Characterization and Fungicide Sensitivity of *Geotrichum candidum* Isolates from the ESVA

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&

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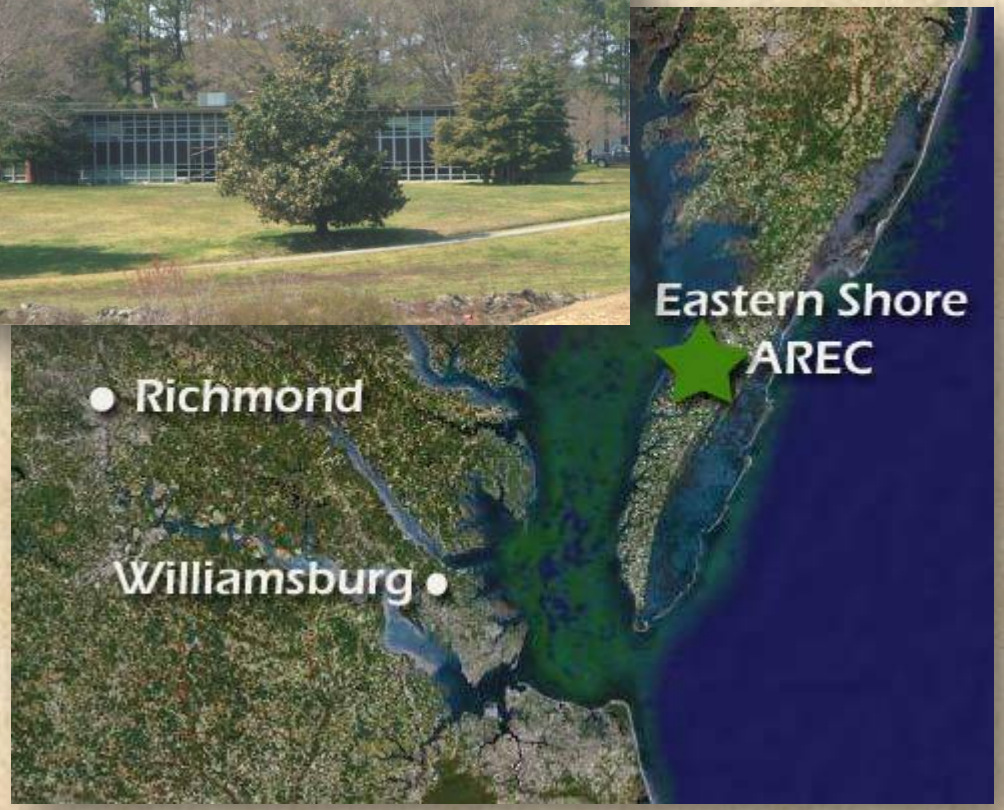
Virginia Tech's

Eastern Shore AREC



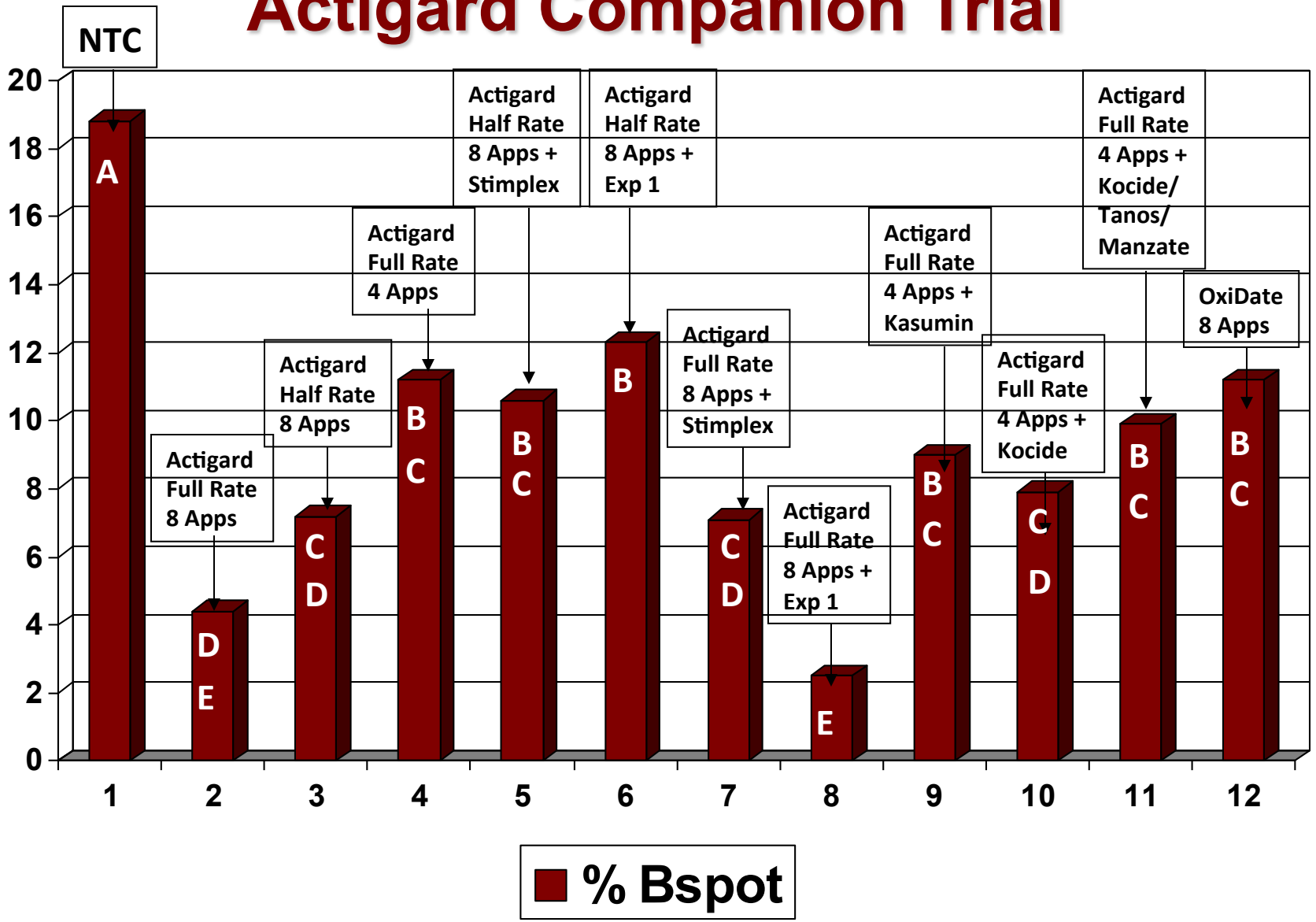
Eastern Shore Agricultural Research & Extension Center

Bacterial Spot Screen 2008

Trial 818

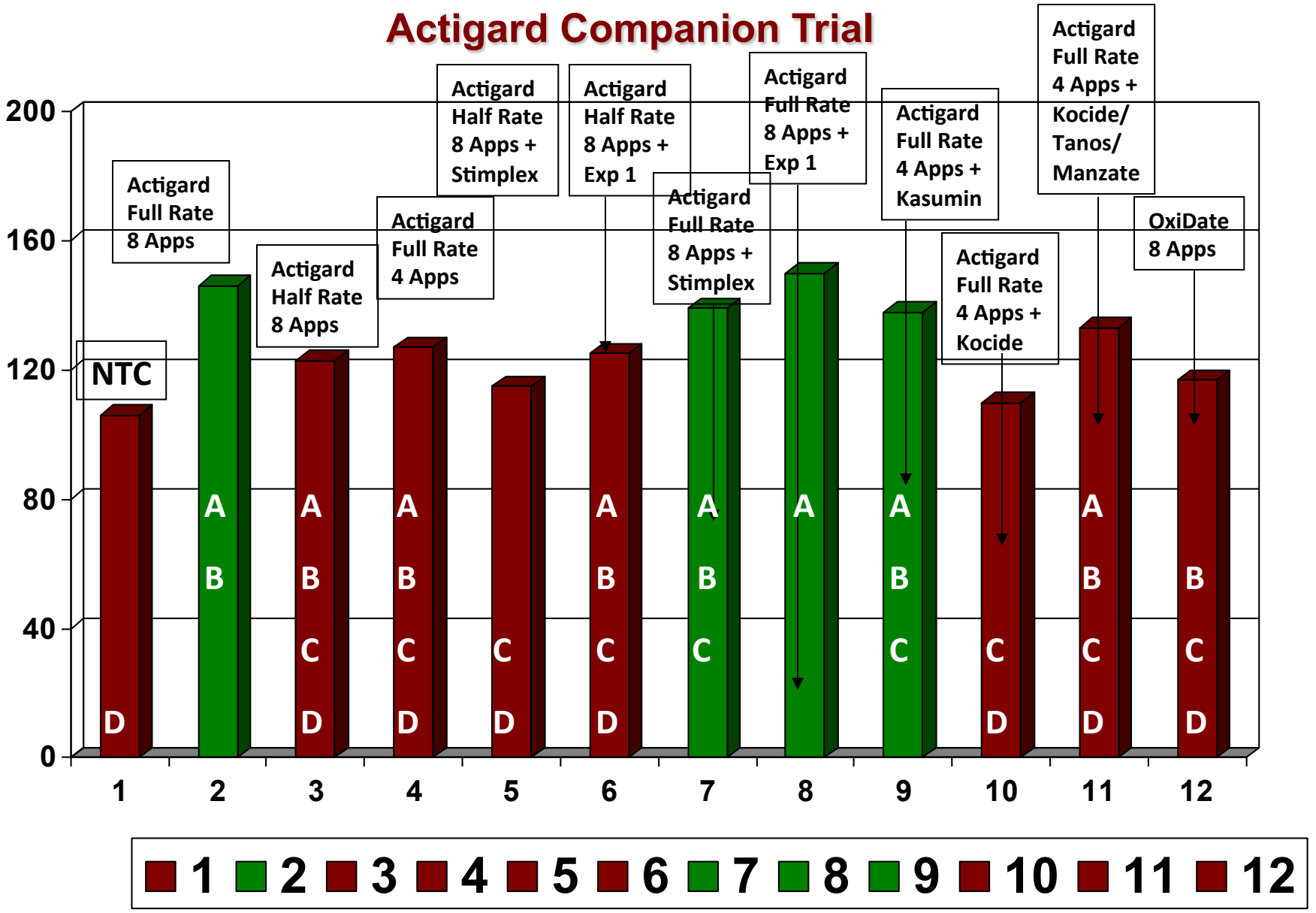
- 1. NTC
- 2. Actigard Standard (0.33 – 0.75 oz/A)
- 3. Actigard Standard Half Rate (0.165 – 0.375 oz/A)
- 4. Actigard Alternating Sprays (0.33 – 0.75 oz/A)
- 5. Actigard Standard Half Rate (0.165 – 0.375 oz/A) + Stimplex
- 6. Actigard Standard Half Rate (0.165 – 0.375 oz/A) + Acadian Exp. 1
- 7. Actigard Standard (0.33 – 0.75oz/A) + Stimplex
- 8. Actigard Standard (0.33 – 0.75oz/A) +Acadian Exp 1
- 9. Actigard Standard (0.33 – 0.75oz/A) alt. Kasumin
- 10. Actigard Standard (0.33 – 0.75oz/A) alt. Kocide
- 11. Actigard Standard (0.33 – 0.75oz/A) alt. Tanos/Manzate/Kocide
- 12. Oxidate

TOMATO BACTERIAL SPOT
Actigard Companion Trial



TOMATO BACTERIAL SPOT

Actigard Companion Trial



Tomato Sour Rot – *Geotrichum candidum*

Geotrichum candidum

Sour Rot Management on ESVA

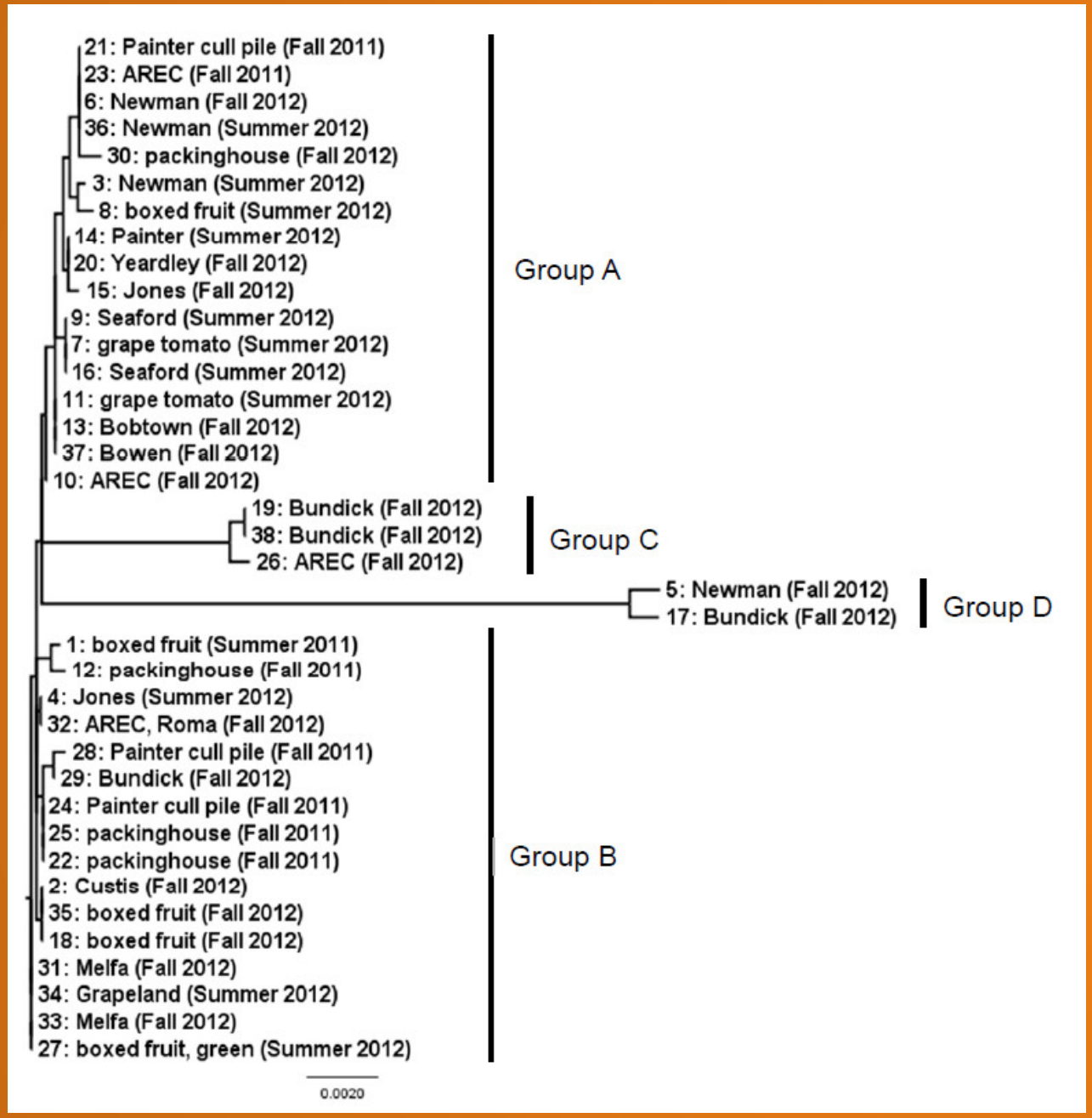
- Mostly a post-harvest issue, observed mostly in fall after heavy rainfall events – harvest alterations
- Harvest care – prevent bruising on 'risky' harvests of green fruit
- Reduce gas to consumer times
- Round > Roma > Grape/Cherry → Grape/Cherry focus in fall
- PH fungicide use – materials containing propiconazole (mostly Chairman – fludioxonil/propiconazole mix)

Geotrichum candidum Isolate Collection

- **37 individual isolates from active infection sites on tomato**
- **Various locations (2011 and 2012)**
  - **Commercial tomato fields**
  - **Cull piles**
  - **ESAREC**
  - **Packed tomato fruit**
- **Isolated on PDA and stored at 8° C until further testing**

Geotrichum candidum isolate comparison

- 6 primer pairs used for amplification and sequencing
  - ala1
  - edc19
  - erg10
  - gln4
  - pgm2
  - pgi1
- Aligned using Clustal W
- Neighbor-joining analysis used to produce phylogenetic tree
- Based on Alper et al, 2013



- 4 distinct groups of *G. candidum*
- Group D is more closely related (96% similar) to *Galactomyces reessii,* a free-living yeast
- Potential subspecies for Group C and D

In-vitro Fungicide Analysis

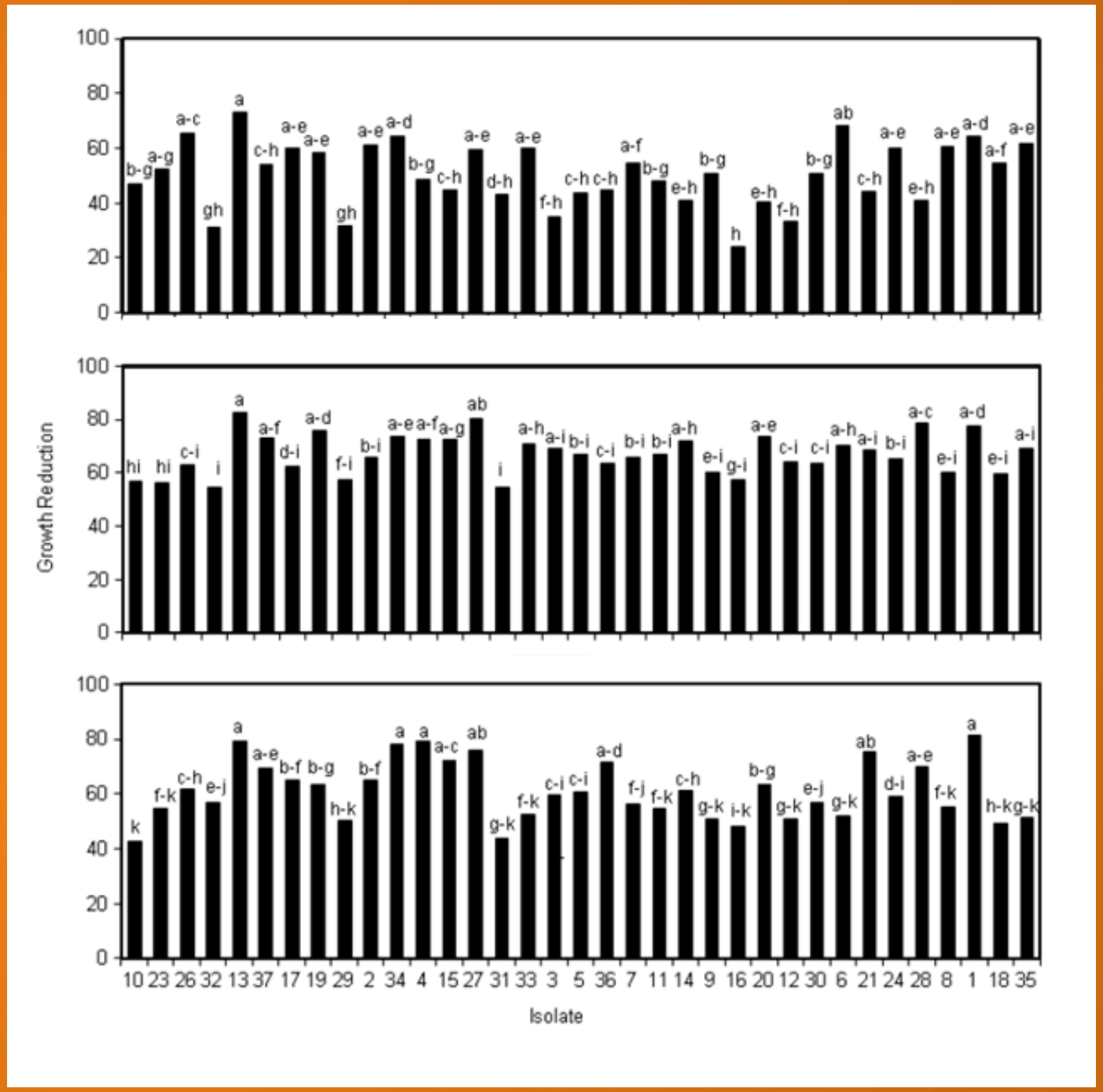
- Conducted on fungicide-amended PDA
- Isolates were tested in triplicate
- High and low concentrations equal the labeled rate for tomato or fruiting vegetable production
- Middle concentration is the mean of the range
- Each isolate was incubated at room temperature for 3 days
- The average colony diameter of each treatment was compared to the average growth diameter of the isolates on control, untreated PDA to obtain average growth reduction by fungicide.

Fungicide Sensitivity

Active Ingredient	Product Name	Manufacturer
dicloran	Botran 5F	Gowan
azoxystrobin	Quadris 2.08SL	Syngenta
~~sodium hypochlorite~~	~~bleach~~	
propiconazole	Mentor 45WP	Syngenta
~~hydrogen dioxide, peroxyacetic acid~~	~~OxiDate 2.0~~	~~BioSafe Systems~~
difenoconazole	Inspire Super MP	Syngenta
prothioconazole	Proline SC	Bayer
myclobutanil	Rally 40 WSP	Dow AgroScience
fludioxonil	Scholar Max MP	Syngenta
tebuconazole	Folicur 3.6F	Bayer
~~hydrogen dioxide, peroxyacetic acid~~	~~Sanidate~~	~~BioSafe Systems~~

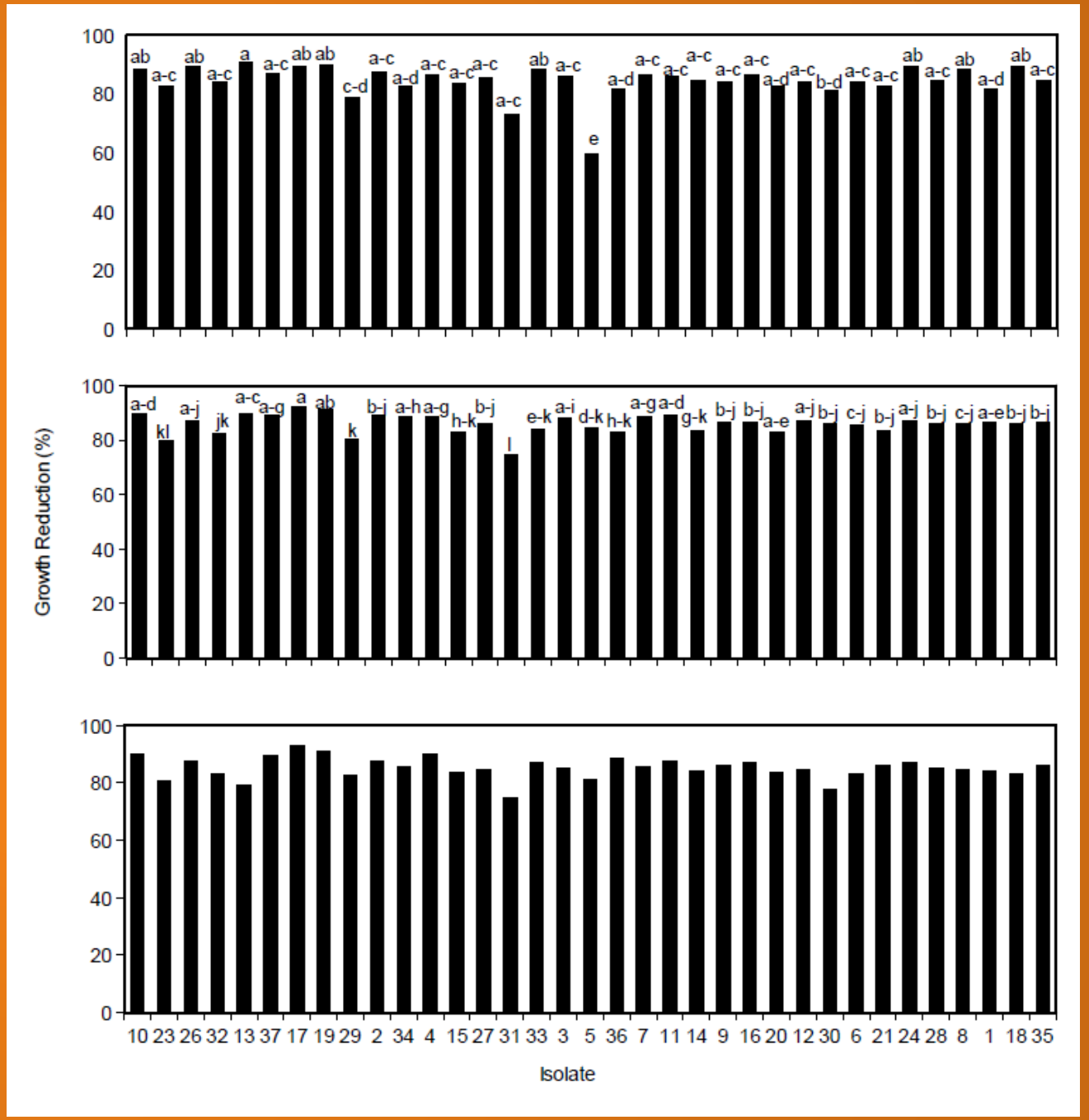
Prothioconazole

- Low (top), medium (middle), and high (bottom) concentrations of prothioconazole amended PDA
- Tukey HSD compared means
- Distinct letter show significant differences (α = 0.05)
- Moderate reduction of growth at all concentrations



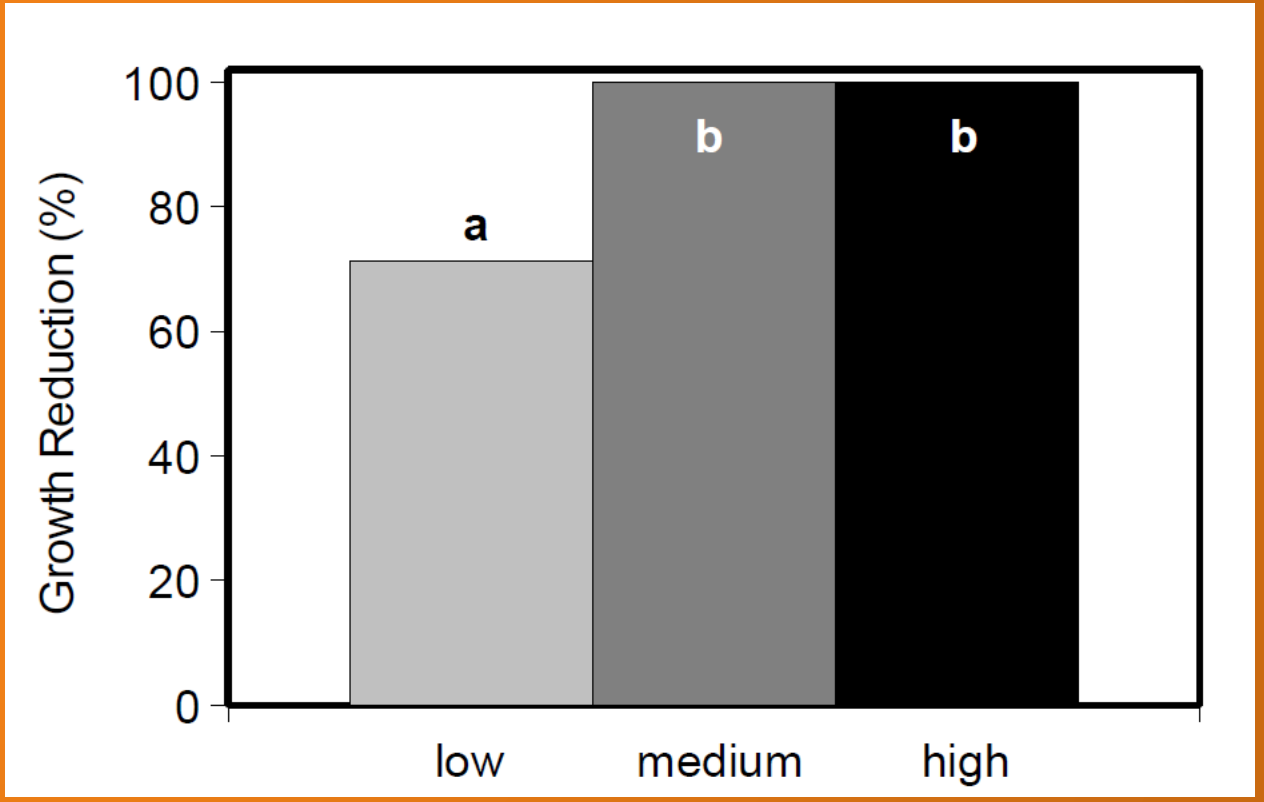
Difenoconazole

- Low (top), medium (middle), and high (bottom) concentrations of difenoconazole amended PDA
- Tukey HSD compared means
- Bars with distinct letter show significant differences (α = 0.05).
- All concentrations were effective at inhibiting growth



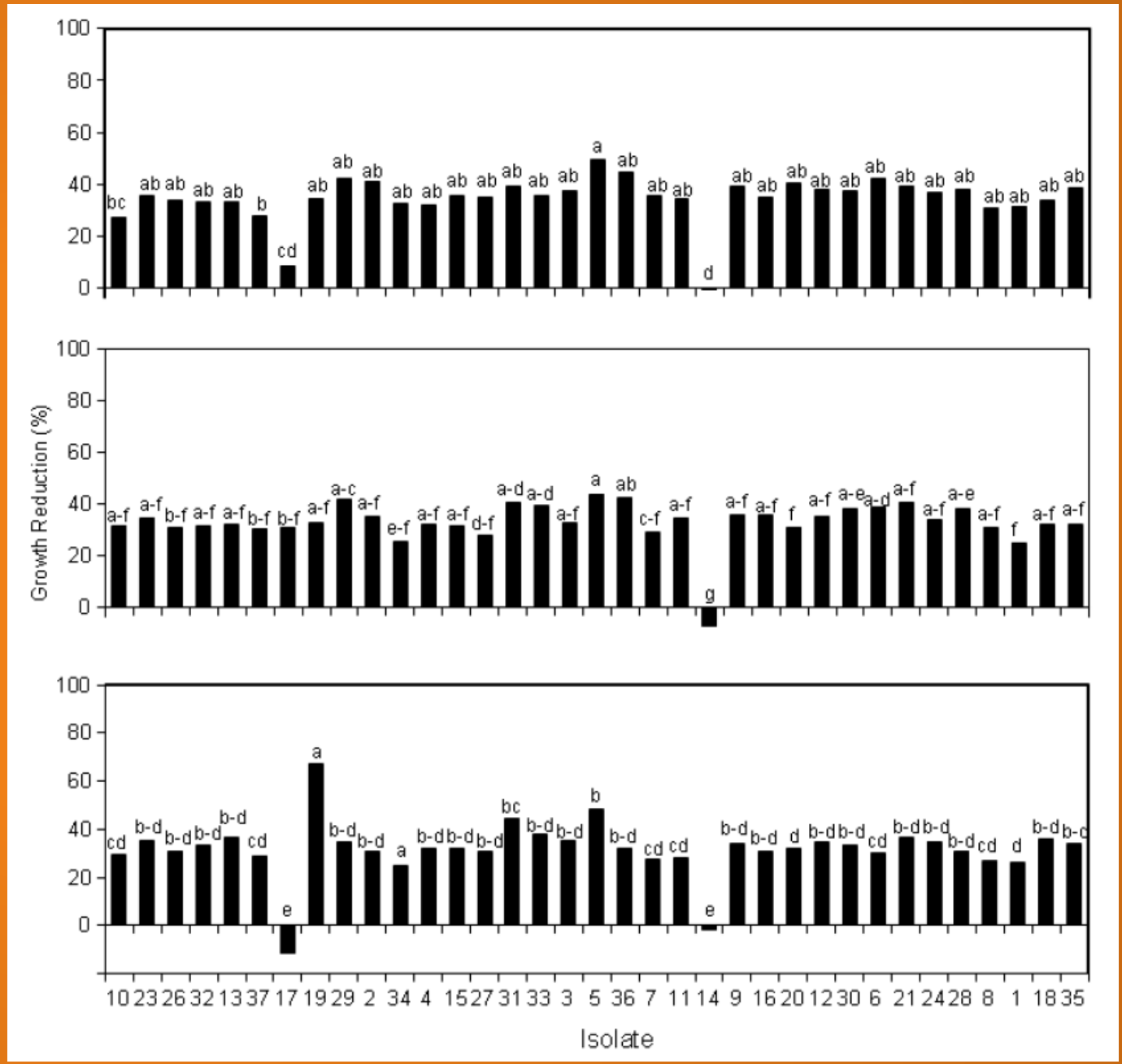
Myclobutanil

- Low, medium, and high concentrations of myclobutanil amended PDA
- Differences between isolates were not significant
- Bars with distinct letter show significant differences (α = 0.05)
- Medium and high rates significantly reduce/eliminate growth



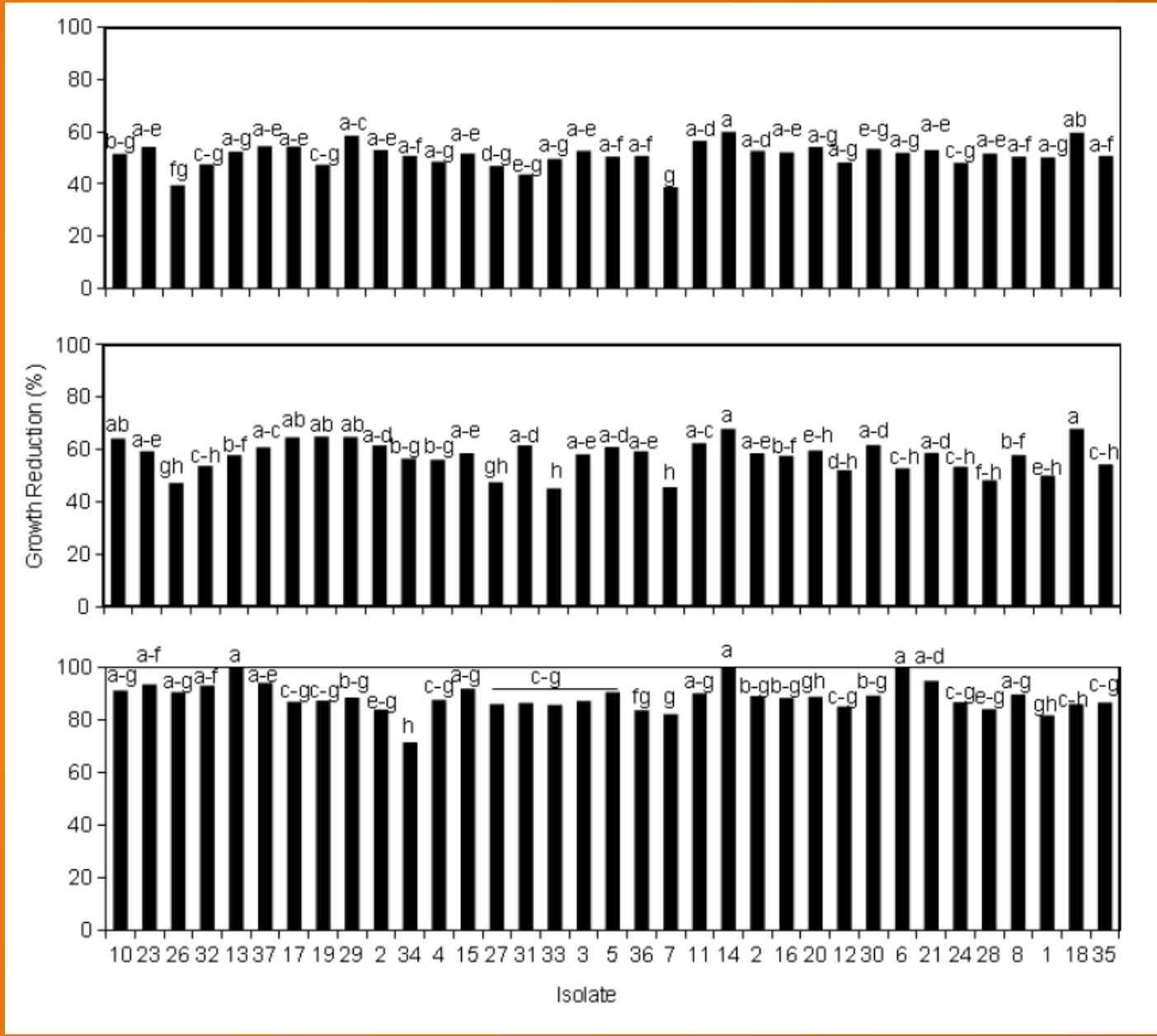
Azoxystrobin

- Low (top), medium (middle), and high (bottom) concentrations of azoxystrobin amended PDA.
- Tukey HSD compared means
- Distinct letter show significant differences (α = 0.05)
- Low level of inhibition
- Insensitivity?



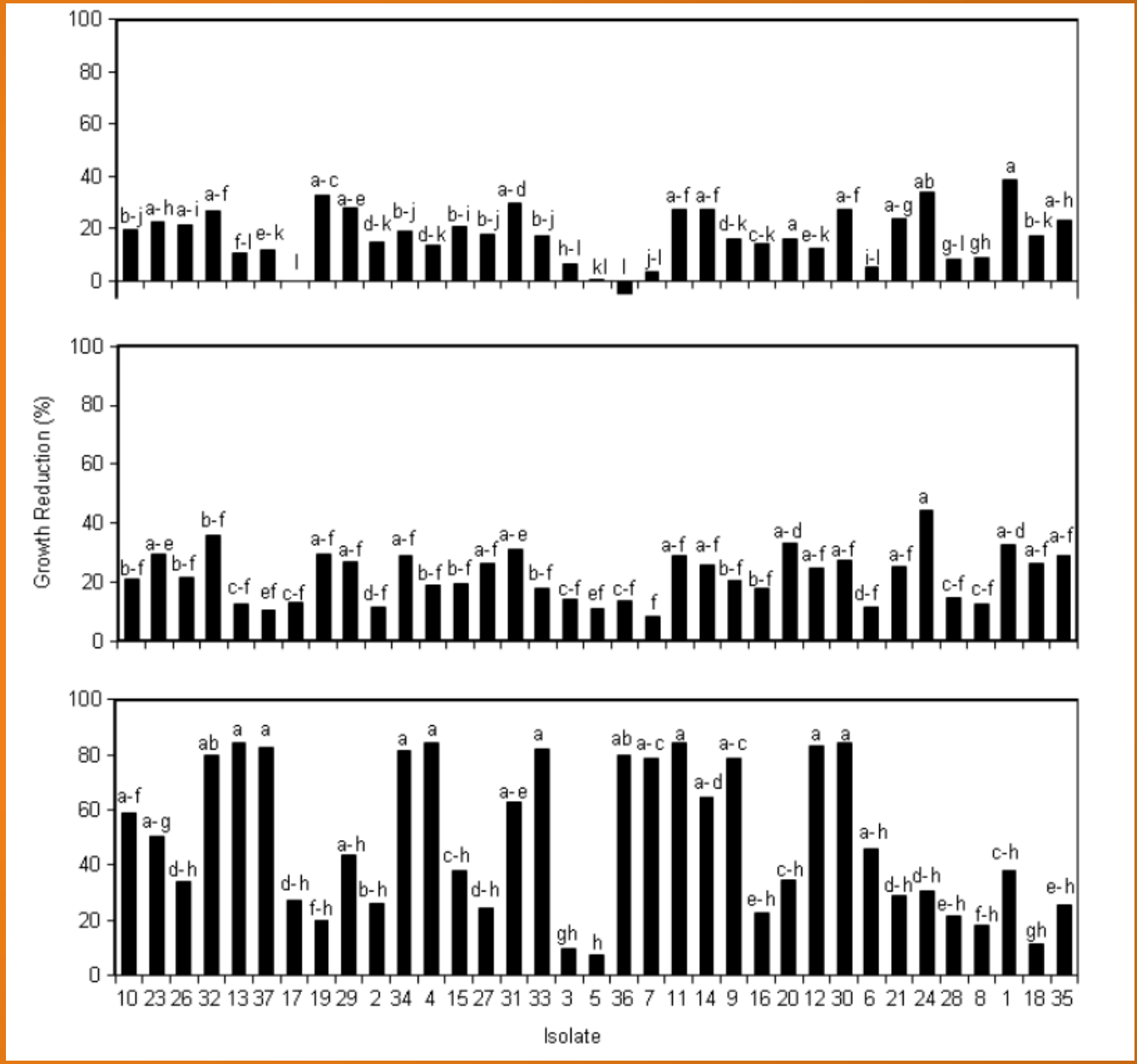
Dicloran

- Low (top), medium (middle), and high (bottom) concentrations of dicloran amended PDA
- Tukey HSD compared means
- Distinct letter show significant differences (α = 0.05).
- High level of control at the highest concentration



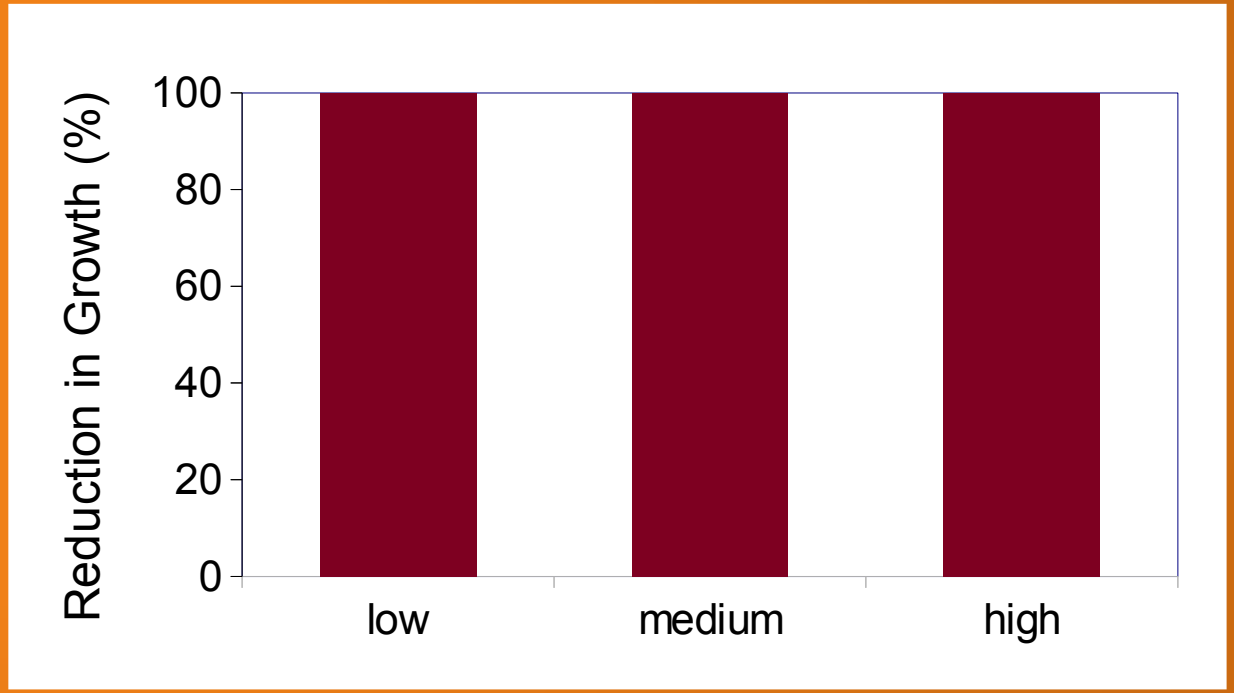
Fludioxonil

- Low (top), medium (middle), and high (bottom) concentrations of fludioxonil amended PDA
- Tukey HSD compared means
- Distinct letters show significant differences (α = 0.05)
- Little/no growth reduction at lower concentrations, variable at higher conc.



Propiconazole & Tebuconazole

- **Complete inhibition of growth.**
- **No statistical differences between concentrations or islolates.**



Conclusions

- Incredibly diverse community of *G. candidum* on ESVA
- All isolates were completely inhibited by propiconazole and tebuconazole
- High level of growth reduction:
  - Difenoconazole
  - Myclobutanil (medium, high)
- Moderate level of growth reduction:
  - Prothioconazole
  - Myclobutanil (low)
- Low/variable/no level of growth reduction:
  - Azoxystrobin
  - Dicloran
  - Fludioxonil
- Sanitizers → Cl and PAA relatively ineffective at 30s exposure times

Questions?

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