IDENTIFICATION SHEET

PHYTOPHTHORA CAPSICI

Root rot disease

JUNE 2021

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IDENTITY

Latin name	*Phytophthora capsici*
Common name	Root rot disease
Taxonomic classification	*Fungi: Chromalveolata: Peronosporales: Peronosporaceae: Phytophthora*

Figure 1 - Symptoms of *Phytophthora* attacks on the roots

MORPHOLOGY

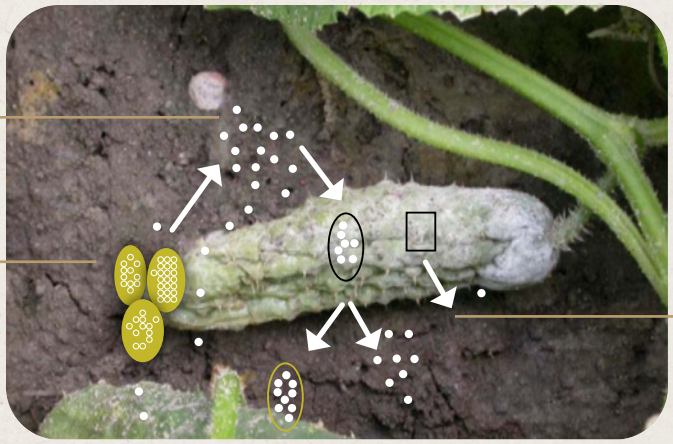

Figure 2 - Morphology of *Phytophthora capsici*

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Description:

- Fungus which lives in the soil.
- Length of life span: Two years in the form of mycelium in plant debris.
- When the fungus produces oospores, it can survive much longer in the soil: at least five years, awaiting conditions which are conducive to its development.

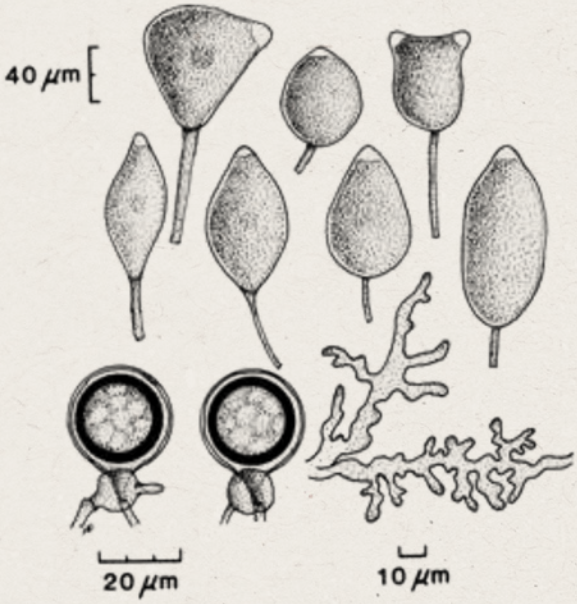

Figure 3 - Morphology of *Phytophthora capsici* sporanges

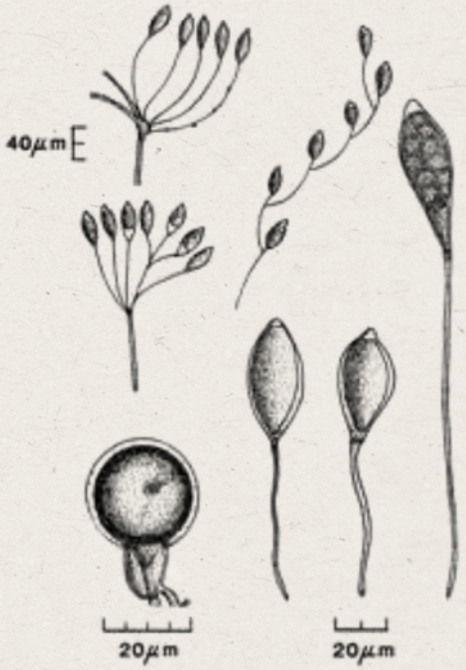

Figure 4 - Morphology of *Phytophthora capsici*

- **Asexual structures**
  - Sporangiophores: narrow, becoming wider at the base of the sporange by branching out.
  - Sympodium: simple, umbrella-like shapes, which form in water.
  - Sporanges: are papillary and large, often deformed with more than one apex.
  - Pedicel: long, between 10µm and 100µm.
  - Chlamydospores: either rare or entirely absent with a diameter of 28µm to 29µm and a wall thickness of 2.4µm to 2.7µm.
  - Hyphae: quite rough, 5µm to 7µm wide.
- **Sexual structures**
  - Antheridia: amphigynous, 15µm to 17µm.
  - Oogonia: yellowish-brown wall, spherical, variable size (23µm to 50µm).
  - Oospores: thick, resistant walls help them survive in harsh conditions (drought, intense cold, prolonged absence of hosts, etc.), they are contained within the oogonium.

LIFE CYCLE

- *P. capsici*: diploids in a vegetative state.
- Reproduction cycles: asexual and sexual.
  - Asexual cycle: via sporanges and zoospores.
  - Sexual cycle: oospores.
- In a water-saturated area, the fungus produces sporanges which release spores that can swim for several hours to reach the roots of host plants.
- One zoospore is enough to infect an entire plant.
- After infestation, the infected plants are covered in sporanges, which look like a thin white downy coating.
- The sporanges become detached and directly infect other plants or release more zoospores.
- Plants can be contaminated by the ground or the air (foliage, stolons, branches and tips of fruit).

CONDITIONS CONDUCIVE TO ITS DEVELOPMENT

- Environment:
  - Water that has been stagnant for at least 24 hours.
  - Host plants (cacao tree, tomato plant, beans, marrows, etc.).
  - Standing water on the surface of leaves.
  - Water-saturated soils.
- Period conducive to the development of the disease:
  - Hot temperatures: between 20°C and 30°C.
  - Rainy season (April to October).

SYMPTOMS AND DAMAGE

The symptoms on support trees and pepper plants are as follows:

- All parts of the pepper plant are affected.
- Visible symptoms: depends on the part of the plant that is infected and the severity of the damage caused.
- Airborne contamination: foliage, stolons, branches and tips of fruit.
  - Yellowing of foliage.
  - Gradual dieback.
  - Defoliation.
  - Tips of fruit lost.
  - Slow death of the plant.
- Contamination by roots and root crown.
  - Fading colours.
  - Yellowing of leaves.
  - Death of plant.

Figure 5 - Symptoms of *P. capsici* on a pepper plant

MONITORING STRATEGY

Each plot is inspected thoroughly. The pepper plants and support trees are observed to identify the symptoms of *Phytophthora capsici* attacks. Special attention should be given to plants in areas liable to flooding and areas of stagnant water.

Crops combined with pepper plants which can be hosts for *P. capsici* should also be inspected.

Swift detection of the symptoms of *P. capsici* enables pepper plant producers to take timely decisions to reduce the level of infestation throughout the orchard.

▶ ***Penja pepper producers are advised to carry out this inspection using an observation and monitoring sheet provided in the appendix.***

GOOD FARMING PRACTICES TO COMBAT PROBLEM

- **Crop control**:
  - Do not set up orchards in areas liable to flooding.
  - Do not combine pepper plants with crops that can be hosts for *P. capsici* (tomato plants, marrows, beans, potatoes, etc.).
  - Regularly prune the pepper plants, support plants and trees in the orchard to reduce shade.
- **Organic control:** no conclusive organic control method to combat *P. capsici* has yet become widespread among producers.
- **Control using plant protection products:** it should be noted that no product is currently approved in Cameroon to combat *P. capsici* in pepper plants (List of pesticides approved in Cameroon consulted on 4 March 2021). Some commercially-available solutions authorised for combating mildew, brown rot and other fungal diseases in cacao trees and tomato plants (see table below) could be used on Penja pepper plants subject to prior authorisation from the competent authorities.

Solutions	Method of use	Status as per Regulation (EC) No 1107/2009	Crop-pest combination for which the active substance is approved in Cameroon	EU MRL for pepper
Metalaxyl-M 120g/kg + Oxychloride 600g/kg	800g cp/ha	**Metalaxyl-M**: Approved **Oxychloride**: Not available	Brown rot on cacao pods/ cacao trees	**Metalaxyl-m**: 0.1* **Oxychloride**: Not available
Oxychloride 60% + Metalaxyl-M 6%	200g of cp/ha	**Oxychloride**: Not available **Metalaxyl-M**: Approved	*Phytophthora palmivora, phytophtora megakarya*/cacao tree	**Oxychloride**: Not available **Metalaxyl-M**: 0.1*
Mancozeb 800g/kg	2kg/ha (85g cp/ 15l spray)		Tomato mildew	**Mancozeb**: 0.1

(*) pc: Commercial product
(*) Indicates the lower limit of the analytical determination

APPENDIX: OBSERVATION AND MONITORING SHEET

Campaign: .....

Date: .....

Plot code: .....

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Vegetative stage: .....

Date of last treatment: .....

Product(s) used: .....

Observations: .....

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INFESTATION LEVEL

Phytophthora capsici: .....

Comments: .....

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Sources: Figure 1 - Le poivre de Penja: Guide des Bonnes Pratiques: COLEACP ¦ Figure 2 - *Phytophthora capsici*: https://www.agrireseau.net/documents/63767/phytophthora-capsiciune-maladie-de-sol-redoutable ¦ Figure 3 - Fact Sheet - *Phytophthora capsici* hpc.ilri.cgiar.org ¦ Figure 4 - Source: *Phytophthora capsici* http://hpc.ilri.cgiar.org/beca/training/IMBB_2016/Phytophtora_CD_update/key/A%20Lucid%20Key%20to%20the%20Common%20Species%20of%20Phytophthora/Media/Html/Phytophthora_capsici.htm ¦ Figure 5 - Le poivre de Penja: Guide des Bonnes Pratiques: COLEACP

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