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- 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- Financial information—costs and returns listed in this publication are out of date.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.
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
heliothis 208
biological insecticides 198, 206
birds 53
control of heliothis 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
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
brown bead 58
brussels sprouts 120, 264
buttoning 122

Cabbage
average yield 63
calculating spacing 40
cooling and storage 65
ethylene damage 65
growth cycle 126
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
zorate leaf spot 228
cabbage cluster caterpillar 17
calibrating sprayers 252
capacity 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
growing, packing 66
gross margin 90
growth cycle 126
handy guide 302
harvesting 61, 63
hot water treatment 233
marketing 71
monitoring nutrients 166
packaging 66
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
calibrating sprayers 252
capacity probes 179
ChemCert 24, 279
ChemClear 258
calibrating sprayers 252
diamondback moth 207
deficiency 157
fertigation amounts 164
management 154
calculate the number of plants 41
capacitor probes 179
carbonate 57
chard 267
chemical control 199
diamondback moth 207
calibrating sprayers 252
capacity probes 179
carbamate 19, 57, 207, 216
calibration sprayers 252
capacity probes 179
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
calmex 10
clay soils 45

GROWING GUIDE: Brassica grower’s handbook
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

dischlorisation 133
initiation 122
cutworm 17, 52
control of 210
monitoring for 192
cyperus rotundus 238

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 semieiclausum 205
diadegma wasps 206
diadromus collaris 219
diagnostic services 279
diamond back moth
monitoring for 191
phomone trap 192
diandrid back 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
Erremocerus 219
Erwinia 20, 231
Escale 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
fertilisation 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
  times 35, 131
head rots 20, 133
*Helicoverpa armigera* 207
heliothis 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
*Helulula hydralis* 209
herbicides
  handy guide 306
  minimise use of 22
  pre-emergent 48, 54
  damage 22
  strategies for weed management 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
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
Japanese mustard spinach 264
journals and magazines 292
kale 120, 264
Kameron 16, 38
kangaroos 17
kikuyu 42
knots and swellings on roots 52
knottweed 48, 238, 242
kohlrabi 120, 265
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
lip 43, 45, 162
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

GROWING GUIDE: Brassica grower’s handbook
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  66
organic additives  154
organic grower associations  277
organic matter–increasing  154
organochlorine  207, 216
organophosphates  15, 57, 207, 216
  control of silverleaf whitefly  213
overhead sprinkler systems  170
Oxyfluorfen  48, 239
P
packaging  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
peppercress  119
peppery leaf spot  19, 20, 228
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  
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  
oradish  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  
riceyness  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  
Sclerotinia 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  
seeding 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  
Shepherd’s pursle  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  
spinklers  
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  
fertigation 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
fertilisation 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
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.
### Chemical handy guide—broccoli pests

<table>
<thead>
<tr>
<th>WHIP</th>
<th>African black beetle</th>
<th>Aphid</th>
<th>Black field cricket</th>
<th>Budworms (Heliothis)</th>
<th>Cabbage aphid</th>
<th>Cabbage cluster caterpillar</th>
<th>Cabbage white butterfly</th>
<th>Cabbage-centre grub</th>
<th>Cluster caterpillar</th>
<th>Corn earworm/cotton bollworm</th>
<th>Cucumber</th>
<th>Diamondback (Cabbage) moth</th>
<th>Field cricket</th>
<th>Green peach aphid</th>
<th>Jassid</th>
<th>Looper caterpillar</th>
<th>Mole cricket</th>
<th>Native budworm</th>
<th>Thrips</th>
<th>Tomato grub</th>
<th>Two-spotted (Red spider) mite</th>
<th>Vegetable weevil</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bacillus thuringiensis var.</strong> aizawai (Bta)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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**Note:** NR = Not Recommended
✓ 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.

Chemical handy guide—broccoli diseases

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<th>copper oxychloride</th>
<th>chlorothalonil</th>
<th>mancozeb</th>
<th>metalaxyl</th>
<th>metalaxyl-M</th>
<th>metalaxyl</th>
<th>triadimenol</th>
<th>fluzoran*</th>
<th>phosphorous acid**</th>
<th>iodine</th>
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## Chemical handy guide—cabbage pests

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<th>Chemical</th>
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<td>esfenvalerate</td>
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<td>prothiofos</td>
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<td>diazinon</td>
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<td>pymetrozine</td>
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<td>phorate</td>
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<td>azulun (8%)</td>
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### Withholding periods:
- Affan black beetle (A. melanurus Vieguera) 28 d.
- Black field cricket (R. dominica) 7 d.
- Black spot (Phoma lingam) 7 d.
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Handy Guides

GROWING GUIDE: Brassica grower’s handbook

**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.

* registered for closed head varieties only
** pre-transplant or seedling drench
*** seedlings in nurseries
NR = not required
NA = not required when used as directed
PH = Postharvest

### Chemical handy guide—cabbage diseases

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<th>chlorothalonil</th>
<th>mancozeb</th>
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Redlegged earth mite
Rutherglen bug
Thrips
Tomato grub
Two-spotted (Red spider) mite
Vegetable weevil
### Chemical handy guide—cauliflower pests

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### Chemical handy guide

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Handy Guides

GROWING GUIDE: Brassica grower’s handbook

Rutherglen bug
Thrips
Tomato grub
Two-spotted (Red spider) mite
Vegetable weevil

✔ 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—cauliflower diseases

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GROWING GUIDE: Brassica grower’s handbook
## Chemical handy guide—brassica (crucifer *) pests

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<tr>
<td>Wingless grasshopper</td>
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* NR: Not Relevant
* ✔️: Effective
* ❌: Not Effective
* var.: variable
* PP: Pre-Plant
Chemical handy guide—brassica (crucifer*) diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>chlorothalonil</th>
<th>Copper as ammonium acetate</th>
<th>Copper hydroxide</th>
<th>Copper oxychloride</th>
<th>Copper sulfate (tribasic)</th>
<th>Copper hydroxide-mancozeb</th>
<th>mancozeb</th>
<th>triadimiel</th>
<th>zineb</th>
<th>quintozene</th>
<th>phosphorous acid***</th>
<th>fenamiphos</th>
<th>metham sodium</th>
<th>sodium hypochlorite</th>
<th>Iodine</th>
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<td>Base rot (Rhizoctonia)</td>
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<tr>
<td>Sclerotium base rot</td>
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</tbody>
</table>

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

Note that different trade products can have different withholding periods.

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.
### Chemical handy guide—herbicides

<table>
<thead>
<tr>
<th></th>
<th>Withholding period</th>
<th>Broccoli</th>
<th>Cabbage</th>
<th>Cauliflower</th>
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<tr>
<td><strong>Grass herbicides</strong></td>
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<td>clethodim</td>
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<tr>
<td>fluazifop-P as butyl</td>
<td>42</td>
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<td>✓</td>
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<tr>
<td>sethoxydim</td>
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<tr>
<td>quizalofop-P-ethyl</td>
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<td>✓</td>
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<td>✓</td>
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<td><strong>Pre-emergence herbicides</strong></td>
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<tr>
<td>chlorthal-dimethyl*</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>metolachlor**</td>
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<td>✓</td>
<td>✓</td>
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<tr>
<td>oxyfluorfen**</td>
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<td>pendimethalin**</td>
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<td>propachlor**</td>
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<td>S-metolachlor**</td>
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<td>trifluralin*</td>
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</tbody>
</table>

- ✓ 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
<table>
<thead>
<tr>
<th>Chemical</th>
<th>Chemical trade name</th>
<th>Qld</th>
<th>NSW</th>
<th>Vic</th>
<th>SA</th>
<th>WA</th>
<th>NT</th>
<th>Tas</th>
<th>ACT</th>
<th>Chemical class</th>
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<tbody>
<tr>
<td>acephate</td>
<td>Lancer 750 DF, Orthene Xtra</td>
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<td>Yes</td>
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<td>Group 1B Insecticide</td>
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<td>alpha-cypermethrin</td>
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<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Yes</td>
<td>Group 3A Insecticide</td>
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<td>beta-cyfluthrin</td>
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<td>Bacillus thuringiensis var. aizawai (Bta)</td>
<td>Bacchus, Xentari WG</td>
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<td>Yes</td>
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<td>Yes</td>
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<td>Yes</td>
<td>Yes</td>
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<td>chlorothalonil</td>
<td>Check-Out 500 SC, Chlorothalonil 500 SC, Echo 500 SC, Fung-o-nil 500, Hurrah Fungicide, Whack 500, Appronil 720 Fungicide, Barrack 720, Bravo, Check-Out 720, Cheers 720, Chlorothalonil 720, Clash 720, Echo 720 Fungicide, Unite 720, Whack Fungicide, Echo 900</td>
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<td>chlorthal-dimethyl</td>
<td>Chlorthal Dimethyl 750 WG, Dacthal, Warrant 750 WP</td>
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<td>Liquicop</td>
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<td>Fusilade</td>
<td>Yes</td>
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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

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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.

<table>
<thead>
<tr>
<th>Contacts</th>
<th>Page</th>
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<tbody>
<tr>
<td>GROWING GUIDE: Brassica grower's handbook</td>
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<th>Contacts</th>
<th>Page</th>
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</thead>
<tbody>
<tr>
<td>Contacts ...............................................................................................</td>
<td>276</td>
</tr>
<tr>
<td>Grower associations ...............................................................................</td>
<td>277</td>
</tr>
<tr>
<td>Seed suppliers ......................................................................................</td>
<td>277</td>
</tr>
<tr>
<td>Seedling nurseries .................................................................................</td>
<td>278</td>
</tr>
<tr>
<td>Farm chemicals .....................................................................................</td>
<td>278</td>
</tr>
<tr>
<td>Farm safety ...........................................................................................</td>
<td>279</td>
</tr>
<tr>
<td>Pest animal, bird and vermin control ...............................................</td>
<td>279</td>
</tr>
<tr>
<td>Diagnostic services ................................................................................</td>
<td>279</td>
</tr>
<tr>
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<td>280</td>
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<tr>
<td>Soil, plant, water and product testing services ...................................</td>
<td>281</td>
</tr>
<tr>
<td>Quality assurance and environmental management ....................................</td>
<td>282</td>
</tr>
<tr>
<td>Market information ................................................................................</td>
<td>282</td>
</tr>
<tr>
<td>Export associations ............................................................................... 284</td>
<td></td>
</tr>
<tr>
<td>AQIS offices ......................................................................................... 284</td>
<td></td>
</tr>
<tr>
<td>Information on interstate movement provisions .................................... 285</td>
<td></td>
</tr>
<tr>
<td>Government services .............................................................................. 286</td>
<td></td>
</tr>
<tr>
<td>Agricultural booksellers ....................................................................... 287</td>
<td></td>
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<tr>
<td>Contacts through the Yellow Pages ..................................................... 288</td>
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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
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
Web: www.wseedlings.com.au

Withcott Seedlings
PO Box 9145
WITHCOTT QLD 4352
Ph: (07) 4630 3372; Fax: (02) 4630 3511
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&É)
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
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™ and SQF 2000™
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
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
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

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

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

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

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.
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 Fisheries (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 information 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 producers 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 management for example soil, water, vegetation, erosion, salinity etc.

Environmental Protection Agency/Queensland Parks and Wildlife
Ph: (07) 3227111
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 Environment (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

**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.au
Web: 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


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


DPI&F notes and web pages


Asian leafy brassica vegetables

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


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

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

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


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


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.


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 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
Includes club root project
Diamondback moth management
Department of Primary Industries, Victoria
For the DBM sampling plan, contact the project team or follow the pest & diseases link
National DBM resistance management strategy Avicare
http://www.avcare.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
Australian New Crops web site—University of Queensland
http://www.newcrops.uq.edu.au/
The New Rural Industries—RIRDC handbook
Asian Foods Research Program - Rural Industries Research and Development Corporation

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:
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
Avicare, National Association of Crop Production and Animal Health:
Web: www.avcare.org.au
ChemClear—Farm chemicals:
Web: www.chemclear.com.au
Cool chain, South Australian Research and Development Institute:
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:

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

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 - Enviromental Protection Agency

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:

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

SQF 2000® and SQF 2000M
Web: www.sqfi.com

Standards Australia:
Web: www.standards.com.au

Sustainable Agriculture Resources—Australian and New Zealand:
Sustainable practices for vegetable production in the south, North Carolina State University:
Web: 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
Chapter 1

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

<table>
<thead>
<tr>
<th>Crop</th>
<th>Area (ha)</th>
<th>Production (tonnes)</th>
<th>Farm gate value ($ millions)</th>
<th>Gross value ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabbages</td>
<td>366</td>
<td>13,148</td>
<td>2.7</td>
<td>4.7</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>693</td>
<td>15,058</td>
<td>4.1</td>
<td>8.2</td>
</tr>
<tr>
<td>Broccoli</td>
<td>1758</td>
<td>11,569</td>
<td>14.3</td>
<td>18.8</td>
</tr>
<tr>
<td>Totals</td>
<td>2817</td>
<td>39,775</td>
<td>21.1</td>
<td>31.7</td>
</tr>
</tbody>
</table>

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

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

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.
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

<table>
<thead>
<tr>
<th>Costs</th>
<th>$ per head</th>
<th>$ per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing</td>
<td>0.22</td>
<td>3,520</td>
</tr>
<tr>
<td>Harvesting (pick, pack &amp; bin)</td>
<td>0.37</td>
<td>5,920</td>
</tr>
<tr>
<td>Marketing (freight and commission)</td>
<td>0.25</td>
<td>4,000</td>
</tr>
<tr>
<td><strong>Total variable costs</strong></td>
<td><strong>0.84</strong></td>
<td><strong>13,440</strong></td>
</tr>
</tbody>
</table>

### 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 $2,560/ha. To determine your net income, deduct fixed and capital costs such as rates, vehicle registration, insurance, electricity, administration, interest and living expenses.

### 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.
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

<table>
<thead>
<tr>
<th>Costs</th>
<th>$ per carton</th>
<th>$ per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing</td>
<td>2.77</td>
<td>4,709</td>
</tr>
<tr>
<td>Harvesting (pick, pack &amp; carton)</td>
<td>5.61</td>
<td>9,537</td>
</tr>
<tr>
<td>Marketing (freight and commission)</td>
<td>2.35</td>
<td>3,995</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10.73</strong></td>
<td><strong>18,241</strong></td>
</tr>
</tbody>
</table>

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 $2,159/ha. To determine your net income, deduct fixed and capital costs such as rates, vehicle registration, insurance, electricity, administration, interest and living expenses.

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.
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

<table>
<thead>
<tr>
<th>Costs</th>
<th>$ per icepack</th>
<th>$ per hectare</th>
</tr>
</thead>
<tbody>
<tr>
<td>Growing</td>
<td>4.75</td>
<td>4,275</td>
</tr>
<tr>
<td>Harvesting (pick, pack &amp; icepack)</td>
<td>6.66</td>
<td>5,994</td>
</tr>
<tr>
<td>Marketing (freight and commission)</td>
<td>2.50</td>
<td>2,250</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>13.91</strong></td>
<td><strong>12,519</strong></td>
</tr>
</tbody>
</table>

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 $1,881/ha. To determine your net income, deduct fixed and capital costs such as rates, vehicle registration, insurance, electricity, administration, interest and living expenses.

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.
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°C and 25°C and cool nights with temperatures between 10°C 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.
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.

**Table 6. Water conductivity threshold for different soil types**

<table>
<thead>
<tr>
<th></th>
<th>Sandy</th>
<th>Loam</th>
<th>Clay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabbage</td>
<td>3.5 dS/m</td>
<td>2.0 dS/m</td>
<td>1.2 dS/m</td>
</tr>
<tr>
<td>Cauliflower</td>
<td>3.2 dS/m</td>
<td>1.8 dS/m</td>
<td>1.1 dS/m</td>
</tr>
<tr>
<td>Broccoli</td>
<td>4.9 dS/m</td>
<td>2.8 dS/m</td>
<td>1.6 dS/m</td>
</tr>
</tbody>
</table>

Source: NRM Facts, water series W55

Until recently water conductivity was reported in microSiemens per centimetre (µS/cm), however it is now reported as deciSiemens per metre (dS/m).

To convert from µS/cm to dS/m use the following formula.

\[
\frac{\text{microSiemens per centimetre (µS/cm)}}{1000} = \text{deciSiemens per metre (dS/m)}
\]

Example: 1200 µS/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 µS/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

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

### 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.