Western Tarnished Plant Bug Diapause and Sampling

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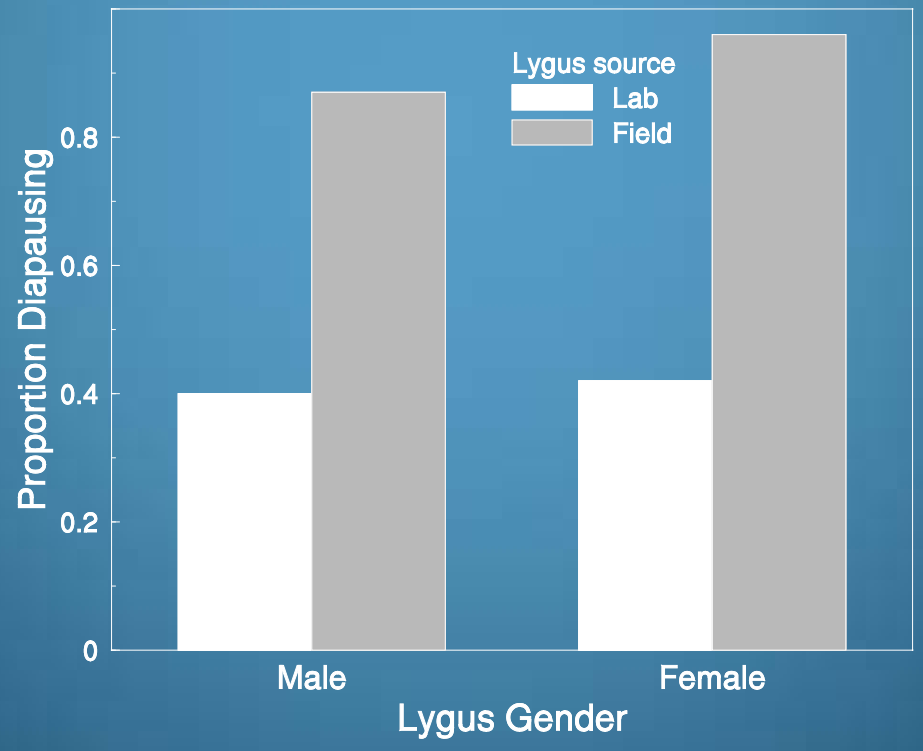
Diapause Response of Field vs Lab Insects

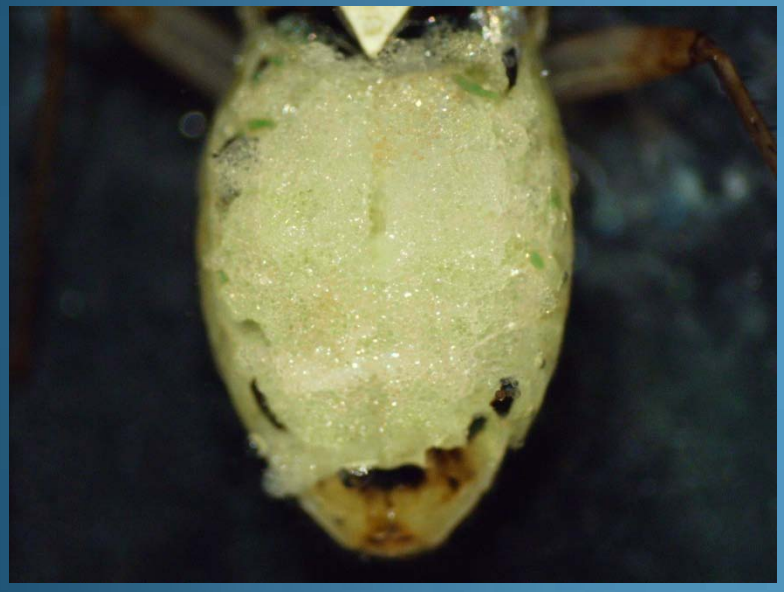
- Eggs obtained from either field-collected or laboratory-reared females
- Nymphs reared at under either 10-h or 14-h photoperiods, 26.6C
- Dissections at 10 d of adulthood
- Recorded reproductive characters, fat body type, oviposition by virgins
- Repeated three times

Diapause Response of Field vs Lab Insects

- 14-h photoperiod, no diapause
- 10-h photoperiod, reduced diapause from colony



Diapause Response of Field vs Lab Insects



- Glass Bead Fat:
  - Lab-reared insects – 0.5%
  - Field-collected insects
    - 10-h females – 43 ± 7%
    - 14-h females – 34 ± 6%
    - 10-h males – 40 ± 7%
    - 14-h males – 32 ± 6%

Diapause Response of Field vs Lab Insects

- Oviposition by virgin females:
  - 14-h photoperiod only
    - Field females – 55 ± 15%
    - Lab females – 95 ± 4%

Diapause Response of Field vs Lab Insects

- Diapause response altered by long-term culture
- Need to determine no. generations to change response
- May use glass bead fat, virginal oviposition as indicators of selection pressure

Change in Diapause Response with Laboratory Culture

- Eggs obtained from field-collected females and reared through 4 successive generations
- Nymphs reared at under either 10-h or 14-h photoperiods, 26.6C
- Dissections at 10 d of adulthood
- Recorded reproductive characters, fat body type, oviposition by virgins
- 1st run of experiment

Change in Diapause Response with Laboratory Culture

- No change in diapause response by generation (*P*=0.15) or bug gender (*P*=0.16)

Generation	Probability of Diapause
1	0.98
2	0.86
3	0.91
4	0.69

Gender	Prob. Diapause
Female	0.94
Male	0.86

Change in Diapause Response with Laboratory Culture

- Differences in probability of glass bead fat by generation (*P*=0.03) and photoperiod (*P*=0.02)

Generation	Probability of GB fat
1	0.47
2	0.46
3	0.44
4	0.71

Photo	Prob. GB fat
10-h	0.60
14-h	0.45

Change in Diapause Response with Laboratory Culture

- N.S. trend for decreased diapause by generation 4
- Change in prob. of GB fat not consistent with lab selection
- Differences in prob. of GB fat between photoperiods artifact of fat body development
- Trends in virginal oviposition suggest little effect of selection

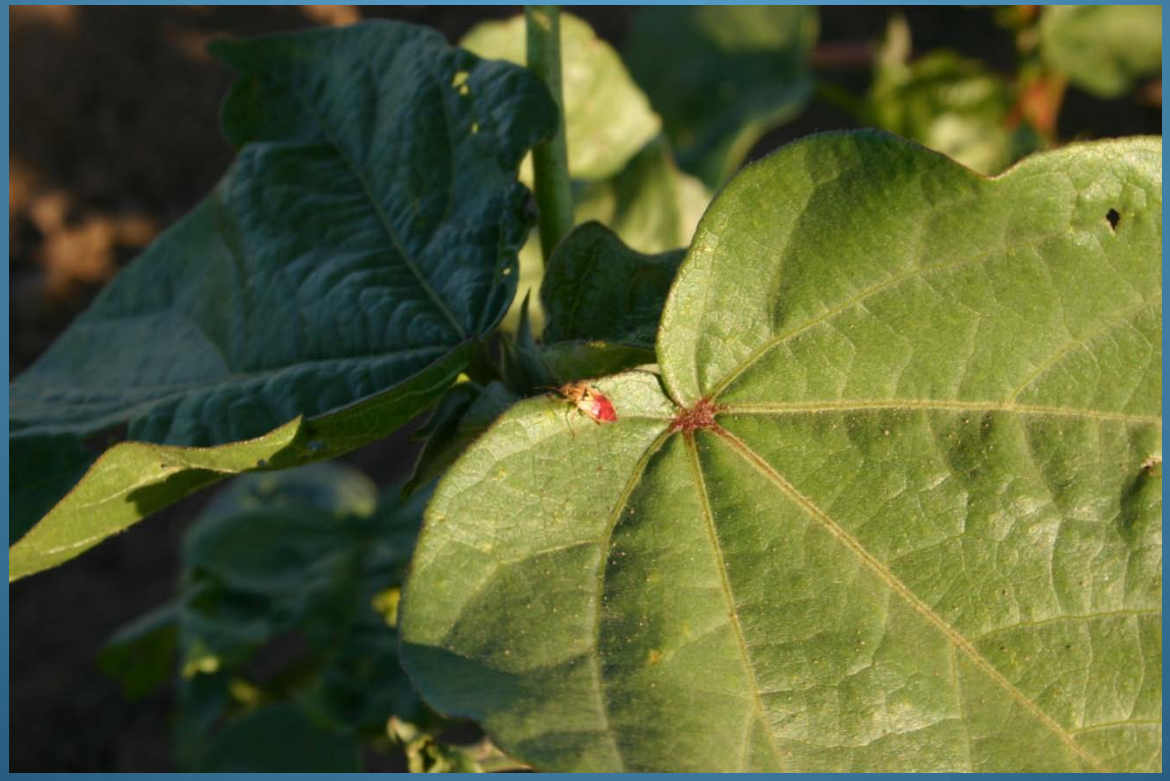
Sweep Net Sampling of Lygus Adults: Bug Age and Gender

Rationale

- Need to better understand meaning of population estimates
- Application in threshold, ecological studies
- Continuation of earlier work indicating change in sampling efficiency with plant development, no differences among trained samplers

Objective

- Evaluate among-sampler differences using known populations of marked Lygus adults



Experimental Design

- Phy 800 planted 6 May; Randomized block with three replications
- Four treatments:
  - Pre-reproductive ♀ (<5 d old)
  - Pre-reproductive ♂ (<5 d old)
  - Reproductive ♀ (>7 d old)
  - Reproductive ♂ (>7 d old)
- 10-m sample rows; 5 bugs/m of row

Experimental Procedure

- Three sample dates: 6/24, 7/2, 7/21
- Bugs released after 1900 h, sampled @ 0900 h
- 10 sweeps/row
- Dissected collected bugs to determine reproductive status
- Two 1-m rows/age class (5 ♀, 5 ♂) to estimate retention

Results

Collection of marked bugs

Date	No. bugs
6/24	6.8 (36%)a
7/2	6.3 (33%)a
7/21	3.3 (17%)b

Treatmt	No. bugs
FPR	3.1 (16%)b
FR	6.4 (34%)a
MPR	5.4 (28%)ab
MR	7.0 (37%)a

Results

Prediction of age classes; retention

Gender	Accuracy
Female	98%
Male	89%

Treatmt	Prop. mated
FPR	0%
FR	80%

Retention of marked bugs

Date	%Recovered
6/24	72.5
7/2	82.5
7/21	87.5

Conclusions

- Preliminary results suggest influence of physiological age class
- Pre-reproductive females are sampled least effectively
- Dissections are accurate enough to estimate age classes of collected bugs

Drop Cloth Sampling of Lygus Adults

Rationale

- Drop cloth is standard method in S.E.
- May lend insights into studies of nymph sampling
- May speed processing of 1-m retention rows in sweep net sampling studies

Experimental Design

- Used both Acala (Phy 72) and Pima (Phy 800)
- Completely randomized design with 4 reps
- Field-collected, marked bugs released PM, AM into 1-m row sections (6/m, 3/gender)
- Sample dates
  - Acala: 7/9, 7/16, 7/23
  - Pima: 7/16, 7/23
- Recorded no. on cloth, total (on and off cloth)

Results

Acala – On drop cloth

Date	No. bugs	Rel. Tm.	No. bugs
7/9	4.4 (73%)	PM	4.6 (77%)
7/16	4.5 (75%)	AM	4.1 (68%)
7/23	4.1 (69%)		

Results

Pima – On drop cloth

Date	No. bugs	Rel. Tm.	No. bugs
7/16	4.4 (73%)a	PM	4.1 (69%)a
7/23	3.0 (50%)b	AM	3.2 (54%)b

Results

Acala – Total

Date	No. bugs	Rel. Tm.	No. bugs
7/9	5.2 (88%)	PM	5.2 (87%)
7/16	5.1 (85%)	AM	5.1 (85%)
7/23	5.0 (83%)		

Results

Pima – Total

Date	No. bugs	Rel. Tm.	No. bugs
7/16	4.8 (79%)a	PM	4.5 (75%)a
7/23	3.6 (60%)b	AM	3.9 (65%)b

Conclusions

- Differences in patterns between Acala, Pima probably related to plant architecture
- Trends for higher captures from PM releases may relate to unestablished bugs dropping to ground
- Drop cloth more efficient than expected, but not adequate for retention rows

Response of Squaring Cotton to Lygus Infestation

Objective

- Gain insights into appropriate methods of studying plant response to lygus

Experimental Design

- Used both Acala (Phy 72) and Pima (Phy 800)
- Completely randomized design with 4 treatments, 3 reps
- Field-collected, marked bugs released into 1-m row sections (6 m^{-1} $release^{-1}$; eq. to 23 count)
- Treatments: Control (no bugs); 1WK (releases 1st wk); 2WK (releases 1st and 2nd wk); 3WK (releases wk 1-3)
- Plots sampled on 4th week

Experimental Design

- 1st releases 29 June (Pima), 1 July (Acala)
- 1st releases in ~2nd week of squaring but poor square retention
- Sampled 20 July (Pima), 22 July (Acala)
- Recorded:
  - Plant height, #s nodes, fruiting positions, small squares (<3mm), med. squares (3-6 mm), large squares (>6 mm), blooms/bolls, damaged squares

Results

Cotton type	# Pos.
Acala	48.0
Pima	51.5

Cotton type	# Fruit
Acala	35.6
Pima	27.8

Cotton type	% Retention
Acala	72
Pima	52

Conclusions

- Differences between Acala, Pima, but not between treatments
- Background lygus infestation, poor early conditions may have obscured effects
- Failure to account for bug age, gender may have introduced large amount of variation
- Cultivars used may have some tolerance to lygus