PUBLICATION **8041**

Damping-Off Diseases

FRANKLIN LAEMMLEN, University of California Cooperative Extension Farm Advisor, Santa Barbara and San Luis Obispo Counties

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Damping-off diseases of seedlings are found worldwide and can be caused by several species of fungi under various weather conditions. The name damping-off is in standard use in the literature and usually refers to the disintegration of stem and root tissues at and below the soil line. The plant tissues become water-soaked and mushy, and the seedling wilts and falls over. Damping-off diseases, however, can have several phases. The fungi that cause these diseases can attack the seed or the seedling before it emerges above the soil surface, causing a seed rot or pre-emergent rot. When this happens, the result is a poor stand that may be mistakenly ascribed to poor seed quality or seed maggots rather than to the presence of a disease. The death of seedlings after emergence or transplanting is called postemergent damping-off and is the condition most often identified as damping-off (although this symptom may also be caused by maggots).

Most pathogens that cause damping-off diseases can also cause disease as the plant grows to maturity. Root rot, crown rot, stem lesions, basal rot, crater rot, bottom rot, and stem girdling diseases may all be associated with damping-off fungi attacking mature plants.

The two fungi that are most often associated with damping-off are *Rhizoctonia solani* and *Pythium* species. *Rhizoctonia solani* is found in most agricultural soils and survives between crops on plant residues and as microsclerotia (fig. 1). This pathogen usually attacks seedlings at or near the soil surface. Initial symptoms are stem lesions that are brick red to brown and sunken. If the disease progresses, the stem may become girdled. Stem canker, soreshin, wirestem, and damping-off are names associated with seedling and postemergent diseases caused by *R. solani*.

Damping-off diseases caused by *Pythium* species usually begin as root rot. This group of fungi survives as oospores (fig. 2) in the soil that germinate to attack root hairs and root tips, causing a progressive deterioration of the root system. The seedling may wilt before aboveground lesions are evident, or the seed may rot in the ground. *Pythium* species are often responsible for pre-emergent damping-off. These species can also infect the lower stem and cause the mushy, watery stem rot typically identified with damping-off syndrome.

Other fungi that can be associated with seedling or transplant damping-off are *Botrytis cinerea, Sclerotinia sclerotiorum, S. minor, Alternaria* species, *Phytophthora* species, *Fusarium* species, and *Thielaviopsis basicola.*

The environmental conditions that favor damping-off vary according to the pathogen. *R. solani* often causes injury to beans during spring germination. Cole crops transplanted in the fall are often victims to wirestem caused by this pathogen. Damping-off caused by *S. sclerotiorum, S. minor,* and *B. cinerea* can be severe in greenhouse seedling production and during spring transplanting and seed germination. *Pythium* species also tend to be most active during the spring months when soil temperatures are still cool and soil moisture plentiful.

Control of damping-off diseases is difficult. Damping-off must be anticipated and prevented by using seed and transplant treatments before the seed or plants are put in the field. In-furrow treatments at seeding and banded treatments over the plant line after transplanting can also be useful. Good seedbed preparation is important. Shallow planting of seed and seedlings to promote rapid germination and

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thereby less stem exposure to the soil has been used to reduce losses from *R. solani* damping-off. Irrigation should be managed to enhance germination and growth and to avoid over watering.

Fungicides used for *Pythium* control, either as seed or seedling treatments, include metalaxyl, thiram, some copper compounds, and captan. *Rhizoctonia solani* damping-off may be suppressed with pentachloronitrobenzene (PCNB), chlorothalonil, benomyl, thiophanate methyl, carboxin, mancozeb, vinclozolin, and iprodione. Always refer to the product label for crop registration and dosage information.

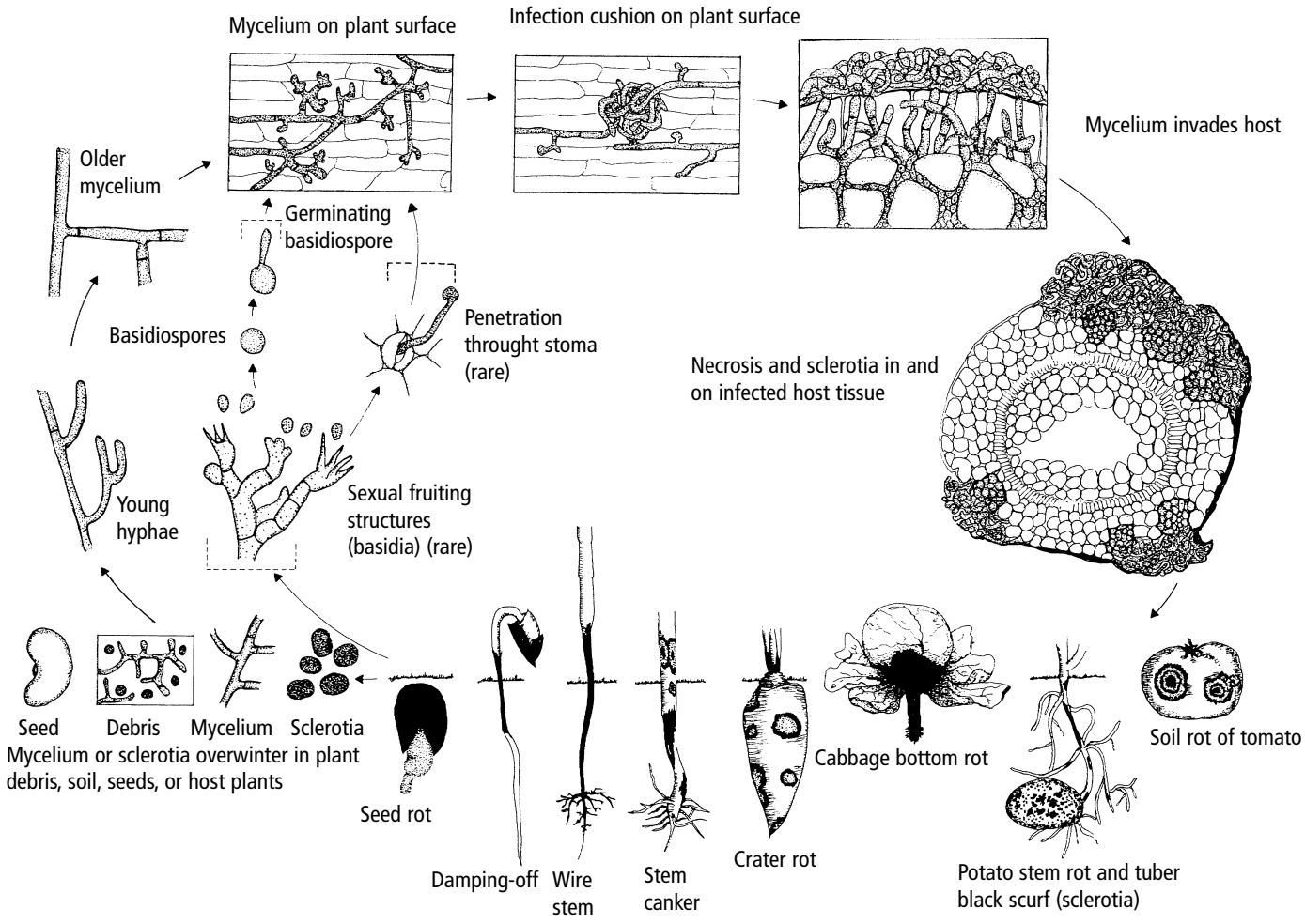

Figure 1. Disease cycle of *Rhizoctonia solani (Thanatephorus cucumeris).*
(*Source:* Agrios, G. N. 1997. Plant pathology, 4th edition. San Diego: Academic Press.)

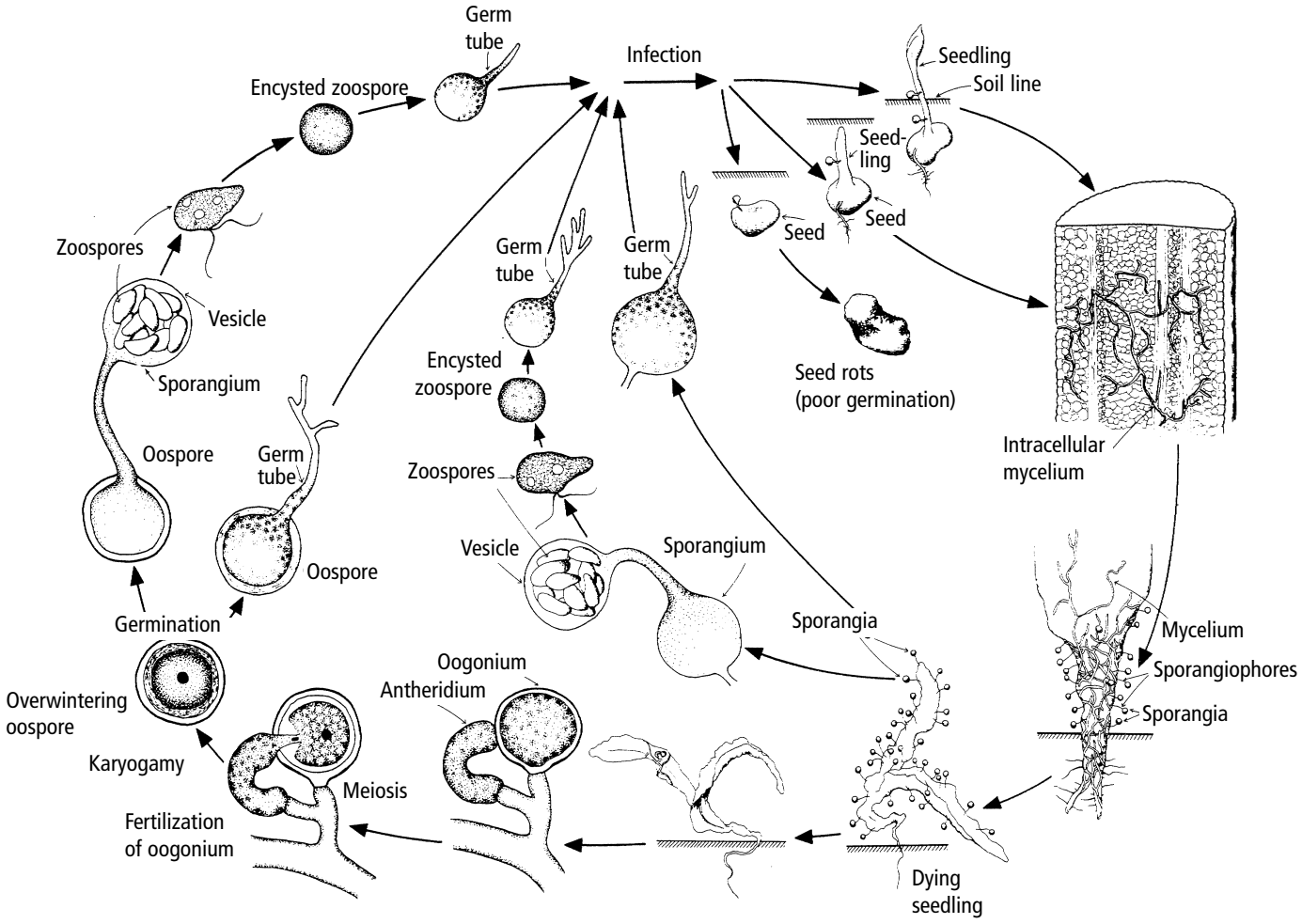

Figure 2. Disease cycle of damping-off and seed decay caused by *Pythium* sp.
(*Source:* Agrios, G. N. 1997. Plant pathology, 4th edition. San Diego: Academic Press.)

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Publication 8041

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pr-12/01-GM/VFG

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