



Pacific Pests and Pathogens - Fact Sheets

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Bele (Abelmoschus) Phytophthora wilt (149)



Photo 1. Bele wilt, caused by the water mould, *Phytophthora nicotianae*, attacking the roots.



Photo 2. Bele wilt, *Phytophthora nicotianae*, showing the death of the young shoot at the top of the plant.

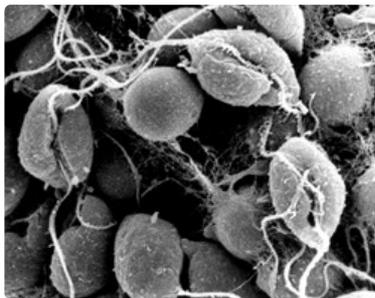


Photo 3. Highly magnified photo of zoospores of *Phytophthora nicotianae*, showing the whip-like hairs used for movement (each zoospore has two).



Photo 4. Root rot caused by *Phytophthora nicotianae*. Note the lack of roots, and that the lower stem has lost its bark, exposing the wood.



Photo 5. Several plants have lost their leaves and are dying due to root and basal stem rot caused by *Phytophthora nicotianae*.

Common Name

Bele Phytophthora wilt

Scientific Name

Phytophthora nicotianae; previously, *Phytophthora nicotianae* pv. *parasitica*.

Distribution

Worldwide. The disease has been identified on *bele* in Fiji, and symptoms seen on *bele* in Solomon Islands, although these have not been verified. *Phytophthora nicotianae* is also present in American Samoa, Australia, Cook Islands, Federated States of Micronesia, Fiji, New Caledonia, Niue, Papua New Guinea, Samoa, Tonga, and Wallis & Futuna, but not on *bele* in those countries (see **Fact sheet nos.**

154, 157 & 264).

Hosts

Bele (*aibika*, island cabbage or sliperi kabis, *Abelmoschus manihot*). Note, this is the same water mould (or oomycete) that causes a similar disease on tomato (root and a firm dark fruit rot, see **Fact Sheet no. 157**), and also attacks capsicum, citrus, papaya, passionfruit (see **Fact Sheet no. 154**) and pineapple.

Symptoms & Life Cycle

The disease is favoured by high soil temperatures, and soils saturated with water due to high rainfall or poor drainage. Waterlogged soils starve roots of oxygen that plants need for healthy growth, and the water allows the swimming spores of *Phytophthora* to spread, infect the roots and cause the *bele* to wilt (Photos 1&2).

Water moulds survive in the soil as thick-walled resting spores called 'chlamydozoospores'. When conditions are right, the chlamydozoospores germinate and produce spores called "sporangia". Yet another spore is produced inside the sporangia called 'zoospores' (Photo 3), and these are capable of swimming short distances in the water between soil particles (the thread-like processes coming from the zoospores in Photo 3 are for swimming). If the zoospores reach the fine feeder roots of susceptible plants they germinate and infect them. Infections also occur at the collar region, the part of the stem at soil level.

Once inside the plant, the water mould develops more sporangia and zoospores.

The root system rots, and the outer layers of the stem become soft and peel away exposing brown areas of rot beneath (Photo 4). Aboveground, the plants wilt, lose their leaves, and soon after collapse and die (Photo 5).

The water mould spreads in rain splash, surface water, and over long distances in soil on machinery and shoes.

Impact

The disease is caused by a species of *Phytophthora*; it is an oomycete or water mould, not a fungus. Although they look like fungi, *Phytophthora* species are related to algae. The water mould infects the roots, and stem of *bele*, especially at soil level, causing a collar rot. Depending on rainfall, the disease may spread quickly causing plants to wilt and die (Photos 1&2). In general, it is not a common disease and the extent of damage on *bele* is not high, although individual plants are killed by the root and collar attack.

Detection & inspection

Look for plants that wilt during the warmest parts of the day although the soil is still moist. At an early stage of the disease, look at the root system of wilting plants to see if the fine feeder roots are dead, and if there is any damage to the stem at soil level.

Management

CULTURAL CONTROL

Cultural control is particularly important in the management of this disease:

- *Rogueing*: Remove wilted plants with as much soil around the roots as practical as soon as wilt symptoms are seen. Do not allow *Phytophthora*-infested soil to fall on adjacent plants. Place diseased plants and soil in a basket or bag and then burn them.
- *Crop rotation*: Crop rotations of at least 4 years should be used, because of the long survival of spores in the soil. During intervals between crops of *bele*, plant root crops which are not hosts of the water mould.
- *Soil drainage*: Plant cuttings used for propagation on ridges or raised beds, surrounded by ditches, to prevent waterlogging.
- *Planting material*: Do not take cuttings for propagation from any plants in areas where the wilt occurs.

RESISTANT VARIETIES

None are known.

CHEMICAL CONTROL

Chemical control is not a method that can be used against this soil borne pathogen.

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Photos 1&3 Mike Furlong, University of Queensland. Photo 2 AR Hardham, Plant Cell Biology Group, Research School of Biology, The Australian National University, Canberra, Australia. Photos 4&5 Pita Tikai, ACIAR ICM/IPM project, Solomon Islands.

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