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Research Update Meeting 2008 - Pathological Highlights from 2007

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Pathological highlights from 2007

Frank L. Caruso

UMass Cranberry Station

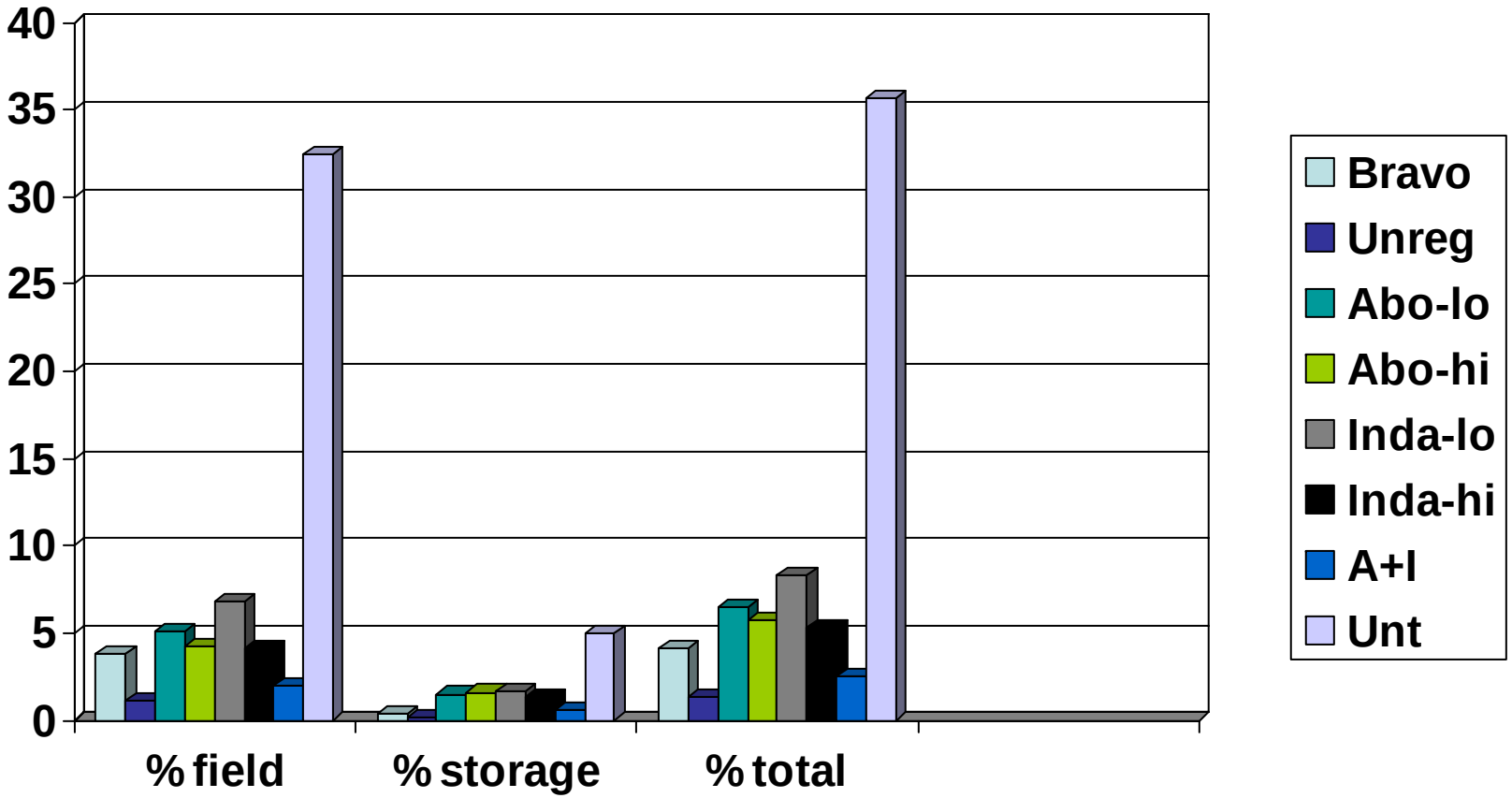
Projects to discuss

- Fruit rot fungicide trial
- Upright dieback
- Smolder dodder trial
- Proanthocyanidins and their role in fruit rot resistance
- New bed establishment strategies

Fruit rot fungicide trial

- Bravo @ 5.5 pt/a
- Unregistered sterol inhibitor @ 5.7 oz/a
- Indar @ 2 oz/a
- Indar @ 4 oz/a
- Abound @ 12.8 oz/a
- Abound @ 15.4 oz/a
- Abound @ 15.4 oz/a + Indar @ 4 oz/a
- Untreated check

Fruit rot trial – 2007



Upright and runner dieback

- Occurs in all cranberry-growing areas
- Affects both vegetative and fruiting uprights
- Causes death of the upright from the growing point downward
- Can expand into the runner
- Most cultivars appear to be susceptible



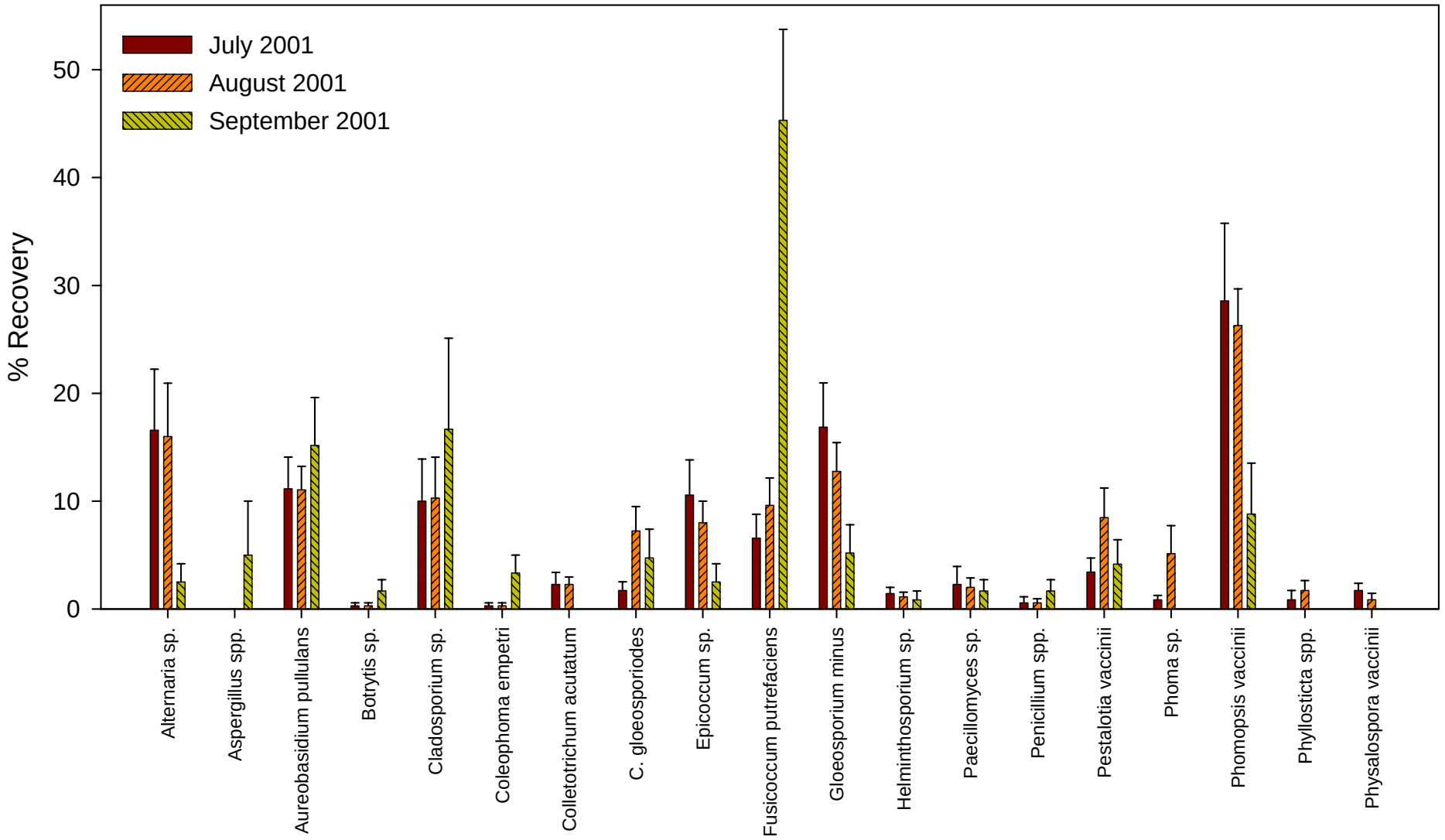


“Affects both vegetative and fruiting uprights”

- Fruiting uprights
- *Phomopsis* 84%*
- *Colletotrichum* 2%*
- *Epicoccum* 18%
- *Cladosporium* 12%

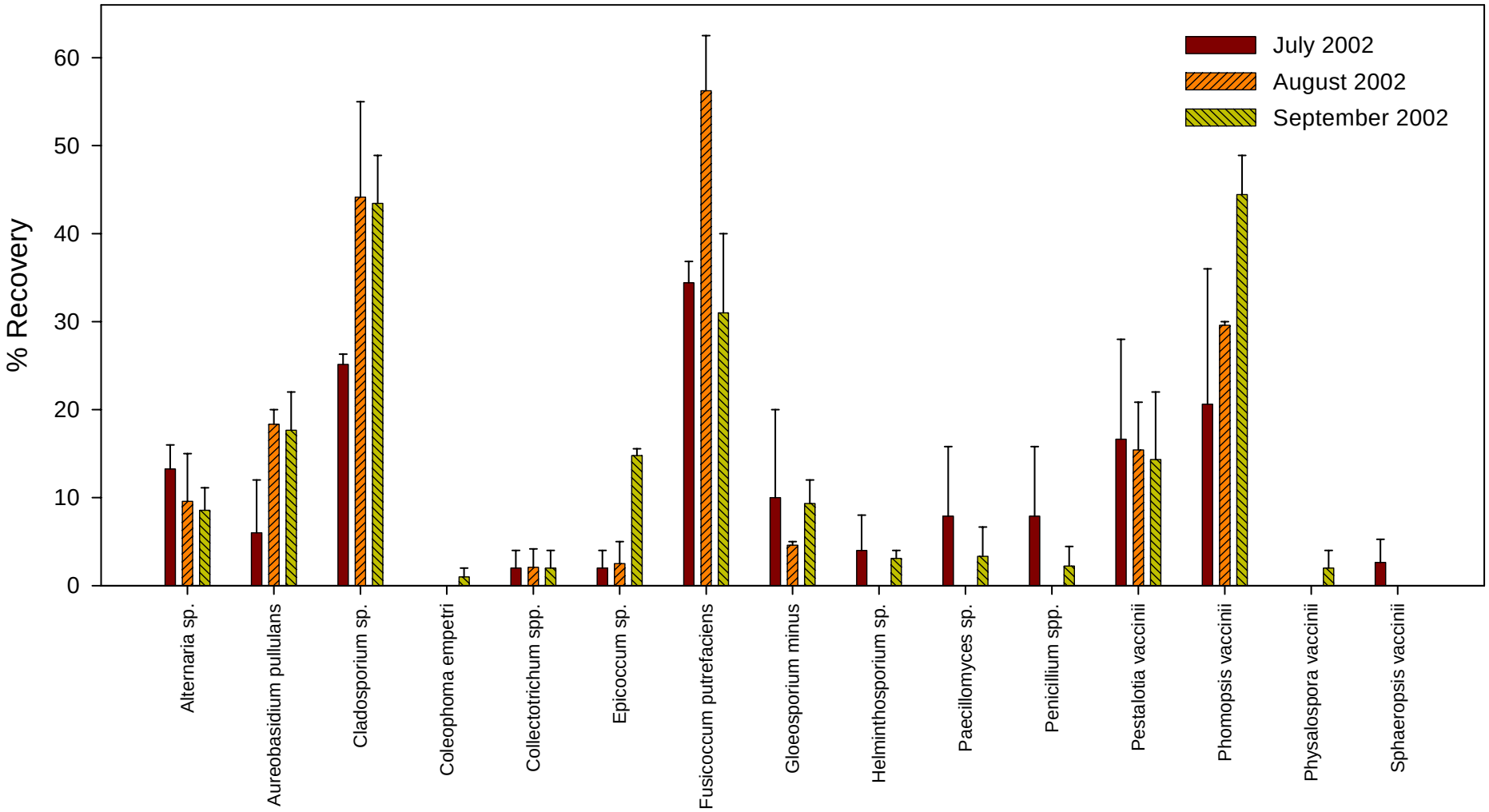
- Vegetative uprights
- *Phomopsis* 2%*
- *Colletotrichum* 2%*
- *Epicoccum* 22%
- *Alternaria* 10%
- *Cladosporium* 6%

Percent recovery of fungi isolated from diseased uprights (N=7)



2001

Percent recovery of fungi isolated from diseased uprights (N=3)



2002

Looking for sites in 2008

- Compare vegetative and fruiting uprights for the presence of *Phomopsis* and other fungal pathogens
- Determine whether *Fusicoccum* is still cultured at a high incidence from symptomatic uprights
- Will perform pathogenicity studies with *Fusicoccum* isolates from uprights
- **Call me if you have upright dieback!**

Smolder trials - 2007

- Grant from IR-4 Biopesticide Program to perform demonstration trials
- Duplicate trials done in Wisconsin by Dr. Jed Colquoun

Objectives in IR-4 proposal

- Test multiple applications of the granular (G) formulation
- Test multiple applications of the wettable powder (WP) formulation
- Test scattered single applications for G
- Test scattered single applications for WP

Multiple applications

- One application of G or WP
- Two applications of G or WP at 14 day intervals
- Three applications of G or WP at 14 day intervals
- Untreated

Scattered applications

Trt	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6
1	X					
2		X				
3			X			
4				X		
5					X	
6						X

Experimental protocols

- Four sites with both trials set up in same or different beds
- Smolder not applied until significant dodder growth above the vine canopy (biofix for both MA and WI)
- Applications made by researchers
- Vines watered briefly before and after applications
- Coordination with growers with fungicide applications (7 day interval)

Evaluation of efficacy

- Digital images taken of dodder coverage at the time of first application
- Digital images taken at regular intervals
- Digital images analyzed by Sigma Scan for differences in dodder coverage
- Collect dodder seed prior to cranberry harvest
- Isolation of pathogenic fungi from infected dodder

Diseased dodder



Perfectly healthy uninfected dodder



Results

- No infection of the dodder in any of the trials in the four sites
- Similar experiences in the trials in Wisconsin
- What happened?

Possible reasons for failure

- Fungus (*Alternaria destruens*) had lost its virulence and the active ingredient had no potency
- Formulation of the product resulted in loss of virulence of the fungus

Next steps

- Culture *Alternaria* from the G and WP material used in 2007 trials
- Get fungus to sporulate
- Inoculate dodder seedlings with *Alternaria* conidia
- Evaluate infection of dodder seedlings
- No 2008 field trials planned

Proanthocyanidins

- Found in bilberry, cranberry, black currant, grape, chokeberry, plus other plants
- Have antioxidant activity
- Possess anti-mutagenic activity plus can confer other beneficial properties in the human body
- Class of isoflavonoids which have been shown to have antifungal properties

Do proanthocyanidins have a role in resistance to cranberry diseases?

- Prepare extracts from green and red berries, leaves, roots (HyRed, Ben Lear, Bugle, wild selection)
- Obtain comparative profiles of phytochemicals in these extracts
- Purify certain fractions that show particular activity
- Assay extracts (crude, purified) for antifungal activity against fungal pathogens causing fruit rot, leaf spot, root rot

Fungi to be screened for inhibition in an *in vitro* assay

- Fruit rot: *Coleophoma empetri*, *Fusicoccum putrefaciens*, *Phomopsis vaccinii*, *Physalospora vaccinii*
- Leaf spot: *Colletotrichum acutatum*, *Phyllosticta vaccinii*
- Root rot: *Phytophthora cinnamomi*

Many beds will be renovated in the next several years

- Stevens, Ben Lear
- HyRed, Grygleski
- Crimson Queen, Mullica Queen, Demoranville
- Other new hybrids?

Early Rot – Phyllosticta vaccinii



Leaf spotting leading to defoliation



Stem lesion with fruiting bodies

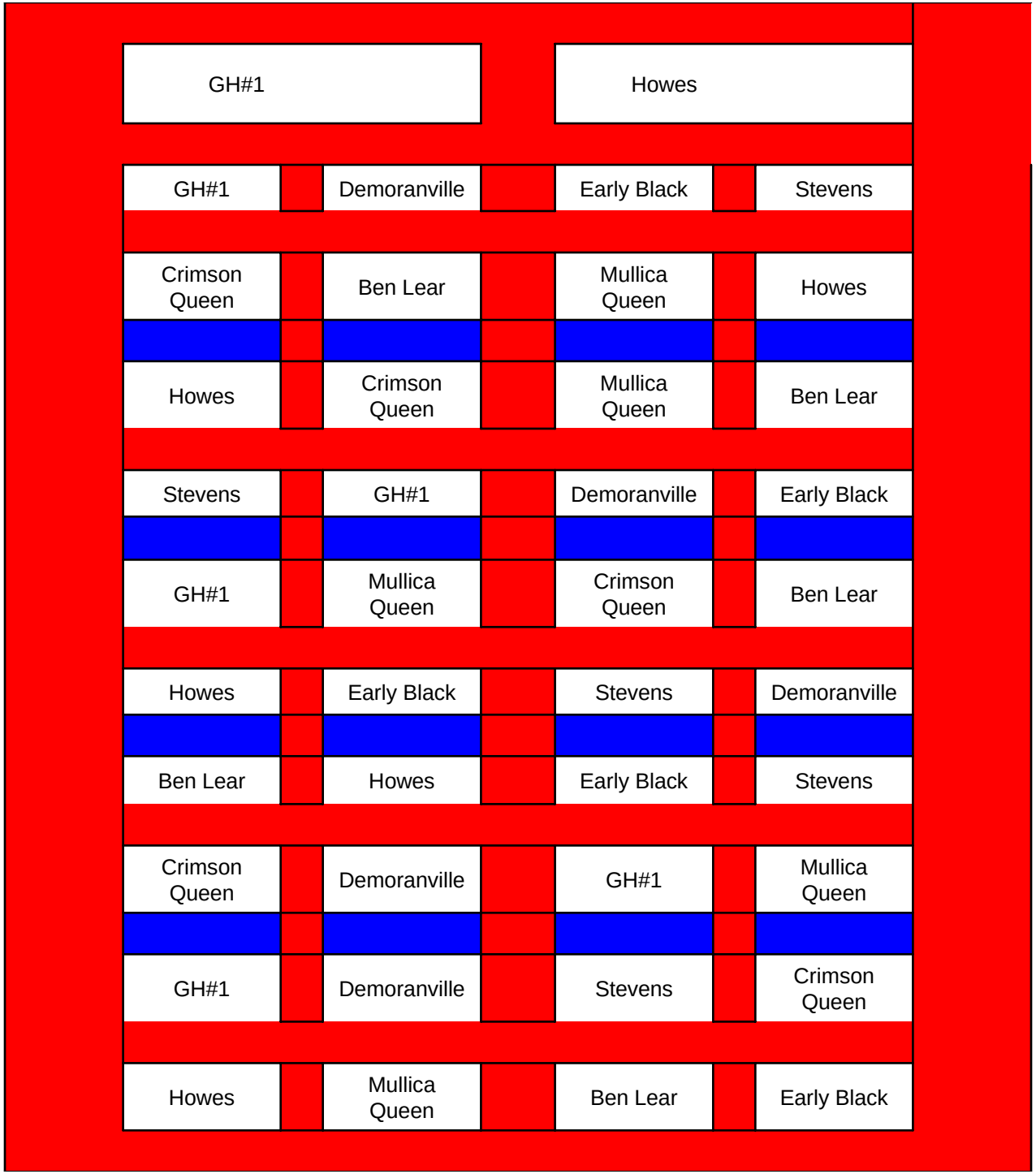


Develop guidelines (BMPs) for disease management in newly-planted beds

- Fungicides – effective formulations, rates, timing, numbers of applications
- Are dormant fungicide applications helpful in reducing inoculum?
- Proper irrigation schedules
- Optimal nutritional programs
- Observe disease susceptibility of the new hybrid releases
- Determine which fungal genera are most important pathogens in each area
- Do vines need to be treated with sterilants before planting?

The Checkerboard

Plots are
80 x 36 ft



Compendium of Blueberry, Cranberry and Lingonberry Diseases, 2nd edition

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85 YEARS OF RESEARCH AND EXTENSION
1910 - 1995
COFFEE