4 SOUR ROT (Geotrichum citri-aurantii)

This fungus is widespread and is present in the soil of all citrus producing areas. The spores are spread to the fruit by dust and by water splashing from the soil onto low-hanging fruit. Injuries penetrating to the albedo (white portion of the peel) are necessary for infection to take place. These are often provided by insect attack, mostly false codling moth (FCM), fruit flies and fruit piercing moth and by incorrect snap-picking. All varieties of citrus are susceptible, but especially the mandarin hybrids. The fungus may also be spread by vinegar flies (Drosophila spp.) from infected to injured fruit. The fungus develops most rapidly at temperatures above 27°C and overmature fruit are more susceptible than younger fruit.

Guazatine (Deccotine, Deccowax) is the only registered post-harvest fungicide that gives good control of sour rot and the use of SOPP (Dowicide A) results in some protection.

To minimise sour rot, insects must be controlled, serious injuries must be avoided, e.g. those caused by careless snap-picking. The fruit must be packed and cooled as soon as possible after harvest (the fungus develops very slowly at temperatures below 5°C), and fruit must be harvested before they become overmature. Packhouse sanitation must be strict so that there is no opportunity for vinegar flies, which are attracted to rotting fruit, to spread sour rot. Sour rot spreads in packed cartons of fruit from infected fruit to sound, uninjured fruit, causing "nests" of decay. Sour rot development is also stimulated by the presence of green mould spores.

5 ALTERNARIA ROT (Alternaria citri)

Alternaria rot of citrus fruit manifests itself in different ways. The fungus causes a navel-end rot of Washington Navels, a stylar-end rot of lemons, mandarin hybrids and sometimes other orange varieties such as Hamlin, Tomango and Valencia, a stem-end rot in all citrus varieties and an internal black or brown rot in most citrus varieties.

The spores of the fungus infect the flower tissue and when the fruit is more mature, the fungus is already established in the button tissue, deep in
the navel cavity of Washington Navels and on
the stylar scar - in most cases out of reach of
fungicides. *Alternaria* rot may also develop
from injuries to the rind, either caused
mechanically or by insects such as false codling
moth. The incidence of *Alternaria* rot increases
with mealybug infestation levels.

Mature fruit and fruit of low vitality, produced
because of unfavourable weather conditions
such as prolonged low temperatures or frost,
dry, hot winds, low humidity or extreme heat,
are very prone to attack by *Alternaria*, as well
as fruit showing sunburn or, in the case of
lemons, affected by endoxerosis.

Control measures consist of cultural procedures
that will produce fruit of high vitality, and the
culling of fruit showing sunburn, cracks at navel
or stylar ends, signs of endoxerosis, e.g. fruit
having high colour or no buttons. The use of
2,4-D in the packhouse, to delay abscission of
the button, is essential.

6 **TRICHODERMA BROWN ROT**
(*Trichoderma viride*)

This fungus is a common soil inhabitant and
attacks the fruit of all citrus varieties. Initial
infection depends on injuries to the fruit, but in
packed cartons of fruit the fungus spreads from
infected fruit to sound uninjured fruit. *Trichoderma*
is a cellulose-decomposer and
makes good growth on paper, cardboard and
wood.

The fungus invades cartons and wooden
storage boxes from where it can grow out again
and infect sound fruit.

Control consists of avoiding injuries to the fruit,
cleaning out (by using steam or formaldehyde)
wooden storage boxes or lugboxes in which
*Trichoderma* rot of citrus fruit has developed, by
using TBZ or benomyl to protect the fruit and by
low temperature storage.

7 **ANTHRACNOSE ROT**
(*Colletotrichum gloeosporioides*)

This fungus is widespread in citrus orchards.
Spores are produced on dry twigs and dead
tissue from where they are spread by wind, rain
and insects to the young fruitlets. The fungus
penetrates the rind and then remains latent until
conditions are favourable for further growth, e.g.

over-maturity or injuries to the fruit. Occasionally young fruit still on the tree may be
attacked by the fungus growing from infected,
dying twigs into the fruit. All citrus species are
susceptible but especially mandarin types.

Control is achieved by cultural practices which
result in vigorous trees and fruit of high vitality,
by avoiding an accumulation of dry twigs in the
tree, harvesting at optimum maturity and
avoiding very long storage. Packhouse
applications of TBZ, imazalil and prochloraz
help to control this disease.

8 **FUSARIUM BROWN ROT** (several
species of *Fusarium*)

*Fusarium* is a common soil inhabitant and is
therefore commonly present in the dust on the
fruit surface. *Fusarium* rot does not occur
commonly, and is restricted to low vitality or
over-mature fruit, or fruit that has been stored
for long periods of time.

*Fusarium* brown rot is avoided by picking fruit at
optimum maturity, not packing low vitality fruit
(e.g. fruit with navel or stylar end splits), storing
fruit at low temperatures (e.g. 4,5°C for
oranges) and by not storing fruit for too long.
TBZ is quite active against *Fusarium* species.