Systemic seed treatments & soil insecticides for pumpkin insect management

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Cucumber beetles

Important damage:

- Chew seedlings
- Transmit bacterial wilt
- Chew on fruit surface

Less critical damage:

- Chew on flowers
- Larvae chew on roots

Bacterial wilt of cucurbits

- **Vectored by cucumber beetles**
  - **Transmitted in feces**
  - **Enters via wound in plant**
- **Hosts:**
  - **Well-known killer of cukes & melons**
  - **Recently adapted to kill squash & pumpkins, but slower to kill**
- **Cotyledon stage most susceptible**

Soil-applied systemic insecticides for cucurbit crops

- Furadan since mid-1980's
- New group: the neonicotinoids
  - Admire in 2000
  - Platinum in 2001

Neonicotinoid insecticides

First a.i.: imidacloprid

- **Soil applied: Admire**
  - First: 1995 for potato
  - Cucurbits added in 2000
- **Foliar sprays: Provado**
  - First: 1995 for potato
  - Not for cucurbits
- **Commercial seed treatment**
  - Gaucho, 2001 (corn, snap bean)
  - Not for cucurbits
- **Hopper-box seed treatment**
  - Latitude & Concur, 2003 (corn)
  - Not for cucurbits

Neonicotinoid products on veg/fruit

A.I.	*Soil*	*Foliar*	*Seed*
imidacloprid	Admire	Provado	Gaucho Latitude Concur
thiamethoxam	Platinum	Actara	Cruiser
acetamiprid	-	Assail	-
thiacloprid	-	Calypso	-
clothianidin	-	Clutch	Poncho
dinotefuran	Venom	Venom	-

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Admire applied in-furrow provides excellent control of striped cucumber beetle on pumpkin seedlings

Admire 2F on cucurbits

- **Label rate = 16 - 24 fl. oz. per acre**
  ($74 - 110/A)

- ***row spacing*** ***Rate (fl. oz.) /1000 ft.***

8 ft	2.9 - 4.4
6 ft	2.2 - 3.3
4 ft	1.5 - 2.2
3 ft	1.1 - 1.7

Pumpkin Trial, 2002

Early seeded (23 May): Significant difference in beetle damage & beetle density at 1-3 leaf stages

Late seeded (11 June): No significant differences

Date, stage	*Trtmt*	*Damage (scale 1-4)*	*Number beetles/ plant*	
			Live	*Dead*
6/5 1-leaf	check	3.7 A	3.0 A	0.02 A
	Admire at-plant	2.1 B	0.3 B	15.7 A
6/13 3-leaf	check	4.0 A	0.55 A	0.05 B
	Admire at-plant	2.2 B	0.23 A	15.8 A

Use of at-plant soil systemic insecticide on pumpkin

- **Recommended:**
  - If plant early
  - If yours is only cucurbit field in area
- **Not recommended:**
  - If plant late
  - If field later than other cucurbits

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Cruiser rates tested (a.i. = thiamethoxam)

mg a.i. per seed	*2005*	*2006*
0.05	√	
0.25	√	
0.40	√	√
0.75		√

Trials 2005 & 2006

- Field
  - Pumpkin
  - Pickle
  - Zucchini (2005 only)
- Lab
  - Germination
  - Beetle bioassays

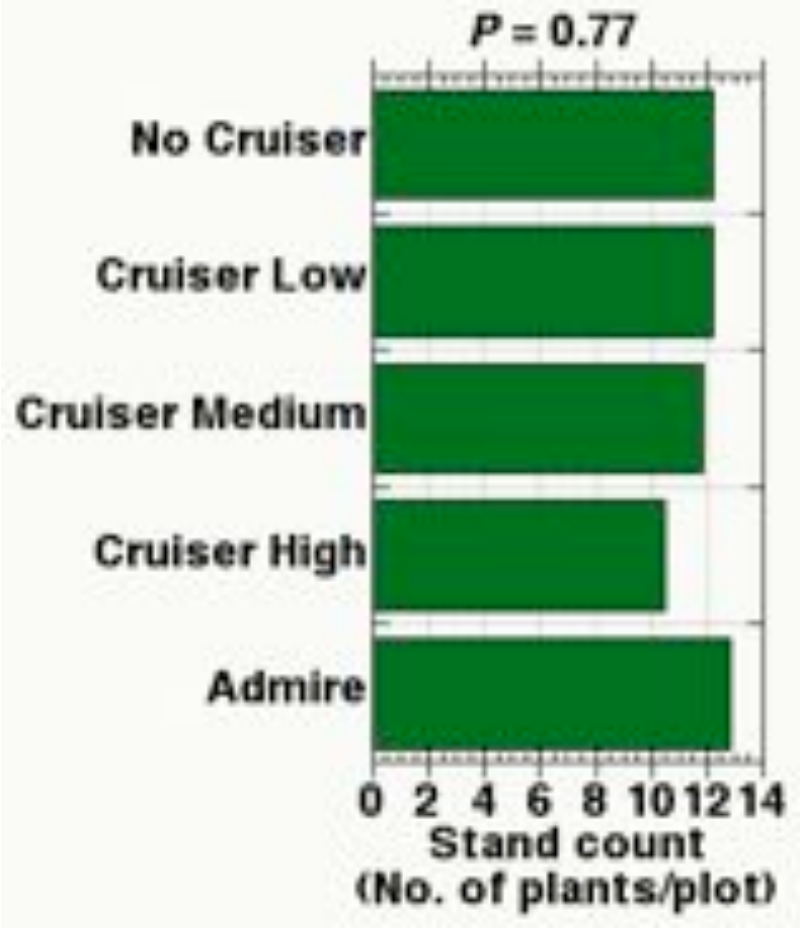
Seeds 2005

‘Vlaspik’ & ‘Eureka’ pickling cucumber

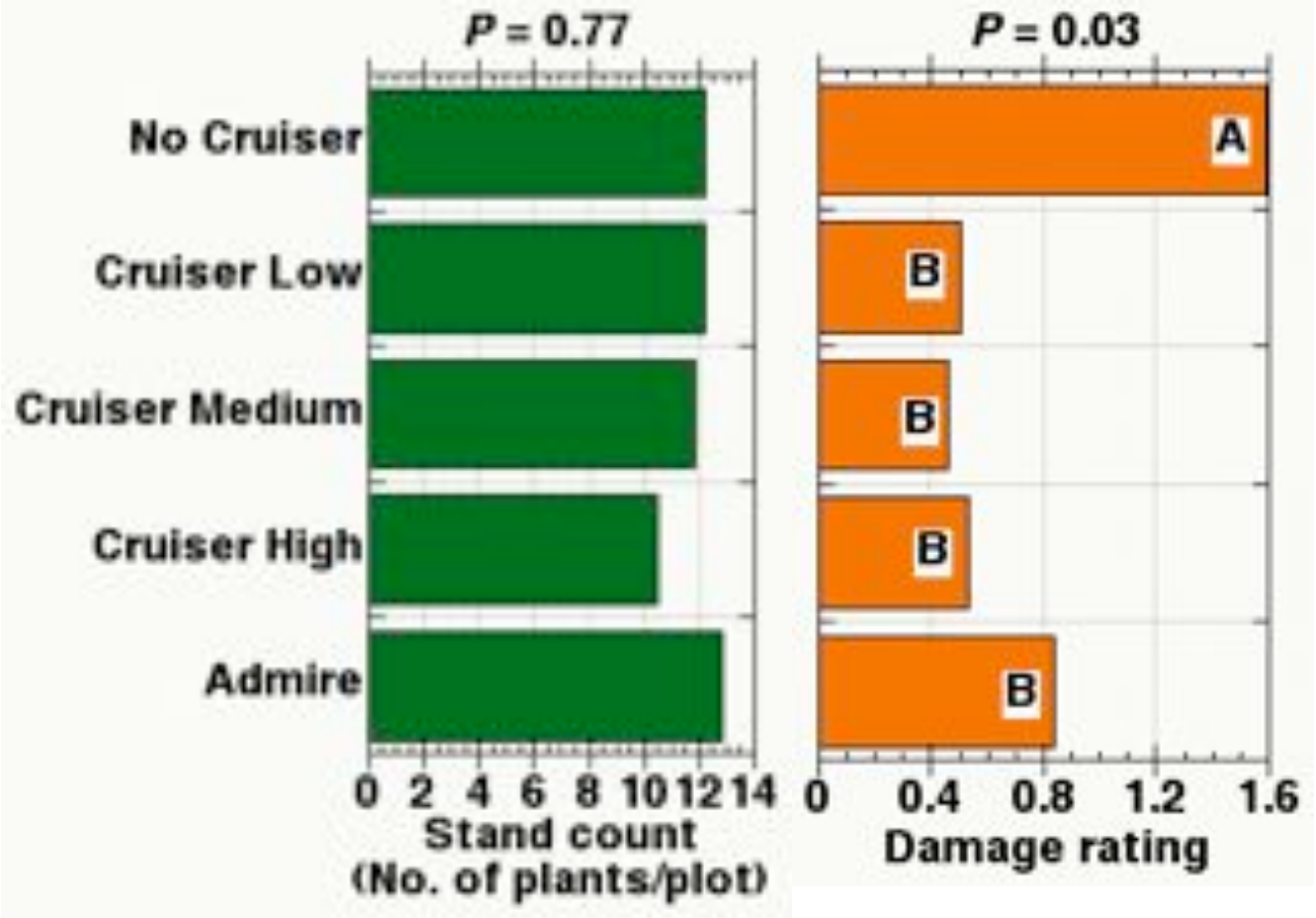
‘Hybrid Pam’ pumpkin

‘Spineless Beauty’ zucchini

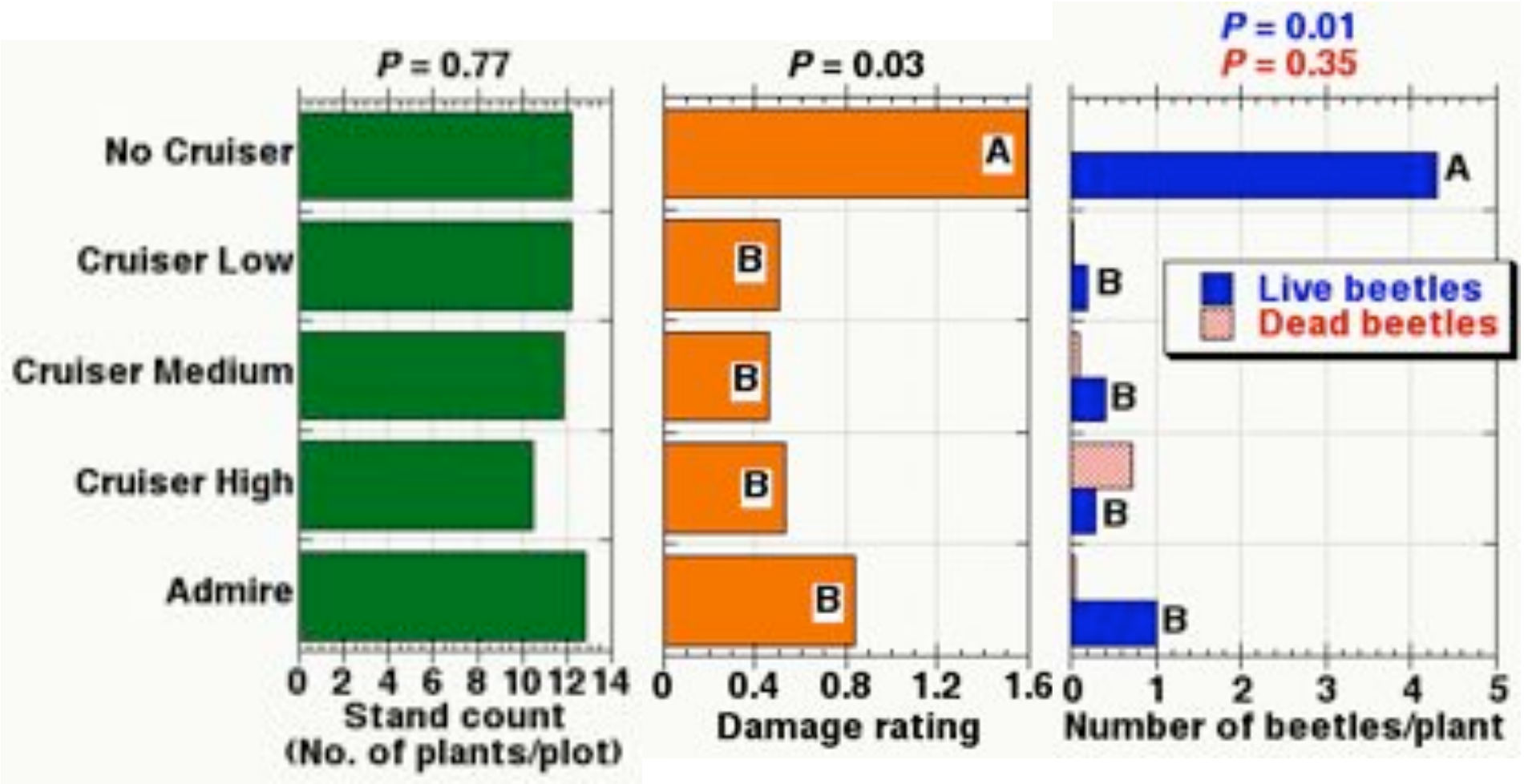
Pumpkin, two-leaf stage, Columbus, 6/8/05



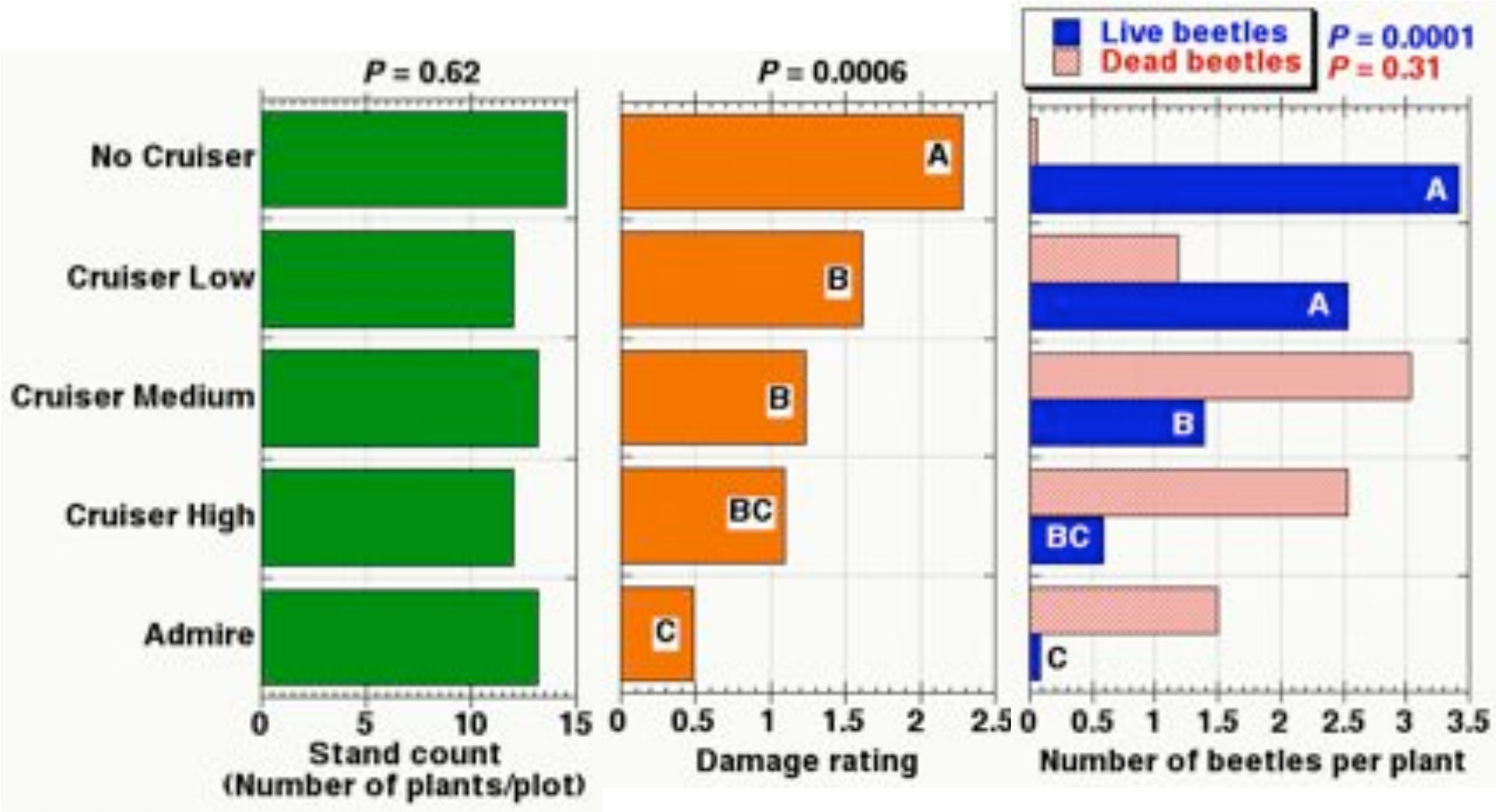
Pumpkin, two-leaf stage, Columbus, 6/8/05



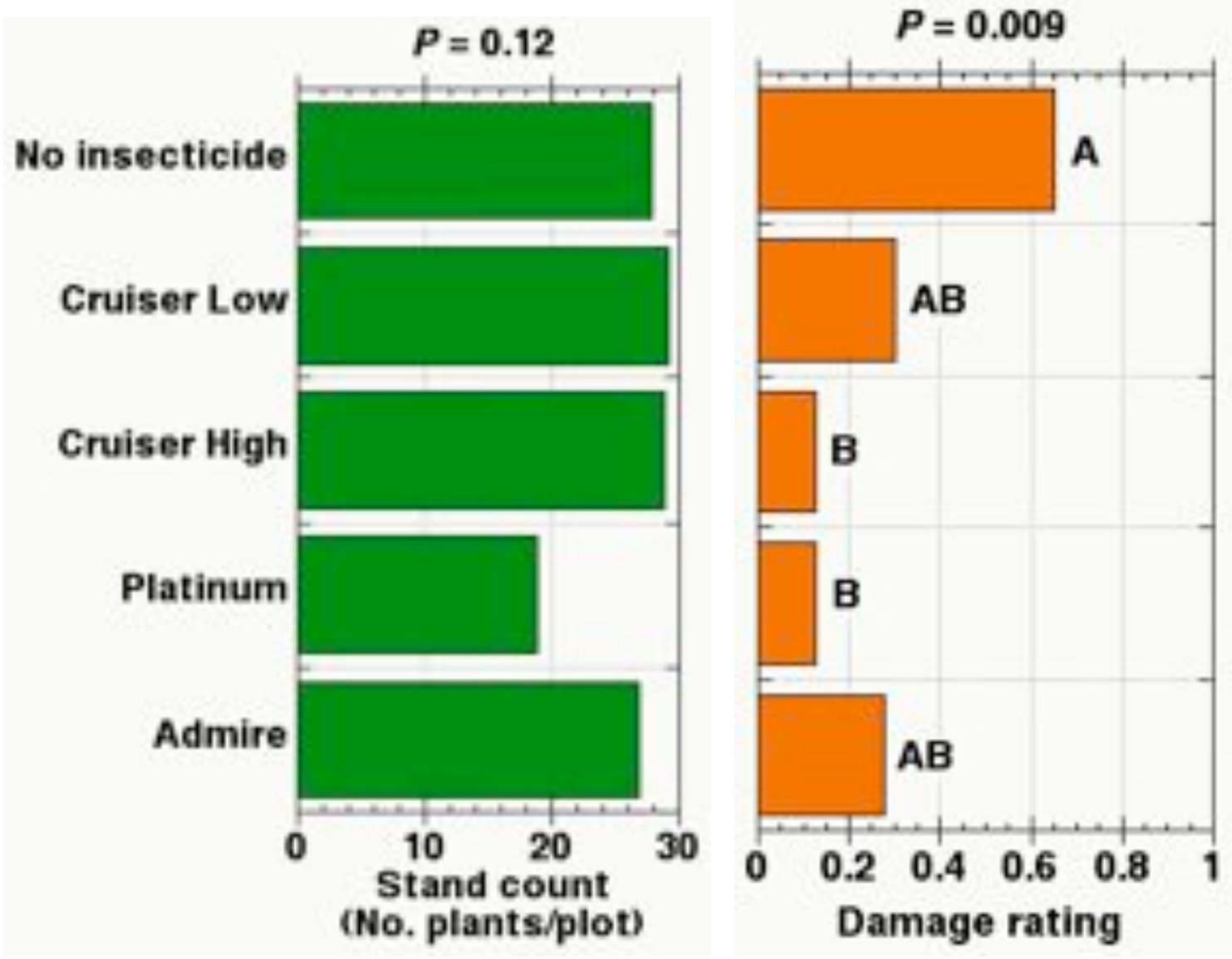
Pumpkin, two-leaf stage, Columbus, 6/8/05



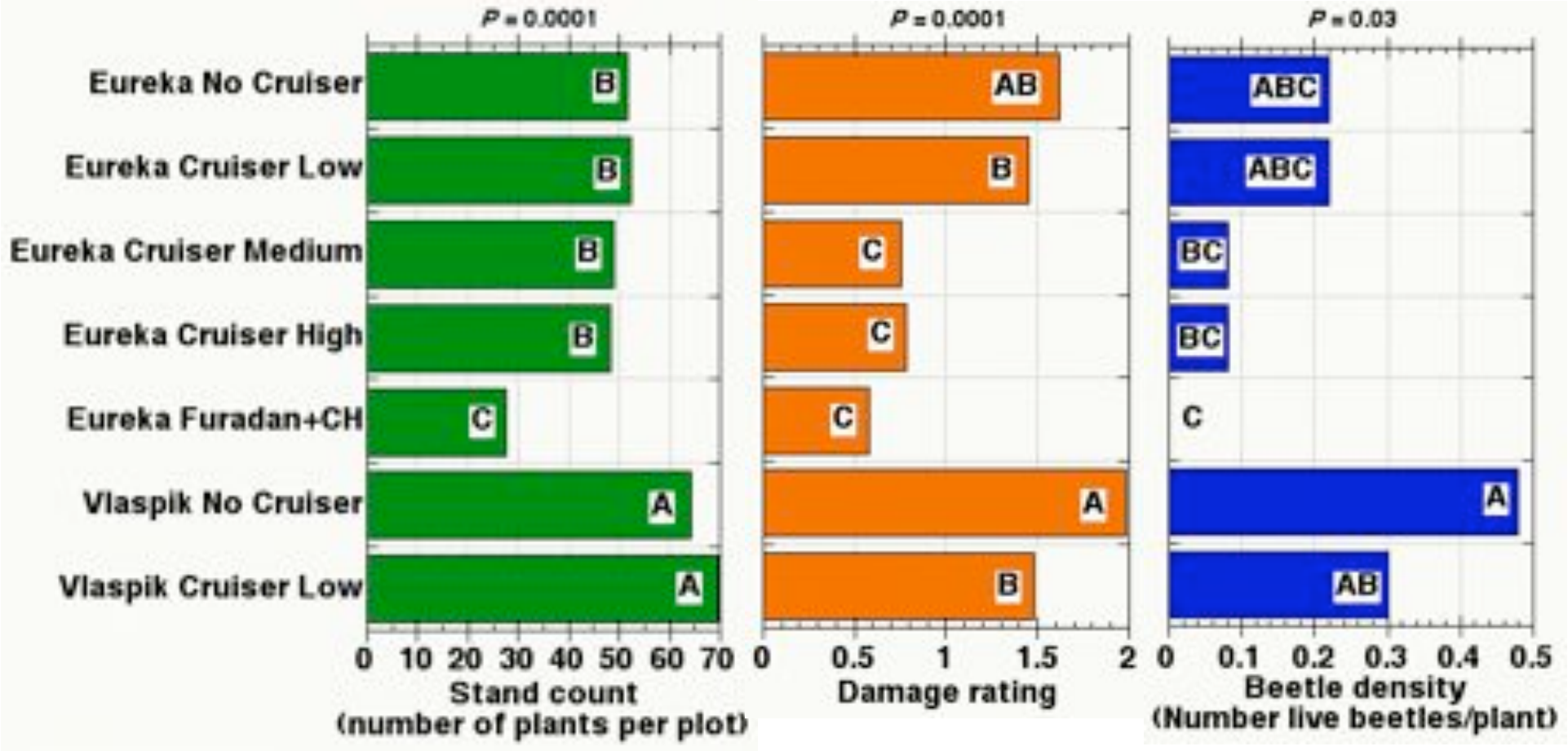
Zucchini, two-leaf stage, Columbus, 6/8/05



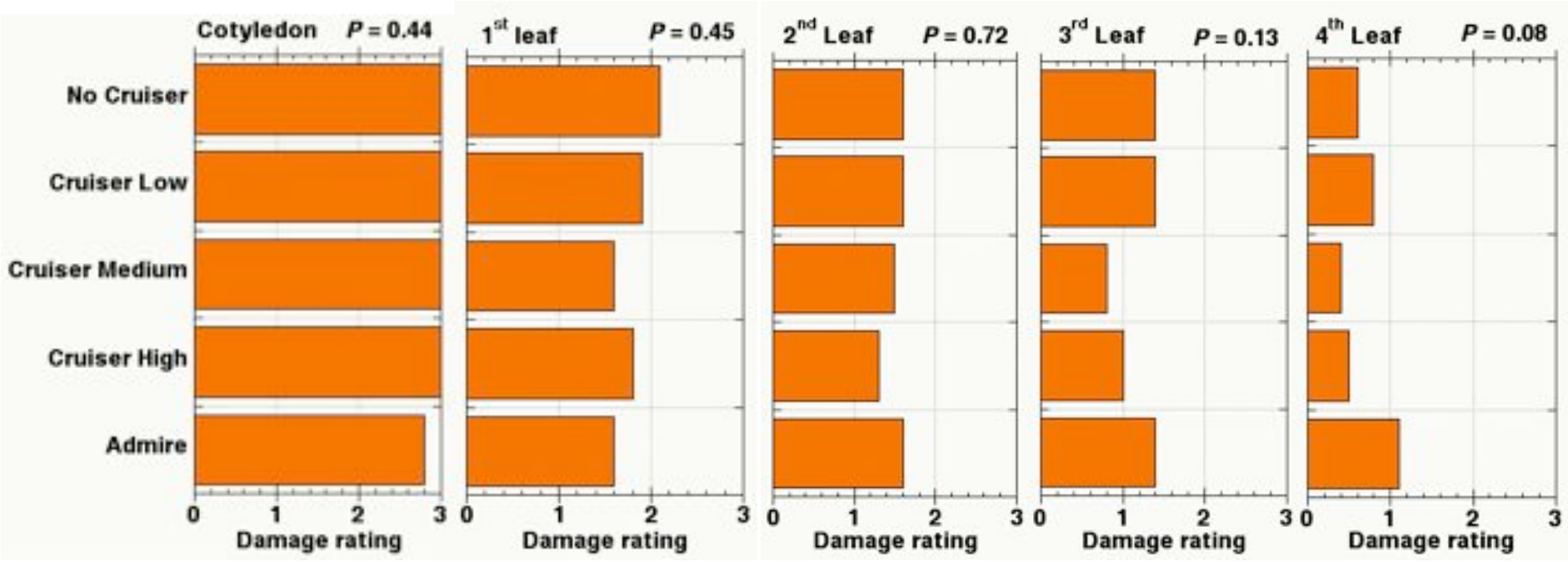
Pumpkin, 1- to 2-leaf stage, Clark County, 6/20/05



Pickles, one-leaf stage, Fremont, 6/14/05



Pumpkin, four-leaf stage, Columbus, 6/14/05 (22 days after seeding)



Lab Bioassay

- Greenhouse plug plants
- Small cage (2 qt deli dishes)
- 1 rep = 1 plant & 3 - 5 beetles
- 5 - 8 replicates per treatment
- Damage & mortality evaluated after 48 hours

Bioassay

- **Damage rating: scale 0 to 3**

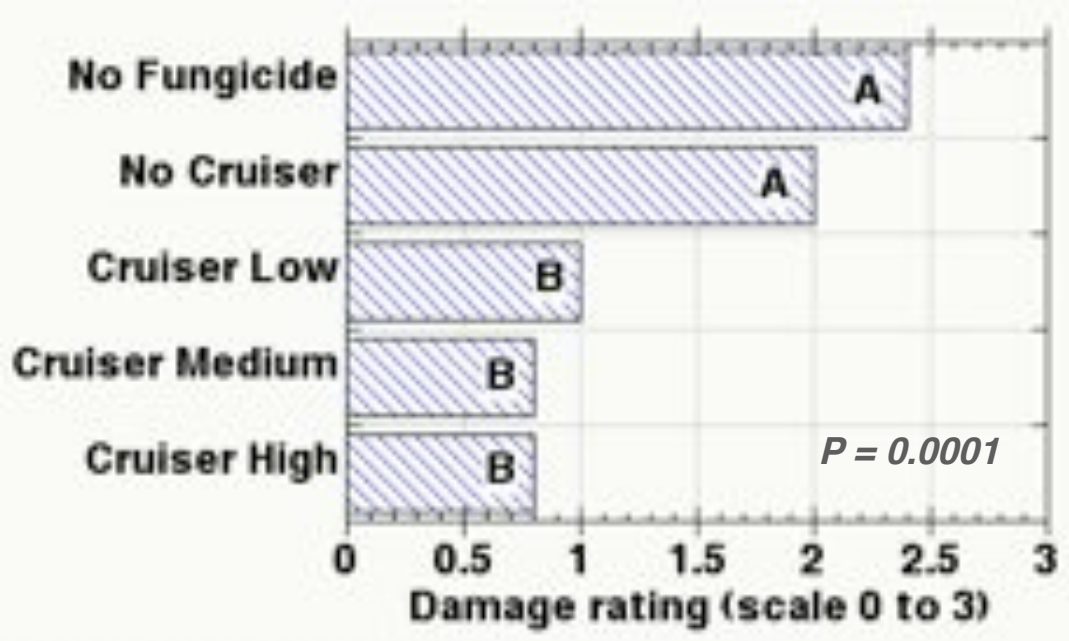
1 = light

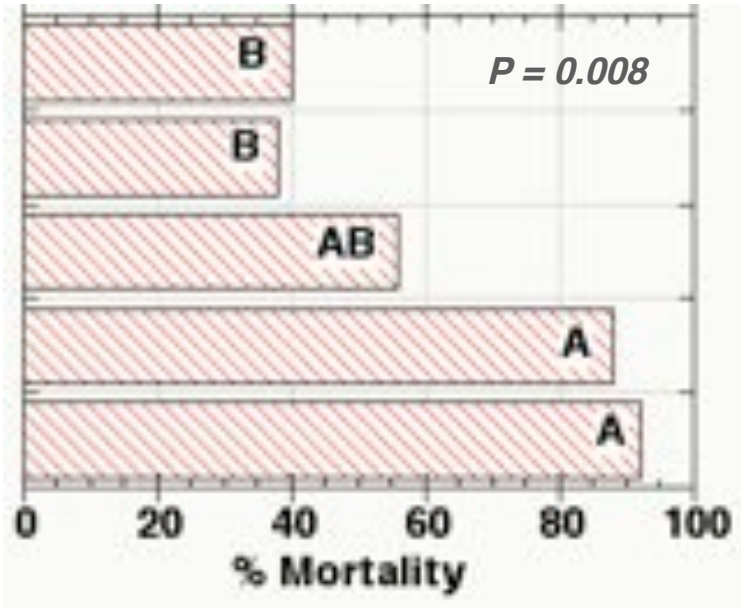
2 = moderate

3 = heavy

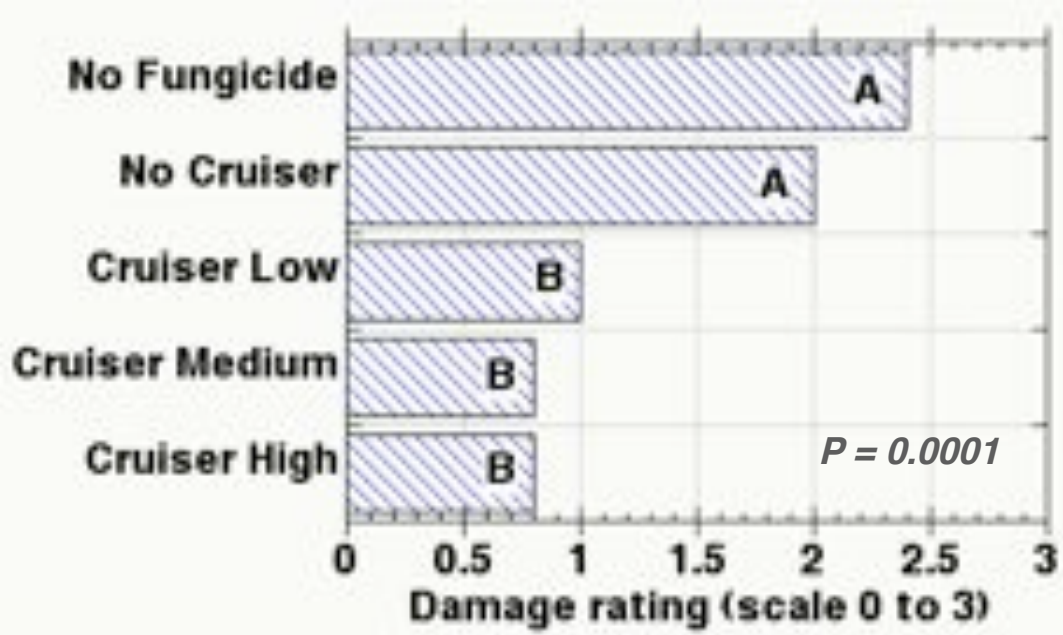
Bioassays on pickles: striped cucumber beetle

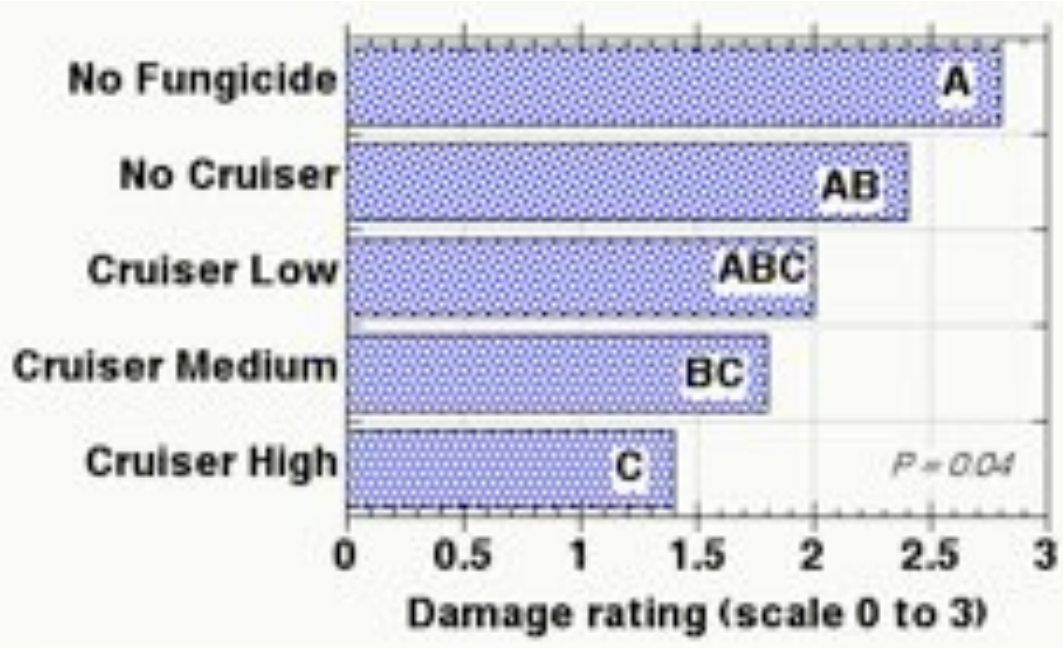
Bioassays on pickles: striped cucumber beetle

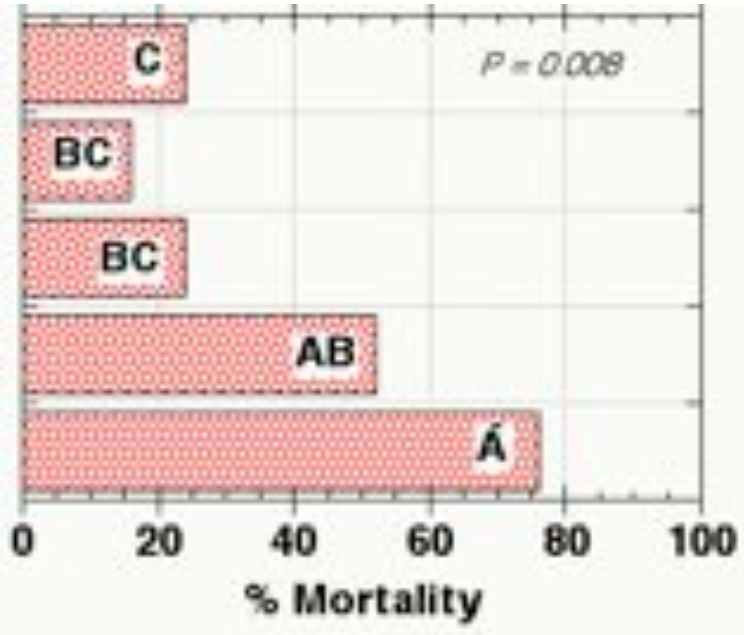




Bioassays: striped vs spotted cucumber beetle







Conclusions, 2005

- Cruiser seed treatment looks promising; as good as Admire for cotyledon to 2-leaf stage pumpkin
- Concern that control not lasting past 2-leaf stage at rates tested
- Rate higher than 0.4 mg AI/ seed should be tested

Seeds 2006

‘Gold Bullion’ pumpkin

‘Vlaspik’ pickling cucumber

Seed insecticides tested in 2006

A.I.	*Mfr.*	*mg a.i. per seed*
thiamethoxam (Cruiser)	Syngenta	0.40, 0.75
L-1497-A	Bayer	0.565, 0.75, 1.13
fipronil (Regent)	BASF	0.75

Note, tests coordinated & supported by IR-4

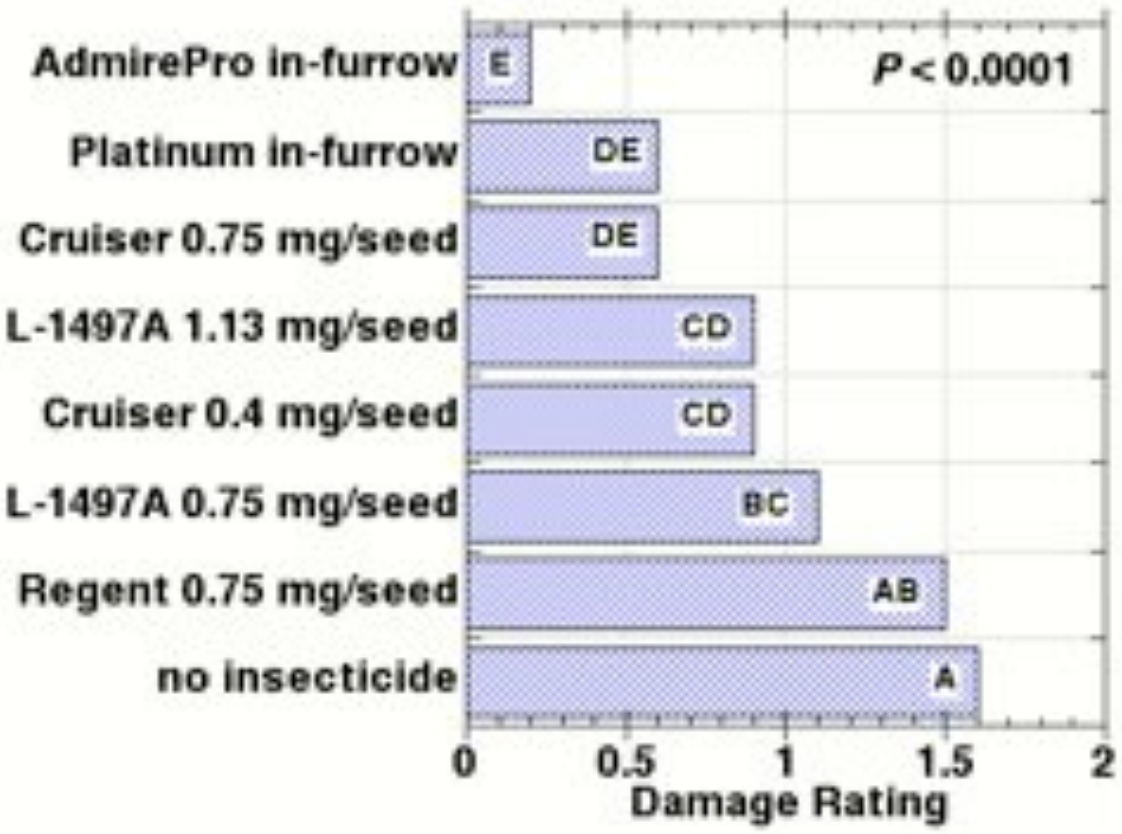
Pumpkin trial at Columbus

- Direct seeded 5/23/2006
- Treatments:
  - 2 in-furrow insecticide treatments: Admire & Platinum
  - 5 seed insecticide treatments
  - No-insecticide control
- All treatments with Thiram on seed
- Spacing 1’ in-row, 7.5’ between rows
- Thinned to 3’ in-row at vine-tip

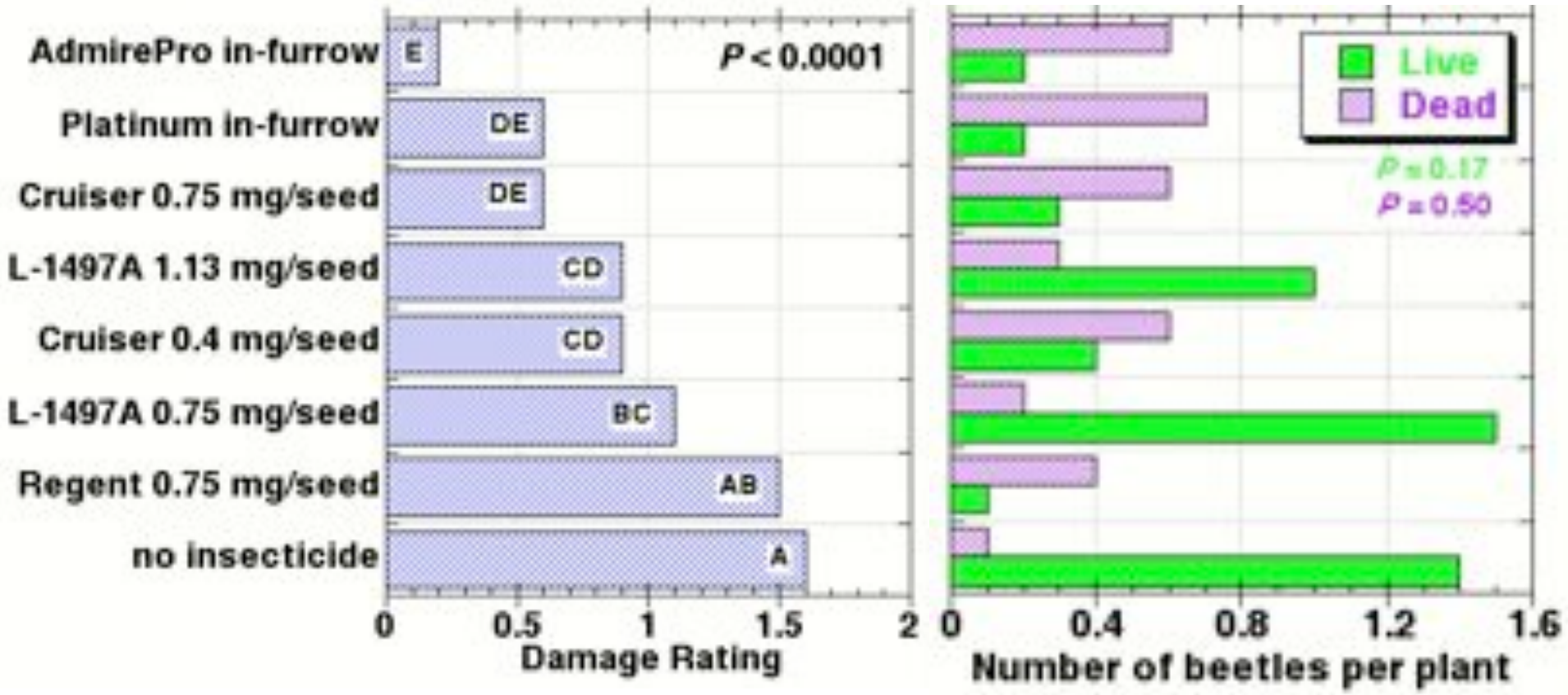
Pumpkin trial at Columbus

- Split emergence, before & after hot dry spell in late May
  - Early emerging plants: low beetle pressure
  - Late emerging plants: moderate beetle pressure
- Damage evaluated at cotyledon & 2-leaf stage
- Yield measured in September

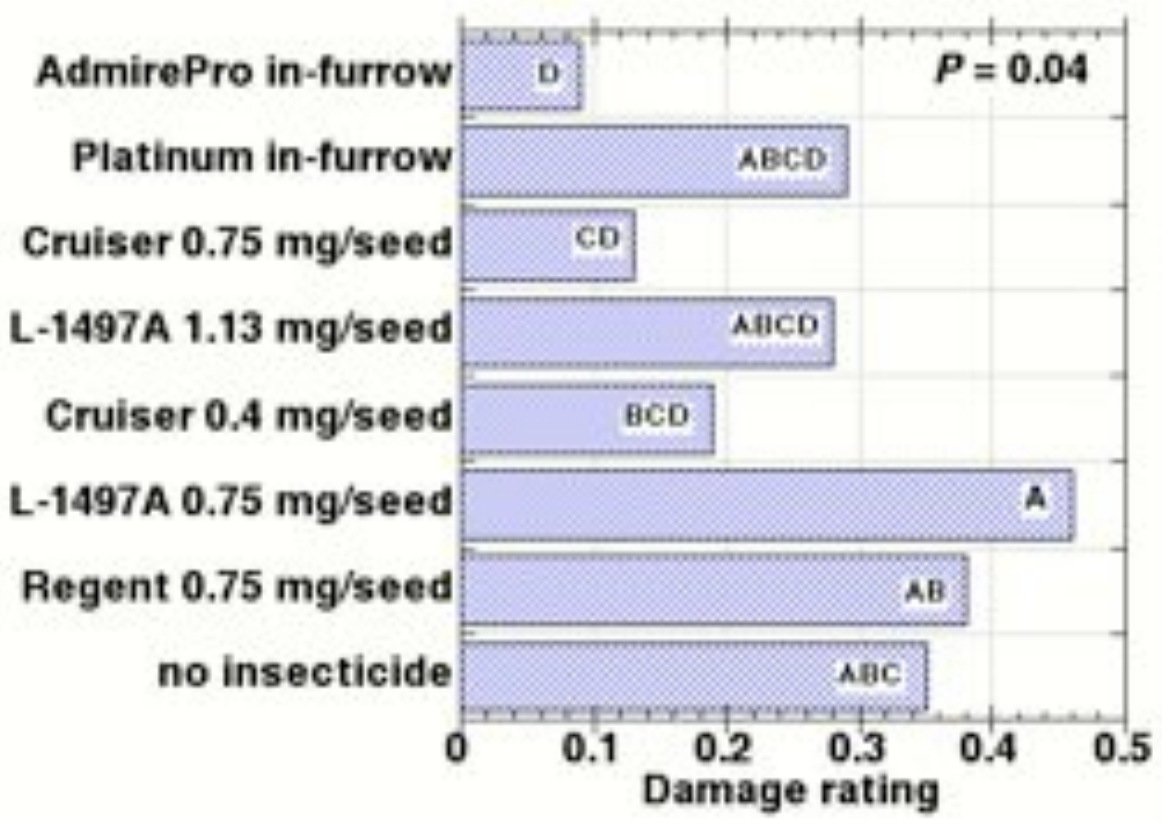
Field Trial 2006: Pumpkin 'Gold Bullion', late-emerging plants, 2-leaf stage, 6/19/06



Field Trial 2006: Pumpkin 'Gold Bullion', late-emerging plants, 2-leaf stage, 6/19/06



Field Trial 2006: Pumpkin 'Gold Bullion', early-emerging plants, 2-leaf stage, 6/12/06



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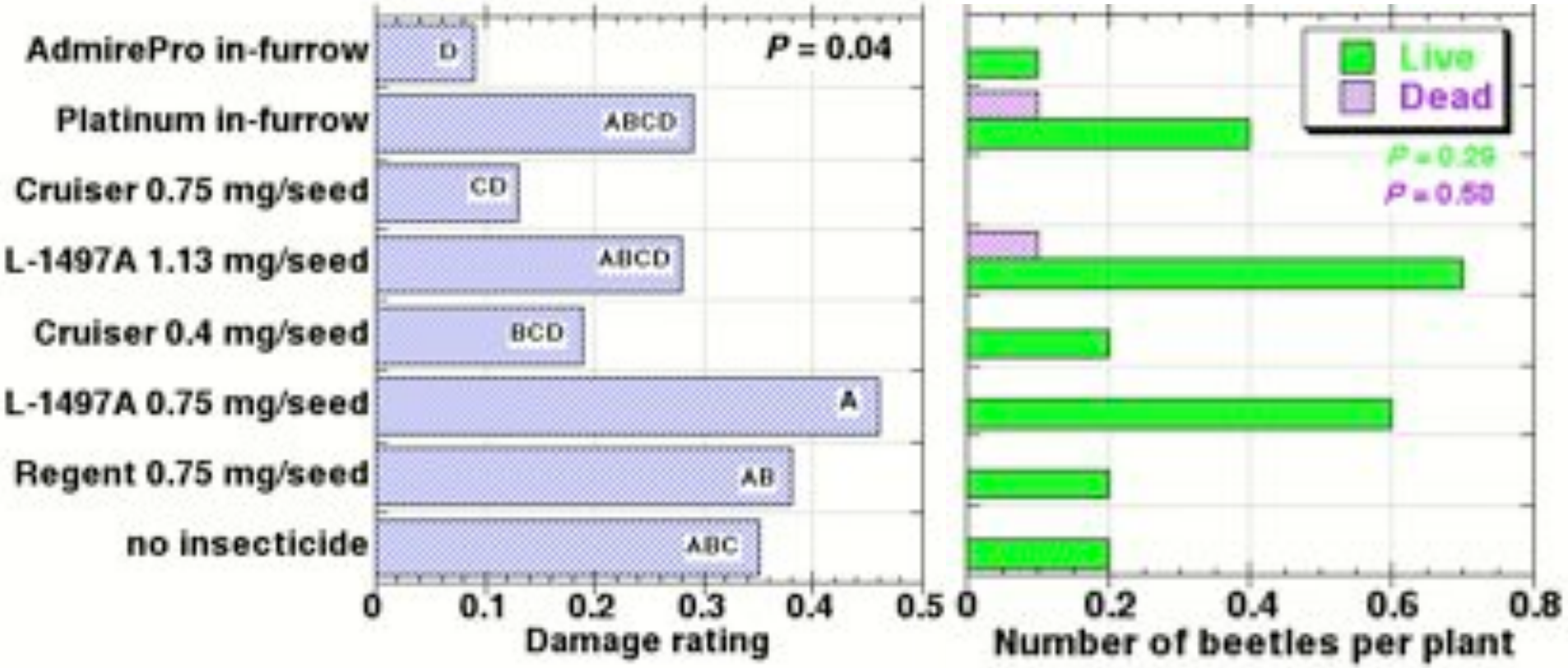


Conclusions, Pumpkins

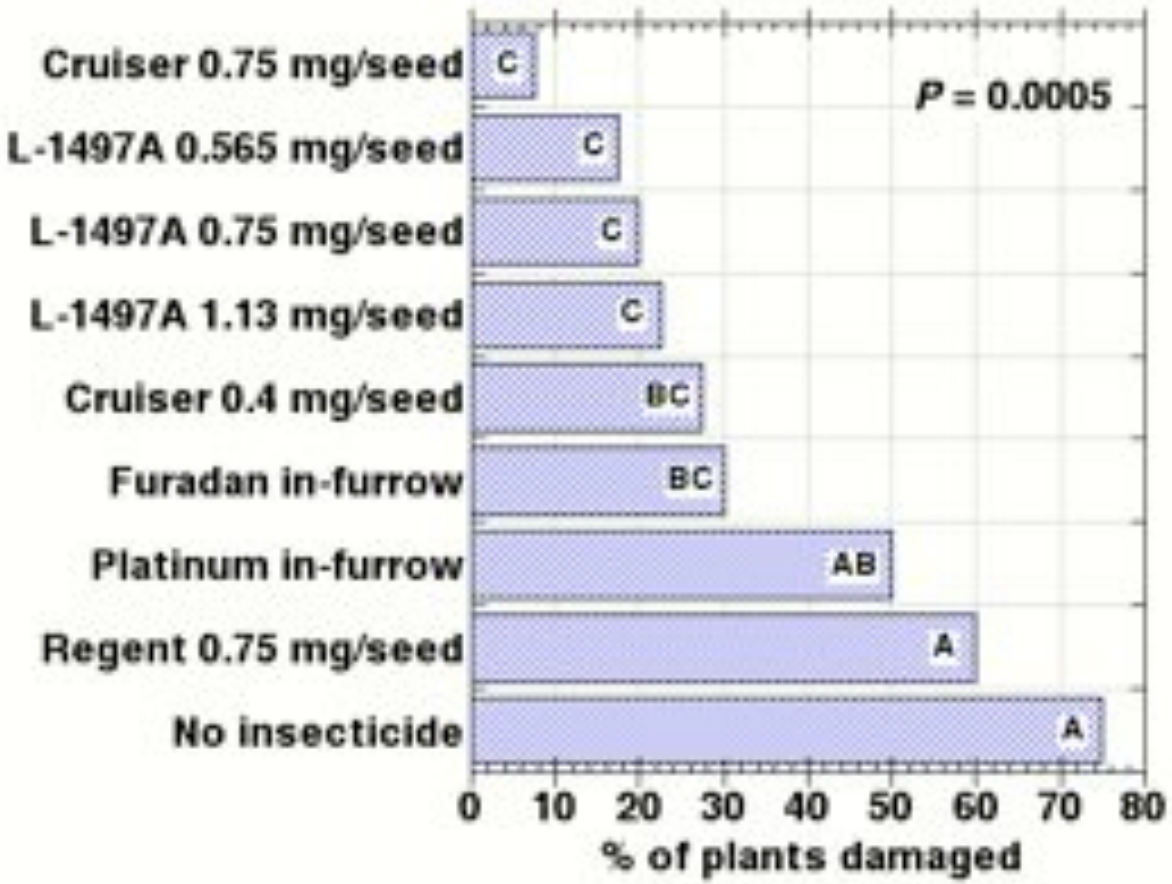
- Damage least in Admire (in-furrow) plots
- Cruiser at high rate similar to Admire
- L-1497-A better at high than low rate
- Regent not effective

Pickle trial

Pickle trial at Fremont

- **Direct seeded 6/6/2006 (2nd try)**
  - **2 in-furrow insecticide treatments: Platinum & Furadan**
  - **6 seed insecticide treatments**
  - **Untreated control**
- **Spacing 4” in-row, 30” between rows**
- **Beetles & damage evaluated 6/15 & 6/24**
- **Bacterial wilt evaluated 7/18 after blocking**

Field Trial 2006:
Pickling Cucumber ‘Vlaspik’



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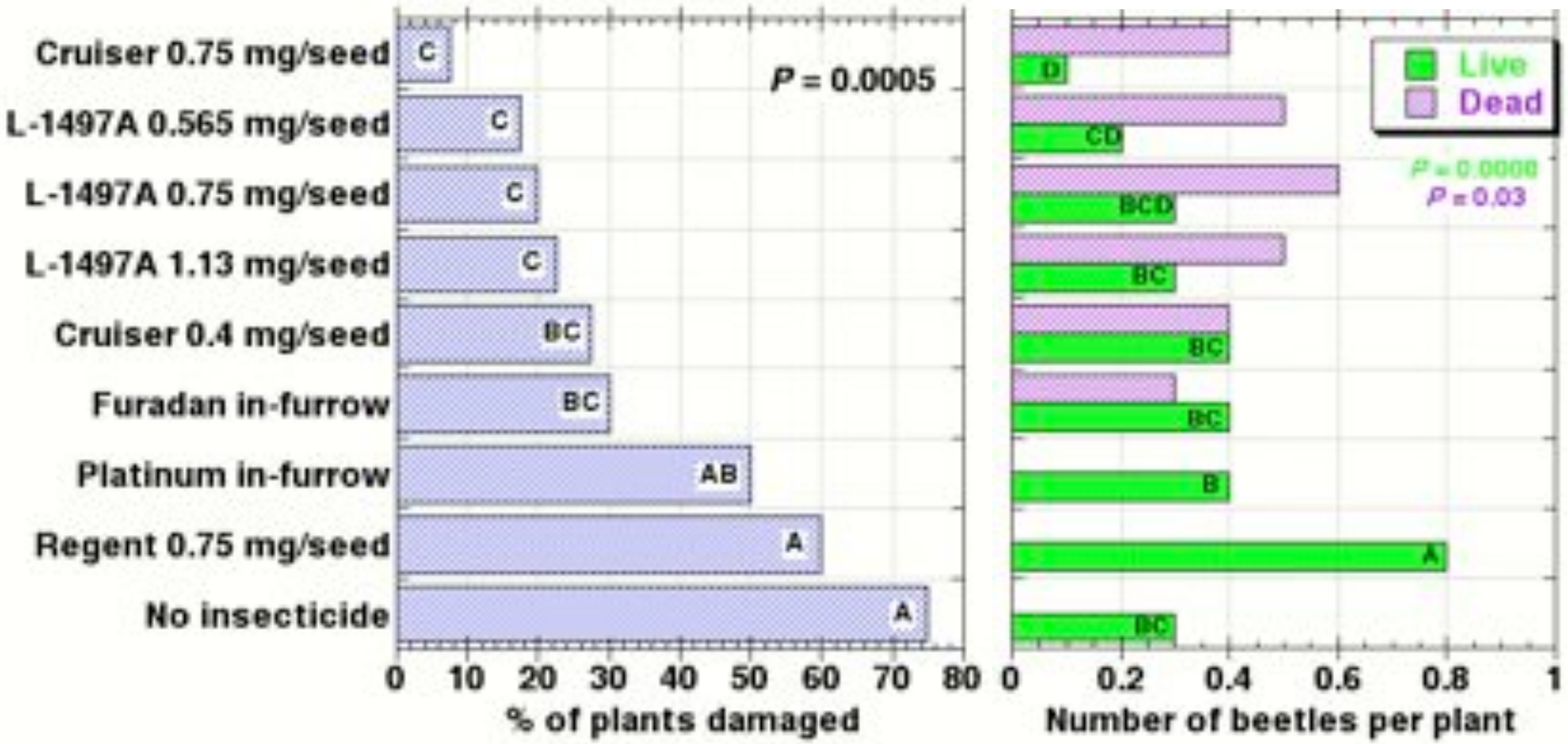

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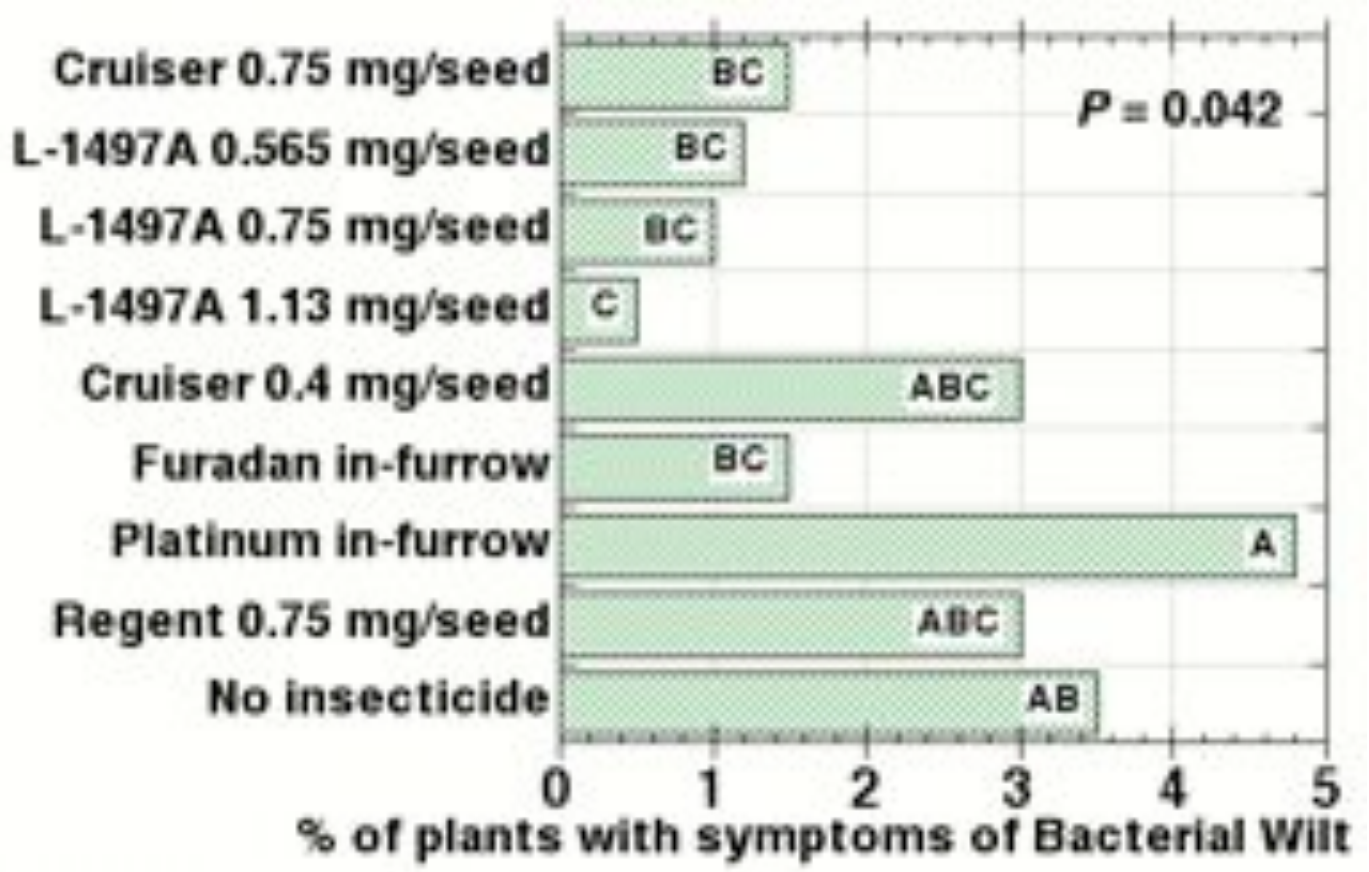
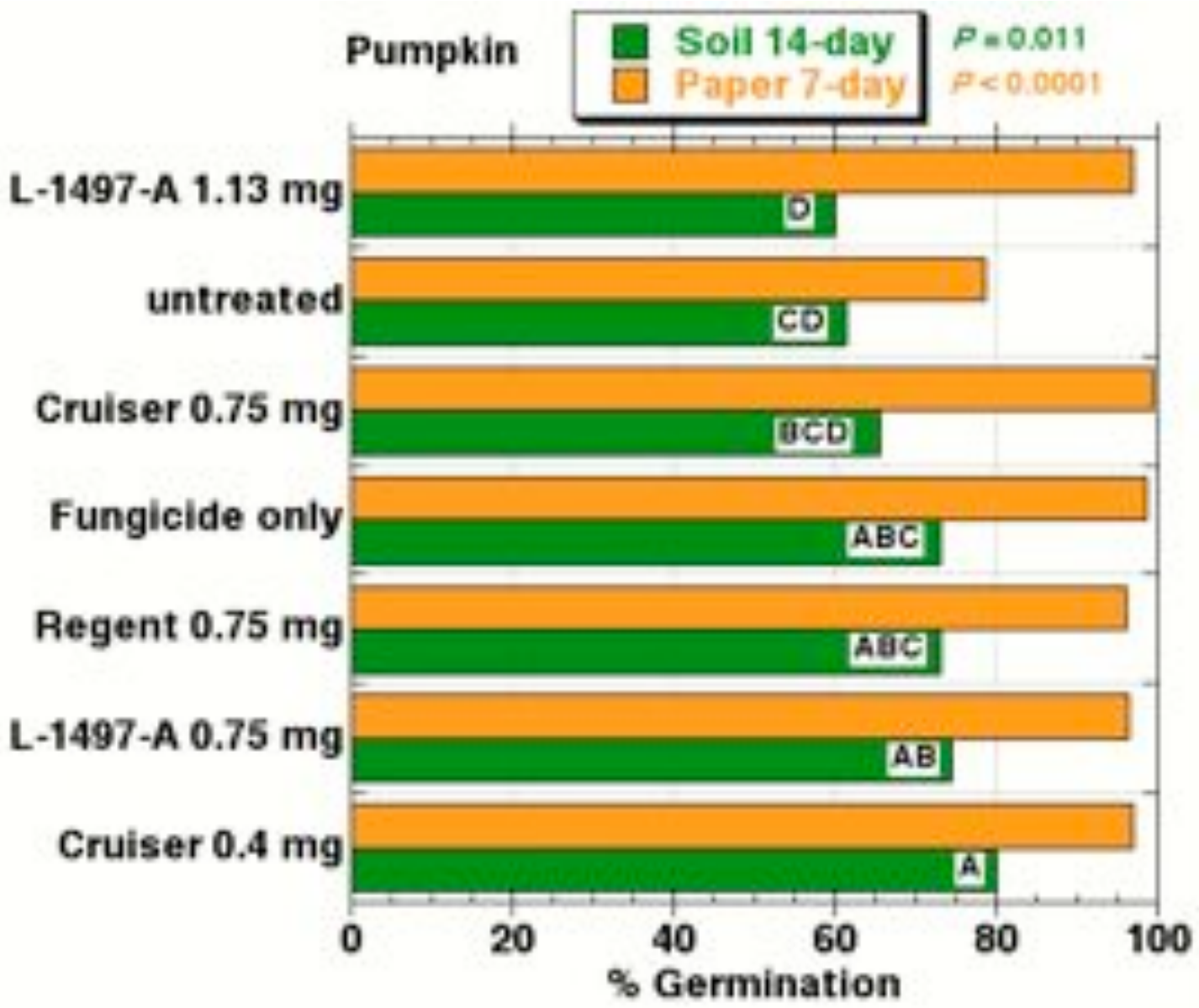


Conclusions, Pickles

- **Damage from beetle feeding:**
  - **Least in Cruiser high & L-1497-A plots**
  - **Not much rate effect for L-1497-A**
  - **Similar to untreated check in Platinum & Regent plots**
- **Bacterial wilt**
  - **Least in L-1497-A high plots**
  - **Most in Platinum plots**

Germination Tests



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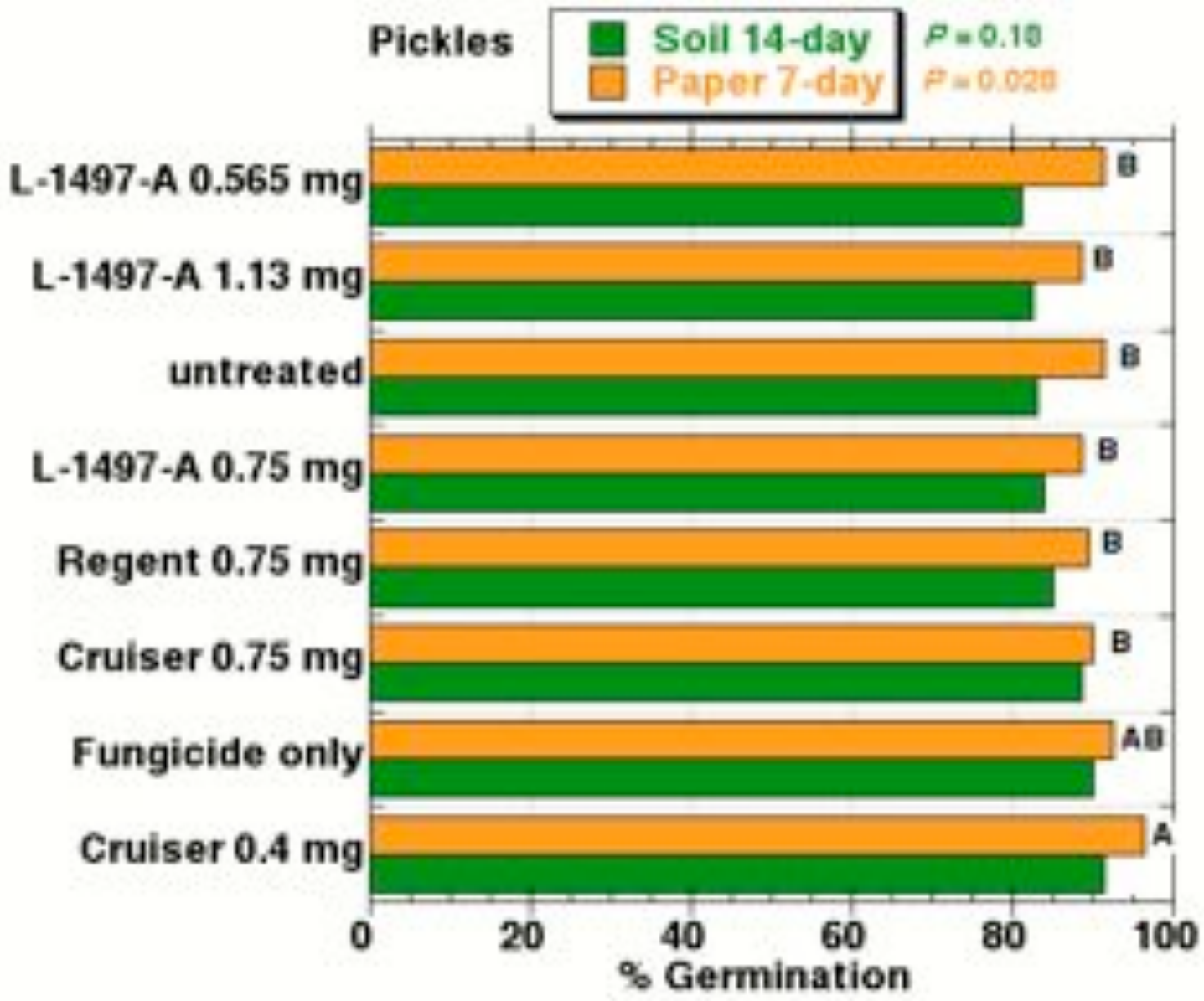
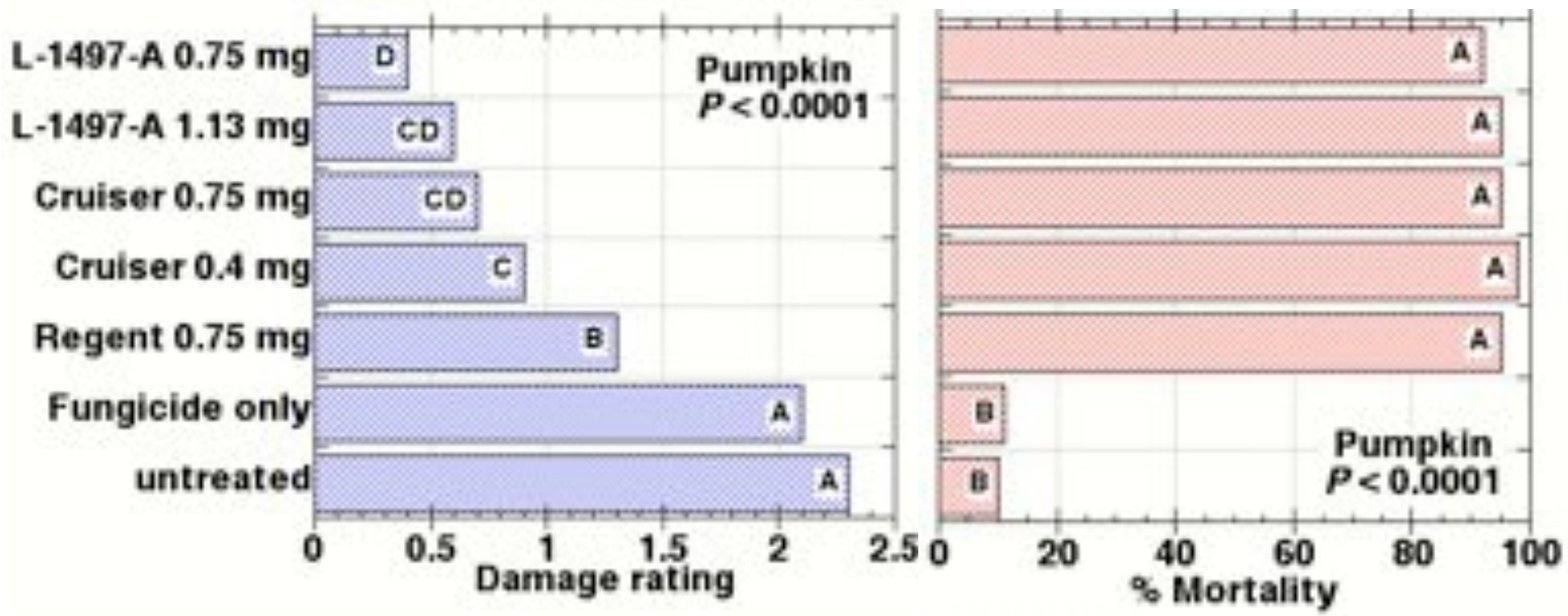


Bioassays 2006:
Striped Cucumber Beetle
on Pumpkin 'Gold Bullion'



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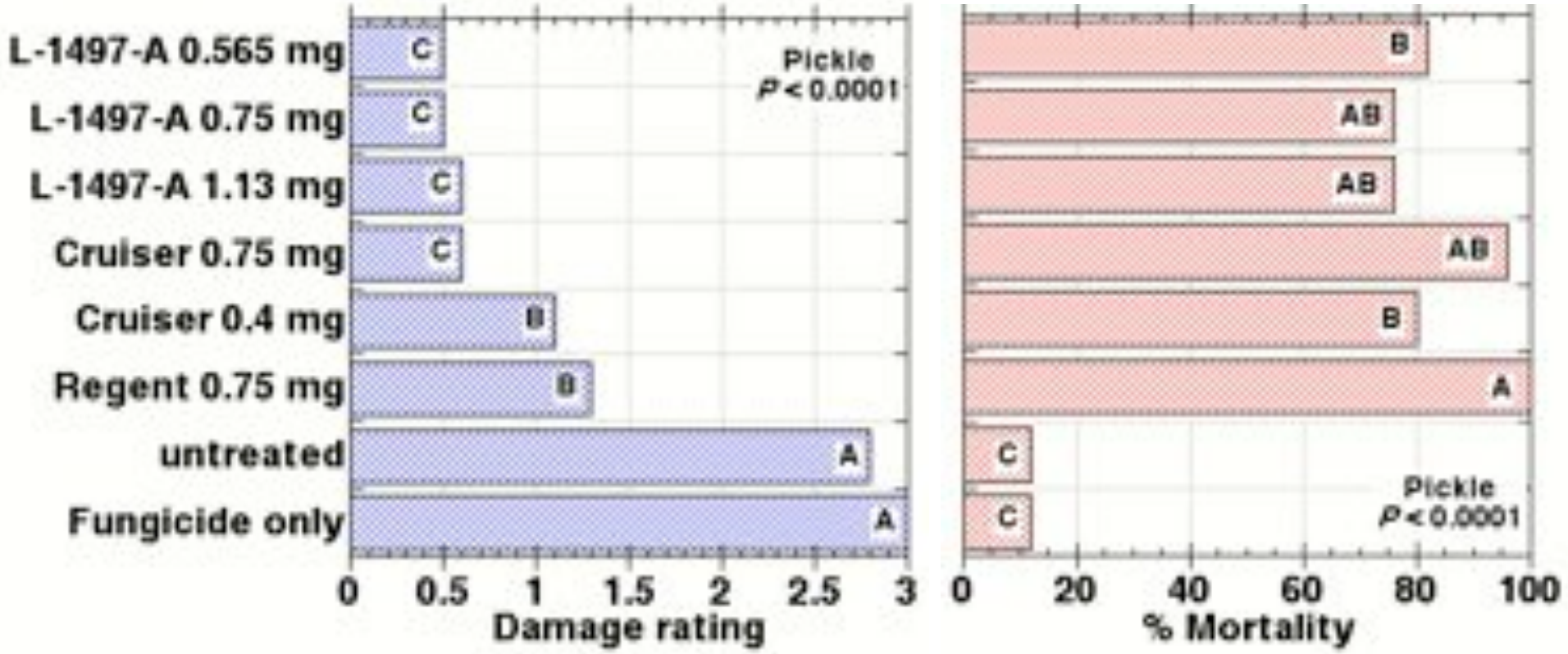

Conclusions

- **Insecticide seed treatment looks promising**
  - **As good as in-furrow, pumpkins**
  - **Better than in-furrow, pickles**
- **Products vary:**
  - **L-1497-A looks excellent; higher rate somewhat better than low rate**
  - **Cruiser at higher rate (0.75 mg/seed) better than lower rate (0.40 mg/seed)**
  - **Regent not as effective as others**

Conclusions

- **Advantages of seed treatment**
  - **Convenience; easier application**
  - **Much lower rate of A.I. per acre**
    - **Cruiser 0.75 mg/seed vs Platinum 8 fl oz/A:**
    - **~25 times less (pumpkins at 3,000 seeds/A)**
    - **~2 times less (pickles at 45,000 seeds/A)**
- **Concern that control not lasting past 2-leaf stage, but control during critical cotyledon to 2-leaf stage is good**

Acknowledgements

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