



Sympathetic Root Necrosis in Plants: Causes, Symptoms, and Management

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DESCRIPTION

Root necrosis is a prevalent and destructive condition affecting various plant species, leading to substantial agricultural and horticultural losses. The term "necrosis" refers to the death of cells or tissues, and when it occurs in the root system of plants, it can severely impact their ability to absorb nutrients and water, leading to stunted growth, wilting, and ultimately, plant death. This comprehensive exploration will delve into the causes, symptoms, and management strategies for root necrosis. Please bright on this critical issue in agriculture and horticulture.

Causes of root necrosis

Fungal infections: Several fungi, including *Fusarium*, *Phytophthora*, *Pythium*, and *Rhizoctonia*, are common culprits in root necrosis. They attack the roots, causing decay and disrupting the plant's ability to uptake water and nutrients.

Bacterial infections: Bacterial pathogens like *Pseudomonas*, *Agrobacterium*, and others can induce necrosis by releasing toxins or by physically damaging root tissues.

Abiotic factors

Salinity: Excessive salts in the soil can lead to osmotic stress, inhibiting water uptake by the roots and causing necrosis.

Waterlogged soil: Prolonged periods of excessive moisture can limit oxygen availability to the roots, leading to root rot and subsequent necrosis.

Poor drainage and compaction: Compacted soil and inadequate drainage can restrict root growth and cause root tissue breakdown.

Chemical factors

Toxic substances: Herbicides, pesticides, and excessive fertilizers, especially those high in salts or certain elements, can induce root necrosis.

Symptoms of root necrosis

Wilting and stunted growth: Plants affected by root necrosis often exhibit wilting even when the soil moisture is adequate. Stunted growth or a failure to thrive is also a common symptom.

Yellowing or browning of foliage: Discoloration of leaves, starting from the tips or edges and gradually spreading inwards, is a typical sign of nutrient deficiency due to impaired root function.

Reduced yield: For agricultural crops, root necrosis leads to reduced yield or quality of produce.

Root discoloration and decay: Visibly darkened or decaying roots upon inspection, accompanied by a foul odor, are indicative of severe root necrosis.

Management and control

Crop rotation: Rotating crops helps break the life cycles of pathogens, reducing the prevalence of diseases causing root necrosis.

Soil drainage improvement: Enhancing soil structure, ensuring proper drainage, and avoiding compaction can mitigate the risk of root necrosis.

Balanced fertilization: Proper application of fertilizers, avoiding excessive use, and opting for slow-release fertilizers can prevent toxicity-induced necrosis.

Biological control

Use of beneficial microorganisms: Inoculating the soil with beneficial microorganisms like mycorrhizal fungi can enhance root health and resistance against pathogens.

Chemical control

Fungicides and bactericides: Application of specific fungicides or bactericides following professional guidance can help manage the spread of root pathogens causing necrosis.

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Careful use of agrochemicals: Strict adherence to recommended doses of pesticides and herbicides, avoiding drift, and considering eco-friendly options can prevent chemical-induced necrosis.

CONCLUSION

Root necrosis remains a significant challenge in agriculture and horticulture, impacting plant health, productivity, and ultimately, global food security. Understanding its causes,

recognizing its symptoms, and implementing effective management strategies are vital for mitigating its impact. Adopting a holistic approach that combines cultural, biological, chemical, and genetic methods can significantly contribute to minimizing the prevalence and effects of root necrosis, ensuring healthier and more resilient plants. By continuously advancing research, practices, and technologies in plant pathology, soil science, and agronomy, the agricultural community can better combat root necrosis, contributing to sustainable and efficient food production worldwide.