



One Health
Student Conference
USAMV București



MAIN DISEASES ENCOUNTERED IN KIWIFRUIT ORCHARDS. A REVIEW

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December 4-6, 2024, București



Introduction

- Kiwifruit is a globally recognized species with an important economic and commercial character.

Taxonomic classification	
Family	Actinidiaceae
Genus	Actinidia
Species	Chinensis, deliciosa, arguta
Type of fruit	Berry



Introduction

- Native to China, kiwifruit is known as Chinese gooseberry, being considered the "Miracle Fruit of China" or "The Horticultural Wonder of New Zealand".



Content

- As kiwifruit became more and more present in the culture, diseases such as Armillaria root rot, Bacterial blight, Crown gall, Phytophthora root and Crown rot made their appearance.
- The installation of pathogens was supported by a series of biotic and abiotic factors, climate changes having a major impact on their spread

Armillaria root rot

Description

- disease spread worldwide
- it is caused by a fungal (*Armillaria spp.*)
- the most common are *Armillaria mellea*, *A. limonaea*, *A. novae-zelandie*, *A. gallica*.
- the first report was recorded in New Zealand, in a plantation of *Actinidia chinensis*, followed by countries such as Greece, Turkey, Italy where plantations of *A. chinensis* and *A. deliciosa* were infected.
- diseases emergence is favoured by permanently damp soil



Armillaria root rot

Symptoms of Armillaria root disease	Indicators of Armillaria root disease
wilting of leaves	
chlorotic foliage	Armillaria mushrooms (on severely infected orchard)
slow loss of foliage	
basal bark cracking	
death of tree	



Armillaria root rot

Management

- before replacing the affected plants, a cleaning is necessary by removing the infected roots left in the soil
- the plantation's water needs are ensured, without exceeding the optimal amount



Phytophthora root and Crown rot

- is a disease caused by a fungus (*Phytophthora spp.*), which associated with waterlogging cause root necrosis- *La Mortia*-
- *deliciosa*, *chinensis* and *arguta* are the actinidia species affected by *Phytophthora*

Taxonomical details	
Phylum	Oomycota
Order	Peronosporales
Family	Peronosporaceae
Genus	Phytophthora

<i>Phytophthora spp.</i>	Country
<i>P. cinnamomi</i>	New Zealand, China, Spain
<i>P. citricola</i>	New Zealand
<i>P. cactorum</i>	New Zealand, USA, China, Italy
<i>P. drechsleri</i>	Korea
<i>P. cryptogea</i>	Italy, Chile, Iran, New Zealand
<i>P. lateralis</i>	China, New Zealand
<i>P. megasperma</i>	Turkey, USA, New Zealand



Phytophthora root and Crown rot

Symptoms of Phytophthora

- reduces shoot growth
- chlorotic leaves
- red-brown discoloration of roots and root crown
- vines may collapse suddenly or can present a gradual decline in productivity

Management

- good water management is recommended
- planting is done on well-drained land
- in case of disease, fungicides are applied

Bacterial blight

- this disease is caused by *Pseudomonas viridiflava*.
- the disease sets in during rainy periods
- countries such as New Zealand, Italy have reported the occurrence of Bacterial blight in kiwifruit orchards.

Taxonomic classification	
Domain	Biota
Kingdom	Bacteria
Phylum	Proteobacteria
Class	Gammaproteobacteria
Order	Pseudomonadales
Family	Pseudomonadaceae
Genus	<i>Pseudomonas</i>
	<i>Pseudomonas</i>
Species	<i>viridiflava</i>

Bacterial blight

Symptoms of disease

- rot of floral buds and flowers
- orange discoloration of petals
- yellow spots on leaves

Management

- to avoid the installation of bacteria, we make sure that the plants do not show any wounds



Crown gall

- caused by *Agrobacterium spp.*(*A. fabacearum*, *A. tumefaciens*)
- China, Japan, New Zealand have reported symptoms of this disease in several *Actinidia spp.* orchards (*A. chinensis*, *A. deliciosa*).

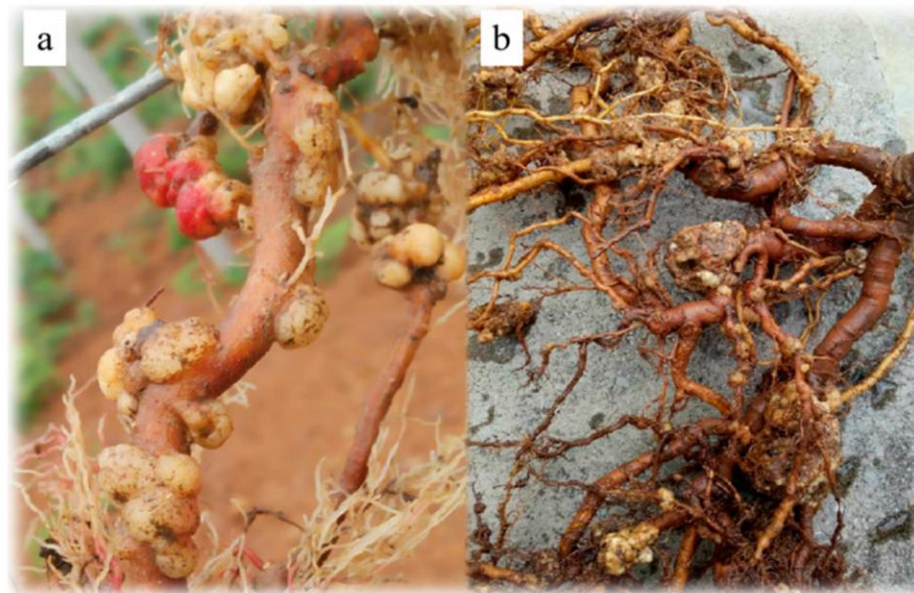


Fig.1 Appearance of tumors on the root



Crown gall

Symptoms

- appearance of tumors
- roots absorption is difficult
- the plants vigor decreases
- causes major damage, leading to the death of plants

Management

- cleaning and treating the soil on the infected surfaces
- plant wound healing
- checking the planting material



Root rot

- Caused by *Fusarium spp.*
- Over the time, China has reported several *Fusarium* species in kiwifruit plantations (*F. solani*, *F. avenaceum*, *F. tricinctum*, *F. breve*, *F. graminearum*, *F. acuminatum*). Also, it has been reported in Korea, Turkey and New Zealand.
- occurred in fields with poor drainage in hot and humid summers.

Root rot

Symptoms

- leaves showing dehydration and curling are actually the early symptoms of the disease
- brown leaf spot
- the roots rot and the plant dies
- rotten root was cracking and flaking and white mycelium covered on surface.

Management

- removing dead plants and cleaning the land
- treatment with mycorrhizae in the early phase of the disease
- chemical treatment for a severe manifestation of the disease

Conclusions and Recommendations

- all these diseases lead to kiwifruit vine decline syndrome (KVDS), being an association between fungi and bacteria

- it is recommended to disinfect the soil before planting
- checking the planting material
- regulating the amount of irrigation water



References

- Ichiro Nishiyama, Fruits of the Actinidia Genus, Advances in Food and Nutrition Research, Academic Press, Volume 52, 2007, Pages 293-324, ISSN 1043-4526, ISBN 9780123737113, [https://doi.org/10.1016/S1043-4526\(06\)52006-6](https://doi.org/10.1016/S1043-4526(06)52006-6). (<https://www.sciencedirect.com/science/article/pii/S1043452606520066>)
- Stan E.G., Iliescu L.M., Stănică, F. 2021, Kiwifruit processing. A review. Scientific papers. Series b, horticulture, vol. Lxv, issue 2, print issn 2285-5653, 93-104.
- Froud, K., Everett, K., Tyson, J., Beresford, R. and Cogger, N. 2015. Review of the risk factors associated with kiwifruit bacterial canker caused by *Pseudomonas syringae* pv. *Actinidiae*, New Zealand Plant Protection. 68, (Jan. 2015), 313–327. <https://doi.org/10.30843/nzpp.2015.68.5828>.
- Lal, Shiv. (2010). Kiwifruit: Miracle berry. Science Reporter.
- T. Thomidis, E. Exadaktylou, Effectiveness of cyproconazole to control *Armillaria* root rot of apple, walnut and kiwifruit, Crop Protection, Volume 36, 2012, Pages 49-51, ISSN 0261-2194, <https://doi.org/10.1016/j.cropro.2012.02.003>.
- Homer, I.a.n. .J. (1992). EPIDEMIOLOGY OF ARMILLARIA ROOT-ROT OF KIWIFRUIT. Acta Hort. 297, 573-578 DOI: 10.17660/ActaHortic.1992.297.75 <https://doi.org/10.17660/ActaHortic.1992.297.75>
- Türkkan, M., Bozoğlu, T., Derviş, S., Erper, İ. and Özer, G. (2024), *Armillaria* Species Causing Kiwifruit Vine Decline and Root Rot in Northeastern Türkiye: A Growing Concern for Kiwifruit Health. J Phytopathol, 172: e13409. <https://doi.org/10.1111/jph.13409>
- Ian Horner, Plant and Food Research, 2009, <https://kvh.org.nz/assets/documents/Newsroom-tab/KiwiTech-Bulletin.pdf>
- Donati, Irene & Cellini, Antonio & Sangiorgio, Daniela & Caldera, Edoardo & Sorrenti, Giovambattista & Spinelli, Francesco. (2020). Pathogens Associated to Kiwifruit Vine Decline in Italy. Agriculture. 10. 119. 10.3390/agriculture10040119.
- Heinzelmann, Renate & Dutech, Cyril & Tsykun, Tetyana & Labbé, Frédéric & Soularue, Jean-Paul & Prospero, Simone. (2018). Latest advances and future perspectives in *Armillaria* research. Canadian Journal of Plant Pathology. 41. 10.1080/07060661.2018.1558284.
- Baudry, A., Morzieres, J. P., & Ellis, R. (1991). Effect of *Phytophthora* spp. on kiwifruit in France. New Zealand Journal of Crop and Horticultural Science, 19(4), 395–398. <https://doi.org/10.1080/01140671.1991.10422883>
- He L, Shi J, Zhao Z, Ran F, Mo F, Long Y, Yin X, Li W, Chen T, Chen J. First Report of Crown Gall of Kiwifruit (*Actinidia deliciosa*) Caused by *Agrobacterium fabacearum* in China and the Establishment of Loop-Mediated Isothermal Amplification Technique. Int J Mol Sci. 2021 Dec 24;23(1):207. doi: 10.3390/ijms23010207. PMID: 35008632; PMCID: PMC8745258.
- Kim GH, Jung JS, Koh YJ. Occurrence and Epidemics of Bacterial Canker of Kiwifruit in Korea. Plant Pathol J. 2017 Aug;33(4):351-361. doi: 10.5423/PPJ.RW.01.2017.0021. Epub 2017 Aug 1. PMID: 28811752; PMCID: PMC5538439.

Thank you for your attention!

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