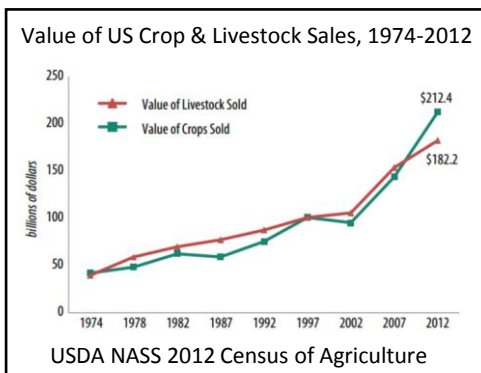


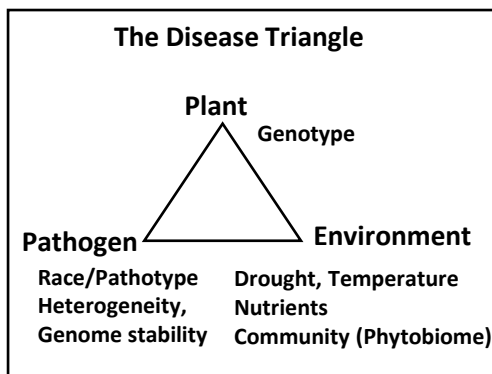
Emerging Plant Pathogens: Need for State Support Focused on Regional Diseases and Plant Diagnostic Laboratories



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- 2012 non-livestock agriculture value \$212 B.
- Estimated losses due to plant pathogens ~\$220 B.

- Environmental conditions (along with the host and pathogen genomes) determines disease incidence.
- Increased plant movement internationally constantly exposes plants to new pathogens



Sudden Oak Death (*Phytophthora ramorum*)



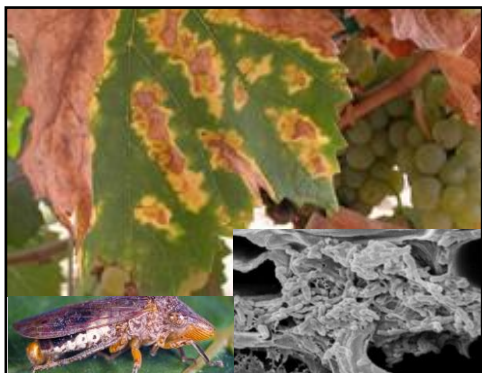
P. ramorum (SOD) believed to have come to US on infected rhododendrons from Himalayas in 2000. Infects oaks and tanoaks. Economic cost of replacing all oaks on developed land in CA = \$729M. Property value losses due to SOD = \$8.3 B. Myrtlewood supports pathogen without becoming diseased so serves as inoculum source.

R. solanacearum r3b2 arrived 2003 via geraniums from Kenya. Causes bacterial wilt of potato, tomato and eggplant. Worldwide impact \$950 M/yr., including the U.S. Listed as a Select Agent. Especially problematic in vegetative propagated materials such as potatoes.

Bacterial Tomato Wilt (*Ralstonia solanacearum*)

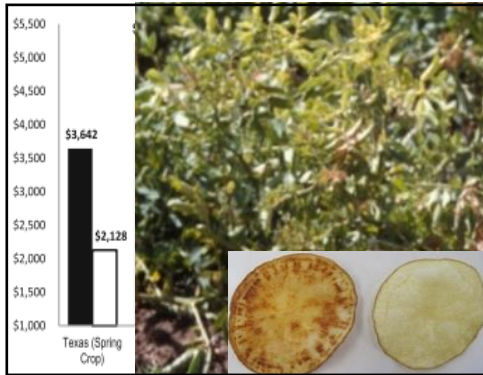


Pierce's Disease (PD) on grapes (*Xyella fastidiosa*)



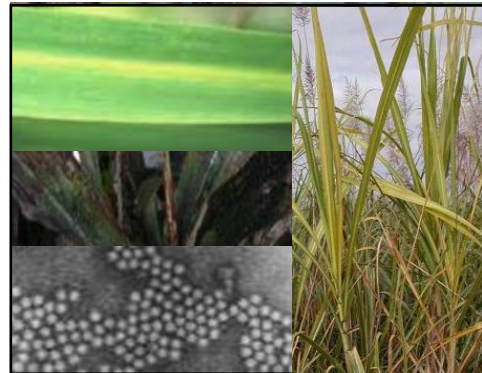
PD is a vascular wilt caused by *X. fastidiosa*. PD occurrence increased due to introduction of European grape varieties in TX and upon arrival of a non-native glassy winged sharpshooter (GWSS) in S. CA in 1990s. In 2012 estimated causes \$56 M/yr. in vine death, threatening the \$3 B/yr. wine industry. 2014 GWSS eggs found in Napa County, expanding the threat. PD a threat to many grape-producing regions.

Zebra Chip on Potato (*C. Liberibacter solanacearum*)



Emerged in US in 2000 from Mexico. Transmitted by psyllid. Currently growers use 23 different insecticides for treatment. Causes a 36% reduction in \$/ha above operating costs (e.g. 41% & 63% (WI, TX). Losses for PNW growers can be higher due to growing season.

Sugarcane Yellow Leaf Virus (SCYLV)



Sugarcane aphid arrived 2 yrs. ago. Affects 90% of sugarcane production in US along with sorghum. Populations >500/leaf can cause 100% loss. Transmits SCYLV that cause 4-10% yield loss. High incidence makes this the greatest threat.

Tan spot (STB) on wheat



Wheat monoculture and crop residue selected a complex including *Pyrenophora tritici-repentis*, *Mycosphaerella graminicola* and *Stagonospora nodorum*. Some members highly virulent due to acquisition of ToxA gene from an introduced fungus (~1941). In Australia losses >\$100M/yr.

P. psidii can infect >440 hosts, including eucalyptus trees. Believed arrived from Brazil where it caused 80-100% loss of guava production. A high priority quarantine threat globally due to severe ecosystem damage. Found in CA, FL and HI.

Myrtle/guava rust (*Puccinia psidii*)



Fusarium Head Blight, FHB (*F. graminearum*)



Ex of food safety threat: FHB cost the U.S. wheat industry \$2.7 B (1998-2000). Reduces grain yield and quality. Also produces several mycotoxins such as deoxynivalenol (known as vomitoxin).

State support should focus on regional issues:

- Increases for plant diagnostic labs at LGUs (+training)
- Constant surveillance and monitoring
- Active education of growers, packers, consumers
- Research on pathogenicity & host responses