Farmer guide to fusarium wilt of watermelon in Tonga

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Tohi fakahinohino ó e kau ngoue ki he mae/mate ó e meleni fakatupu é he fusaliumi í Tonga

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In recent years farmers in Tonga have been faced with increasing numbers of plants wilting and dying from a 'new' disease in watermelon.

'I he ngaahi taú kimui ni maipe ne fehangahangai lahi ai á e kau to meleni í Tonga ni mo e fakautuutu á e lahi ó e ngaahi fuú meleni naá nau mae mo mate mei ha mahaki 'foóu'.

What does the disease look like?

- The disease is usually first seen when young plants are forming runners and starting to flower and set fruit.
- One or two runners on a vigorous young plant suddenly wilt (Figure 1). They sometimes recover overnight but wilt again the next day and eventually dry out and die.
- Other runners on the plant also start to wilt and eventually the whole plant dies.
- If the stem and root is cut in half, there is often a brown discoloration of the woody tissue at about ground level (Figure 2).

Koe ha e fotunga óe mahaki maumau koeni?

- Koe mahaki maumau koeni óku úluaki ási ia he kei iiki áe fuú meleni pea kamata ke tupu ó totolo mo matala ó laku fua mai.
- Koe vaá é taha pe ua mei ha fuú meleni moúi lelei é fakafokifa pe éne mae (Fakatata 1). Taimi é niíhi é malava pe kenau fakaakeake he poúli ka tenau toe mae pe he áho hake pea iku aipe ó nau momoa ó mate.
- Koe toenga óe ngaahi vaá óe fuú meleni é kamata pe ke mae pea iku pe ó mate kotoa.

- Kapau é tofií vaeua e aka pe koha vaá meleni í he levolo ó e kelekele, oku faá ási lanu melomelo pe engeenga e kakano í loto (Fakatata 2).

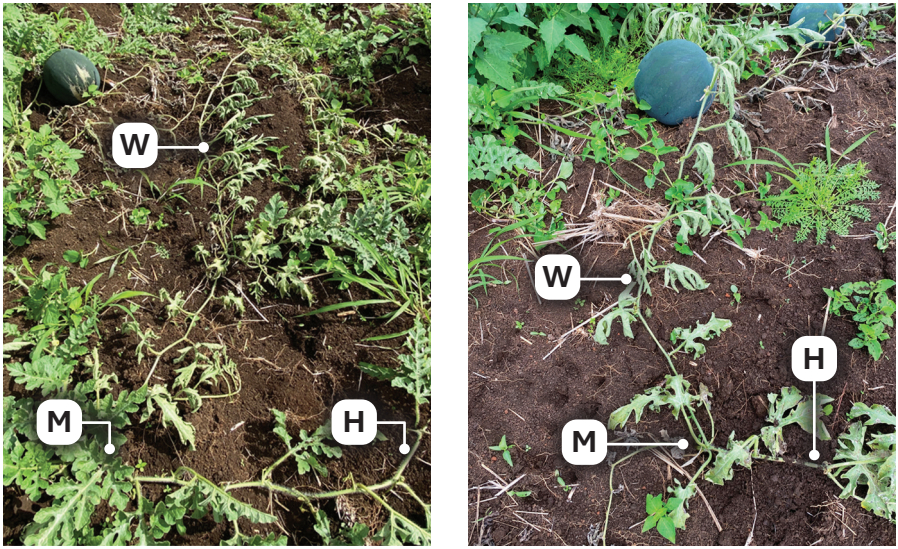


Figure 1. Typical early symptoms of wilt. Often only a single runner wilted. **M** – mother plant, **H** – healthy runner, **W** – wilted runner on same plant.

Fakatata 1. Ngaahi fakaílonga angamaheni óe mae. Taimi lahi koe vaá pe é taha óku mae. **M** – Fuú meleni, **H** – ngaahi vaá moúi lelei, **W** – ngaahi vaá óku mae he fuú meleni tatau pe.

(Photo credit: R. A. Fullerton, PFR)

Figure 2. Browning of the woody tissue in an infected watermelon stem.

Fakatata 2. Lanu melomelo pe engeenga e kakano í loto he fuú meleni óku maú he mahaki.

(Photo credit: R. A. Fullerton, PFR)

What is the cause of the problem?

- The disease is commonly called fusarium wilt.
- It is caused by a fungus known as *Fusarium oxysporum* forma specialis *niveum*.
- For convenience the fungus is commonly called 'Fon'.
- It is one of the most common and destructive diseases of watermelon worldwide.

Koe ha á e tupuánga óe palopalema?

- Óku faá ui pe á e mahaki koeni koe fusaliumi wilt.
- Óku tupu ia mei he kalasi óe fangikasi óku íloa koe *Fusaliumi ókisipolaumi niveiumi.*
- Ke toe faingofua ange óku faá ui pe á e fangikasi koeni koe 'Fon'.
- Koe taha ia ó e ngaahi mahaki óku ne fakaáuha e meleni fakamamani lahi.

How does it attack the plant?

- The fungus lives in the soil and infects the plant through the roots.
- It blocks the tissues that carry water up into the plant.
- This causes the plant to wilt and eventually die from lack of water.
- The fungus forms thousands of tiny seed-like structures called ‘resting spores’ in the dead tissue (Figure 3). These spores are not visible by eye.
- The resting spores remain dormant in the soil for 10 years between crops of watermelon.
- The numbers of resting spores in the soil (and number of infected plants) will increase with each successive crop of watermelons.
- Eventually plant losses will be so high that it is not possible to grow watermelon in that area.

Óku anga fefe éne maumauí e fuú ákau?

- Óku nofo á e fangikasi koeni ‘I he kelekele pea óku ne maumauí á e fuú ákau ó fakafou í he ngaahi aka.
- Óku ne taófi pe polokaí a e ngaahi halanga vai í loto he fuú ákau.
- Óku ne fakatupu heni á e mae pea iku pe ó mate á e fuu ákau mei he íkai ha vai.
- Óku faú é he fangikasi koeni á e fanga kií fua iiki áupito hange ha tengaí ákau é lauiafe he konga óku mate (Fakatata 3). Koe fanga kií fua koeni óku íkai ketau lava ó mamata kiai.
- Koe fanga kií fua koeni ó e fangikasi ‘oku nau nofo í he kelekele ó aú ki he taú é 10 í he taimi to meleni.
- É fakautuutu á e lahi e fanga kií fua koeni he kelekele (moe lahi e ngaahi fuú ákau óku nau maú e mahaki) í he taimi óku to hokohoko ai e meleni.

- ’E faifai pe ó lahi áupito e maumau pea íkai toe lava ke to ha ngoue meleni í he élia pe feituú koia.

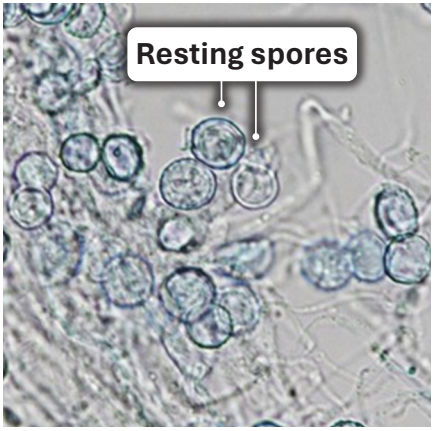


Figure 3. Resting spores of *Fusarium oxysporum* f. sp. *niveum* produced in infected plant material.

Fakatata 3. Koe fanga kií fua eni óe *Fusaliumi ókisipolaumi* f. sp. *niveiumi* óku tupu mei ha fuú ákau óku mae pe mate.

(Photo credit: J. L. Tyson: PFR)

How is the disease spread?

Óku anga fefe á e mafola á e mahaki?

In Soil:

- This is the most important method of spread within and between farms.
- It can be carried on wheels, machinery, tools, boots, feet of animals and in runoff water.
- Anywhere infected soil is moved the disease will be moved with it.

‘I he kelekele:

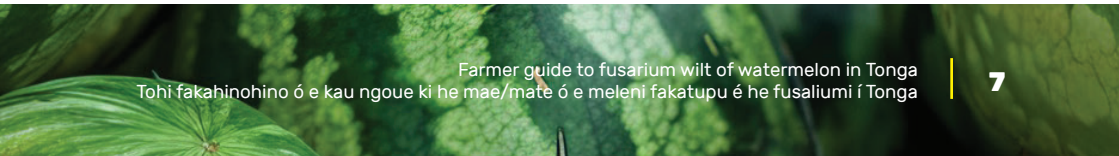
- Koe founga mahuínga taha éni éne mafola he taimi to.
- É lava ke fetuku í he ngaahi vaé meálele, ngaahi misini, meángaue, su puti moe vaé ó e fanga monumanu pea moe ngaahi fakatafenga vai.
- Koe feituú pe óku fetuku ai e kelekele óku ósi uesia é áve aipe á e mahaki ni.

On seed:

- The disease can be carried on seed but it is not common.
- This is normally the method of spread over long distances or between countries.
- It is not likely to be a problem in Tonga if high-quality commercial or certified seed is purchased from a reputable seed supplier.

Í he pulopula pe tengaí meleni:

- ‘E malava pe ke maú pea fetuku he tengaí meleni e mahaki ka óku íkai ke faá angamaheni áki.
- Koe founga angamaheni éni á ene mafola ki ha ngaahi feituú mamaó pe fakavahaá fonua.
- He íkai malava ke hoko e palopalema koeni í Tonga ókapau é fakatau mai e tengaí ákau fakakomesiale mei ha kautaha pau pe íloa.



Management of fusarium wilt

Mapuleí pe Taótaófi e fusaliumi wilt

- Fusarium wilt cannot be controlled by fungicides applied to either the plants or soil.
- Once fusarium wilt is established in an area it cannot be eradicated.

- Óku íkai lava ke mapuleí á e fusaliumi wilt áki á e ngaahi fana fangikasi óku ngaueáki ki he fuú ákau pe koe kelekele.
- Koe ási pe áe fusaliumi wilt í ha feituú heíkai malava ke toe taótaófi.

Cultural control methods:

- Avoid moving soil on vehicles, machinery and equipment from one farm to another.
- Rotate watermelons with other crops that are not affected by Fon.
- Because Fon infects only watermelon, other cucurbits such as pumpkin, buttercup, butternut, cucumber can be grown successfully on Fon contaminated land.
- Crops such as taro, kape, cassava, kumala, tomato, capsicum, chilli, eggplant etc. are also not affected by Fon and can be grown as rotation crops.
- Do not plant watermelon in the same area two years in a row.
- Although the resting spores can survive for a very long time their numbers can decrease naturally by up to 50% after 3 years without growing watermelon
- It is recommended that watermelon only be planted in the same area every 5-7 years.

Founga Maluí angamaheni:

- Fakaéhiéhi mei hono áve pe fetuku holo e kelekele í he ngaahi meálele, misini moe ngaahi meángaue mei ha faama/feituú e taha ki ha faama/feituú é taha.
- To fetongitongi e meleni mo ha ngoue kehe óku íkai uesia é he Fon.
- Koeúhi koe Fon óku ne uesia pe maumauí pe á e meleni pea koe ngaahi kiukepiti kehe hange koe hina,patakapu, patanati, kiukamupa é malava peia ke tupu lelei í ha kelekele kuo ósi lahi ai e Fon.
- Koe ngaahi ngoue hange koe talo, kape, manioke,kumala, temata, polo, polo fifisi, paingani etc ‘oku íka foki ke uesia pe maumauí é he Fon pea é malava ke to fetongitongi áki e ngaahi ngoue koia.
- Óua é to e meleni í he feituú tatau í ha taú hokohoko é ua.
- Neongo é lava ke moúi a e ngaahi fua koeni e fangikasi í ha taimi fuoloa ka é holo fakanatula pe honau tokolahi ó aú ki he 50% hili ha taú é 3 okapau é ikai ke toe to ai ha meleni.
- Óku fiemaú pe fokotuú atu ke toki to ha ngoue meleni í he feituú tatau í ha ósi ha taú e 5-7.

Resistant varieties:

- Some watermelon varieties are resistant to Fon.
- Any new varieties should to be tested against the Tongan strain of Fon before being used commercially.

Ngaahi kalasi e meleni óku nau lava ó matuúaki e fangikasi:

- Óku íai e kalasi e meleni óku nau matuúaki e Fon.
- Koha kalasi foóu e meleni óku fiemaú ke tesi ia ki he faáhinga ó e Fon i Tonga kimuá pea toki ngaueáki fakakomesiale.

Grafting onto resistant rootstocks:

- Fon infects only watermelon.
- The disease can be avoided by grafting watermelon onto rootstocks of other cucurbits such as squash, pumpkin or bottle gourd.

Hoko ki ha aka óku lava talitekeí e Fon:

- Óku maumauí pe é he Fon e Meleni.
- É malava ke taófi e mahaki fangikasi koeni mei hano hoko ha fuú meleni ki ha aka ha fuú kiukepiti kehe hange koe kalasi kehekehe ó e hina.

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