

Laboratory 12 Study Guide (video: 1 hour 44 minutes)

Note: The new binomial for *Pseudomonas solanacearum* is *Ralstonia solanacearum*. Citrus canker has been variously referred to as *Xanthomonas campestris* pv. *citri*, *X. citri*, and *X. axonopodis* pv. *citri*. The so-called "nursery strain" of citrus canker is now known as citrus bacterial leafspot and has the binomial, *Xanthomonas campestris* pv. *citrumelo*.

Study Questions

1. What are some of the physical characteristics of plant pathogenic bacteria? Are any of them spore formers? Why is that important?
2. How do plant parasitic bacteria gain ingress into their hosts?
3. Tobacco wildfire is noteworthy for the severe necrosis it induces. What does the bacterium do to produce such severe symptoms? How is this bacterium controlled?
4. Bacterial wilt can be confused with the fungus-induced wilts, but can be diagnosed readily in the field. How?
5. What is produced by *Erwinia carotovora* to cause its hosts to develop a wet rot?
6. What vectors are involved in initiating the primary cycles of the apple fire blight disease. Secondary cycles? Is the use of insecticides a practical means to control this disease? How can the primary inoculum be controlled?
7. What is the chief vector of cucumber wilt. Why is the disease particularly bad following mild winters? Can disease forecasting be applied to control this agent?
8. What types of diseases and symptoms do various pathovars of *Xanthomonas campestris* cause? What is citrus canker and why is it so important? What methods have been used to control the Asian strain? Are all citrus-infecting pathovars of *X. campestris* equally significant? Why is citrus so vulnerable to citrus canker?
9. *Rhizobium* and *Agrobacterium* are both gall-forming plant parasites, but are they both pathogens? How can they be differentiated? How can *Rhizobium*-induced root nodules be distinguished from those induced by *A. tumefaciens* and/or the root knot nematode?
10. What are "fastidious bacteria"? How do they differ from other plant pathogenic bacteria? How are they transmitted and what types of symptoms do they induce?
11. What causes Pierce's disease, how is it transmitted, and why is it such a serious threat to the California grape industry?
12. Aster yellows, a phytoplasma, is much more common in the northern US than in places such as Florida. Why? Likewise, the sweet potato witches' broom phytoplasma is much more common in certain South Pacific islands, such as Guadalcanal, than others. Why?
13. What is coconut lethal yellow and what impact did it have in Florida? Why does Florida still have coconut palms, despite the incursions of lethal yellowing into the mainland?
14. What causes corn stunt and why is it less common in Florida than in such places as Central America? Are all of its leafhopper vectors equally efficient?
15. Tetracycline antibiotics have been used to "cure" plants infected with fastidious bacteria. Yet, this is not considered to be a viable means of controlling these bacteria. Why not? What are the limitations of such an approach?

Key Words

Agrobacterium tumefaciens
Ants (and fire blight)
Aster yellows phytoplasma
Bacterial soft rot (*E. carotovora*)
Bacterial wilt (*P. solanacearum*)
Bees (and fire blight)
Chrysomelid beetles
Citrus canker (*X. campestris* pv. *citri*)
Coconut lethal yellowing phytoplasma
Corn stunt spiroplasma
Crown gall (*A. tumefaciens*)

Cucumber wilt (*E. tracheiphila*)
Disease cycles (primary and secondary for fire blight)
Erwinia amylovora
Erwinia carotovora
Erwinia tracheiphila
Fastidious bacteria
Fire blight of apples and pears (*E. amylovora*)
Leafhopper (phloem and xylem feeding)
Middle lamella
Moko disease of banana
Nitrogen fixing (*Rhizobium*)
"Nursery strain" of citrus canker (*X. campestris pv. citrumelo*)
Ooze
Pathovar
Pectolytic enzyme
Phyllody (flower greening)
Phytoplasma
Pierce's disease of grapes (*Xylella*)
Pseudomonas solanacearum
Pseudomonas syringae pv. tabaci
Rhizobium
Sharpshooter leafhoppers
Spiroplasma
Sweet potato witches' broom phytoplasma
Symptom remission
Tab toxin (of *P. syringae pv. tabaci*)
Tetracycline antibiotic
Tumor-inducing plasmid (Ti plasmid)
Tobacco wildfire (*P. syringae pv. tabaci*)
Xanthomonas campestris complex
Xylella