

Diseases of Sugarbeet

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Damping off and Root rot

Symptoms

Damping off: It causes pre-emergence and post-emergence damping off.

Root rot: This phase is characterized by yellowing, wilting and drying of the plants involving all the aerial parts. Infected roots show externally a deep brown discoloration.

Fungus: *Pythium aphanidermatum*. In addition to *P. aphanidermatum*, *P. debaryanum* and *P. ultimum* are also responsible for causing damping off and root rot.



Figure 1. Symptoms of *Pythium* damping-off include brown, water-soaked seedlings, usually within one week of emergence.

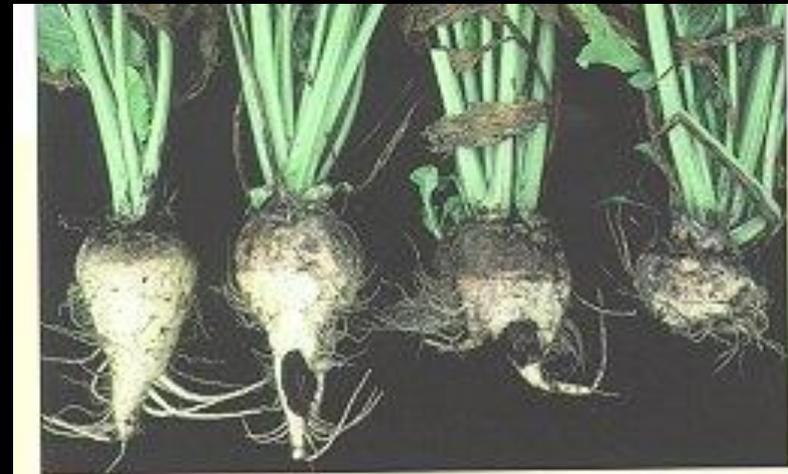


Figure 9. *Pythium* root rot occurs under prolonged, extremely wet soil conditions. Healthy plant is on the left.

Damping off



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***Rhizoctonia* root rot**

Symptoms:

It causes crown rot and dry root rot

In crown rot, basal portion of the petiole blackens and subsequently the entire crown of the plant rots.

In dry root rot, roots in upper 1-2 cm layer show sunken lesions. Beneath these lesions pockets of spongy tissues develop.

***R. bataticola*:** Numerous small, black, round sclerotia are seen on the diseased roots. On the petiole pycnidia are seen.



Figure 7. Symptoms of *Rhizoctonia solani* on a sugarbeet seedling where rot occurs on the upper root and hypocotyl. Healthy beet is on the left.



Figure 8. Stunting and root tip necrosis on sugarbeet seedlings infected by *Rhizoctonia solani*. Healthy plants are on the left.



Figure 15. Taproot lesions caused by *Rhizoctonia solani*.

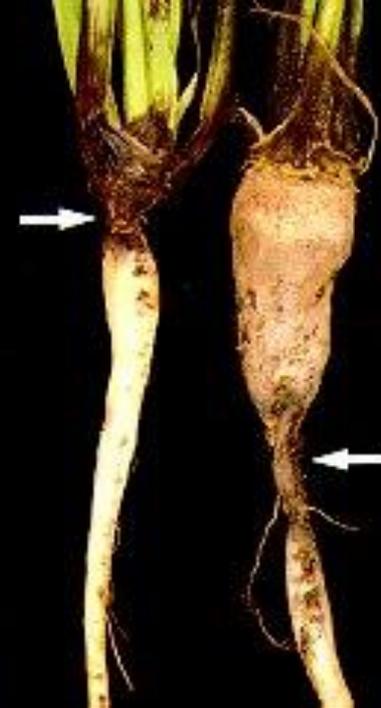


Figure 17. *Rhizoctonia* root and crown rot of sugarbeet. Note damage to petioles.

Fungi:

Rhizoctonia solani – The sclerotia are irregular, brown to black and 5 mm in dia.

R. bataticola – The sclerotia measure up to 1 mm in dia. In the pycnidial stage, the fungus produces globose pycnidia and hyaline, oval to elliptical pycnidiospores.



Figure 18. Hymenial layer of *Thanatephorus cucumeris* on petioles of a sugarbeet plant.





Root rot



Root rot



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***Sclerotium* root rot**

Symptoms:

The disease attacks the plant and causes yellowing and wilting.

The fungus causes rotting of roots and tubers.

Root rot affected plants can be easily pulled out.

Fungus: *Sclerotium rolfsii*..



Crown and Root Rot starts at injury on sugar beet root or at the crown.

Courtesy Harold Kaufman, TAEX, 1996.

Southern sclerotium rot (*Sclerotium rolfsii*)



Symptoms on the beet (grey-white mycel and yellow to black sclerotia)

Phoma disease - *Phoma betae*

Symptoms:

Seedling blight: Diseased seedlings exhibit black lesions on primary roots, just below the collar region leads to severe necrosis of root tip.

Leaf spot: Necrotic spots of circular to oval with light to dark brown concentric rings with diffused margin appear on the leaves.

Stem rot: Severe infection of basal stem leads to withering of plants.

Storage rot: Tubers from diseased plants carry incipient infection of the fungus and cause rotting during storage.

Fungus: seed and soil-borne.



Phoma Leaf Spot on sugar beet leaf.
Courtesy Harold Kaufman, TAEX, 1996.

Phoma root rot on seed crop (*Phoma betae*)



Phoma root rot on seed crop (*Phoma betae*)



Cercospora leaf spot -
Cercospora beticola





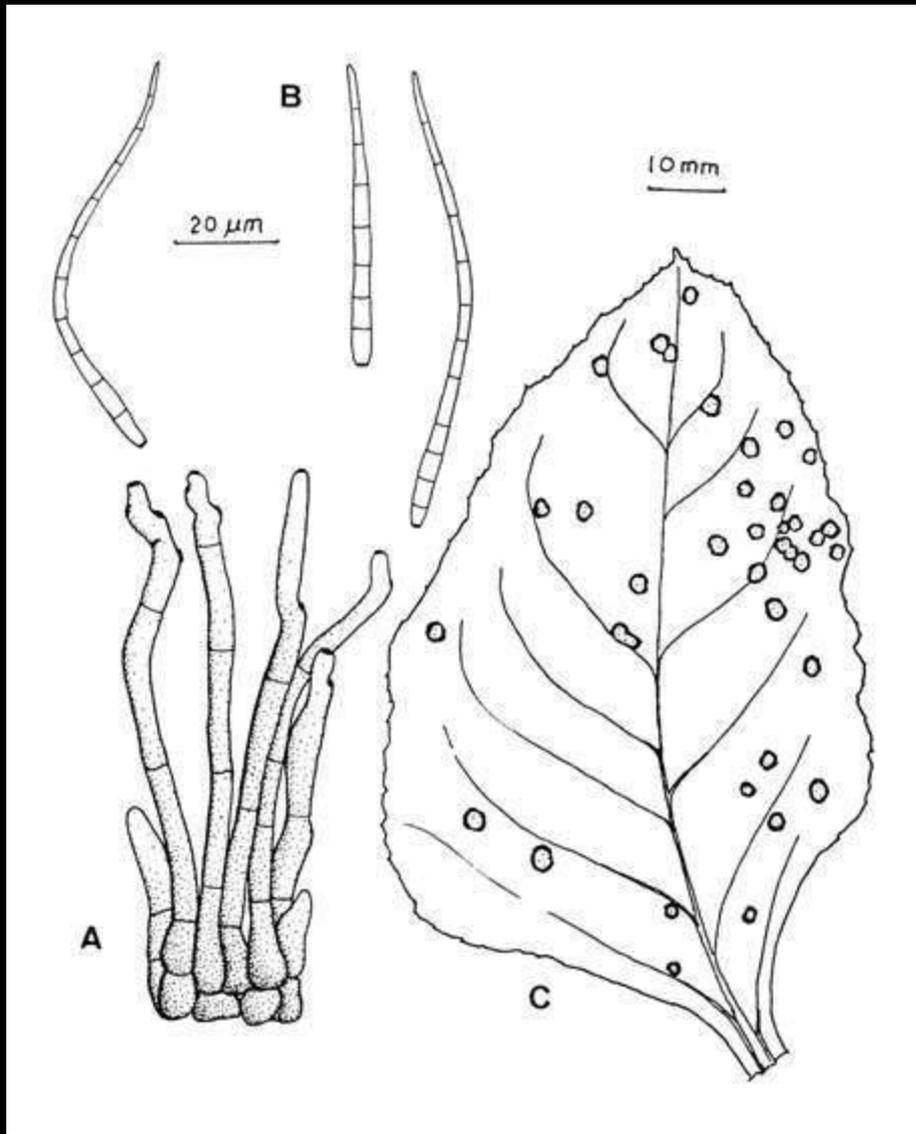






Cercospora beticola **Black conidophores with conidia**





Ramularia - leaf spot (*Ramularia beticola*)



Ramularia beticola

Sporulation, typical grey-white conidophores with conidia







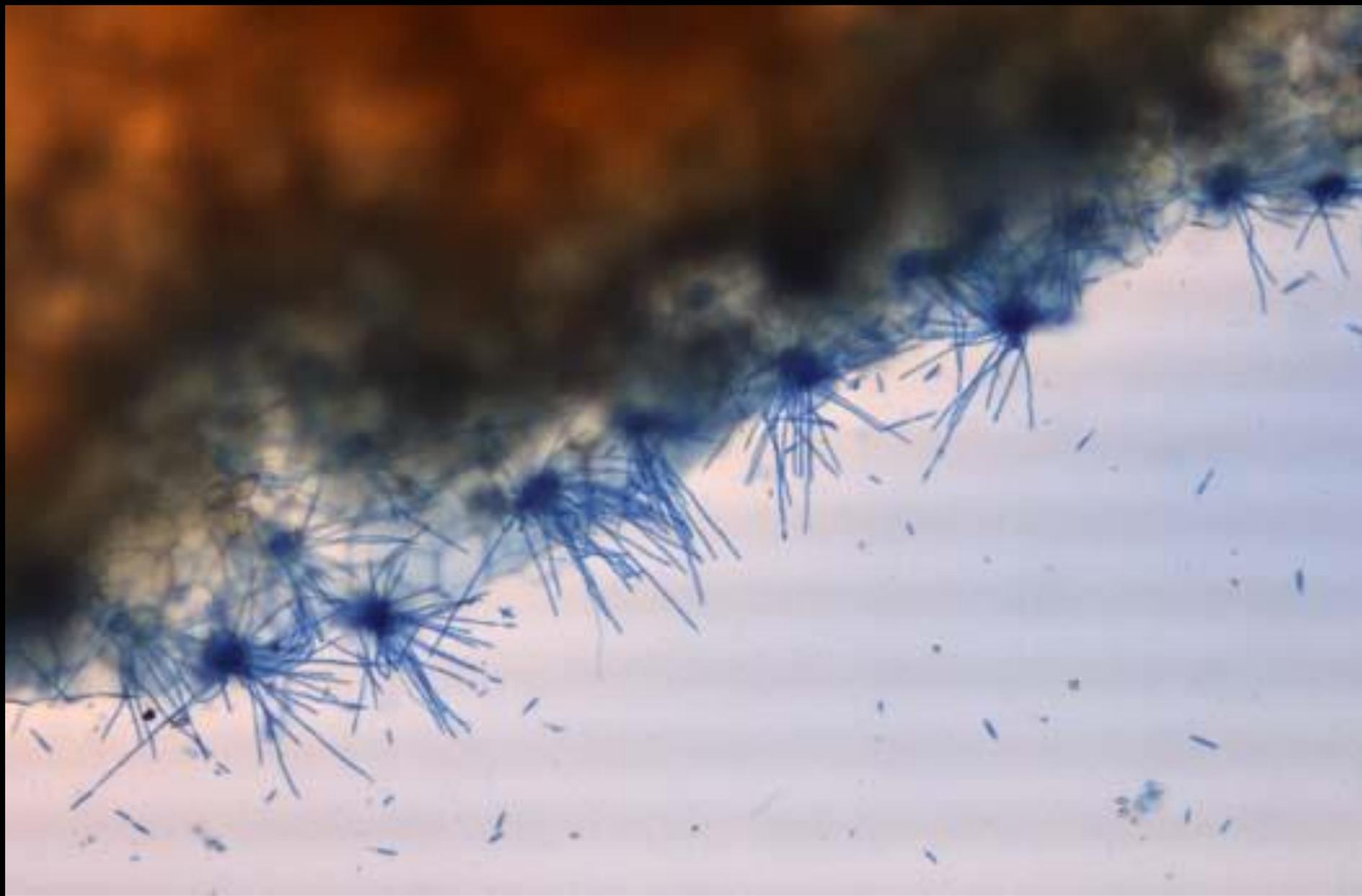
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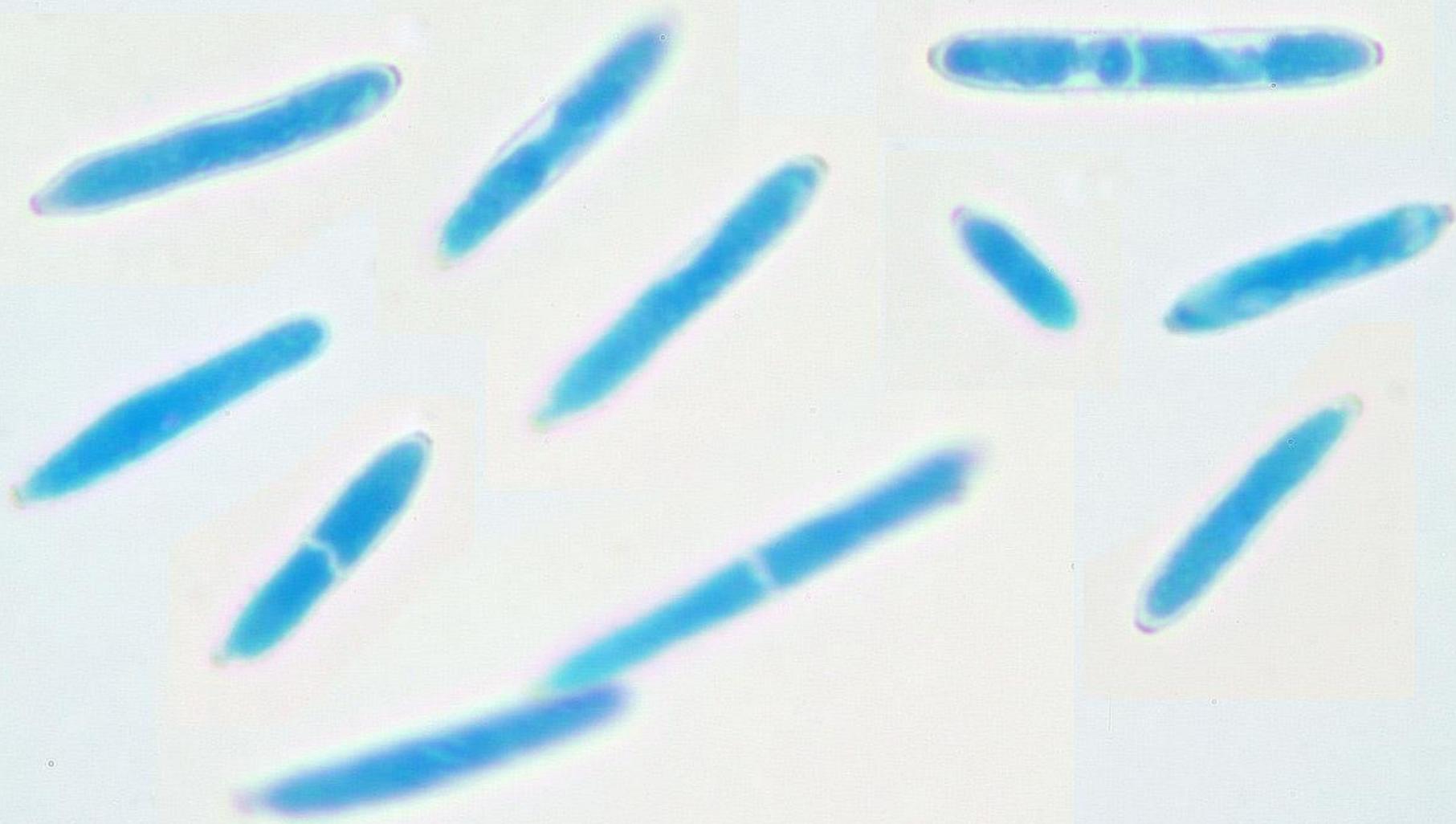


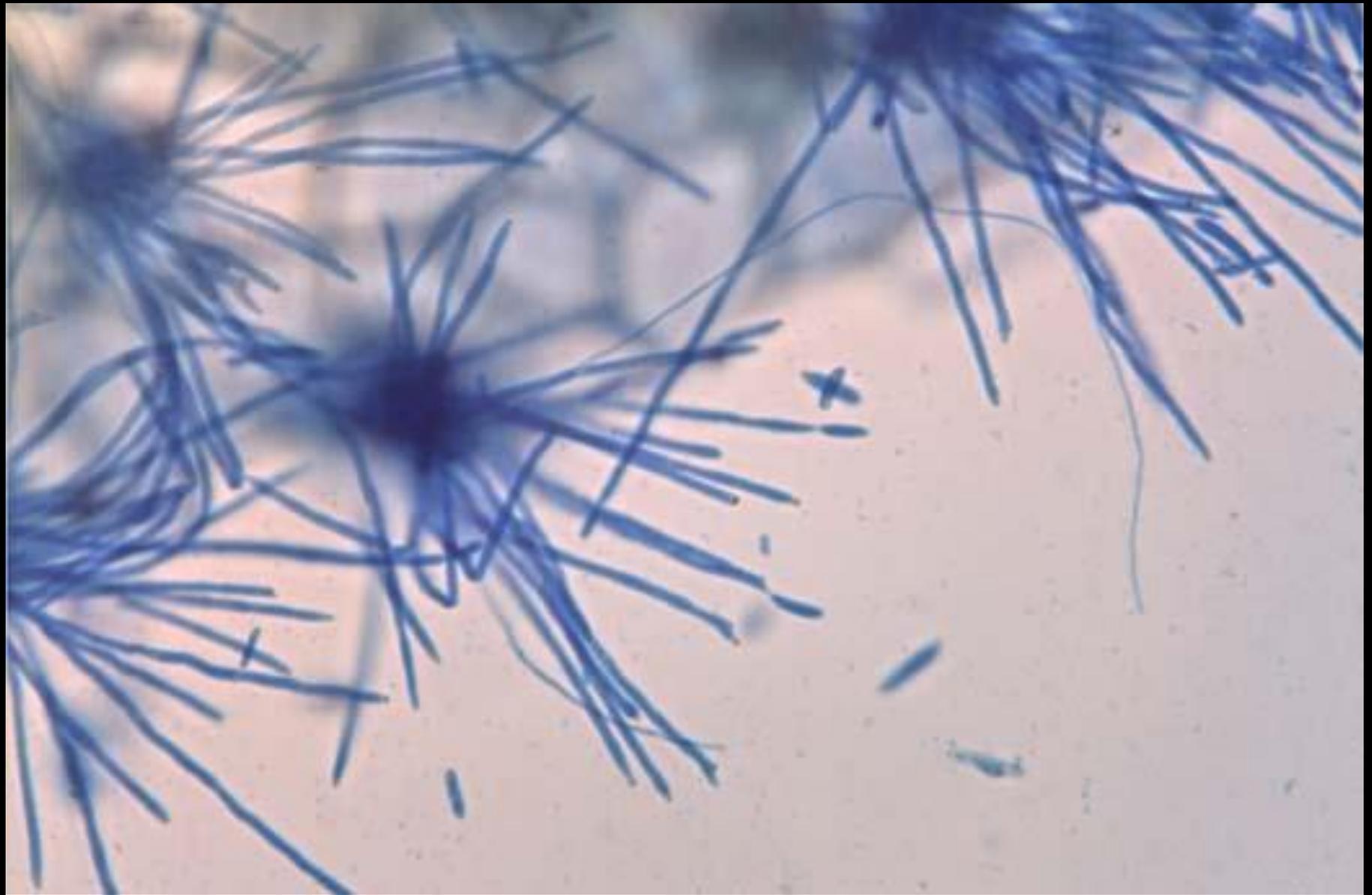




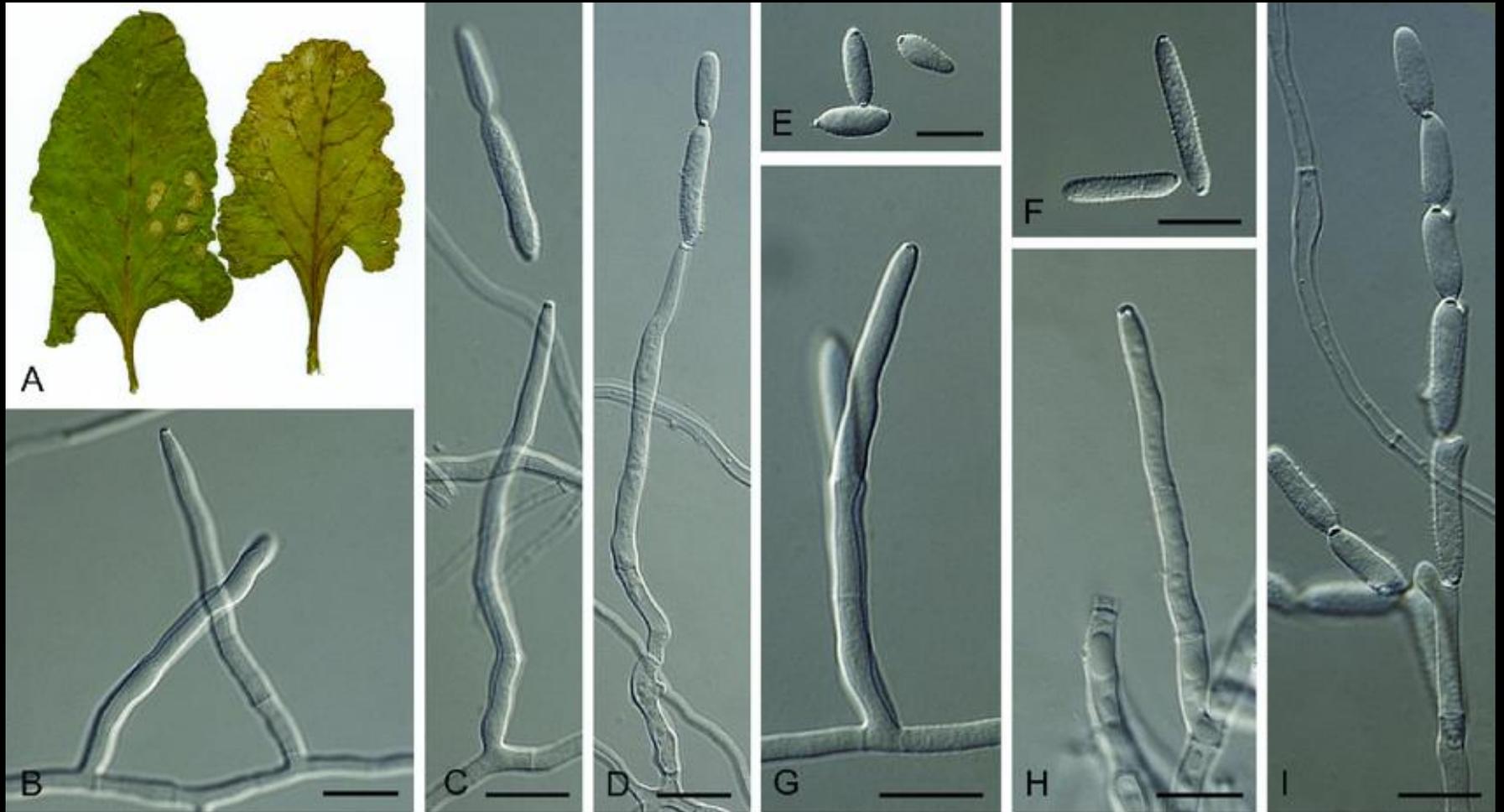


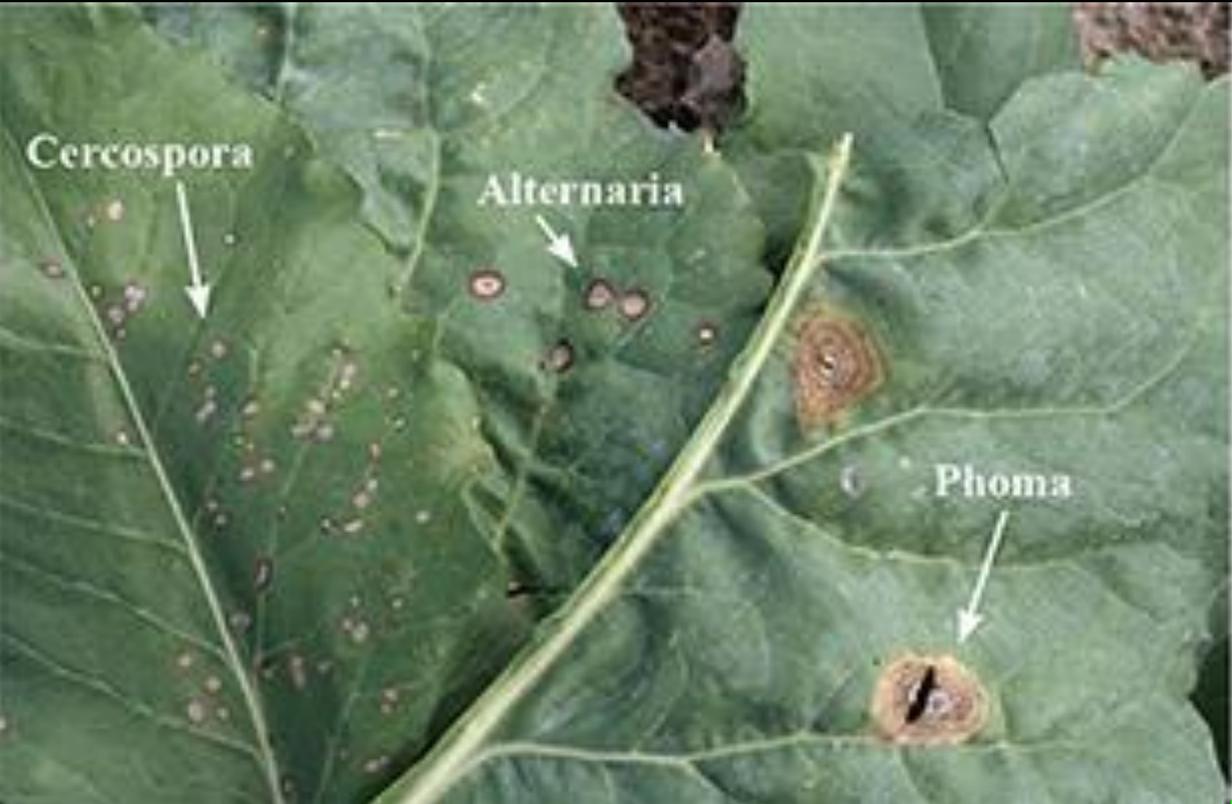
Ramularia beticola a beet leaf-spot





Ramularia beticola





Alternaria leaf spot - Alternaria alternata and *Alternaria brassicae*





Powdery mildew (*Erysiphe betae*)







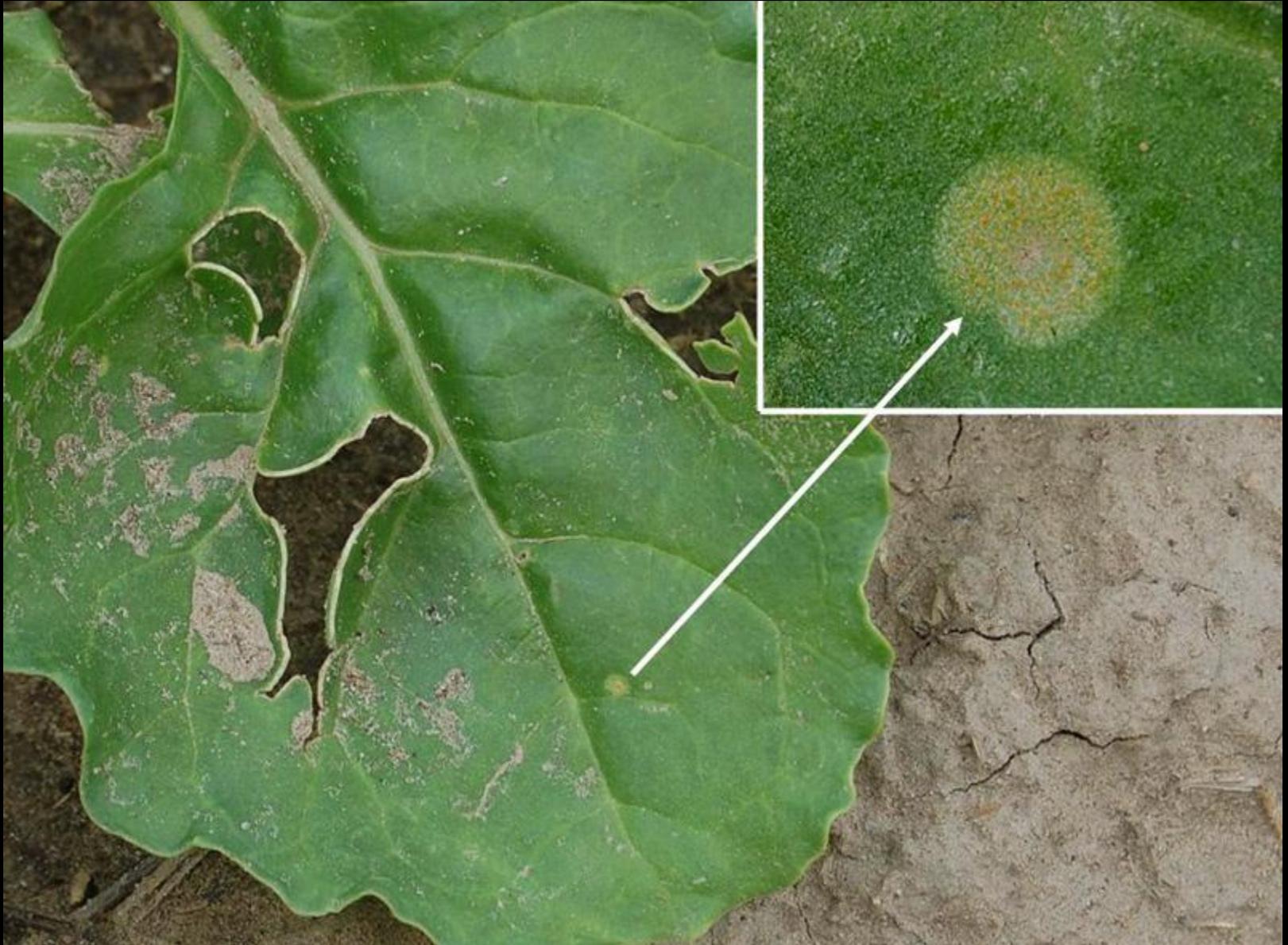
Downy mildew (*Peronospora betae*)



Downy mildew in crown of sugar beet plant



Sugarbeet rust (*Uromyces betae*)









Sugarbeet rust (*Uromyces betae*)

Aecidium (aecidiospores) on underside of the leaf



Bacterial scab - *Streptomyces scabies*

Symptoms

Small, brownish and slightly raised spots appear on fleshy tap root. Later they enlarge, coalesce and become very corky.

The rounded, wart-like growths are sparsely scattered over the tap root and often they are concentrated in bands.

Two types of scab *viz.*, shallow and deep scabs are found in sugarbeet.





Erwinia carotovora subsp. *betavasculatorum*



Bacterial leaf spot / blight –

Pseudomonas syringae

Symptoms

Water-soaked, soft and black lesions appear on young leaves. Several lesions occur in single cotyledon and cause distortion. Serious infections cause blighting of leaves and stalks.



Bacterial leaf spot (*Pseudomonas syringae* pv. *aptata*)



Bacterial leaf spot (*Pseudomonas syringae* pv. *aptata*)



Crown gall (*Agrobacterium tumefaciens*)

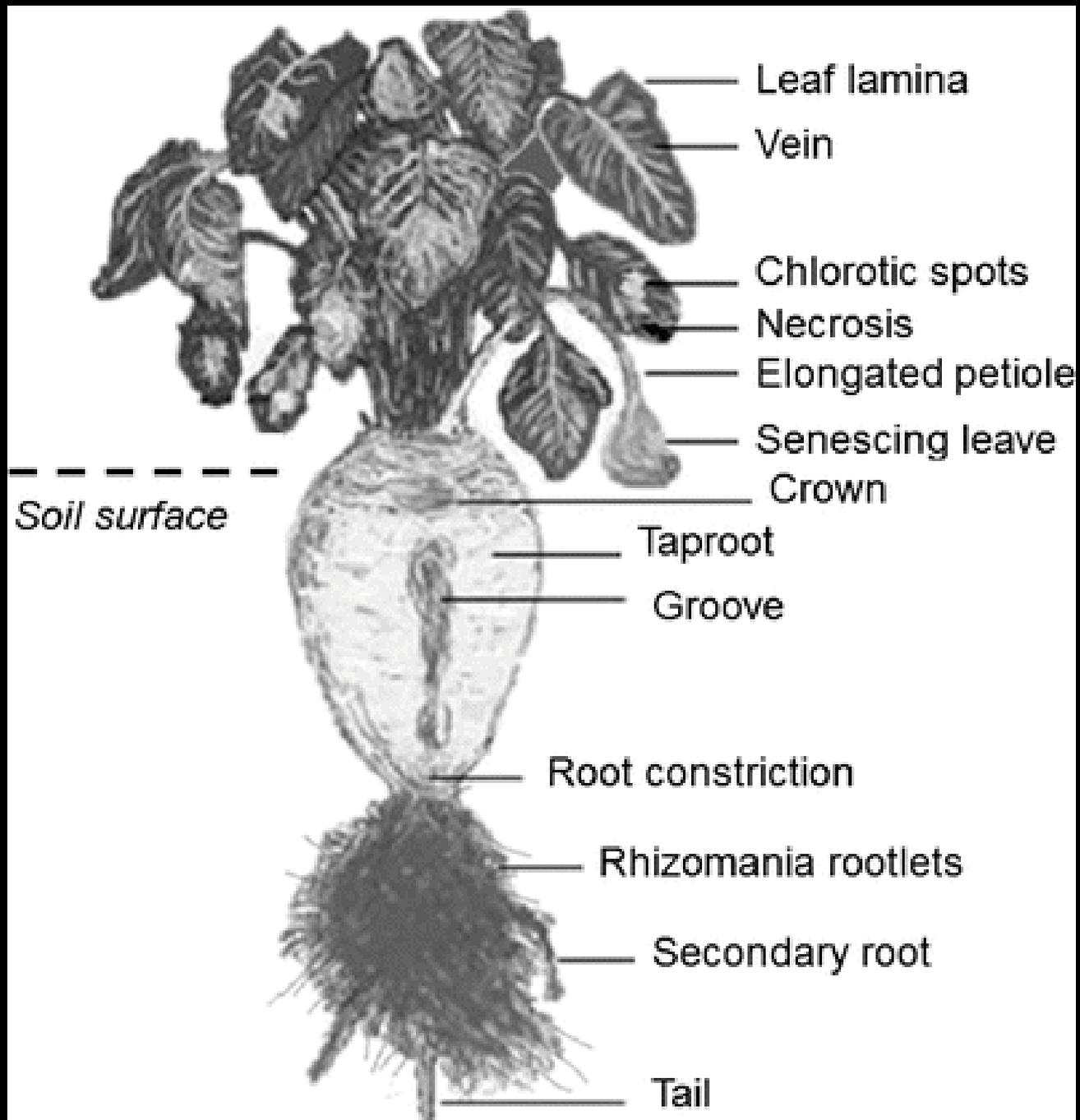


Rhizomania

Rhizomania—one of the costliest foes to sugar beet growers worldwide—is the work of a microbe called “beet necrotic yellow vein virus.” The virus moves through soil with the help of a fungal ally known as *Polymyxa betae*

The disease causes sugar beets to form small, lateral roots instead of the plump, sugar-rich taproot—the beet—we harvest. Sick plants may also have leaves that are a bright fluorescent yellow, actually a more common symptom than yellowed veins.

Rhizomania was first detected in the United States in 1984. Now it occurs in every region of the country where sugar beets are grown.



Necrotic yellow vein virus or rhizomania



Systemic symptoms of
rhizomania, exhibiting vein
clearing and yellowing



Vein banding symptoms
becoming necrotic









Beet necrotic yellow vein virus (BNYVV) (*Benyvirus BNYVV*)



Root symptoms of Rhizomania. Wineglass shaped root



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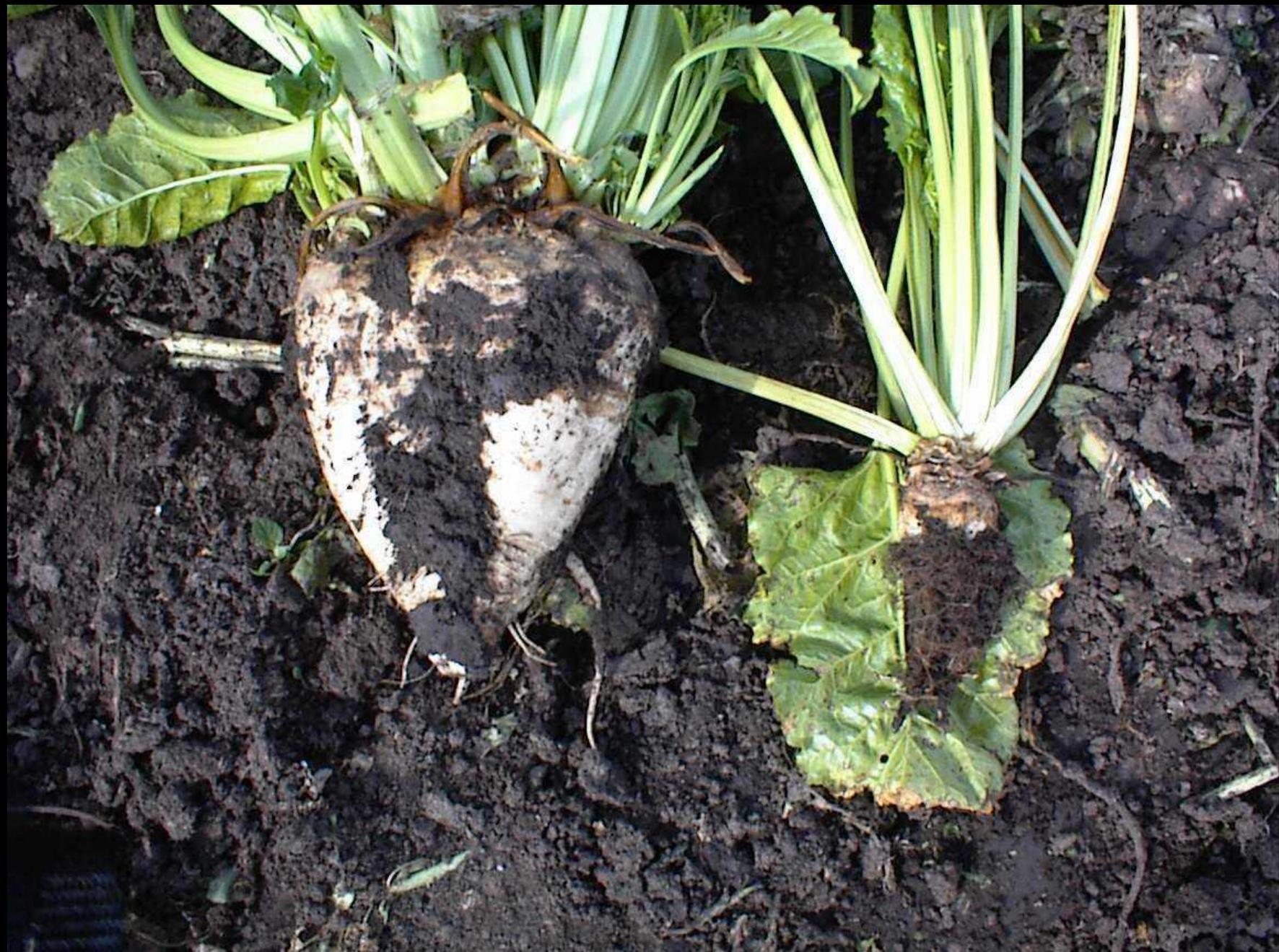


Root symptoms of Rhizomania. Discoloration of vascular tissue

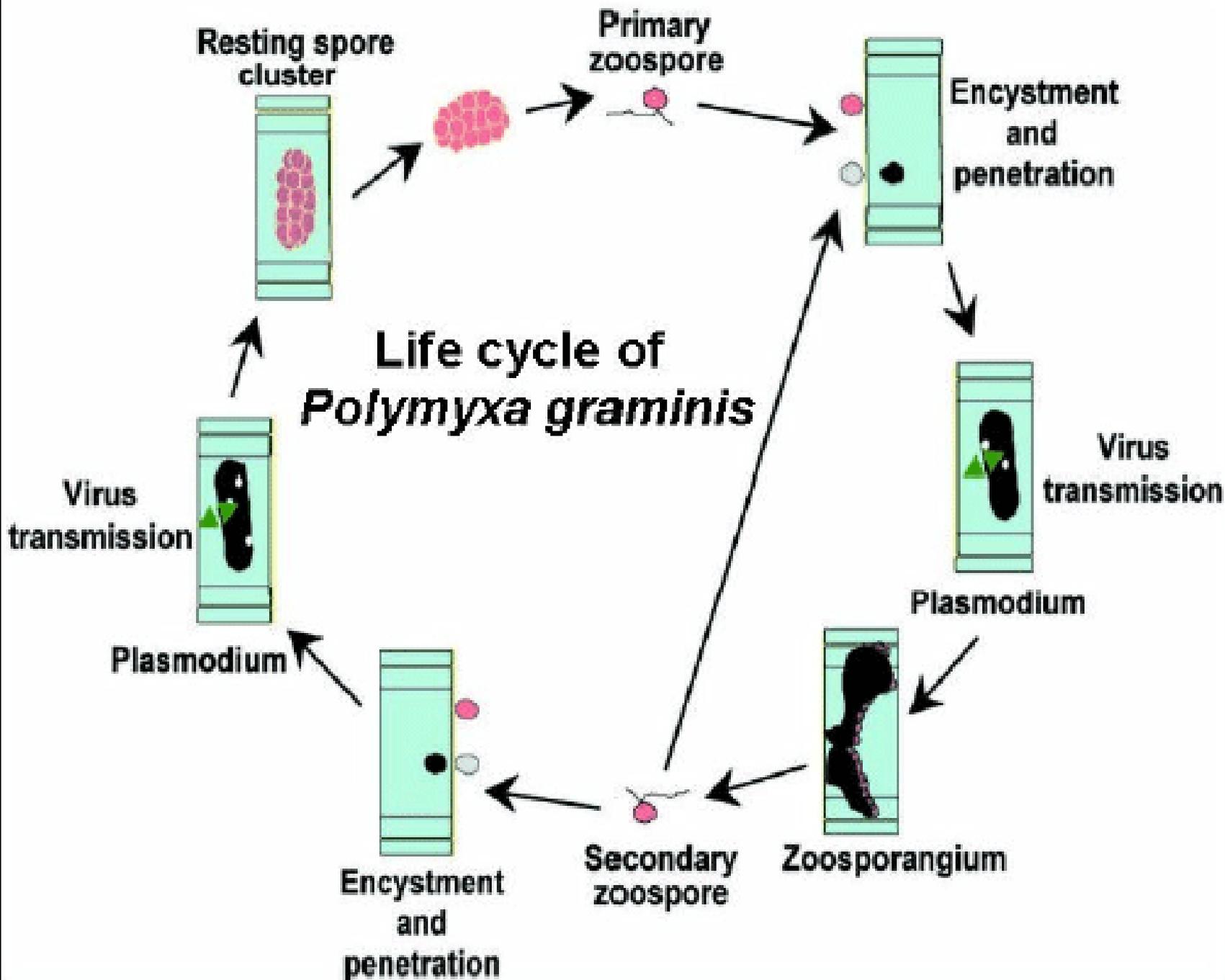


Beet necrotic yellow vein virus (BNYVV) - <https://gd.eppo.int>





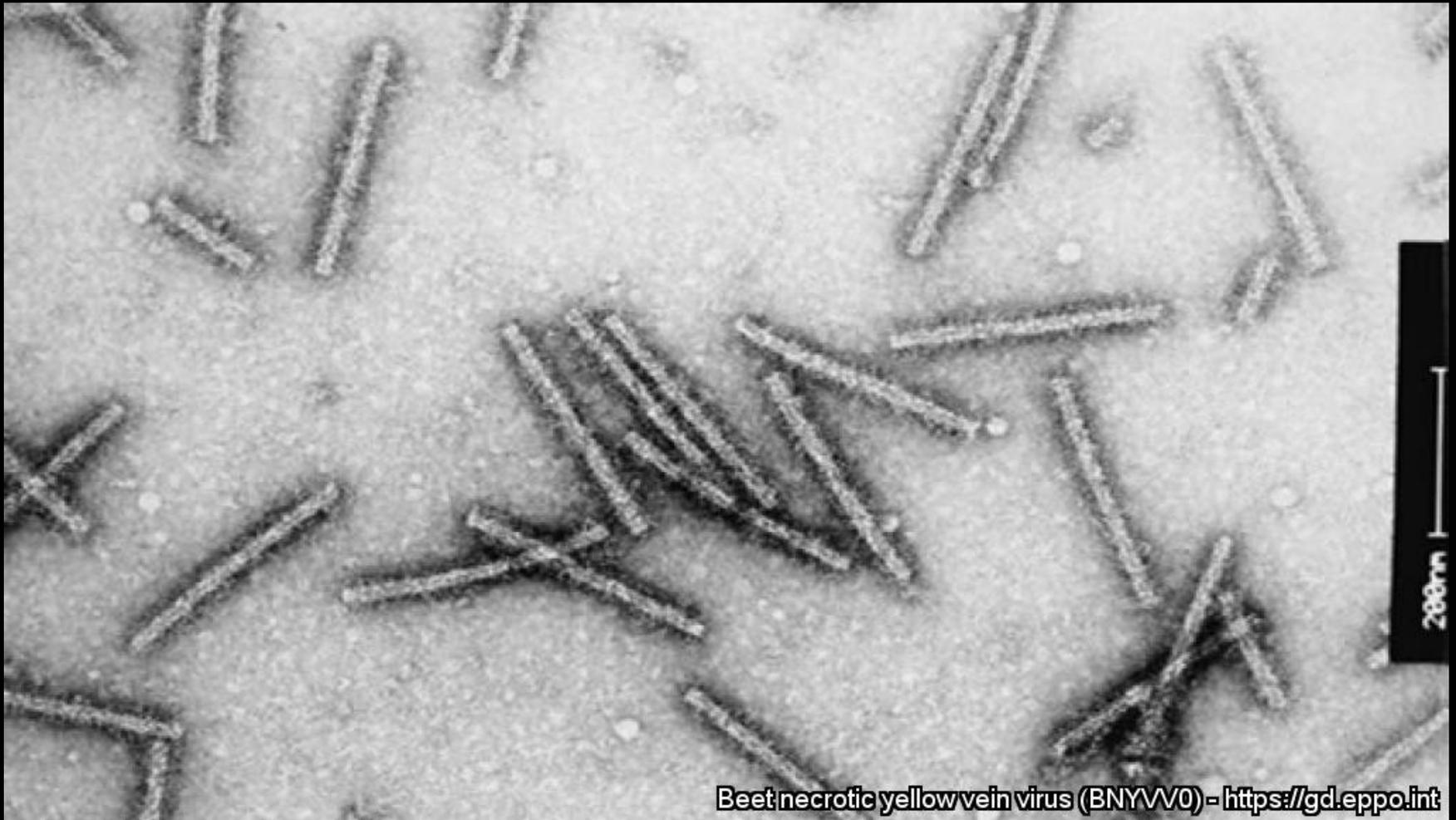






Beet necrotic yellow vein virus (BNYVV) - <https://gd.eppo.int>

**Microscope slide of
Polymyxa betae cystosori.**



Electron micrograph of rod-shaped virions of BNYVV, using the IEM method

Beet yellows virus (BYV)



Beet yellows virus (BYV)



Beet mild yellowing virus (BMV)



Mosaic (*Beet mosaic virus*=*BtMV*)





Thank you