrips					✓			✓										✓
Tomato russet mite								✓										
Turnip aphid									✓									
Vegetable weevil							✓											
Wingless grasshopper								✓										

✓ indicates that a trade product containing the active ingredient is registered or under APVMA permit in Queensland.
 For a list of trade products and their registration in all states see the Chemical trade name handy guide.
 ALWAYS check the label before use, follow the directions and wear protective clothing.
 Note that different trade products can have different withholding periods.

* refers to flowerhead type crucifers/cole crops only
 ** Includes general vegetable registrations
 *** seedlings in nurseries
 Var = 1 day withholding period except broccoli 3 days
 NR = not required
 NA = not required when used as directed
 PP = Preplant
 PH = Postharvest

Chemical handy guide—brassica (crucifer*) diseases

	chlorothalonil	Copper as ammonium acetate	copper hydroxide	copper oxide	copper oxychloride	Copper sulfate (tribasic)	Copper hydroxide+mancozeb	mancozeb	triadimenol	zineb	quintozene	phosphorous acid****	fenamiphos	metham sodium	sodium hypochlorite	iodine
Withholding period	1	1	1	1	1	1	7	7	7	7	28	NA	PP	PP	PH	PH
Alternaria spot					✓		✓	✓								
Bactericide																✓
Base rot (Rhizoctonia)											✓					
Black rot		✓	✓	✓	✓	✓	✓									
Club root														✓		
Downy mildew		✓	✓	✓	✓	✓	✓	✓		✓		✓				
Fungi																✓
Grey mould	✓															
Nematodes													✓			
Papery leaf spot							✓	✓								
Peppery leaf spot		✓	✓	✓	✓	✓										
Ring spot		✓	✓	✓	✓	✓	✓	✓	✓							
Soft rot															✓	
Sclerotium base rot											✓					

Chemical handy guide—herbicides

	Withholding period	Broccoli	Cabbage	Cauliflower
Grass herbicides				
clethodim	7		✓	
fluazifop-P as butyl	42	✓	✓	✓
sethoxydim	42	✓	✓	✓
quizalofop-P-ethyl	63/14		✓	✓
quizalofop-P-tefuryl	63/14		✓	✓
Pre-emergence herbicides				
chlorthal-dimethyl*	NA/NS	✓	✓	✓
metolachlor**	NS	✓	✓	✓
oxyfluorfen**	NA	✓	✓	✓
pendimethalin**	NA/NS	✓	✓	✓
propachlor**	NS	✓	✓	✓
S-metolachlor**	NA	✓	✓	✓
trifluralin*	NA	✓	✓	✓

✓ indicates that a trade product containing the active ingredient is registered for use in Queensland.

For a list of trade products and their registration in all states see the Chemical trade name handy guide.

ALWAYS check the label before use, follow the directions and wear protective clothing.

Note that different trade products can have different withholding periods.

Pre-emergent herbicides must be applied just before or just after planting depending on the product - check the label for specific directions

* seeding or transplanting

** transplanting only

63/14 = 63 days cabbage, 14 days cauliflower

NA = not required when used as directed

NS = not supplied on label

Chemical trade names

Chemical	Trade name	Qld	NSW	Vic	SA	WA	NT	Tas	ACT	Chemical class
acephate	Lancer 750 DF, Orthene Xtra	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Group 1B Insecticide
alpha-cypermethrin	Alpha 100, Alpha duop 100, Alpha-cyp 100 duo, Alpha-cypermethrin 100, Alpha-cypermethrin 100 EC, Alphamax 100 EC, Alpha-scut Elite, Alphasip Duo, Astound Duo, Buzzard, Dictate 100, Dictate Duo 100, Dominex 100, Dominex 100 EC, Dominex Duo, Fastac Duo, Ken-tac 100, Unialphacyper 100, Alpha - Cyp ULV, Alphamax 16 ULLV, Alpha-scut ULLV, Dominex 16 ULLV, Fastac ULLV, Fastac Xcel	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 3A Insecticide
beta-cyfluthrin	Bulldock 25 EC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 3A Insecticide
<i>Bacillus thuringiensis</i> var. aizawai (Bta)	Bacchus, Xentari WG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 11C Insecticide
<i>Bacillus thuringiensis</i> var. kurstaki (Btk)	Full-Bac WDG, DiPel DF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 11C Insecticide
<i>Bacillus thuringiensis</i> var. kurstaki (Btk)	APVMA Permit	Yes	No	No	No	No	No	No	No	Group 11C Insecticide
chlorfenapyr	Secure 360 SC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 13A Insecticide
chlorothalonil	Check-Out 500 SC, Chlorothalonil 500 SC, Echo 500 SC, Fung-o-nil 500, Hurray Fungicide, Whack 500, Applonil 720 Fungicide, Barrack 720, Bravo, Check-Out 720, Cheers 720, Chlorothalonil 720, Clash 720, Echo 720 Fungicide, Unite 720, Whack Fungicide, Echo 900	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
chlorothalonil	APVMA Permit	Yes	No	No	No	No	No	No	No	Group Y Fungicide
chlorpyrifos	Agricultural Insecticide, Bar 500 EC, Chlorpyrifos, Chlorpyrifos 500, Chlorpyrifos 500 EC, Chlorpyrimax 500, Fortune 500, Generifos 500 EC, Kensban 500, Lorsban 500 EC, Pest Controller 500, Profos 500, Protector 500 EC, Strike-Out 500 EC, Voodoo 500	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
chlorpyrifos	APVMA Permit	Yes	No	No	No	No	No	No	No	Group 1B Insecticide
chlorthal-dimethyl	Chlorthal Dimethyl 750 WG, Dacthal, Warrant 750 WP	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group D Herbicide
clethodim	Select	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group A Herbicide
copper as ammonium acetate	Liquicop	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide

Chemical	Trade name	QLd	NSW Vic	SA	WA	NT	Tas	ACT	Chemical class
copper hydroxide	Kocide Blue, Kocide Blue Xtra, Kocide Liquid Blue, Champ Dry Prill, Blu-Cop 400DF, Coppit-oh Dry Flowable, Blue Mantel, Blue Shield DF, Copper Hydroxide 500 WP, Coppit-oh, Kocide, Flo-Bordo	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
copper hydroxide + mancozeb	Mankocide DF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
copper oxide	Flocop, Norshield, Nordox 500, Norshield 750 WP, Norshield WG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
copper oxychloride	Copper fungicide, Brycop (Agric. Fungicide), Copper oxychloride, Copper oxychloride 50% WP, Copper oxychloride 500 WP, Copper oxychloride WP, Copperoxy 500 WP, Coppox, Oxydul DF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
copper oxychloride	APVMA Permit	Yes	Yes	No	Yes	Yes	Yes	Yes	Group Y Fungicide
copper sulfate (tribasic)	Tri-Base Blue	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
cypermethrin	Cypermethrin 200, Cypermethrin 200 EC, Cypershield, Ken-cyper 200, Scud 200 EC, Scud Elite, Sonic 200 EC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 3A Insecticide
deltamethrin	Assign, Ballistic EC, Ballistic Elite, Decis Options, Deltamethrin Duo, Deltashield 27.5, D-sect EC, Hornet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 3A Insecticide
diazinon	Diazinon, Diazinon 800	Yes	Yes	Yes	Yes	No	No	No	Group 1B Insecticide
dimethoate	Dimethoate, Dimethoate 400, Dimethoate Insecticide, Dimethomax, Rogor, Romethoate, Stalk, Unidime 400	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
emamectin as benzoate	Proclaim Insecticide	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 6A Insecticide
endosulfan	APVMA Permit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 2A Insecticide
esfenvalerate	Sumi-Alpha Flex Insecticide	Yes	Yes	Yes	Yes	No	Yes	No	Group 3A Insecticide
fenamiphos	Nemacur 100 G, Assassinator 400, Nemacur 400	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
fipronil	Regent 200 SC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 2C Insecticide
fluzifop-P as butyl	Fusilade	Yes	Yes	Yes	Yes	Yes	Yes	No	Group A Herbicide
fluzinam	Shirlan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
imidacloprid	Confidor 200 SC, Confidor Nursery	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 4A Insecticide
imidacloprid	APVMA Permit – renewal pending at time of publication	Yes	No	No	No	No	No	No	Group 4A Insecticide

Chemical	Trade name	Qld	NSW	Vic	SA	WA	NT	Tas	ACT	Chemical class
indoxacarb (25:75)	Avatar	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 22A Insecticide
iodine	Biomaxa Iodine Granules	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	fungicide, bactericide
maldison	Hy-Mal, Maldison 500	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Group 1B Insecticide
mancozeb	Dithane DF, Dithane Rainshield, Kencozeb 750 DF, Mancozeb 750 DF, Mancozeb DF, Mancozeb DG, Manzate DF, Penncozeb 750 DF, Dithane M-45, Mancozeb 800, Mancozeb 800 WP, Mancozeb Fungicide	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
metaxyl	Axiom 50G, ZEE-MIL 50G	Yes	Yes	No	No	No	No	No	No	Group D Fungicide
metaxyl-M	Ridomil Gold 25G	Yes	Yes	No	Yes	Yes	Yes	Yes	No	Group D Fungicide
metham sodium	Metham, Metham Sodium	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1A Insecticide
methamidophos	Monitor, Nitofol	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
methidathion	Supracide 400, Suprathion 400 EC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
methomyl	Electra 225, Lannate L, Marlin, Marlin 225, Nudrin, Nudrin 225	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1A Insecticide
methomyl	APVMA Permit	Yes	No	No	No	No	No	No	No	Group 1A Insecticide
metiram	Polyram DF	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
metolachlor	Bouncer Herbicide, Clincher, Hook 720 Herbicide, Hook 720 Herbicide, Metal 720, Metoken 720, Metolachlor 720, Metolachlor 720 Herbicide, Metolachlor Herbicide, Support Herbicide	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Group K Herbicide
mevinphos	Phosdrin	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Group 1B Insecticide
oxyfluorfen	Cavalier, Goal, Oxen Herbicide, Point Herbicide, Striker	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group G Herbicide
pendimethalin	Charger 330 EC, Cyclone 330 EC, Fist 330, Gazelle, Pendimethalin 330, Pendimethalin 330 EC, Pennant 330, Rebel 330 EC, Rifle 330, Stomp 330E, Cyclone 440 EC, Stomp Xtra	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group D Herbicide
permethrin 40:60	Ambush, Axe Insecticide, Hellfire 500 EC, Perma 500 EC, Permasect 500, Permerid 500 EC, Pounce, Stakeout	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 3A Insecticide
phorate	Phorate 100, Thimet 100G, Umet 100G, Phorate 200, Zeemet 200G	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
phosphorous acid	APVMA Permit	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide

Chemical	Trade name	Qld	NSW	Vic	SA	WA	NT	Tas	ACT	Chemical class
pirimicarb	Aphidex 500, Pirimicarb 500 Insecticide, Pirimor WG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1A Insecticide
propachlor	Ramrod^ Flowable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group K Herbicide
prothiofos	Tokuthion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1B Insecticide
prothiofos	APVMA Permit	Yes	No	No	No	No	No	No	No	Group 1B Insecticide
pymetrozine	Chess 250 WP, Chess	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 9A Insecticide
pymetrozine	APVMA Permit	Yes	No	No	No	No	No	No	No	Group 9A Insecticide
quintozene	Chloroturf DG, Quintozene 750, Terraclor	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide
quintozene	APVMA Permit	Yes	No	No	No	No	No	No	No	Group Y Fungicide
quizalofop-P-ethyl	Targa Bolt, Targa Forte, Atomic, Elantra, Leopard, Quizalofop-P-Ethyl, Quizalofop-P-Ethyl 100 EC, Savvy, Targa	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group A Herbicide
quizalofop-P-tefuryl	Buzzard, Pantera	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group A Herbicide
sethoxydim	Sertin Plus, Sertin 186 EC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group A Herbicide
S-metolachlor	Dual Gold	Yes	Yes	Yes	No	No	Yes	Yes	No	Group K Herbicide
sodium hypochlorite	APVMA Permit	Yes	No	No	No	No	No	No	No	inorganic
spinosad	Success Naturalyte, Entrust Naturalyte	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 5A Insecticide
tau-fluvalinate	Mavrik Aquaflow	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 3A Insecticide
thiodicarb	Larvin 375, Showdown 375, Larvin 800 WG	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group 1A Insecticide
thiram	Thiram, Thiram DG, Thiram WP	Yes	No	No	No	No	No	No	No	Group Y Fungicide
thiram	APVMA Permit	Yes	No	No	No	No	No	No	No	Group Y Fungicide
triadimenol	Bayfidan 250 EC, Triadimenol 250 EC, Tridim 250 EC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group C Fungicide
trichlorfon	Dipterex 500 SL, Lepidex 500	Yes	No	No	No	No	Yes	No	No	Group 1B Insecticide
trifluralin	Crew, Treflan 480, Tricon 480, Trifluasip 480, Trifluralin 480, Trifluramax 480, Triflurx	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group D Herbicide
zineb	Zineb	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Group Y Fungicide



Contacts and **REFERENCES**

Want more information? This section helps direct you to other important providers and sources of brassica information. The Contacts directory contains the names and contact details of people and organisations serving the brassica industry. The References section contains a list of information that is useful reading for anyone involved in the industry.

Contacts **276**

Grower associations, special product suppliers, market information, consultants and technical information services

References **289**

Books, articles, journals, magazines, reports and internet sites



Contacts

The Department of Primary Industries and Fisheries and the authors give no warranty as to the quality or suitability of goods or services provided by companies and businesses listed in this book.

Names are provided solely for helping readers to make contact with individuals and organisations serving the brassica industry. Inclusion of a person or organisation does not constitute an endorsement by the Department of Primary Industries and Fisheries or the authors, nor does it endorse a particular person or organisation over others not mentioned. The authors regret any omissions.

Contacts	276
Grower associations	277
Seed suppliers	277
Seedling nurseries	278
Farm chemicals	278
Farm safety	279
Pest animal, bird and vermin control	279
Diagnostic services	279
Suppliers of beneficial insects, traps and lures	280
Soil, plant, water and product testing services	281
Quality assurance and environmental management	282
Market information	282
Export associations	284
AQIS offices	284
Information on interstate movement provisions	285
Government services	286
Agricultural booksellers	287
Contacts through the Yellow Pages	288

Grower associations

Queensland associations

Growcom

Floor 1, St Pauls Terrace
PO Box 202
FORTITUDE VALLEY QLD 4006
Ph: (07) 3620 3844; Fax: (07) 3620 3880
Members hotline: 1800 654 222
E-mail: info@growcom.com.au
Web: www.growcom.com.au

Vegetable Industry Development Officer (Queensland)

Mathew Dent
Floor 1, St Pauls Terrace
PO Box 202
FORTITUDE VALLEY QLD 4006
Ph: (07) 3620 3844; Fax: (07) 3620 3880
Mobile: 0408 135 042
E-mail: mdent@growcom.com.au
Web: www.growcom.com.au

National associations

AUSVEG

RMB 5307
STRATHBOGIE VIC 3666
Ph: (03) 5790 5247; Fax: (03) 5790 5259

Horticulture Australia Limited

Level 1, 50 Carrington Street
SYDNEY NSW 2000
Ph: (02) 8295 2300; Fax: (02) 8295 2399
E-mail: info@horticulture.com.au
Web: www.horticulture.com.au

Organic grower associations

Note: These organisations do not have the resources to provide a general advisory service about organic production. Their main function is to provide information about certification standards and processes. Special services are also provided to members after joining. Kits containing information on membership and certification standards and processes are available for purchase.

Bio-Dynamic Research Institute

c/- Post Office
POWELLTOWN VIC 3797
Ph: (03) 5966 7333; Fax: (03) 5966 7433

Biological Farmers of Australia (BFA)

PO Box 530
CHERMSIDE QLD 4032
Ph: (07) 3350 5716; Fax: (07) 3350 5996
E-mail: info@bfa.com.au
Web: www.bfa.com.au

National Association for Sustainable Agriculture Australia Ltd

(NASAA)
PO Box 768
STIRLING SA 5152
Ph: (08) 8370 8455; Fax: (08) 8370 8381
E-mail: enquiries@nasaa.com.au
Web: www.nasaa.com.au

Organic Federation of Australia

(Australia's Organic Industry Peak Body)
Suite 502 'Park Place'
3 Waverly Street
Bondi Junction
SYDNEY NSW 2022
Ph: (02) 9340 7808; Fax: (02) 9340 7807
Email: info@ofa.org.au
Web: www.ofa.org.au

Organic Food Chain Pty Ltd

PO Box 2390
TOOWOOMBA QLD 4350
Ph: (07) 4637 2600; Fax: (07) 4696 7689
E-mail: ofc@organicfoodchain.com.au

Seed suppliers

Bejo Seeds Pty Ltd

PO Box 5627
CRANBOURNE VIC 3977
Ph: (03) 9782 2811; Fax: (03) 9782 2445

Charlcon Seeds

220 Eighth Drive
 AUSTRAL NSW 2171
 Ph: (02) 9606 0522; Fax: (02) 9606 9817
 E-mail: charlcon@hotmail.net.au

Fairbanks Selected Seed Company Pty Ltd

542 Footscray Road
 FOOTSCRAY VIC 3011
 Ph: (03) 9689 4500; Fax: (03) 9687 7089
 Web: www.fairbanks.com.au

Henderson Seeds

PO Box 118
 BULLEEN VIC 3105
 Ph: (03) 9850 2266; Fax: (03) 9850 6794

Lefroy Valley (Queensland)

PO Box 7506
 Toowoomba Mail Centre
 TOOWOOMBA QLD 4352
 Ph: (07) 4635 2099; Fax: (07) 4635 2138
 Web: www.lefroyvalley.com.au

Rijk Zwaan Australia Pty Ltd

PO Box 284
 DAYLESFORD VIC 3460
 Ph: (03) 5348 9000; Fax: (03) 5348 5530
 E-mail: vegieseeds@rijkszwaan.com.au

Seminis Vegetable Seeds

Suite 3, upstairs
 77 Upper Heidelberg Road
 IVANHOE VIC 3077
 Ph: (03) 9499 9800; Fax: (03) 9499 9199
 Web: www.seminis.com

South Pacific Seeds

102 Andrew Street
 WYNNUM QLD 4178
 Ph: (07) 3393 3766; Fax: (07) 3893 1522
 E-mail: infoupdate@spseed.com.au
 Web: www.southpacificseeds.com.au

Syngenta Seeds

Locked Bag 1335
 DANDENONG SOUTH VIC 3164
 Ph: (03) 9706 3033; Fax: (03) 9706 3182

Terranova Seeds Pty Ltd

13/19 Chifley Street
 SMITHFIELD NSW 2164
 Ph: (02) 9725 1088; Fax: (02) 9725 1066

Seedling nurseries

In south-east Queensland, there are two major seedling nurseries servicing the brassica industry. Check the yellow pages for seedling nurseries in your local area.

Quickstart Seedlings

811 Tenthill Creek Road
 GATTON QLD 4343
 Ph: (07) 5462 7227; Fax: (07) 5462 7377

Withcott Seedlings

PO Box 9145
 WITHCOTT QLD 4352
 Ph: (07) 4630 3372; Fax: (02) 4630 3551
 Web: www.wseedlings.com.au

Farm chemicals

AVCARE Ltd

National Association for Crop Protection & Animal Health
 Locked Bag 916
 CANBERRA ACT 2601
 Ph: (02) 6230 6399; Fax: (02) 6230 6355
 E-mail: info@avcare.org.au
 Web: www.avcare.org.au

Australian Pesticides & Veterinary Medicines Authority

(The APVMA is the National Registration Authority for Agricultural and Veterinary Chemicals)
 PO Box E240
 KINGSTON ACT 2604
 Ph: (02) 6272 5852; Fax: (02) 6272 4753
 E-mail: contact@apvma.gov.au
 Web: www.apvma.gov.au

ChemClear

(A collection and disposal service for unwanted rural chemicals)

GPO Box 816

CANBERRA ACT 2601

Ph: 1800 008 182; Fax: (02) 6230 6710

E-mail: info@chemclear.com.au

Web: www.chemclear.com.au

drumMUSTER (national office)

GPO 816

CANBERRA CITY ACT 2601

Ph: (02) 6230 6712; Fax: (02) 6230 6713

E-mail: drummuster@drummuster.com.au

Web: www.drummuster.com.au

John Whitehead

Farm chemicals consultant

172 Bourbong Street

CHAPEL HILL QLD 4069

Ph: (07) 3378 6552

ChemCert Australia

For training in pesticide application contact ChemCert to find your nearest accredited trainer.

ChemCert Training Qld Inc

Ph: (07) 5460 1295

E-mail: chemcertqld@bigpond.com.au

ChemCert Australia National Office

E-mail: national@chemcert.org.au

Web: www.chemcert.org.au

Farm chemical supplies

Check the yellow pages for suppliers of chemicals/fertilisers in your local area.

Farm safety

For information on workplace health and safety and the Managing Farm Safety Program:

Farmsafe Queensland

The Queensland head office is located in Townsville

PO Box 785

THURINGOWA QLD 4817

Ph: (07) 4774 0522; Fax: (07) 4774 0289

Freecall: 1800 818 006

E-mail: jcupples@farmsafe.com.au

Web: www.farmsafe.com.au

Farmsafe Australia

The national head office is located in Moree, NSW

Ph: (02) 6752 8218

E-mail: mail@farmsafe.org.au

Web: www.farmsafe.org.au

Pest animal, bird and vermin control**Environmental Protection Agency/Queensland Parks and Wildlife**

Central Office

160 Ann Street

BRISBANE QLD 4000

Ph: 07 3227111

Web: www.env.qld.gov.au

For information on controlling native animals and wildlife permits:

Ecoaccess Customer Service Unit

Ph: 1300 868 326

Department of Natural Resources, Mining and Energy (NRM&E)

For information on pest animal and weed control.

Ph: (07) 3896 3111

Web: www.dpi.nrme.qld.gov.au

Diagnostic services

Biological Crop Protection

Dr G. Stirling

3601 Moggill Road

MOGGILL QLD 4070

Ph: (07) 3202 7419; Fax: (07) 3202 8033

Mobile: 0412 083 489

E-mail: biolcrop@powerup.com.au

Crop Health Services

Institute for Horticultural Development
DPI Victoria
Private Bag 15
KNOXFIELD VIC 3176
SOUTH EASTERN MAIL CENTRE
Ph: (03) 9210 9356; Fax: (03) 9800 3521

GrowHelp Australia

PO Box 327
CLEVELAND QLD 4163
Ph: (07) 3824 9526; Fax: (07) 3286 3094
E-mail: growhelp@dpi.qld.gov.au
Web: www.dpi.qld.gov.au

Plant Health Diagnostic Services

Forest Road
ORANGE NSW 2800
Ph: (02) 6391 3843; Fax: (02) 6391 3899
E-mail: www.dpi.nsw.gov.au

Suppliers of beneficial insects, traps and lures

Australasian Biological Control (ABC), the association of beneficial arthropod producers, maintains a list of suppliers of beneficial insects on their website:

www.goodbugs.org.au

Beneficial Bug Co.

PO Box 436
RICHMOND NSW 2753
Ph: (02) 4570 1331; Fax: (02) 4578 3979
E-mail: info@beneficialbugs.com.au
Web: www.beneficialbugs.com.au

Biological Services

PO Box 501
LOXTON SA 5333
Ph: (08) 8584 6977; Fax: (08) 8584 5057
E-mail: fruitdrs@sa.ozland.net.au

Bio-Protection

PO Box 384
KILMORE VIC 3764

Ph: (03) 5781 0033; Fax: (03) 5781 0044
E-mail: rcoy@hyperlink.com.au

BioResources Pty Ltd

PO Box 578
SAMFORD QLD 4520
Ph: (07) 3289 4919; Fax: (07) 3289 4918
E-mail: richard@bioresources.com.au
Web: www.bioresources.com.au

BioWorks Pty Ltd

PO Box 203
NAMBUCCA HEADS NSW 2448
Ph: (02) 6568 3555
E-mail: bioworks@tsn.cc

Bugs for Bugs

Bowen Street
MUNDUBBERA QLD 4626
Ph: (07) 4165 4663; Fax: (07) 4165 4626
E-mail: info@bugsforbugs.com.au
Web: www.bugsforbugs.com.au

Horticultural Crop Monitoring

PO Box 3725
CALOUNDRA QLD 4551
Ph/Fax: (07) 5491 4662
E-mail: pjones@hotkey.net.au

IPM Technologies

PO Box 600
HURSTBRIDGE VIC 3099
Ph: (03) 9710 1554; Fax: (03) 9710 1354
E-mail: ipmtechnologies@bigpond.com

Traps and lures

Entosol (Australia) Pty Ltd (AgriSense agent)
Roger Allanson
PO Box 28
ROSELANDS NSW 2196
Ph: (02) 9758 4552; Fax: (02) 9758 4882
E-mail: sales@entosol.com.au
Web: www.entosol.com.au

Texas (Scentry traps)

Web: www.scentry.com

Soil, plant, water and product testing services

The National Association of Testing Authorities (NATA) is the Government-endorsed provider of accreditation for laboratories and similar testing facilities. Contact NATA for assistance with choosing an accredited laboratory.

National Association of Testing Authorities (NATA)

Brisbane Office
80 Jephson Street
TOOWONG QLD 4066
Ph: (07) 3870 3844; Fax: (07) 3870 4570
Web: www.nata.asn.au

Soil, plant and water testing

Casco Agritech Laboratory Services
PO Box 549
214 McDougall Street
TOOWOOMBA QLD 4350
Ph: (07) 4633 0599; Fax: (07) 4633 0711
E-mail: info@casco.com.au
Web: www.casco.com.au

Crop Tech Laboratories Pty Ltd

410 Langbeckers East Road
BUNDABERG QLD 4670
Ph: (07) 4155 6344; Fax: (07) 4155 6656
E-mail: croptech@croptech.au
Web: www.croptech.com.au

Incitec Pivot Ltd

GPO Box 1322L
MELBOURNE VIC 3001
Ph: (03) 8694 4400; Fax: (03) 8695 4419
Toll free: 1800 803 453
Web: www.incitecpivot.com.au

Simmonds & Bistow Pty Ltd

40 Reginald Street
ROCKLEA QLD 4106
Ph: (07) 3710 9100; Fax: (07) 3710 9199
E-mail: david@simmondsbristow.com.au

Microbial and chemical testing—product and water

Casco Agritech Laboratory Services
PO Box 549
214 McDougall Street
TOOWOOMBA QLD 4350
Ph: (07) 4633 0599; Fax: (07) 4633 0711
E-mail: info@casco.com.au
Web: www.casco.com.au

Centre for Food Technology

19 Hercules Street
HAMILTON QLD 4007
Ph: (07) 3406 8555; Fax: (07) 3406 8665
Web: www.dpi.qld.gov.au/food

Crop Health Services

Institute for Horticultural Development
DPI Victoria
Private Bag 15
KNOXFIELD VIC 3176
SOUTH EASTERN MAIL CENTRE
Ph: (03) 9210 9356; Fax: (03) 9800 3521

Food and Agriculture Laboratories of Australia Pty Ltd

41 Rosedale Street
COOPERS PLAINS QLD 4108
Ph: (07) 3345 4566; Fax: (07) 3345 4871

Queensland Health Scientific Services

39 Kessels Road
COOPERS PLAINS QLD 4108
Ph: (07) 3274 9111; Fax: (07) 3274 9119
Web: www.health.qld.gov.au

Simmonds & Bistow Pty Ltd

40 Reginald Street
ROCKLEA QLD 4106
Ph: (07) 3710 9100; Fax: (07) 3710 9199
E-mail: david@simmondsbristow.com.au

Symbio Laboratories

47 Manilla Street
EAST BRISBANE QLD 4169
Ph: (07) 3391 7558; Fax: (07) 3391 6160
E-mail: symbio@powerup.com.au

Quality assurance and environmental management

Enviroveg

National Program Manager

Ph: 03 9544 8098

Web: www.enviroveg.org

Mailing address:

AUSVEG

Suite 9

756 Blackburn Road

CLAYTON NORTH VIC 3168

EurepGAP

Contact the Department of Agriculture, Fisheries and Forestry

Ph: 02 6272 3317

E-mail: eurepgap@daff.gov

Web: www.eurep.org

Farmcare Code of Practice

Growcom (previously Queensland Fruit and Vegetable Growers)

Floor 1, St Pauls Terrace

PO Box 202

FORTITUDE VALLEY QLD 4006

Ph: (07) 3620 3825; Fax: (07) 3620 3880

Members hotline: 1800 654 222

E-mail: info@growcom.com.au

Web: www.growcom.com.au

Food Operations

7 Leeds Street

RHODES NSW 2138

Ph: (02) 9736 8266

E-mail: training@foodoperations.com.au

Web: www.foodoperations.com.au

Freshcare Ltd

PO Box 247

SYDNEY MARKETS NSW 2129

Ph: (02) 9764 3244; Fax: (02) 9764 2776

E-mail: freshcare@freshmarkets.com.au

Web: www.freshcare.com.au

ISO 9002 and ISO 14001

Contact Standards Australia

Ph: 1300 654 646

Web: www.standards.com.au

SQF 2000^{CM} and SQF 2000^{CM}

Contact the Australian Information Desk

Ph: 1800 77 33 77

E-mail: info@sqfi.com

Web: www.sqfi.com

Woolworths Quality Assurance Standard (WQA)

Contact a Woolworths buyer or merchandise manager.

Web www.woolworths.com.au

Market information

Ausmarket Consultants

The Ausmarket Consultants group offers historic and current fruit and vegetable market price information, market intelligence, outturn reporting and product assessment. Participants in the network operate separate businesses within Australia's major markets. Details can be found on their web site:

Web: www.ausmarket.net.au

Individual members of the network are:

Brisbane

Market Information Services

PO Box 229

BRISBANE MARKET QLD 4106

Ph: (07) 3379 4576; Fax: (07) 3379 4103

Mobile: 0417 712 427

E-mail: info@ausmarket.net.au

Recorded market reports

Infocall: 1902 262 580 (\$2.75 per minute, covers faxed reports from Adelaide, Brisbane, Melbourne, Perth and Sydney).

Brisbane Market Produce Surveyors

PO Box 229

BRISBANE MARKET QLD 4106

Ph: (07) 3379 4576; Fax: (07) 3379 4103

Mobile: 0418 713 688

E-mail: info@ausmarket.net.au

Adelaide

SAFF Market Intelligence Pty Ltd
 PO Box 6014
 ADELAIDE SA 5000
 Ph: (08) 8349 6480; Fax: (08) 8349 5894
 Mobile: 0419 868 265
 E-mail: bbishop@saff.com.au

Melbourne**Melbourne Market Reporting Service (DataFresh)**

Box 170 Melbourne Markets
 FOOTSCRAY VIC 3011
 Ph: (03) 9689 3444; Fax: (03) 9689 3411
 Mobile: 0411 117 578
 E-mail: info@datafresh.com.au

Rudge Produce Systems Pty Ltd

Box 177 Melbourne Markets
 WEST MELBOURNE VIC 3003
 Ph: (03) 9689 1234; Fax: (03) 9689 1232
 Mobile: 0419 335 802
 E-mail: administration@rudgeproduce.com.au

Perth**West Coast Produce Consultants**

c/- Perth Market Authority
 Mail Point 1, Market City
 280 Bannister Road
 CANNING VALE WA 6155
 Ph: (08) 9455 2900; Fax: (08) 9455 2902
 Market reports: 1900 983 304 (recording); 75c per minute

Sydney

The Sydney Market Reporting Service & Sydney Produce Surveyors Pty Ltd
 PO Box 350
 FRENCHS FOREST NSW 2086
 Ph: (02) 9746 3437; Fax: (02) 9746 1075
 Mobile: 0416 108 639
 E-mail: cqs@accsoft.com.au

Resolving payment and other disputes

If you have a disagreement about payment for produce, or other matters relating to the retail grocery industry, the Retail Grocery Industry Ombudsman (RGIO) may be able to help.

The RGIO is funded by the Commonwealth Department of Industry, Tourism and Resources and is responsible for assisting industry participants in the retail grocery sector resolve commercial disputes. The industry includes fruit and vegetables, dairy, meat, eggs, flowers, fish, cotton, grains etc. Common disputes are over payment and/or contractual terms between growers, packers, transporters, wholesalers, retailers and/or exporters.

The RGIO and his staff may be telephoned for advice and will formally respond to all queries and dispute notifications within five working days of a written application being lodged. Contact details for the Ombudsman are:

Retail Grocery Industry Ombudsman (RGIO)

GPO Box 1422
 SYDNEY NSW 2001
 Ph: 1800 004 444 (Free call)
 Fax: 1300 760 220
 E-mail: ombudsman@rgio.com.au
 Web: www.rgio.com.au

Wholesaler information

If you want a list of registered farm produce commercial sellers the following contacts should be helpful.

Australian Chamber of Fruit and Vegetables Ind.

PO Box 6
 SYDNEY MARKETS NSW 2129,
 Ph: (02) 9764 3244; Fax: (02) 9764 2776
 E-mail: thechamber@freshmarkets.com.au
 Web: www.freshmarkets.com.au
 (lists the contact details for the Chamber in each market)

Adelaide**Adelaide Produce Markets Ltd**

Diagonal Road
 POORAKA SA 5095
 Ph: (08) 8349 4493; Fax: (08) 8349 6574
 E-mail: apml@adelaidemarkets.com.au
 Web: www.adelaidemarkets.com.au

South Australian Chamber of Fruit and Vegetables Industries

c/- Adelaide Produce Markets Ltd
Diagonal Road
POORAKA SA 5095
Ph: (08) 8349 4528; Fax: (08) 8260 5922

Brisbane

Brisbane Markets Ltd
PO Box 80
BRISBANE MARKETS QLD 4106
Ph: (07) 3379 1062; Fax: (07) 3379 4903
Marketline: 1800 631 002
E-mail: admin@brisbanemarkets.com.au
Web: www.brisbanemarket.com.au

Brismark

PO Box 70
BRISBANE MARKETS QLD 4106
Ph: (07) 3379 3061; Fax: (07) 3379 3792
E-mail: brismark@brismark.com.au
Web: www.brismark.com.au

Melbourne

Melbourne Market Authority
Box 1
WEST MELBOURNE VIC 3003
Ph: (03) 9258 6100; Fax: (03) 9687 7714
Email: info@melbournemarkets.com.au
Web: www.melbournemarkets.com.au

Victorian Chamber of Fresh Produce Wholesalers Inc.

(Trading as Fresh State)
PO Box 113
FOOTSCRAY VIC 3011
Ph: (03) 9689 3233; Fax: (03) 9689 9223
E-mail: vicchamber@freshstate.com.au
Web: www.freshmarkets.com.au

Perth

Perth Market Authority
Mail Point 1, Market City
CANNING VALE WA 6155
Ph: (08) 9455 2900; Fax: (08) 9455 2902
E-mail: pma@perthmarket.com.au
Web: www.perthmarket.com.au/
produceinfoframe.htm

West Australian Chamber of Fruit and Vegetables Industries

PO Box 1464
CANNING VALE DC WA 6970
Ph: (08) 9455 2742; Fax: (08) 9455 4923

Sydney

Sydney Markets Ltd
PO Box 2
SYDNEY MARKETS NSW 2129
Ph: (02) 9325 6200; Fax: (02) 9325 6288
E-mail: info@sydneymarkets.com.au
Web: www.sydneymarkets.com.au

NSW Chamber of Fruit and Vegetable Industries Inc.

PO Box 6
SYDNEY MARKETS NSW 2129
Ph: (02) 9764 3244; Fax: (02) 9764 2776
E-mail: nswchamber@freshmarkets.com.au

Export associations

Australian Horticultural Exporters Association

Institute of Horticultural Development
Private Bag 15
FERNTREE GULLY DELIVERY CENTRE
VIC 3156
Ph: (03) 9210 9380; Fax: (03) 9210 9381
E-mail: ahea@ahea.com.au
Web: www.ahea.com.au

AQIS offices

For information on exporting brassicas contact an export inspector at the closest office of the Australian Quarantine and Inspection Service, Department of Agriculture, Fisheries and Forestry.

The address and contact numbers for state offices are listed below, or
Freecall 1800 020 504

Adelaide

PO Box 63
Port Adelaide SA 5015
Ph: (08) 8305 9700; Fax: (08) 8305 9825

Brisbane

GPO Box 778
BRISBANE QLD 4000
Ph: (07) 3246 8755; Fax: (07) 3839 9313

Canberra

GPO Box 7193
FYSHWICK ACT 2609
Ph: (02) 6239 7979; Fax: (02) 6230 7986

Darwin

GPO Box 1970
BERRIMAH NT 0828
Ph: (08) 8999 2075; Fax: (08) 8999 2108

Hobart

PO Box 347
NORTH HOBART TAS 7002
Ph: (03) 6233 3626; Fax: (03) 6234 6785

Melbourne

PO Box 1006
TULLAMARINE VIC 3043
Ph: (03) 8318 6700; Fax: (03) 8318 6701

Perth

WA AQIS
PO Box 1410
CANNING VALE WA 6970
Ph: (08) 9311 5333; Fax: (08) 9455 3052

Sydney

PO Box 657
MASCOT NSW 1460
Ph: (02) 8334 7444; Fax: (02) 8334 7555

Information on interstate movement provisions

Interstate Certification Assurance (ICA) and Inspections for interstate produce shipments

For the names of local inspectors and information on interstate requirements, contact the DPI&F Animal and Plant Health Services.

Senior Operational Support Officer

Animal and Plant Health Services
Department of Primary Industries and Fisheries
GPO Box 46
BRISBANE QLD 4001
Ph: (07) 3239 3330; Fax: (07) 3211 3293

Information on interstate requirements

Requirements change regularly. To check on latest requirements, here are the contacts for each state.

New South Wales

Regulatory Operations Coordinator (Plants)
Locked Bag 21
ORANGE NSW 2800
Ph: (02) 6391 3583; Fax: (02) 6391 3605

Australian Capital Territory

Quarantine & Inspection Officer
Environment ACT
PO Box 1038
TUGGERANONG ACT 2901
Ph: (02) 6207 2265; (02) 6207 2268

Victoria

Supervisor Plant Standards
Department of Primary Industries
Private Bag 15
Ferntree Gully Delivery Centre
KNOXFIELD VIC 3156
Ph: (03) 9687 5627; Fax: (03) 9687 6746

Tasmania

Senior Quarantine Officer
Quarantine
Macquarie Wharf Number 1
Hunter Street
HOBART TAS 7000
Ph: (03) 6233 3352; Fax: (03) 6234 6785

South Australia

Program Leader—State Quarantine Inspection Service
Pest Eradication Unit
46 Prospect Road
PROSPECT SA 5082
Ph: (08) 8344 1203; Fax: (08) 8344 6033

Western Australia**Senior Inspector**

Western Australian Quarantine & Inspection
Service

PO Box 1410

CANNING VALE WA 6970

Ph: (08) 9311 5333; Fax: (08) 9455 3052

Northern Territory**Senior Inspector (Interstate Quarantine)**

Primary Industry and Fisheries

Department of Business, Industry and Resource
Development

PO Box 990

BERRIMAH NT 0801

Ph: (08) 8999 2138; Fax: (08) 8999 2111

Government services**National**

CSIRO Australia—Scientific and Industrial
Research

Web: www.csiro.au

**Department of Agriculture, Fisheries and
Forestry (DAFF)**

Web: www.affa.gov.au

FarmBis Australia

This program provides financial assistance to
primary producers to undertake business and
natural resource management training.

Web: www.farmbis.gov.au

State**Queensland**

**Department of Primary Industries and Fish-
eries (DPI&F)**

GPO Box 46

BRISBANE QLD 4001

E-mail: callweb@dpi.qld.gov.au

Web: www.dpi.qld.gov.au

Call Centre. Helps you access DPI&F's informa-
tion services and products. Queenslanders can
ring 13 25 23 from 8 a.m. to 6 p.m. Monday to

Friday, excluding public holidays, for the cost of
a local call. Interstate callers can phone
(07) 3404 6999.

GrowSearch. An information service for produc-
ers of horticultural crops. Fee-for-service.

Ph: (07) 3821 3784; Fax: (07) 3286 7618

E-mail: growsearch@dpi.qld.gov.au

Web: www.dpi.qld.gov.au/growsearch

**Department of Natural Resources, Mining
and Energy (NRM&E)**

Ph: (07) 3896 3111

Web: www.dpi.nrme.qld.gov.au

For information on natural resource manage-
ment for example soil, water, vegetation, erosion,
salinity etc.

**Environmental Protection Agency/Queens-
land Parks and Wildlife**

Ph: (07) 32271111

Web: www.env.qld.gov.au

For information on environmental planning,
technical services and management of parks,
forestry and wildlife.

New South Wales

**NSW Department of Primary Industries
(NSWDPI)**

Locked Bag 21

ORANGE NSW 2800

Ph: (02) 6391 3100; Fax: (02) 6391 3336

E-mail: nsw.agriculture@agric.nsw.gov.au

Web: www.dpi.nsw.gov.au

Victoria

Department of Primary Industries (DPI)

E-mail: customer.service@dpi.vic.gov.au

Web: www.dpi.vic.gov.au

**Department of Sustainability and Environ-
ment (DSE)**

E-mail: customer.service@dse.vic.gov.au

Web: www.dse.vic.gov.au

Call Centre. Helps you access information services and products, from DPI and DSE ring 136 186 from within Australia.

Tasmania

Department of Primary Industries, Water and Environment (DPIWE)

GPO Box 44

HOBART TAS 7001

Ph: 1300 368 550 (toll free in Australia)

E-mail: FAF.Enquiries@dpiwe.tas.gov.au

Web: www.dpiwe.tas.gov.au

South Australia

Department of Primary Industries and Resources (PIRSA)

GPO Box 397

Adelaide 5001 S A

E-mail: pirsa.sardi@saugov.sa.gov.au

Web: www.pir.sa.gov.au

Western Australia

Department of Agriculture (DAWA)

Locked Bag 4

BENTLEY DELIVERY CENTRE WA 6983

Ph: (08) 9368 3333

Email: enquiries@agric.wa.gov.au

Web: www.agric.wa.gov.au

Northern Territory

Primary Industry and Fisheries—part of the Department of Business, Industry and Resources Development (DBIRD)

GPO Box 3000

DARWIN NT 0801

Ph: (08) 8999 2292; Fax: (08) 8999 2049

Web: www.nt.gov.au/dbird/dpif

Agricultural booksellers

These booksellers specialise in agricultural books.

DA Information Services

648 Whitehorse Road

MITCHAM VIC 3132

Ph: (03) 9210 7777; Fax: (03) 9210 7788

E-mail: service@dadirect.com.au

Web: www.dadirect.com.au

DPI&F Publications

GPO Box 46

BRISBANE QLD 4001

Orders—Freecall: 1800 816 541

Fax: (07) 3239 6509

E-mail: books@dpi.qld.gov.au

Web: www.dpi.qld.gov.au/shop

Granny Smith's Bookshop

156 Onslow Road

SUBIACO WA 6008

Ph: (08) 9381 2880; Fax: (08) 9388 1852

E-mail: grannysmith@iinet.net.au

Web: www.aoi.com.au/granny

Johima Books

PO Box 226

MENAI CENTRAL NSW 2234

Ph: (02) 9541 4791; Fax: (02) 9543 1710

E-mail: madhu@johima.com.au

Web: www.johima.com.au

Landlinks Press

PO Box 1139

COLLINGWOOD VIC 3066

Ph: (03) 9662 7666; Fax: (03) 9662 7555

Orders—Freecall 1800 645 051

E-mail: publishing@csiro.au

Web: www.publish.csiro.au

Morescope Publishing

36 Bridge Street

RICHMOND TAS 7025

Ph: (03) 6260 2094

DPI Information Centre

PO Box 500

EAST MELBOURNE VIC 3002

Ph: (03) 9637 8325; Fax (03) 9637 8150

E-mail: customer.service@dpi.vic.gov.au

Web: www.dpi.vic.gov.au

NSW Department of Primary Industries

Bookshop

Orange Agricultural Institute

ORANGE NSW 2800

Ph: (02) 6391 3994;

Orders–Freecall: 1800 028 374

Fax: 1800 642 065

E-mail: bookshop@agric.nsw.gov.auWeb: www.agric.nsw.gov.au**Contacts through the Yellow Pages**

The following Yellow Pages headings cover the main topics for which contacts may be needed. Check the listings under the appropriate heading.

Seedlings and seed

Nurseries

Seedsmen

Chemicals/fertilisers

Chemicals, agricultural

Chemical suppliers

Fertilisers

Insecticides, herbicides and fungicides

Lime

Soil conditioners and treatments

Consultants

Farm and agricultural advisory services

Quality Assurance Services

Horticultural consultants

Economics and marketing

Fruit and vegetable wholesalers

Grain and produce

Transport services

Equipment, irrigation, machinery

Agricultural machinery

Engineers

Farm contracting services

Farm equipment and supplies

Instruments–scientific

Irrigation

Pesticides and spraying

Aerial spraying

Fertiliser and/or insecticide spreading

Protective clothing

Spray equipment and/or supplies

Postharvest handling and packaging

Boxes and cartons

Cold room builders/designers

Cold stores

Food processing and/or packing machinery

Fruit and vegetable packing and/or packs

Labels

Polystyrene products

Grain and produce packaging materials

Refrigerated transport trucks and equipment

Scales and weighing equipment



References

This is not an exhaustive list of references for brassicas. It consists of references and internet sites which the authors recommend as useful sources of information and reading for the brassica grower. If you require more detailed information on a subject, use the literature search facilities available from most libraries.

DPI&F information products

Books

Crop weeds of northern Australia, Wilson, B.J., Hawton, D. & Duff, A.A. (1995), Department of Primary Industries and Fisheries, Queensland.

Diseases of vegetable crops, Persley, D. M. & Cooke, A.W. (eds) (1994), Department of Primary Industries and Fisheries, Queensland.

Forced air cooling, (2nd edn). Watkins, J.B. (1990), Department of Primary Industries and Fisheries, Queensland.

Insect pests of fruit and vegetables (2nd edn), Swaine, G., Ironside, D.A. & Corcoran, R.J. (1992), Department of Primary Industries and Fisheries, Queensland

Pesticide application manual (3rd edn), Banks, A.G., Broadley, R.H., Collinge, M. & Middleton, K. (1990), Department of Primary Industries and Fisheries, Queensland.

Poisonous plants: a field guide, Dowling, R. & McKenzie, R., (1993), Department of Primary Industries and Fisheries, Queensland.

Suburban weeds (3rd edn), Kleinschmidt, H., Holland, A. & Simpson, P. (1997), Department of Primary Industries and Fisheries, Queensland.

Water it right—irrigation using tensiometers, Daniels, J.L., Banks, A.G. & Jamieson, G.I. (1994), Department of Primary Industries and Fisheries, Queensland.

DPI&F notes and web pages

Broccoli development, yield and quality—importance of temperature, <http://www.dpi.qld.gov.au/horticulture/5293.html>

Emerging plant pests—melon thrips, <http://www.dpi.qld.gov.au/health/2774.html>

Exotic plant pests—white blister of broccoli, <http://www.dpi.qld.gov.au/health/10290.html>

Interstate Certification Assurance (ICA), <http://www.dpi.qld.gov.au/health/4056.html>

Diamondback moth in selected brassica vegetable crops, <http://www.dpi.qld.gov.au/horticulture/1885.html>

Managing weeds in broccoli, cauliflower and cabbage, <http://www.dpi.qld.gov.au/horticulture/4743.html>

Soil compaction, www.dpi.qld.gov.au/fieldcrops/9424.html

Soil insects in Queensland, identification and management, www.dpi.qld.gov.au/fieldcrops/3689.html

Using conductivity meters in agriculture, <http://www.dpi.qld.gov.au/horticulture/3096.html>

Asian leafy brassica vegetables

Chinese broccoli, <http://www.dpi.qld.gov.au/horticulture/5313.html>

Chinese mustard, <http://www.dpi.qld.gov.au/horticulture/7917.html>

Choy sum, <http://www.dpi.qld.gov.au/horticulture/5312.html>

Komatsuna, <http://www.dpi.qld.gov.au/horticulture/5308.html>

Mizuna and mibuna, <http://www.dpi.qld.gov.au/horticulture/5305.html>

Mustard greens, <http://www.dpi.qld.gov.au/horticulture/5303.html>

Pak choy, <http://www.dpi.qld.gov.au/horticulture/5300.html>

Tatsoi, <http://www.dpi.qld.gov.au/horticulture/7922.html>

DPI&F notes are available on the Internet at: www.dpi.qld.gov.au
or on *Prime notes on CD-ROM*

DPI&F information products are available from:
DPI&F Publications
Department of Primary Industries and Fisheries
GPO Box 46
BRISBANE QLD 4001
Ph: (07) 3239 3163; Freecall: 1800 816 541;
Fax: (07) 3239 6509
E-mail: books@dpi.qld.gov.au
Web: www.dpi.qld.gov.au/shop

Other DPI&F products

Crop weeds of northern Australia CD Rom, Wilshire, B. et al (2003), Department of Primary Industries and Fisheries, Queensland.

Infopest—Agvet CD-ROM and Infopest—MSDS CD-ROM

Available from:

Infopest

Animal & Plant Health Services
Department of Primary Industries and Fisheries
GPO Box 46
BRISBANE QLD 4001
Ph: (07) 3239 3967; Fax: (07) 3239 3510
E-mail: infopest@dpi.qld.gov.au
Web: www.dpi.qld.gov.au/infopest

Other books

Australian soil fertility manual—Revised edition, Glendinning J.S., (ed), (1999), Fertilizer Industry Federation of Australia, CSIRO Publishing, Collingwood, Victoria.

CSIRO Handbook of Australian weeds, Lazarides, M., Cowley, K. & Hohnen, P. (1997), CSIRO Publishing, Australia.

Plant analysis—an interpretation manual, (2nd edn), Reuter, D.J. & Robinson, J.B. (1997), CSIRO Publishing, Collingwood, Victoria.

Available from:

CSIRO Publishing

PO Box 1139,
COLLINGWOOD, VIC 3066
Ph: 1300 788 000 (to order)

Australian farmers guide to the internet—second edition, RIRDC

The New Rural Industries—a handbook for farmers and investors, Hyde, K. (ed) (1997), RIRDC

Available from:
Rural Industries Research and Development Corporation
 Level 1, 10 Macquarie Street
 BARTON ACT 2600
 Ph: (02) 6272 4539; Fax: (02) 6272 5877
 Web: www.rirdc.gov.au/farmersguide

Export control (fresh fruit and vegetables) orders, Schedule 4, 5 and 25, (1988) Commonwealth of Australia, Canberra, Australia.

Available from:
Australian Government Printing Service
 GPO Box 84
 CANBERRA ACT 2601

Field guide to pests, diseases and disorders of vegetable brassicas, Donald, C., Endersby, N., Ridland, P., Porter, I., Lawrence, J. & Ransom, L., (2000), Department of Natural Resources and Environment, Victoria.

Quality description language:

- *broccoli*, O'Donnell, D.
- *cauliflower*, Vujovic, S. et. al.
- *cabbage*, Vujovic, S. et. al.
- *Chinese broccoli*, Morgan, W. and Chew, M.
- *Chinese cabbage*, Morgan, W. and Chew, M.
- *Chinese chard*, Morgan, W. and Chew, M.
- *Shanghai Chinese chard*, Morgan, W. and Chew, M.

Available from:
DPI Information Centre
 PO Box 500
 EAST MELBOURNE VIC 3002
 Ph: (03) 9637 8325; Fax (03) 9637 8150
 E-mail: customer.service@dpi.vic.gov.au
 Web: www.dpi.vic.gov.au

Australian weed management systems, Sindel, B.M. (ed), (2000), R.G. and F.J. Richardson, Meredith, Victoria.

Integrated pest management for cole crops and lettuce, Flint, M.L. (ed) (1992), Division of Agriculture and Natural Resources, University of California, USA.

National Standard for Organic and Bio-Dynamic Produce, Department of Agriculture, Fisheries and Forestry, Canberra.

Organic agriculture—getting started, Madge, D. (1995), Agmedia, Melbourne.

Oriental vegetables, Waters, C.T., Moragan, W.C. & McGeary, D.J. (1992), Victorian Department of Food and Agriculture.

Plant nutrient disorders 3, vegetable crops, Weir, R.G., & Cresswell, G.C. (1994), NSW Agriculture, Inkata Press, Sydney NSW.

The Australian vegetable growing handbook, Salvestrin, J. (ed)(1998), Scope Publishing, Frankston, Victoria.

The good bug book (2nd edn), Llewellyn, R. (ed) (2002), Integrated Pest Management for Australasian Biological Control Inc., New South Wales.

Weeds—An illustrated botanical guide to the weeds of Australia, Auld, B.A. & Medd, R.W. (1992), Inkata Press, Australia.

Reports

Asian vegetable industry—a situation assessment, Hassall and Associates (2003) RIRDC, Publication No 02/168

The above report and a number of other reports on Asian vegetables are available at:

Rural Industries Research and Development Corporation
 Level 1, 10 Macquarie Street
 BARTON ACT 2600
 Ph: (02) 6272 4539; Fax: (02) 6272 5877
 Web: www.rirdc.gov.au/farmersguide

Guidelines for implementing EUREGAP for Australian fresh fruit and vegetable producers, McBride, W. (2004), Australian Department of Agriculture Fisheries and Forestry, Canberra.

Guidelines for on-farm food safety for fresh produce, Working group on Safety and Quality Systems' Equivalence, (2001), Department of Agriculture, Fisheries and Forestry, Canberra.

Available at:

Department of Agriculture, Fisheries and Forestry (DAFF)

For the EUREGAP guidelines

Ph: (02) 6272 3317

For the On-farm food safety guidelines

Ph: (02) 6272 4161

E-mail: foodinfo@affa.gov.au

Web: www.daff.gov.au

Annual publications

Brisbane markets business directory

Available from:

Brisbane Market Authority

PO Box 8

BRISBANE MARKETS QLD 4106

Ph: (07) 3379 1062; Fax: (07) 3379 4903

Web: www.brisbanemarket.com.au

Prices and throughput for the Brisbane market

Available from:

Market Information Services

PO Box 229

BRISBANE MARKET QLD 4106

Ph: (07) 3379 4576; Fax: (07) 3379 4103;

Mobile: 0417 712 427

E-mail: info@ausmarket.net.au

Web: www.ausmarket.net.au

Melbourne markets business directory

Available from:

Melbourne Market Authority

PO Box 1

542 Footscray Road

FOOTSCRAY VIC 3011

Ph: (03) 9258 6100; Fax: (03) 9687 7714

E-mail: info@mma.vic.gov.au

Web: www.melbournemarkets.com.au

Sydney markets users guide

Available from:

Sydney Market Ltd

PO Box 2

SYDNEY MARKETS NSW 2129

Ph: (02) 9325 6200; Fax: (02) 9325 6288

E-mail: sydma@sydneymarkets.com.au

Web: www.sydneymarkets.com.au

The Sydney markets yearly prices for fresh fruit & vegetables

Available from:

The Sydney Market Reporting Service

PO Box 350

FRENCHS FOREST NSW 2086

Ph: (02) 9746 3437; Fax: (02) 9746 1075;

Mobile: 0416 108 639

E-mail: cqs@accsoft.com.au

Journals and magazines

American Vegetable Grower

Available from:

American Vegetable Grower

37733 Euclid Avenue

WILLOUGHBY OHIO 44094 USA

Good Fruit & Vegetables

Available from:

Good Fruit & Vegetables

PO Box 160

PORT MELBOURNE VIC 3207

Ph: (03) 9287 0900; Fax: (03) 9287 0999

Subscriptions: Ph: 1800 035 351

Useful internet sites

Brassica sites

UC IPM Online—Cole Crops—University of California

<http://www.ipm.ucdavis.edu/PMG/selectnewpest.cole-crops.html>

Brassica projects—Department of Primary Industries Victoria

www.dpi.vic.gov.au/agvic/ihd/projects/veg-keyproject.htm

Includes club root project

Diamondback moth management

Department of Primary Industries, Victoria
<http://www.dpi.vic.gov.au/agvic/ihd/projects/dbm.htm>

For the DBM sampling plan, contact the project team or follow the pest & diseases link

South Australian Research and Development Institute <http://www.sardi.sa.gov.au/entomology/index.html>

National DBM resistance management strategy Avcare
<http://www.avecure.org.au>

International working group for diamondback moth
<http://www.nysaes.cornell.edu/ent/dbm/>

Asian vegetables

Access to Asian vegetables—Department of Primary Industries Victoria
www.nre.vic.gov.au/trade/asiaveg/

Australian New Crops web site—University of Queensland
<http://www.newcrops.uq.edu.au/>

The New Rural Industries—RIRDC handbook
www.rirdc.gov.au/pub/handbook/contents.html

Asian Foods Research Program - Rural Industries Research and Development Corporation
<http://www.rirdc.gov.au/programs/af.html>

Other sites

AGRIFOR—The UK's Gateway to Internet Resources in Food, Agriculture and Forestry
 Web: www.agrifor.ac.uk

Austrade—Australia's export and investment facilitation agency:
 Web: www.austrade.gov.au

Australasian Biological Control:
 Web: www.goodbugs.org.au

Australian Centre for Agricultural Health and Safety—the University of Sydney
 Web: www.acahs.med.usyd.edu.au

Australian Farm & Rural OHS Resources:
 Web: www.worksafe.gov.au/OHSInformation/Agriculture

Australian Government Agricultural Portal:
 Web: www.agriculture.gov.au/index.cfm

Australian Pesticides and Veterinary Medicines Authority (APVMA):
 Web: www.apvma.gov.au

Australian Quarantine & Inspection Service (AQIS):
 Web: www.aqis.gov.au

AQIS—export conditions database (phyto):
 Web: www.aqis.gov.au/phyto

Avcare, National Association of Crop Production and Animal Health:
 Web: www.avecure.org.au

ChemClear—Farm chemicals:
 Web: www.chemclear.com.au

Cool chain, South Australian Research and Development Institute:
 Web: www.sardi.sa.gov.au/coolchai/index.htm

Crop Protection, The Official Journal of the International Association for the Plant Protection Sciences:
 Web: www.elsevier.com/locate/cropro

Department of Agriculture, Fisheries and Forestry:
 Web: www.affa.gov.au

Department of Agriculture Western Australia
 Web: www.agric.wa.gov.au

Department of Natural Resources, Mines and Energy—Fact Sheets:
 Web: www.nrm.qld.gov.au/factsheets

Department of Primary Industries and Resources South Australia

Web: www.pir.sa.gov.au

Department of Primary Industries Victoria - Notes information series Web:

www.dpi.vic.gov.au/notes

drumMUSTER:

Web: www.drummuster.com.au

Entosol (Australia) Pty Ltd (AgriSense agent):

Web: www.entosol.com.au

Environmental Protection Agency/ Queensland Parks and Wildlife Service

Web: www.env.qld.gov.au/

Enviroveg:

Web: www.enviroveg.org

EUREPGAP:

Web: www.eurep.org

Farmsafe Australia:

Web: www.farmsafe.org.au

Farmsafe Queensland:

Web: www.farmsafe.com.au

Food Info Australia—Department of Agriculture, Fisheries and Forestry

Web: www.affa.gov.au/foodinfo

Food Operations

Web: www.foodoperations.com.au

Freshcare

Web: www.freshcare.com.au

Growcom:

Web: www.growcom.com.au

Horticulture Australia Limited:

Web: www.horticulture.com.au

Integrated Crop and Pest Management Guidelines for Commercial Vegetable Production—Cornell university:

Web: www.nysaes.cornell.edu/recommends

International Federation of Organic Agriculture Movements (IFOAM)

Web: www.ifoam.org

ISO 9002 and ISO 14001

Web: www.standards.com.au

NSW Department of Primary Industries

Web: www.agric.nsw.gov.au

Organic Federation of Australia

Web: www.ofa.org.au

Postharvest technology, University of California, Davis:

Web: <http://postharvest.ucdavis.edu>

Queensland Parks and Wildlife Service - Environmental Protection Agency

Web: www.env.qld.gov.au/

Queensland Rural Adjustment Authority:

Web: www.qraa.qld.gov.au

Rural Industries Research and Development Corporation:

Web: www.rirdc.gov.au

Rural Water Use Efficiency - Department of Natural Resources, Mines and Energy:

Web: www.nrme.qld.gov.au/rwue/factsheets.htm#horticulture; www.nrme.qld.gov/rwue/pdf/factsheets/brassica.pdf

Rural Safety Links:

Web: www.whs.qld.gov.au/subject/rural.htm#links

SQF 2000^{CM} and SQF 2000^{CM}

Web: www.sqfi.com

Standards Australia:

Web: www.standards.com.au

Sustainable Agriculture Resources—Australian and New Zealand:

Web: www.une.edu.au/agronomy/weeds/organic/links/aust-nz.html

Sustainable practices for vegetable production
in the south, North Carolina State University:
Web: [www.cals.ncsu.edu/sustainable/peet/
index.html](http://www.cals.ncsu.edu/sustainable/peet/index.html)

Sydney Postharvest Laboratory
Web: www.postharvest.com.au

Texas (Scentry traps)—USA home page:
Web: www.scentry.com

University of California—Vegetable Research
and Information Centre:
Web: <http://vric.ucdavis.edu>

University of Florida, Institute of Food and
Agricultural Sciences:
Web: <http://edis.ifas.ufl.edu>

United States Department of Agriculture:
Web: www.usda.gov/Agriculture/

Woolworths Quality Assurance Standard
(WQA)
www.woolworths.com.au

Workplace health and safety—Queensland:
Web: www.whs.qld.gov.au



Before you **START**

If you have never grown cabbage, cauliflower or broccoli before, then you will find this section very useful. It is a brief checklist of the essential things you need to know before you start. It will help you make the right decisions. The information here is brief and to the point. We provide more detail on important areas in other sections of the book. Symbols on the left of the page will help you make these links.

Contents

A brief overview of the Queensland brassica industry	2
Know what you are getting into	3
What can you expect to make?	4
Cabbage yields and prices	4
Cauliflower yields and prices	6
Broccoli yields and prices	8
Capital required	10
The farm you need	11
The machinery and equipment you need	12
The labour you need	13
Other considerations	14

A brief overview of the Queensland brassica industry

Official statistics suggest that the Queensland brassica industry is relatively static, although supply tends to fluctuate from year to year. In 2001–02, around 40 000 tonnes of cabbage, cauliflower and broccoli were produced from about 2 800 hectares. Table 1 shows the industry had a farm gate value of about \$21 million and a gross value of around \$32 million.

Table 1. The Queensland brassica industry

Crop	Area (ha)	Production (tonnes)	Farm gate value (\$ millions)	Gross value (\$ millions)
Cabbages	366	13,148	2.7	4.7
Cauliflower	693	15,058	4.1	8.2
Broccoli	1758	11,569	14.3	18.8
Totals	2817	39,775	21.1	31.7

Source: *Australian Bureau of Statistics* 2001–02 estimates

Most Queensland brassicas are grown in the south-eastern corner of the State in the Lockyer Valley, Eastern Darling Downs and the Granite Belt. Small growing areas exist in coastal areas and other horticultural production districts of the state.

The industry primarily supplies the domestic fresh market, either through the central market system or direct to supermarket chains which account for the majority of sales. There are small markets for semi-prepared or semi-processed product (coleslaw, salad and vegetable mixes).

Brassicas from Queensland are sold throughout Australia. Fresh cabbage, cauliflower or broccoli can be sourced from Queensland at any time of the year but the main supply period is from May to September when the Lockyer Valley and Eastern Darling Downs are in full production. During the warmer months, production is centred in the cooler highland areas of the Granite Belt and around Toowoomba.

Returns can vary greatly. Prices are often low during peak production in winter. Summer prices are often high. In regions with warm or hot summers such as the Lockyer Valley, low yields, reduced head quality and pest and disease problems are often not offset by these higher summer prices.

Some larger brassica growers have actively pursued export markets for a number of years with some success. The major overseas markets for Queensland brassicas are south-east Asia and Japan, with \$5.7 million of broccoli, \$1.8 million of cauliflower and smaller quantities of cabbage exported during 2002–03 (Source: *Australian Bureau of Statistics*).

Know what you are getting into

The average price for broccoli, cauliflower and cabbage varies between seasons, making profitability and cash flow inconsistent and hard to estimate. The market is often oversupplied, particularly during winter and early spring, when returns may be below costs of production.

Consistent yields and quality can be difficult to achieve due to insect pests (for example, diamondback moth), disease problems (for example, head rots) and climatic factors. These include frosts, heat wave conditions or wet weather during harvest. Varieties also perform differently in various growing areas and under different growing conditions.

Growing brassicas is labour intensive, particularly at planting and harvest times, and there can be problems getting a good, reliable labour force.

Successful production requires cool to mild growing conditions, a well-drained soil and reliable irrigation. Capital costs can be high depending on arrangements for harvesting and packing of product. Access to rapid pre-cooling and cold storage facilities is essential for broccoli and highly desirable for cauliflower. Cabbage can be cooled and stored in a conventional cold room.

Table 2 lists some of the strengths, weaknesses, opportunities and threats (SWOT) affecting the brassica industry.

Table 2. Factors affecting the brassica industry of Queensland

Strengths	Weaknesses	Opportunities	Threats
Staple, well known products	Not suited to warm weather production	Value adding and semi-processing	Overproduction
High nutritional value	Cabbage and cauliflower not fashionable	Health aspects of the product	Lack of irrigation water (drought)
Versatile product	Generic promotions	Targeted promotion	Substantial price fluctuations
Value for money	Competition from southern states in domestic markets	New varieties	Club root
Convenient	Strong competition in export markets	Niche markets, organics, eco-labelling	Insecticide resistance problems
Reliable crop to grow in season with good management	Highly perishable product (broccoli, cauliflower)	New export markets	Labour, packaging and freight costs

IMPORTANT
Do a marketing and business plan. This will give you a more accurate picture of what you are getting into.

What can you expect to make?

Yields vary considerably, depending on climatic conditions, pests and diseases, variety, season and planting density. Prices vary greatly, depending on supply and quality.

Cabbages are usually supplied in bulk bins and sold on a per head basis. Sugarloaf cabbages are often sold in waxed fibreboard cartons. Cauliflowers are sold either on a per head basis or, more commonly, in 78L cartons that hold 10 or 12 heads. Broccoli is usually sold in icepacks holding 8 kg of heads or in waxed fibreboard cartons holding 10 kg of product.

Production and marketing costs for cabbages, cauliflower and broccoli vary, depending on yields achieved, the size and efficiency of the operation and the cost structure of the business. Each farm is different. The estimates given in the following sections are intended only to illustrate the level of costs involved for growing, harvesting and marketing the different brassica crops.

Of the three crops, cauliflower is by far the riskiest crop to grow as production costs are high and yields can vary substantially. Cauliflowers also require a fair amount of agronomic and management expertise to grow successfully. Cabbage and broccoli are easier to grow. However, since broccoli is the more perishable of the three products, timeliness of harvest and access to adequate cooling facilities complicate crop management.

IMPORTANT

Estimate costs for your situation. See *Economics of production* in Chapter 4, Key issues.

Cabbage yields and prices

Marketable yields commonly range from 14 000 to 18 000 heads per hectare.

Price can range from \$0.20 to \$4.00 or more per cabbage head, but is usually in the \$0.60 to \$2.00 range. Figures 1 to 3 show average prices for ballhead cabbages on the Brisbane and Sydney markets and throughput of all cabbages at the Brisbane market for 2001 to 2003. The bigger the variation above or below the average price, the greater the opportunity or risk involved.



Market prices
Chapter 6 page 282

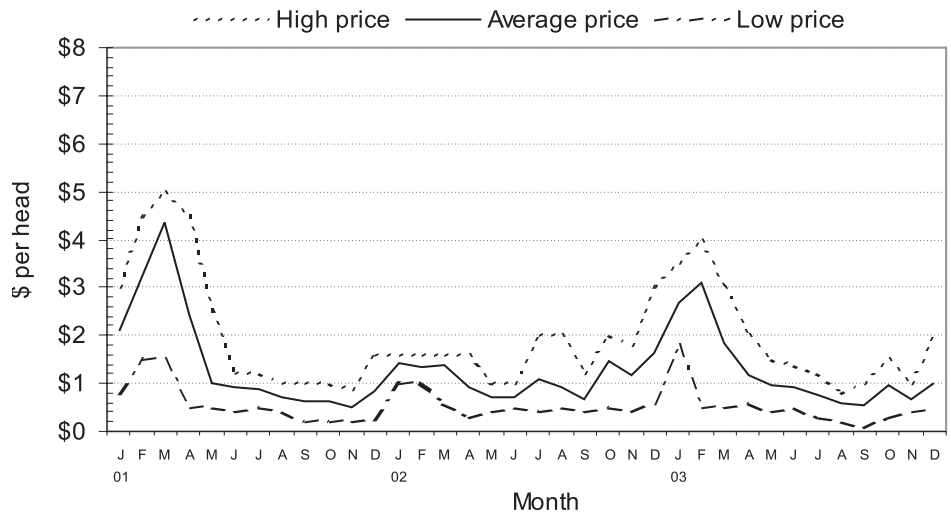


Figure 1. Average monthly price for ballhead cabbage on the Brisbane market 2001 to 2003

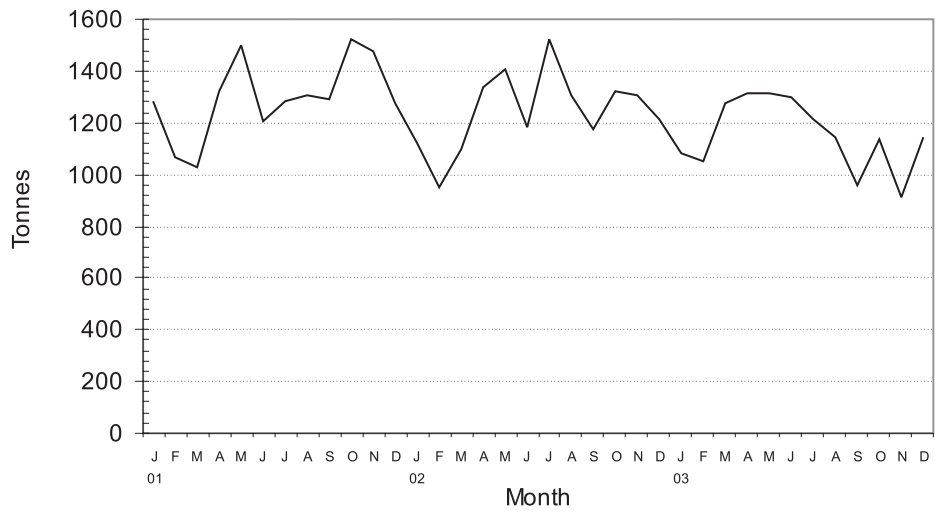


Figure 2. Throughput of cabbage on the Brisbane market 2001 to 2003

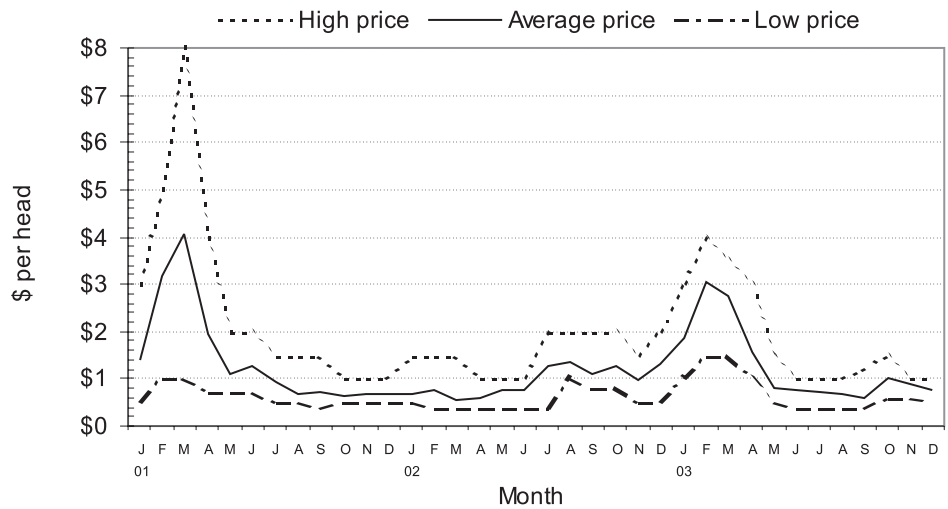


Figure 3. Average monthly price for ballhead cabbage on the Sydney market 2001 to 2003

Production costs for cabbage

Production and marketing costs in southern Queensland are at least \$0.70 per head. Variable growing, harvesting and marketing costs range from \$10 000 to \$16 000 or more per hectare.

Table 3 shows the estimated average costs of a southern Queensland crop yielding 16 000 heads per hectare sold in fibreboard bulk bins at \$1.00 per head on the Brisbane market.

Table 3. Example costs of producing and marketing a cabbage crop grown in southern Queensland

Costs	\$ per head	\$ per hectare
Growing	0.22	3 520
Harvesting (pick, pack & bin)	0.37	5 920
Marketing (freight and commission)	0.25	4 000
Total variable costs	0.84	13 440

Gross margin

At an average yield of 16 000 heads per hectare and an average price of \$1.00 per head, the gross return would be \$16 000/ha. The gross margin (income after deducting growing, harvesting and marketing costs) for the yield, price and cost averages used here would be \$2560/ha. To determine your net income, deduct fixed and capital costs such as rates, vehicle registration, insurance, electricity, administration, interest and living expenses.



a key issue

Cabbage gross margin
Chapter 4 page 87

Cauliflower yields and prices

Marketable yields commonly range from 1 500 to 2 000 cartons per hectare. Yields can be substantially lower during unfavourable growing conditions.

Price can range from \$2.00 to \$50.00 per carton, but is usually in the \$8.00 to \$18.00 range. Figures 4 to 6 show average prices and throughput at the Brisbane market and prices at the Sydney market for 2001 to 2003. The bigger the variation above or below the average price, the greater the opportunity or risk involved.



more info

Market prices
Chapter 6 page 282

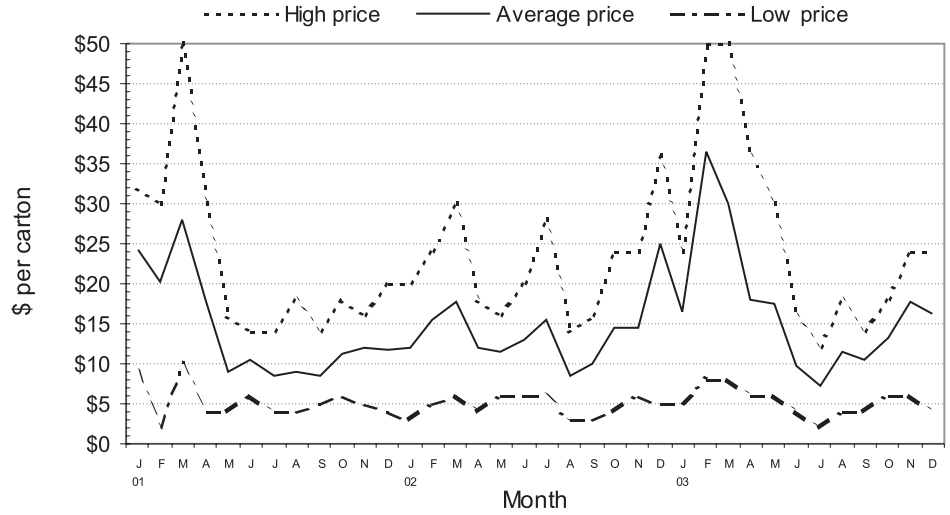


Figure 4. Average monthly price for cauliflower on the Brisbane market 2001 to 2003

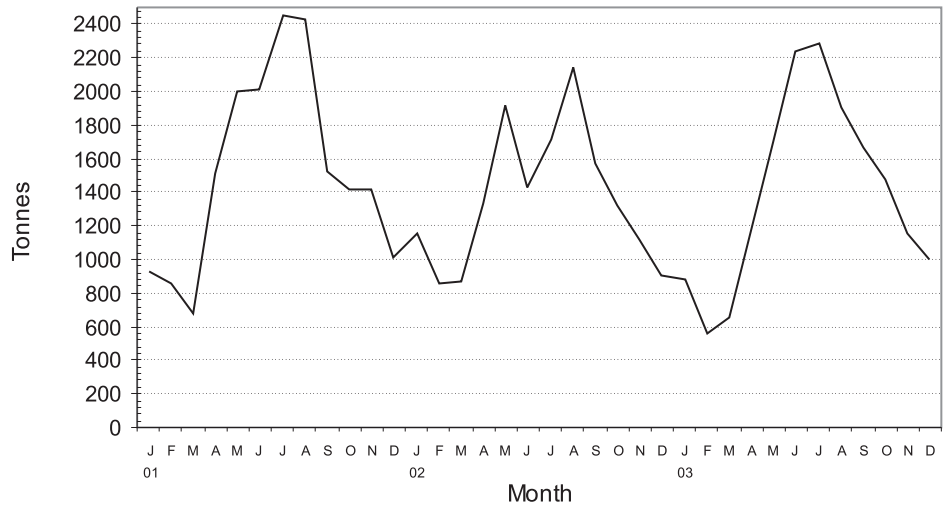


Figure 5. Throughput of cauliflower on the Brisbane market 2001 to 2003

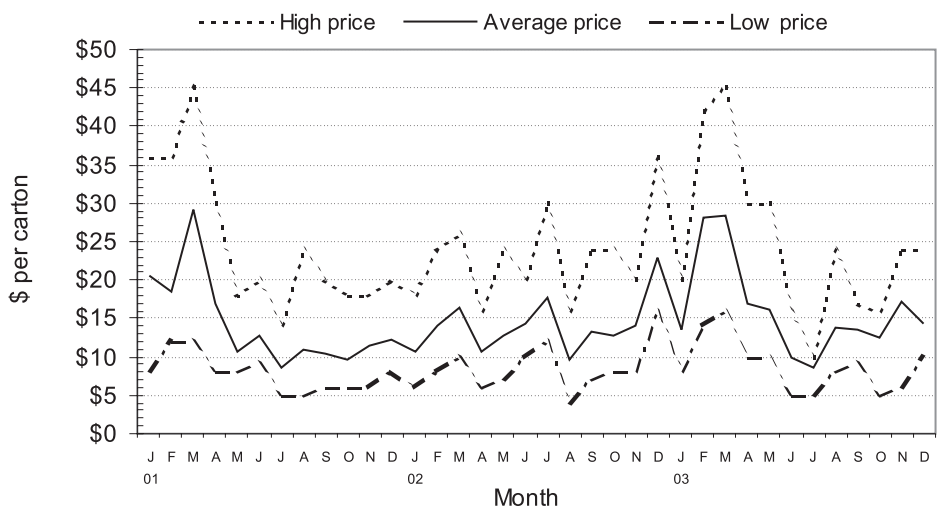


Figure 6. Average monthly price for cauliflower on the Sydney market 2001 to 2003

Production costs

Production and marketing costs in southern Queensland are at least \$9.50 per carton. Variable growing, harvesting and marketing costs are at least \$14 000/ha, but can be \$20 000 or more per hectare. The evenness of crop maturity will have a significant impact on harvesting costs.

Table 4 shows the estimated average costs of a southern Queensland crop yielding 1 700 cartons per hectare sold at \$12 per carton on the Brisbane market.

Table 4. Example costs of producing and marketing a cauliflower crop grown in southern Queensland

Costs	\$ per carton	\$ per hectare
Growing	2.77	4 709
Harvesting (pick, pack & carton)	5.61	9 537
Marketing (freight and commission)	2.35	3 995
Total	10.73	18 241

Gross margin

At an average yield of 1 700 cartons per hectare and an average price of \$12 per carton, the gross return would be \$20 400/ha. The gross margin (income after deducting growing, harvesting and marketing costs) for the yield, price and cost averages used here would be \$2159/ha. To determine your net income, deduct fixed and capital costs such as rates, vehicle registration, insurance, electricity, administration, interest and living expenses.



a key issue

Cauliflower gross margin
Chapter 4 page 90

Broccoli yields and prices

Marketable yields commonly range from 700 to 1000 icepacks per hectare.

Price can range from \$3.00 to \$40.00 per icepack, but is usually in the \$12.00 to \$22.00 range. Figures 7 to 9 show average prices and throughput at the Brisbane market and prices at the Sydney market for 2001 to 2003. The bigger the variation above or below the average price, the greater the opportunity or risk involved.



more info

Market prices
Chapter 6 page 282

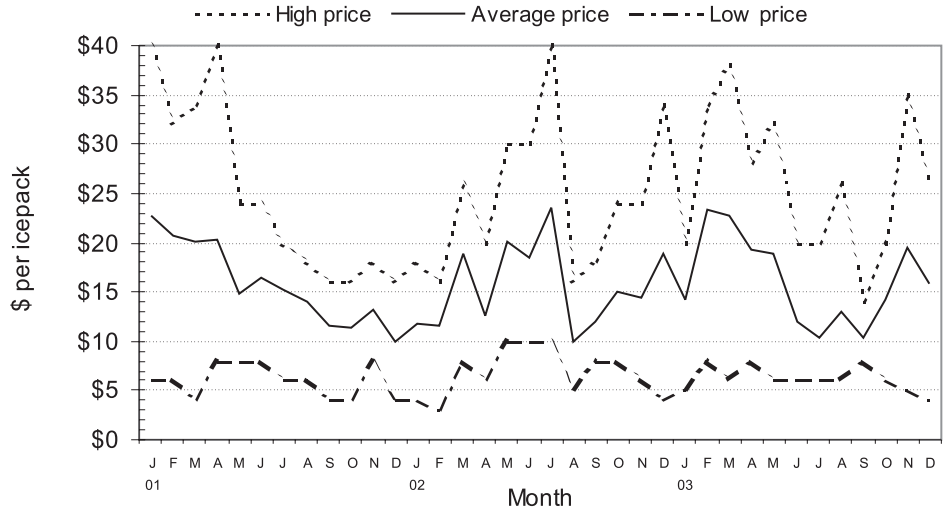


Figure 7. Average monthly price for broccoli on the Brisbane market 2001 to 2003

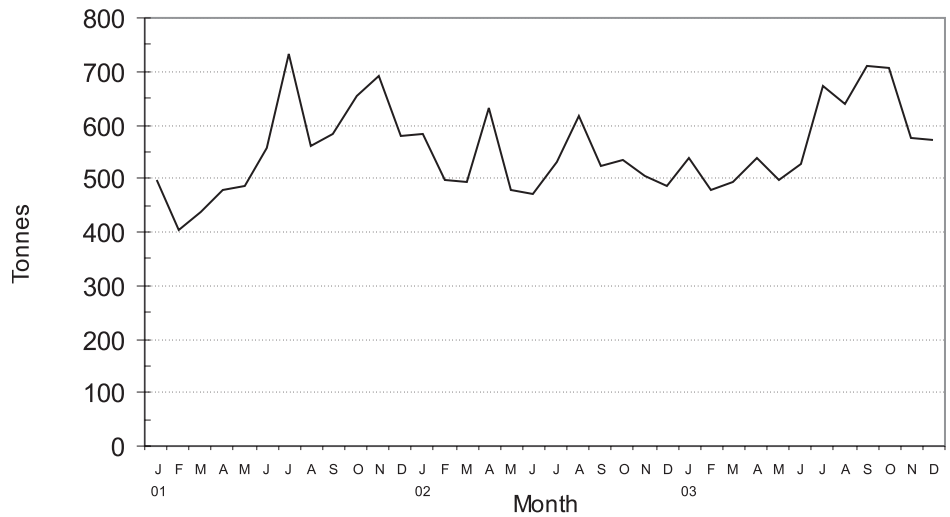


Figure 8. Throughput of broccoli on the Brisbane market 2001 to 2003

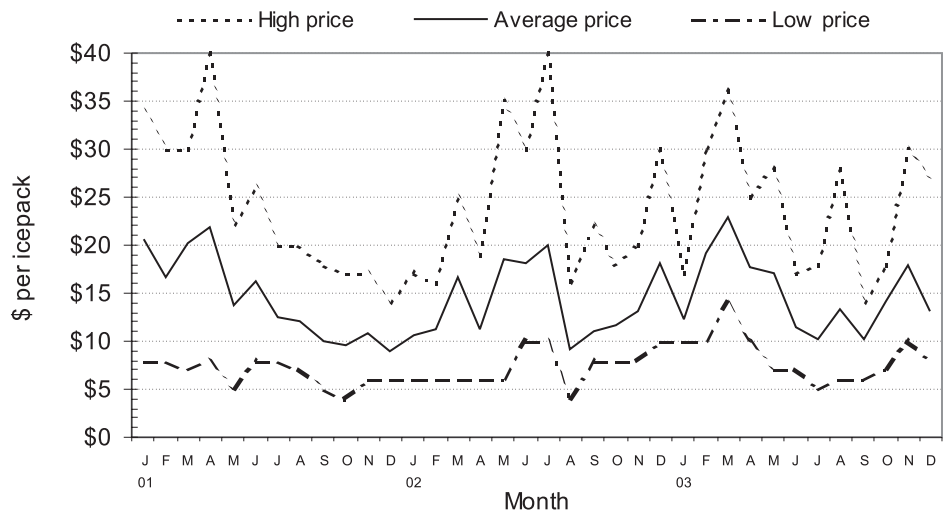


Figure 9. Average monthly price for broccoli on the Sydney market 2001 to 2003

Production costs

Production and marketing costs in southern Queensland are at least \$13.00 per icepack. Variable growing, harvesting and marketing costs range from \$11 000 to \$15 000 or more per hectare.

Table 5 shows the estimated average costs of a southern Queensland crop yielding 900 icepacks per hectare sold at \$16.00 per icepack on the Brisbane market.

Table 5. Example costs of producing and marketing a broccoli crop grown in southern Queensland

Costs	\$ per icepack	\$ per hectare
Growing	4.75	4 275
Harvesting (pick, pack & icepack)	6.66	5 994
Marketing (freight and commission)	2.50	2 250
Total	13.91	12 519

Gross margin

At an average yield of 900 icepacks per hectare and an average price of \$16 per icepack, the gross return would be \$14 400/ha. The gross margin (income after deducting growing, harvesting and marketing costs) for the yield, price and cost averages used here would be \$1881/ha. To determine your net income, deduct fixed and capital costs such as rates, vehicle registration, insurance, electricity, administration, interest and living expenses.



Broccoli gross margin
Chapter 4 page 93

Capital required

Assuming that you own or have access to suitable land, it would cost around \$250 000 to \$300 000 to buy the minimum amount of new machinery, plant and equipment needed to set up a 20 to 30 hectare brassica enterprise. This will depend on which crop you grow and what harvesting and packing arrangements you use. Cabbage would generally be less capital intensive than broccoli or cauliflower.

To reduce capital outlays, you could lease or borrow equipment and contract harvesting and packing operations. Second-hand equipment prices are normally about half that of new equipment, depending on condition and age.

You will also need to finance production and marketing of the crop. Brassicas are usually planted on a weekly schedule over a number of months. You may be looking at investing \$100 000 to \$200 000 in variable growing, harvesting and marketing costs before receiving a gross return from the first harvest.



Getting the crop started
Chapter 3 page 34

The farm you need

Soil

Brassicas will grow on most soil types but the crop needs at least 300mm of friable, well-drained topsoil. Poorly drained soils or heavy clay soils become waterlogged after rain or irrigation, making crop management more difficult. Brassicas prefer a slightly acid soil (pH 6.0 to 6.5) but will tolerate a slightly alkaline soil, up to pH 7.5.

Climate

Brassicas grow best under cooler temperatures. Mild, sunny days with temperatures between 15° and 25°C and cool nights with temperatures between 10° and 15°C are considered ideal. Heavy winter frost (below –4°C) can damage heads and will kill young seedlings. Some varieties will tolerate hot conditions but high temperatures will reduce both head quality and yields. Cauliflower is particularly sensitive to temperature extremes.

During extended rainy weather, plants are more likely to become infected with diseases such as black rot and bacterial head rots. These are difficult to manage once the disease is established in the field. Rainfall will also restrict machinery operations, particularly on heavy soils.

Brassica crops are attacked by a range of butterfly and moth larvae (caterpillars). These can be difficult to control, particularly in the warmer months.

Slope

Ideally slopes should be no more than 3%. A slight slope will provide better drainage while still allowing for efficient irrigation and use of machinery. Steep slopes will be more difficult and expensive to work. Uniform slopes are desirable but not essential. Soil erosion can be a problem on steep slopes while depressions can result in waterlogging.

Slopes above 5% require recognised soil conservation practices. Slopes above 8% make machinery operations hazardous and it can be difficult to maintain uniform irrigation.

Water

An adequate water supply is essential to ensure economic yields of high quality product. Each crop will require 2.5 to 4 megalitres (ML) of water per hectare, depending on season, soil type and crop type. This is equivalent to 250 to 400 mm of total rain and/or irrigation over one hectare of land.



Prepare the land
Chapter 3 page 41

When surface water, for example dams, is your main source of irrigation water, a storage capacity of 6 to 8 ML will be required for each hectare of crop grown. This will ensure that you have adequate water supplies to meet peak irrigation demands even in unseasonably dry conditions.

Brassicas are usually watered with overhead irrigation systems although some growers are switching to drip (trickle) irrigation.

The crop is moderately sensitive to poor quality water. Electrical conductivity is a measure of water salinity. Table 6 shows the water conductivity threshold for different soil types at which yield reductions may occur.



Irrigation management
Chapter 4 page 168

Table 6. Water conductivity threshold for different soil types

	Sandy	Loam	Clay
Cabbage	3.5 dS/m	2.0 dS/m	1.2 dS/m
Cauliflower	3.2 dS/m	1.8 dS/m	1.1 dS/m
Broccoli	4.9 dS/m	2.8 dS/m	1.6 dS/m

Source: *NRM Facts, water series W55*

Until recently water conductivity was reported in microSiemens per centimetre ($\mu\text{S}/\text{cm}$), however it is now reported as deciSiemens per metre (dS/m).

To convert from $\mu\text{S}/\text{cm}$ to dS/m use the following formula.
microSiemens per centimetre ($\mu\text{S}/\text{cm}$) divided by 1000 =
deciSiemens per metre (dS/m)

Example: 1200 $\mu\text{S}/\text{cm}$ divided by 1000 = 1.2 dS/m

To convert from deciSiemens per metre to microSiemens
per centimetre multiply by 1000.

Example: 1.2 dS/m x 1000 = 1200 $\mu\text{S}/\text{cm}$

The machinery and equipment you need

The machinery and equipment required will depend on the size of the enterprise and crop grown. Table 7 lists the machinery and equipment considered essential for brassica production on a small scale (20 to 30 hectare). Machinery, plant and equipment listed as desirable would make management easier by increasing flexibility and would be considered essential in a larger enterprise.

The prices listed in the table are estimates only. Rather than buying new machinery you could lease, borrow or buy second-hand equipment to reduce capital outlays. Harvesting, cooling and packing can be contracted out in most major vegetable production districts.

Table 7. Estimated cost of new machinery and equipment

Equipment	New price \$
ESSENTIAL	
Tractor (26 kW) for planting, cultivation, spraying, harvest	30 000
Tractor (45 to 60 kW) for discs, ripper, rotary hoe	60 000
Truck or tractor and trailer	10 000–40 000
Cultivation equipment	20 000–25 000
Bed-former	2 000
Transplanter	4 000
Fertiliser spreader	10 000
Spray equipment for crop	10 000
Irrigation equipment	80 000
Tractor mounted forklift	10 000
Pallet jack	700
DESIRABLE	
Power harrows (1.5m width with bed-former)	17 000
Spray equipment for herbicides	4 000
Harvest aid	26 000
Shed forklift	30 000
Slasher/pulveriser	3 000–6 000
Sorting/packing tables and equipment	10 000
20 pallet coldroom	35 000
Forced air cooling facilities (8 pallet room)	50 000

The labour you need

One person could grow 10 to 15 hectares of crop over a six-month period with additional labour to help with transplanting, harvesting and packing. Cabbage production is less labour-intensive than cauliflower and broccoli growing.

Three people plus a driver are required for planting. This team could plant out around 5000 to 7000 transplants per hour.

A team of four can cut around three half-tonne bins of cabbage per hour. Six to eight people are needed to operate a harvest aid efficiently. Using a harvest aid, a team of eight could pick and pack between 40 to 50 icepacks of broccoli per hour or 60 to 80 cartons of cauliflower per hour. Cutting and packing rates would slow considerably when more than two or three passes are needed to harvest the crop.

Transplanting, harvesting, cooling and packing operations can be contracted out for all three crops; this reduces problems associated with managing a large number of staff.

Other considerations

Growing brassica crops involves hard, physical work. This includes land preparation, planting, spraying for weed, pest and disease control, fertilising, irrigating, harvesting and packing. There is a high labour requirement for transplanting, picking and packing, particularly for product sold in cartons or icepacks.

Management skills or access to consultants with these skills are required for managing finances, administration, staff and the crop. Good communication skills, or staff with these skills, are essential for successfully managing labour and organising markets. Skills in machinery operation and maintenance, the ability to read and understand chemical labels, and skill in observing and fixing problems in their early stages, are essential. Careful attention to detail is necessary to be a successful brassica grower.

Quality of the end product is most important in successful cabbage, cauliflower or broccoli growing. This starts with good land preparation, careful selection of varieties to suit the district and season and continues through the growing of the crop, harvesting, cooling, packing and marketing.

Brassica crops may be grown organically. However, it can be difficult to achieve adequate weed, pest and disease control.



Organic production
Chapter 4 page 260
