

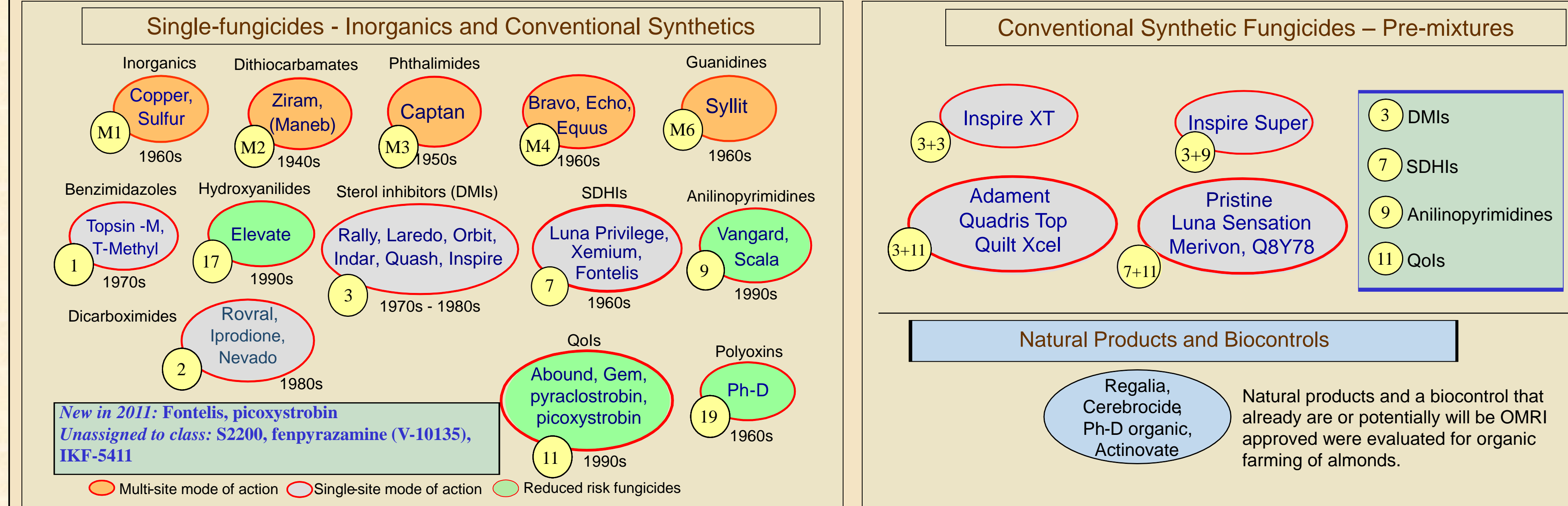


# Epidemiology and Management of Brown Rot, Gray Mold, Shot Hole, Rust, and Hull Rot of Almond

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## Classes of fungicides and natural products registered and in development for use on almond in California



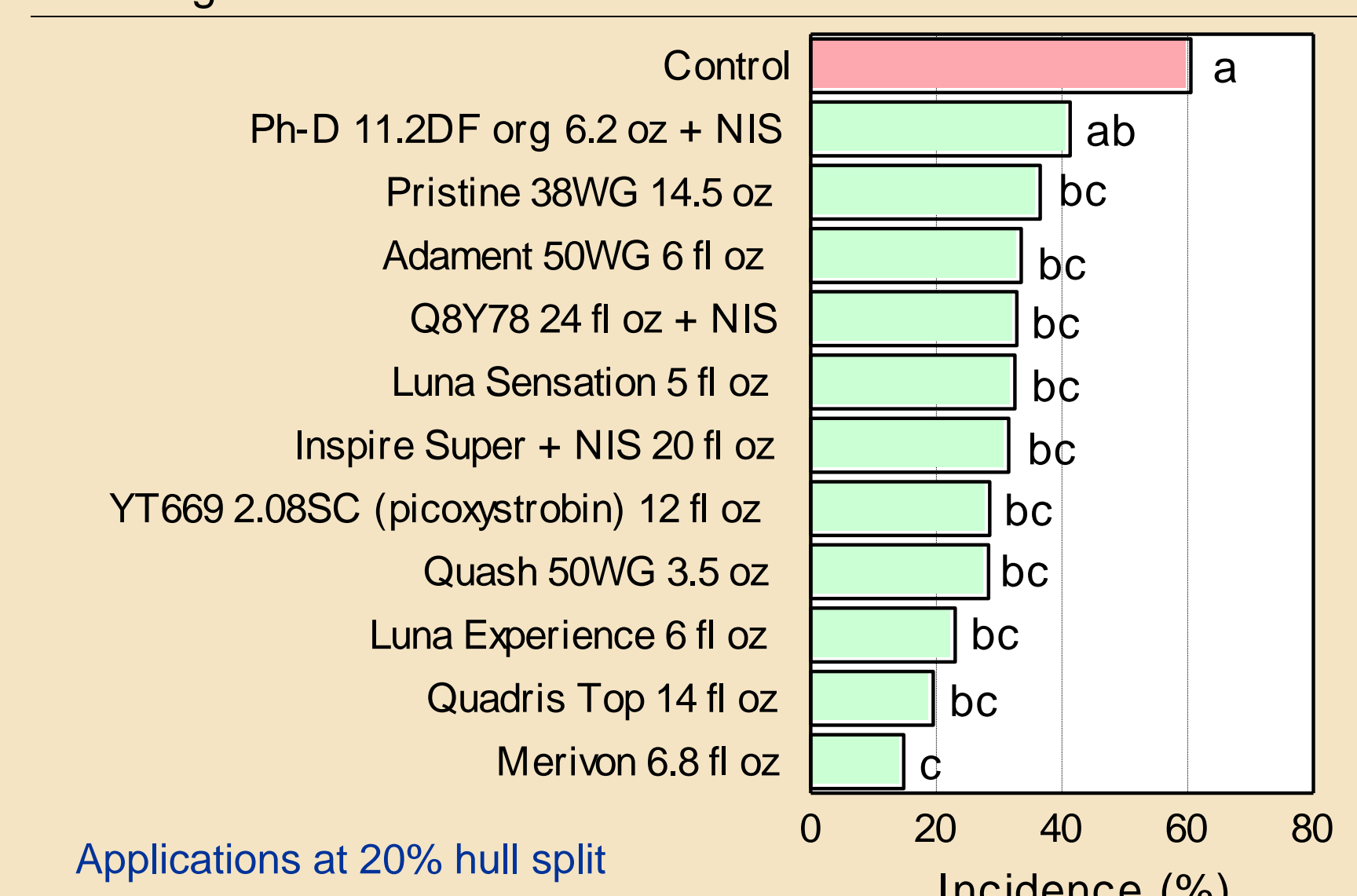
## Hull Rot

Causal agents: *Rhizopus stolonifer* and *Monilinia fructicola*. The two pathogens require different management strategies



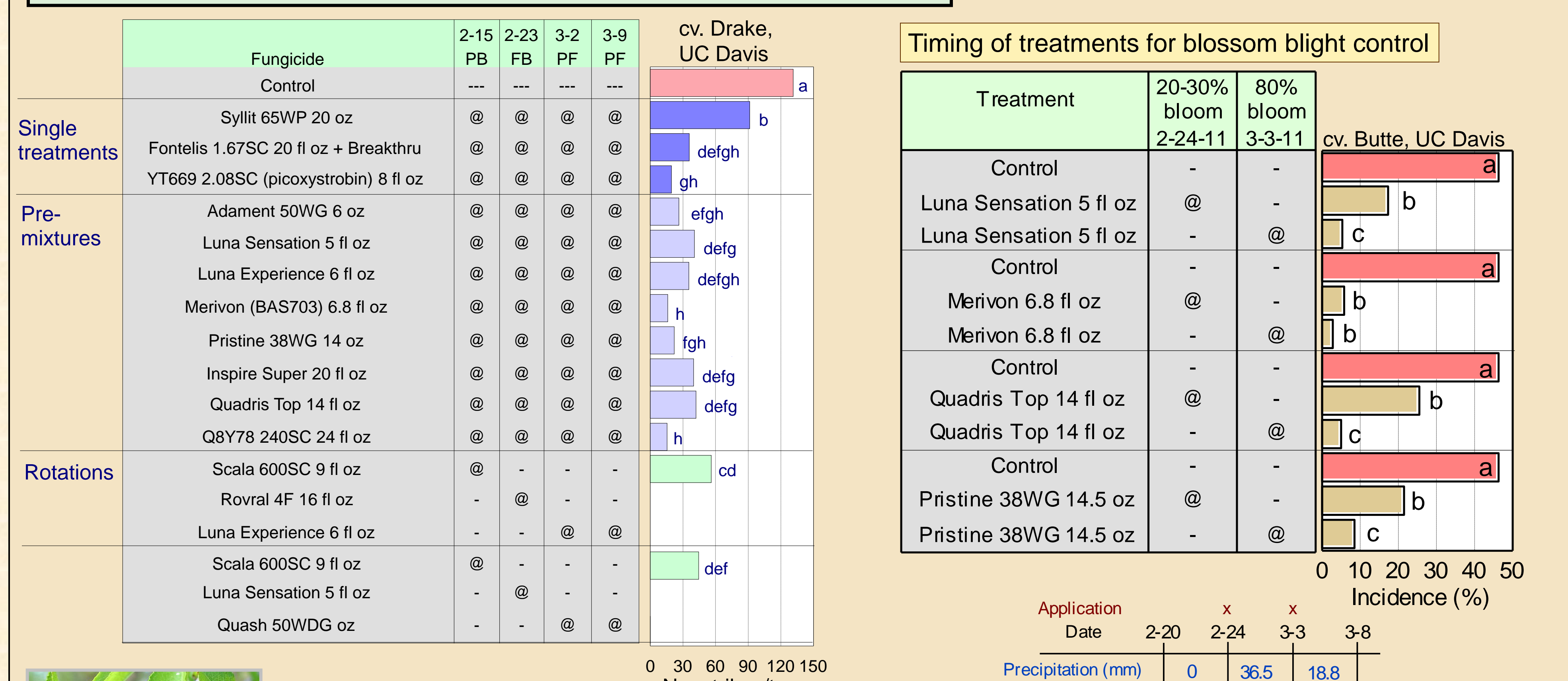
1) and 2): Hull rot caused by *Rhizopus stolonifer* with infected fruit and associated dieback after the infection progressed in the branch.  
2) Hull rot caused by *Monilinia fructicola* and dieback.

Test plot on cv. Nonpareil, Colusa Co. - Pathogens are *R. stolonifer* and *M. fructicola*



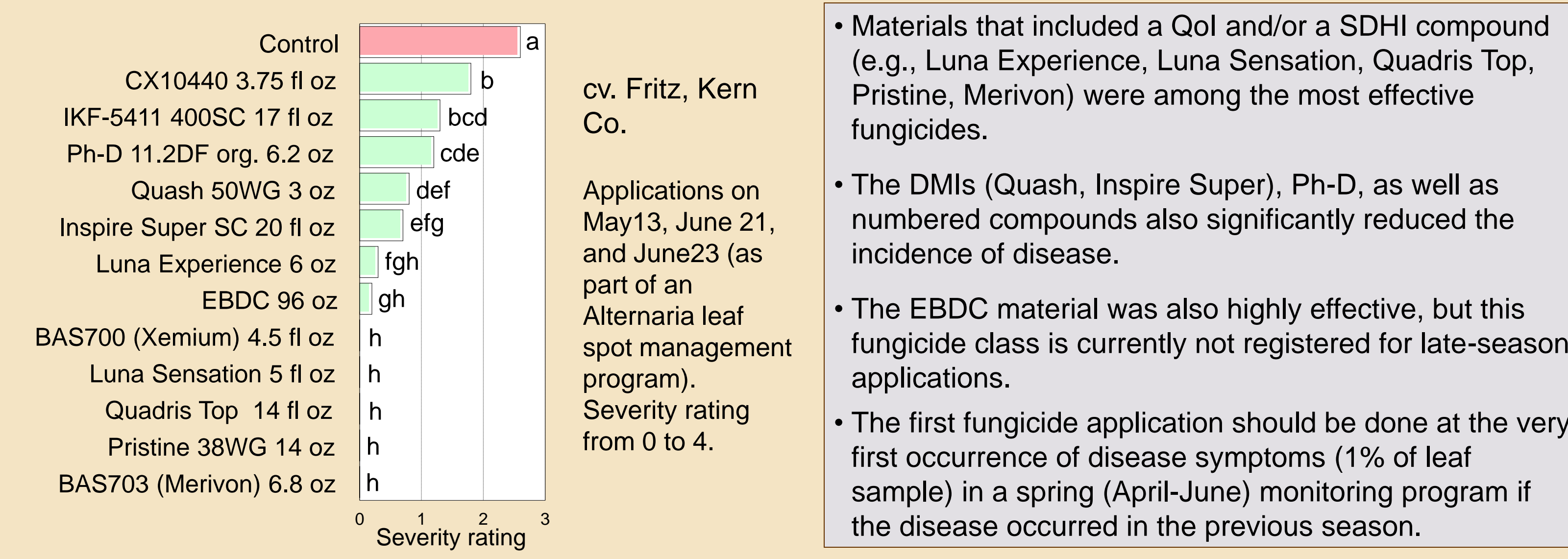
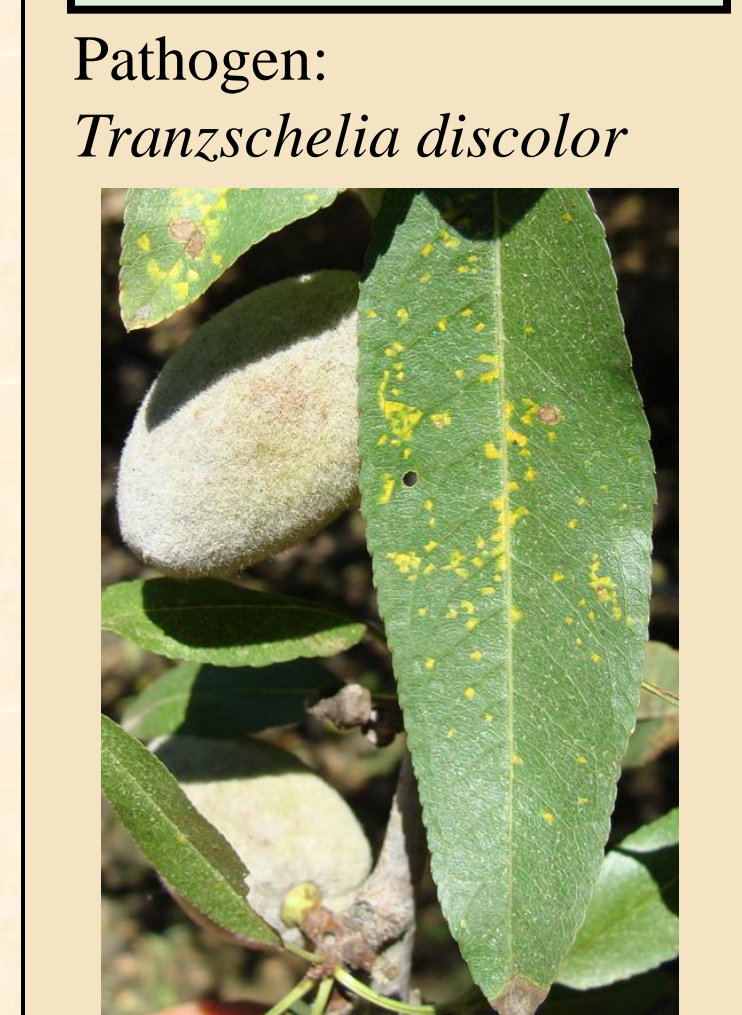
- Fungicide treatments **are effective** in reducing hull rot caused by *R. stolonifer*, but **not** by *M. fructicola*.
- Rhizopus* hull rot: no differences in application timings (early split or 20% split) possibly because of the long hull split duration within an orchard. Applications during the stages when susceptibility is high and with NOW applications.
- Monilinia* hull rot: earlier application timings need to be tested (*M. fructicola* infects younger tissues - *R. stolonifer* generally infects senescent tissues).
- PGRs (e.g., ethephon) that were evaluated in 2010 possibly can be used to accelerate hull rot for late-maturing varieties.
- For the most effective integrated management of hull rot, hull split should be induced simultaneously with proper water management (i.e., deficit irrigation).

## Brown Rot Blossom Blight, Jacket Rot, and Shot Hole

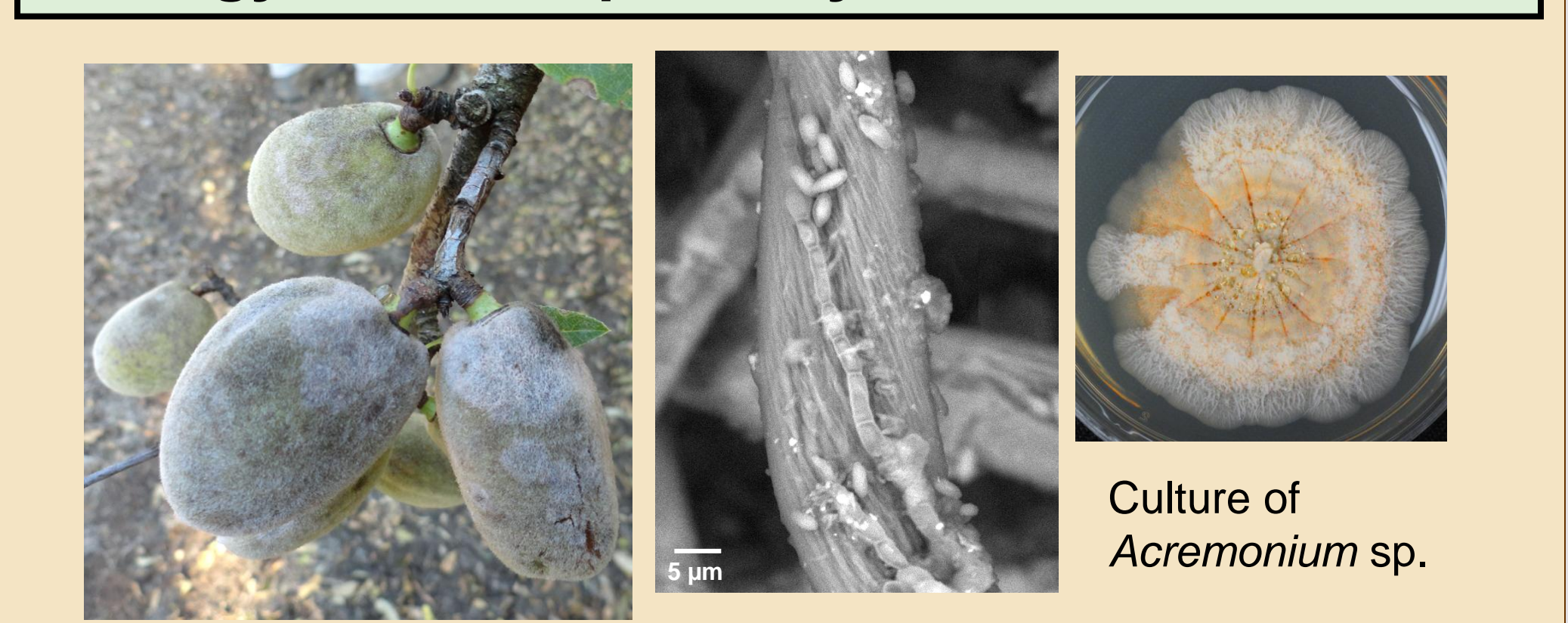


- Brown rot:**
- Numerous excellent treatments available
  - Classes: DMIs (3), SDHIs (7), APs (9)
  - Pre-mixtures of groups 3+11, 7+11, and 3+9
  - New pre-mixtures: Luna Sensation, Merivon, Inspire Super
- Gray mold:**
- Most effective treatments in the SDHIs (7) and APs (9)
  - Effective pre-mixtures: 3+11, 7+11, and 3+9
- Shot hole:**
- Most effective: pre-mixtures of 7+11 and 3+11, rotations of 2 and M5 also effective
  - Luna Sensation, Merivon, Inspire Super, Quadris Top
- Timing for blossom blight control:**
- A single application at full bloom was generally more effective than a single application at early bloom even when high rainfall occurred before full bloom.
  - In another trial on cv. Drake (very high disease pressure), applications at pink bud plus full bloom were more effective than a single treatment at full bloom.

## Almond Rust

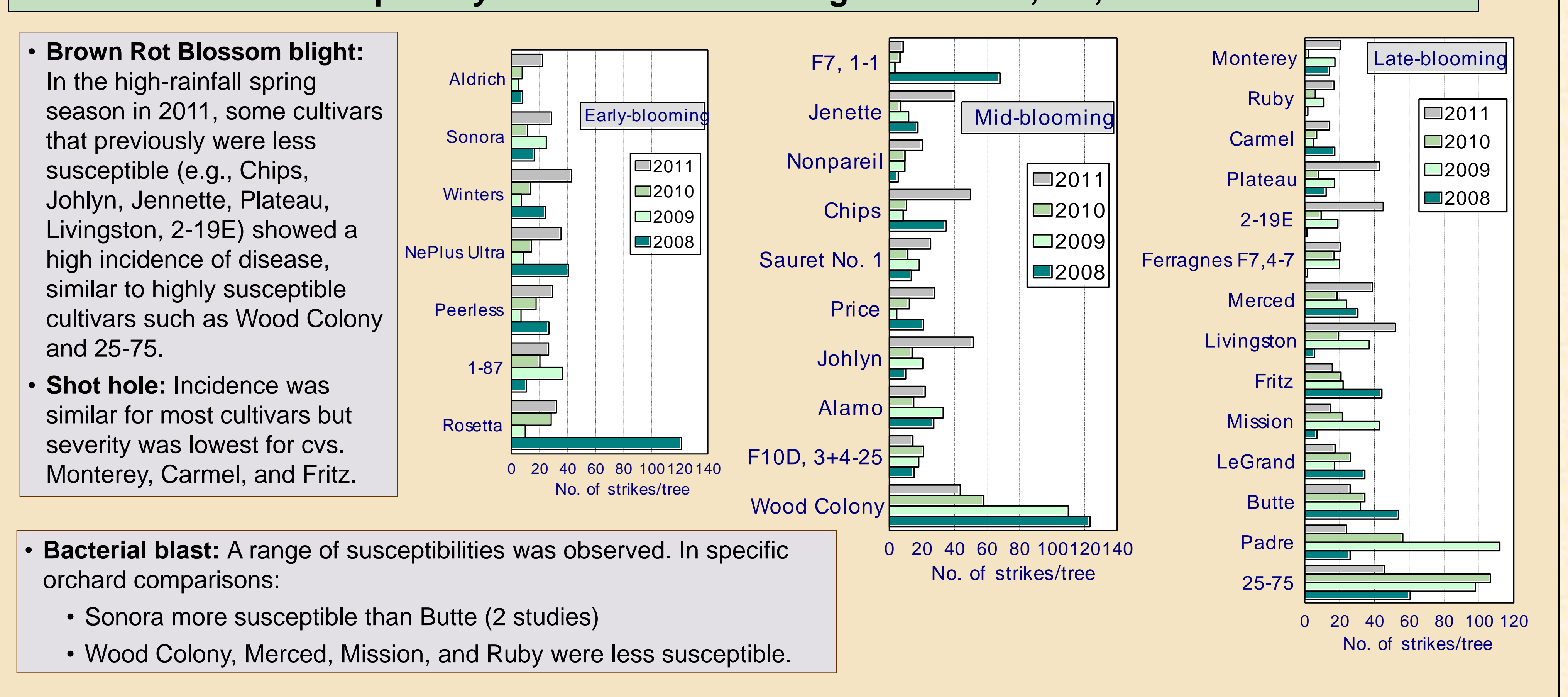


## Etiology of a new 'powdery mildew-like' disease



- Powdery mildew-like symptoms on almond fruit have been observed at numerous locations in recent years.
- A high incidence at one location in 2011.
- A fungus was consistently isolated and identified by morphology and DNA sequence analysis: *Acremonium* sp.
- Inoculations are planned for 2012 to verify pathogenicity of the fungus (Koch's postulates).
- The disease is most likely not caused by a powdery mildew fungus, but by a species of *Acremonium* that produces white (later more orangish) superficial growth similar to mildew on fruit.
- Economic importance of this pathogen is currently not known.

## Natural host susceptibility of almond cultivars against BRBB, SH, and BB – UC Davis



- Brown Rot Blossom blight:** In the high-rainfall spring season in 2011, some cultivars that previously were less susceptible (e.g., Chips, Johlyn, Jennette, Plateau, Livingston, 2-19E) showed a high incidence of disease, similar to highly susceptible cultivars such as Wood Colony and 25-75.
- Shot hole:** Incidence was similar for most cultivars but severity was lowest for cvs. Monterey, Carmel, and Fritz.
- Bacterial blast:** A range of susceptibilities was observed. In specific orchard comparisons:
  - Sonora more susceptible than Butte (2 studies)
  - Wood Colony, Merced, Mission, and Ruby were less susceptible.