Updates on Insecticide Trials Targeting Lygus Bug in Strawberry

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Life stages

Lygus eggs are inserted into plant tissues (including leaves, petioles, immature fruit). Photo Credit: Jack Kelly Clark, University of California Regents.

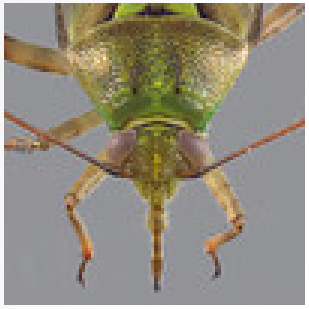
- Five immature stages
- Third and later instars are green and characterized by five black dots

Life history

- Eggs: 7 days
- Immatures: 13 days
- Adults: 35-43 days
- Females take about 10 days to start laying eggs
- Females lay on average 32 eggs per day
- On average, a female lays 202 eggs and max. 448 eggs

(Leigh 1963)

Mouth part



Damage

- “Cat-facing” - Irregularly shaped strawberries
- Feeding on seeds- affecting normal growth of the tissue beneath the achenes
- Risk period: Flower opening to ~10 days after petal fall
- Damage from nymphs when there are more flowers than fruits – early summer

Damage

- Not all Cat-faced strawberries are related to lygus bug feeding
  - Improper pollination (cold weather or frost injury)
  - Lygus bug injured achenes will be hollow
  - Lygus bug damage could be severe during the summer

http://www.omafra.gov.on.ca/english/crops/hort/news/hortmatt/2006/14hrt06a1.htm

- Do NOT base your sprays on incidence of cat-faced berry

Projects

1. Small plot: Insecticide efficacy trial

2. Large plot: Closer SC

3. Field-level efficacy of insecticides on lygus bug in commercial fields

Small plot: Insecticide efficacy trial

Treatment	Amt formulated/ acre
Athena	17 fl oz
Beleaf	2.8 oz
Bexar	27 fl oz
Actara + Brigade	6.5 fl. oz + 32 oz
Closer	4.5 fl oz
Ecotec*	64 fl oz
Grandevo + Pyganic*	2 lb + 18 fl oz
Sivanto	14 fl oz
Tritek*	2 gal
Tritek EC*	64 fl oz + 2 gal
UTC	Water

* Appl twice

Methods

- Strawberry ‘Albion’ in Watsonville
- Plot size: 4 beds; 40-feet long
- Four replicates of each treatment completely randomized block design
- Broadcast-spray application on August 24 then on August 31
- Using a back-pack sprayer at 120 psi
- Water volume: 70 gal/ acre
- Dynamic (Spreader): 0.25% v/v

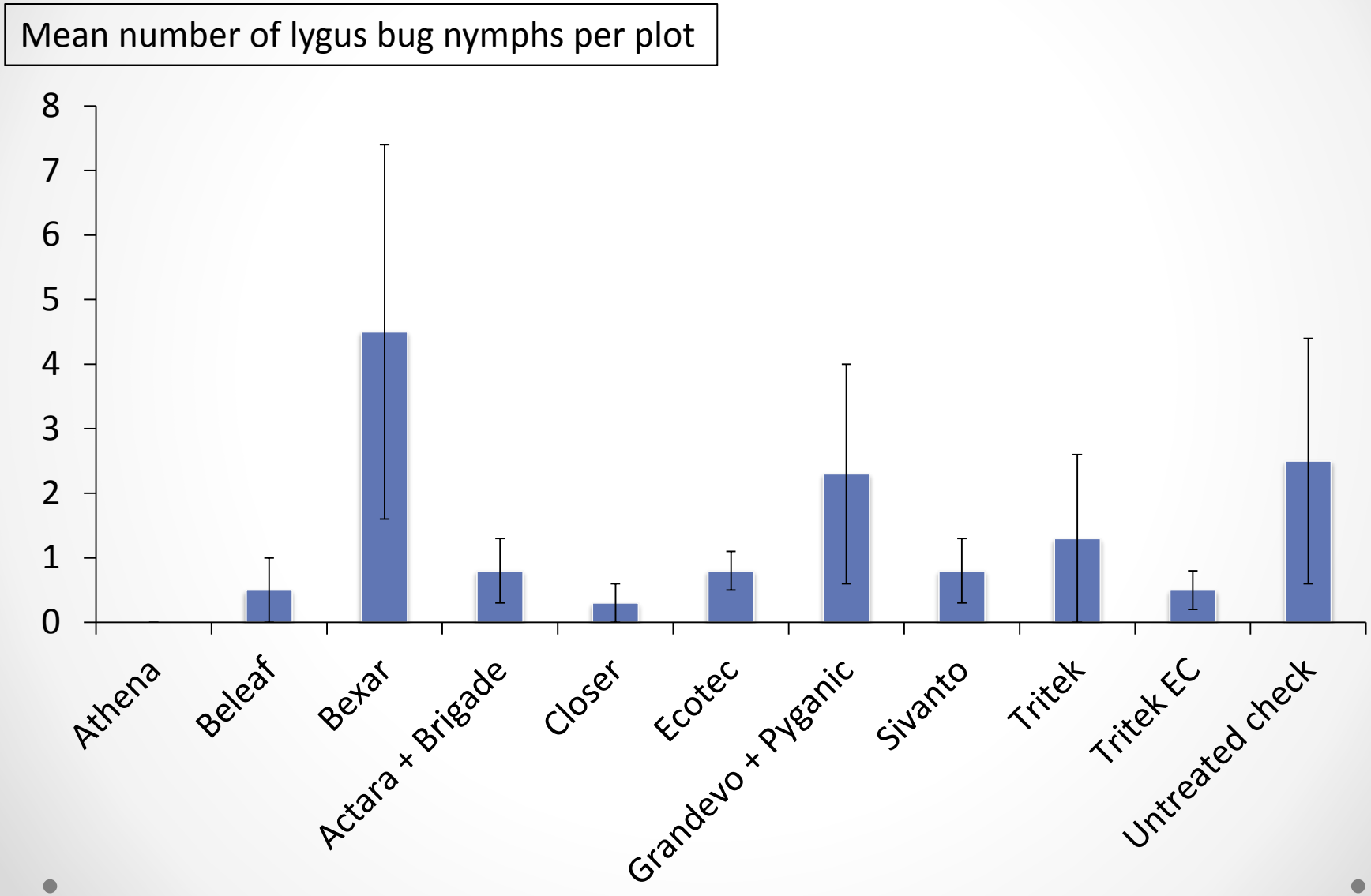
Sampling

- Ten plants were randomly sampled from each plot using a beat-tray method
- Beat-tray sampling: Five strikes per plant with the lid of Rubbermaid container
- Sampling: Pre, 3, 7, 14, 21, 28 days after first application
- Lygus bug samples were bagged, transported to the lab and stored in the freezer for later counting in the laboratory

Sampling and evaluations

- Evaluated: Adult and nymphs of lygus bug
- 30 fruits were randomly sampled at 28-days after application
- Fruits were evaluated for marketable and unmarketable fruits
- Within unmarketable fruits, fruits were evaluated for “cat-facing” symptom

3-days after application



Conclusion and future directions

- No conclusion could be drawn
- Lygus bug pressure was low
- Stronger border effects

- Avoid border zone
- Larger plot size: 100 feet long; 10 beds
- Multiple applications
- Increase the number of samples per plot
- Conduct early trial

Closer demonstration trial

Specimen Label

Dow AgroSciences

Closer™ SC

INSECTICIDE

®™Trademark of The Dow Chemical Company ("Dow") or an affiliated company of Dow

For control or suppression of aphids, fleahoppers, plant bugs, stink bugs, whiteflies and certain psyllids, scales, and thrips in *Brassica* (cole) leafy vegetables, citrus, cucurbit vegetables, fruiting vegetables, leafy vegetables (except *Brassica*), leaves of root and tuber vegetables, low growing berry, okra, pistachio, pome fruits, small fruit vine climbing (except fuzzy kiwifruit) except strawberry, strawberry, stone fruits, tree nuts, and watercress.

Group	4C	INSECTICIDE

Active Ingredient:	
sulfoxaflor	21.8%
Other Ingredients	78.2%
Total	100.0%

Contains 2 lb active ingredient per gallon.

Precautionary Statements

Hazard to Humans and Domestic Animals

EPA Reg. No. 62719-623

CAUTION

Causes Moderate Eye Irritation

Avoid contact with eyes or clothing.

Personal Protective Equipment (PPE)

Applicators and other handlers must wear:

- Long-sleeved shirt and long pants
- Shoes plus socks

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables, use detergent and hot water. Keep and wash PPE separately from other laundry.

User Safety Recommendations

Users should:

- Wash hands before eating, drinking, chewing gum, using tobacco or using the toilet.
- Remove clothing immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.

First Aid

If in eyes: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor, or going for treatment. You may also contact 1-800-992-5994 for emergency medical treatment information.

Environmental Hazards

This product is highly toxic to bees exposed through contact during spraying and while spray droplets are still wet. This product may be toxic to bees exposed to treated foliage for up to 3 hours following application. Toxicity is reduced when spray droplets are dry.

Risk to managed bees and native pollinators from contact with pesticide spray or residues can be minimized when applications are made before 7:00 am or after 7:00 pm local time or when the temperature is below 55° F at the site of application.

Refer to the Directions for Use for crop specific restrictions and additional advisory statements to protect pollinators.

Do not apply directly to water, to areas where surface water is present or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment washwaters.

Directions for Use

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.
Read all Directions for Use carefully before applying.

Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application. For any requirements specific to your state or tribe, consult the agency responsible for pesticide regulation.

Agricultural Use Requirements

Use this product only in accordance with its labeling and with the Worker Protection Standard, 40 CFR Part 170. This Standard contains requirements for the protection of agricultural workers on farms, forests, nurseries, and greenhouses, and handlers of agricultural pesticides. It contains requirements for training, decontamination, notification, and emergency assistance. It also contains specific instructions and exceptions pertaining to the statements on this label about personal protective equipment (PPE), and restricted entry interval. The requirements in this box only apply to uses of this product that are covered by the Worker Protection Standard.

Do not enter or allow worker entry into treated areas during the restricted entry interval (REI) of 12 hours.

PPE required for early entry to treated areas that is permitted under the Worker Protection Standard and that involves contact with anything that has been treated, such as plants, soil, or water, is:

- Coveralls
- Shoes plus socks

Non-Agricultural Use Requirements

The requirements in this box apply to uses of this product that are NOT within the scope of the Worker Protection Standard for agricultural pesticides (40 CFR Part 170). The WPS applies when this product is used to produce agricultural plants on farms, forests, nurseries, or greenhouses.

Do not enter or allow others to enter the treated area until sprays have dried.

Storage and Disposal

Do not contaminate water, food or feed by storage or disposal.
Pesticide Storage: Store in original container only.
Pesticide Disposal: Wastes resulting from the use of this product must be disposed of on site or at an approved waste disposal facility.

Nonrefillable rigid containers 5 gallons or less:
Container Handling: Nonrefillable container. Do not reuse or refill this container.
Triple rinse or pressure rinse container (or equivalent) promptly after emptying. **Triple rinse** as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times. **Pressure rinse** as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 psi for at least 30 seconds. Drain for 10 seconds after the flow begins to drip. Then offer for recycling if available or puncture and dispose of in a sanitary landfill, or by incineration, or by other procedures allowed by state and local authorities.

Sampling

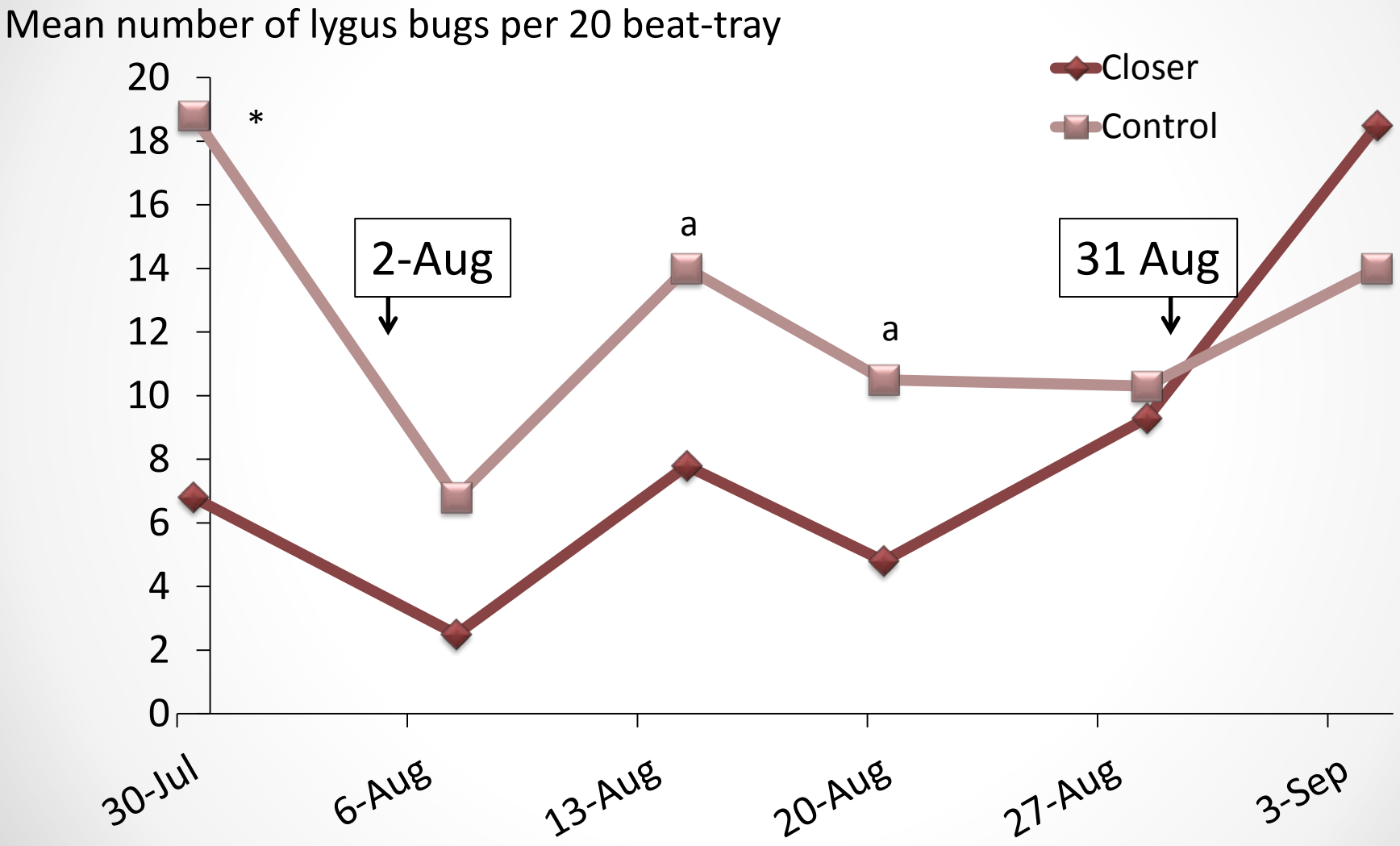
- Fours spots per treatment
- Twenty plants were randomly sampled from each spot
- Beat-tray sampling: Five strikes per plant with the lid container
- Sampling: Pre, 3, and/or 7 days after application
- Lygus bug samples were bagged, transported to the lab and stored in the freezer for later counting in the laboratory

Site 1

Site 1: Insecticide applications

Appl. date	Grower standard	Closer
8/2/13	Malathion 2 pt Danitol 15 oz Actara 4 oz	Closer 4.5 fl oz/A
8/12/13	Brigade 16 oz	No Closer
8/31/13	Brigade 16 oz Assail 3 oz	Closer 4.5 fl oz/A

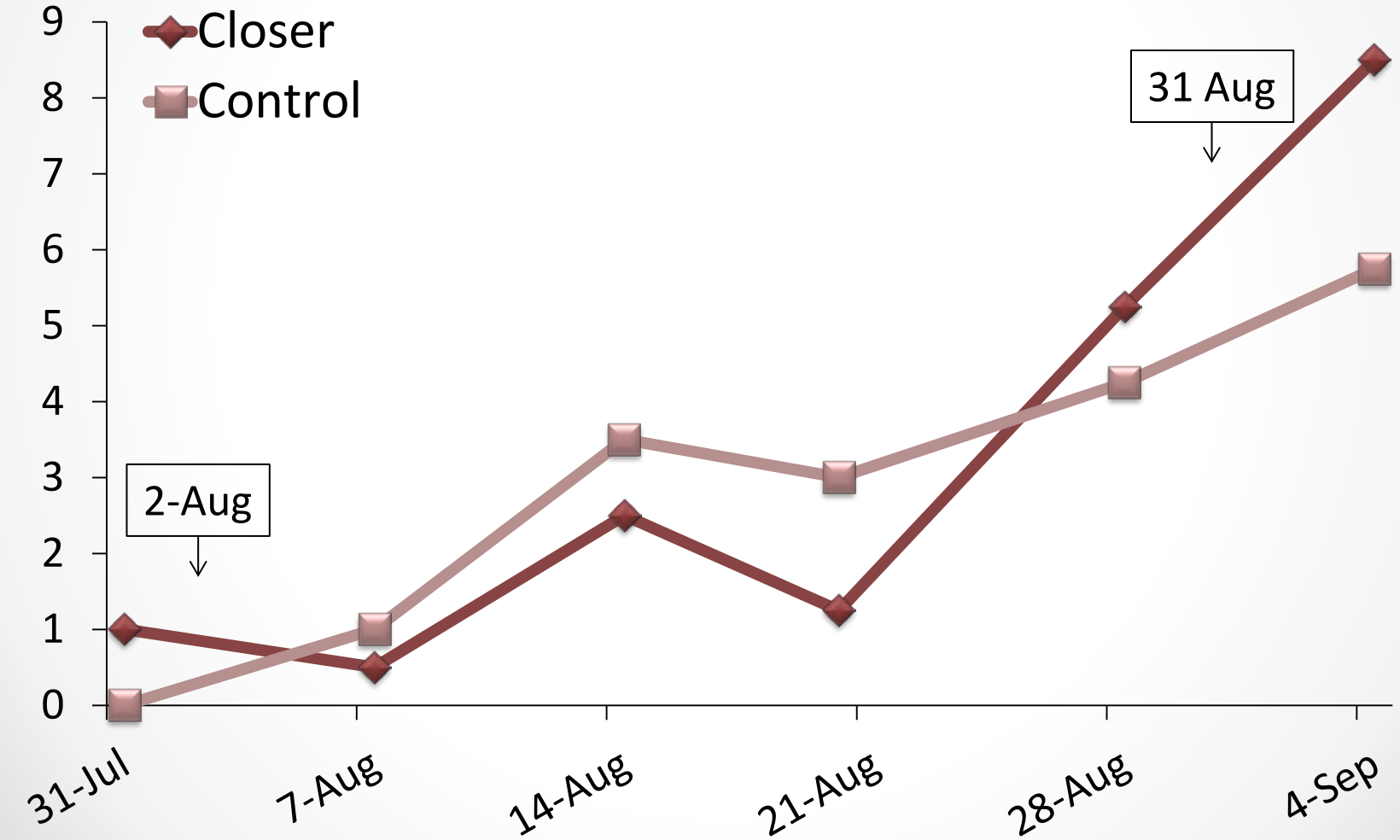
Site 1: Lygus bug nymphs



*P = 0.05; ^{a}P= 0.1

Site 1: Lygus bug adults

Mean number of lygus bug per 20 beat-tray



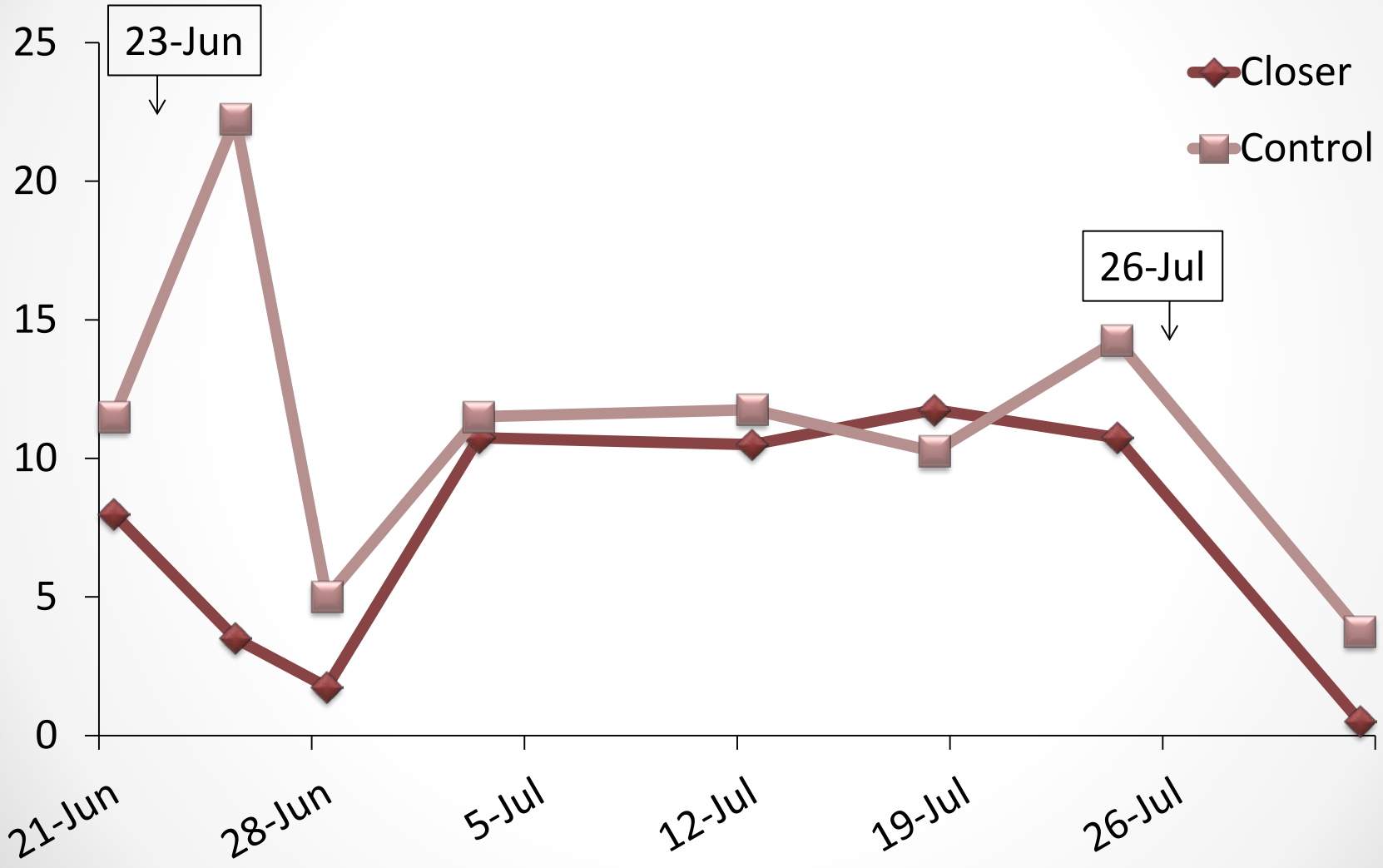
Site 2

Site 2: Insecticide applications

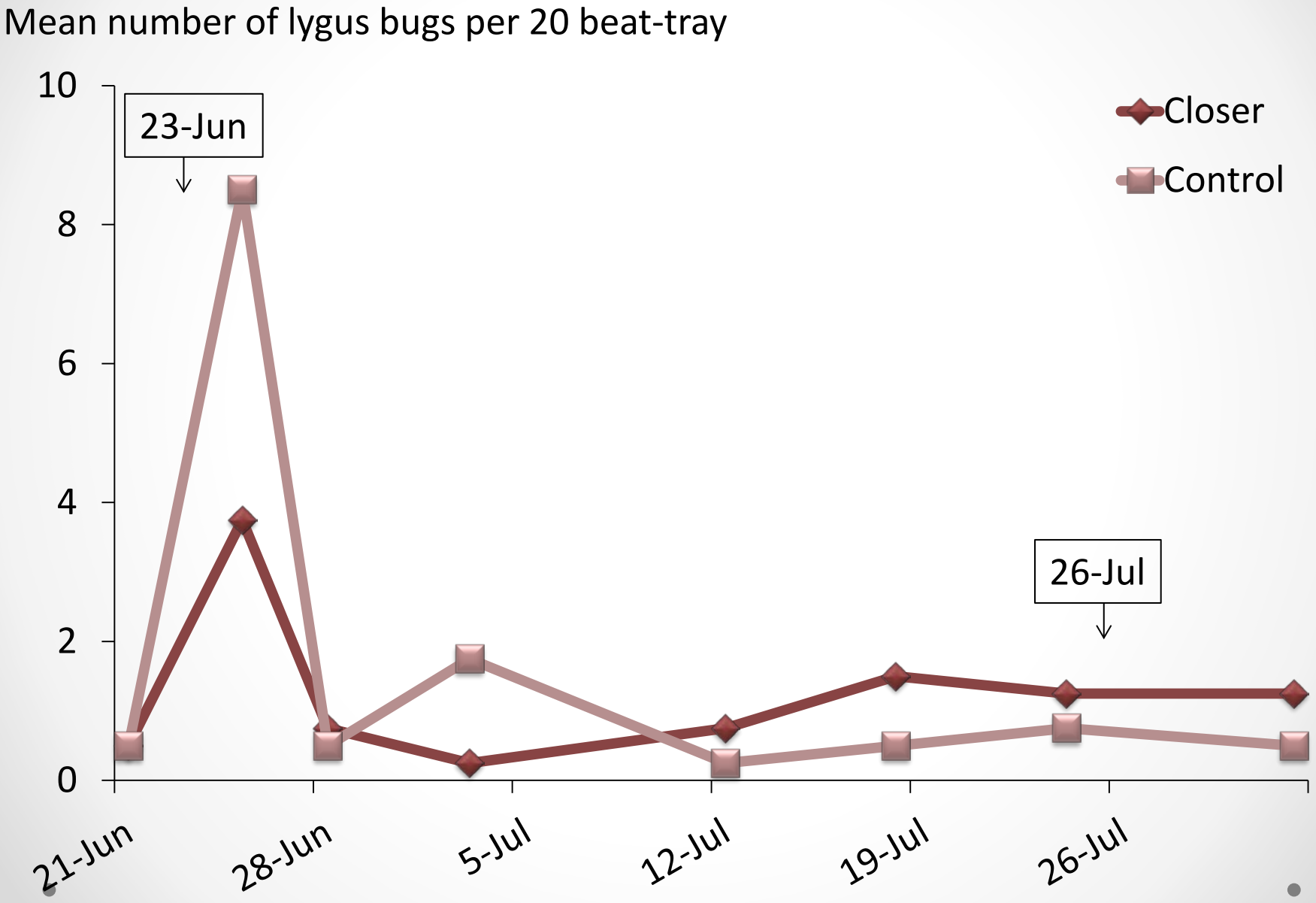
Appl. date	Grower standard	Closer
23 June 2013	Rimon 12 oz/A	Closer 4.5 oz/A
26 July 2013	Beleaf 2.8 oz/A	Closer 4.5 oz/A

Site 2: Lygus bug nymphs

Mean number of lygus bugs per 20 beat-tray



Site 2: Lygus bug adults

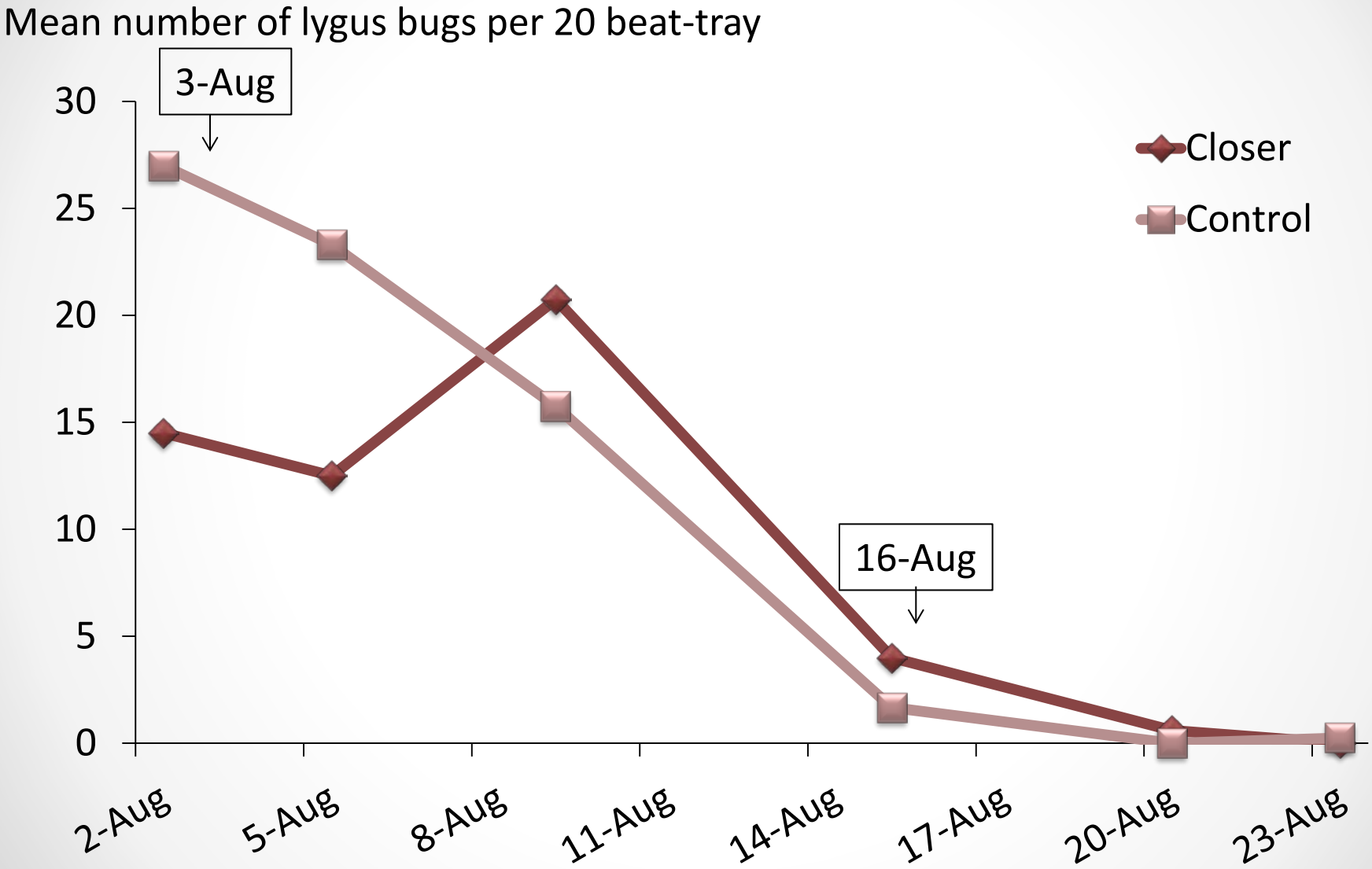


Site 3

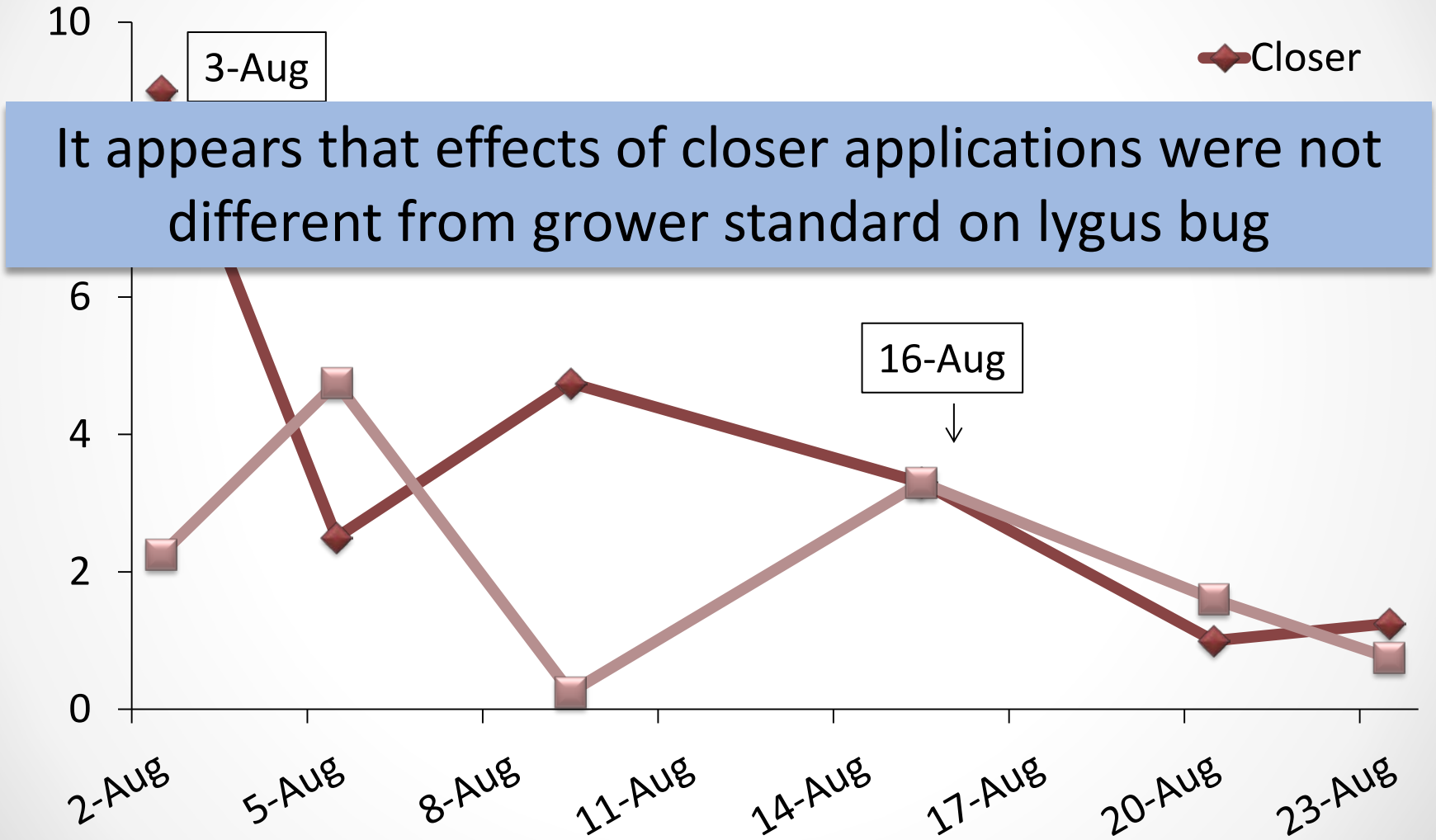
Site 3: Insecticide applications

Appl. date	Grower standard	Closer
3 August 2013	Brigade 2 lb/A Dibrom 16 oz/A	Closer 4.5 oz/A
16 August 2013	Danitol 16 fl oz /A	Closer 4.5 oz/A

Site 3: Lygus bug nymphs



Site 3: Lygus bug adults



It appears that effects of closer applications were not different from grower standard on lygus bug

Field-level efficacy of insecticides on lygus bug in commercial strawberry

Sites


Site 1
loc2
loc3
Site 1: 2nd yr
loc3
loc1
loc2
Loc1


Site 2
loc3
Loc2
loc1


Site 3
Loc2
Loc1
loc3

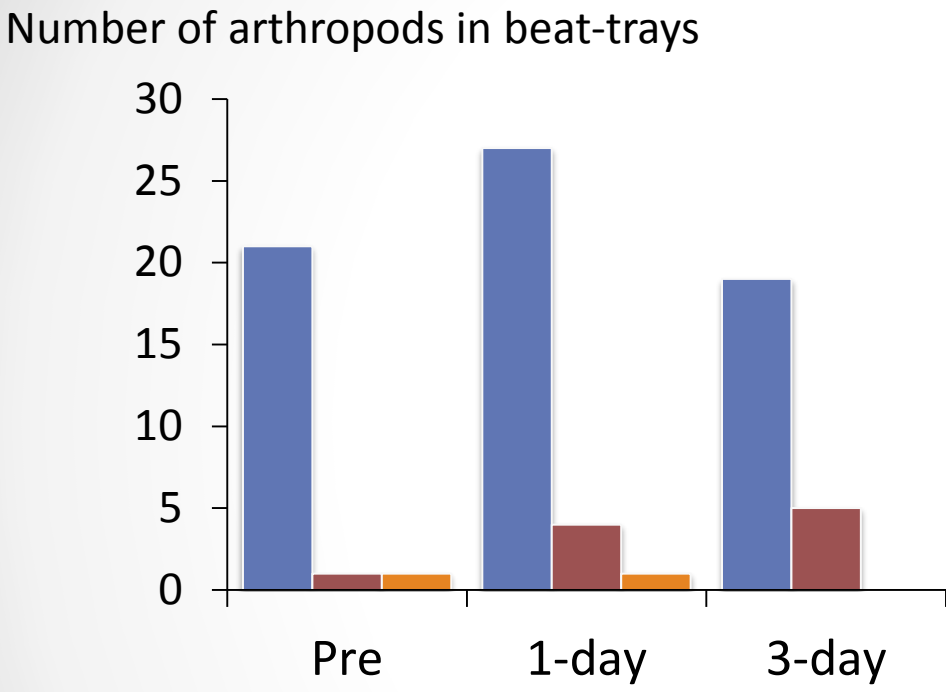
Sampling

- Pre sampling: 24 hours before commercial insecticide application
- Post sampling: 1 or 3 days after commercial insecticide application

- Three beat-tray samples - 20 random plants per sample

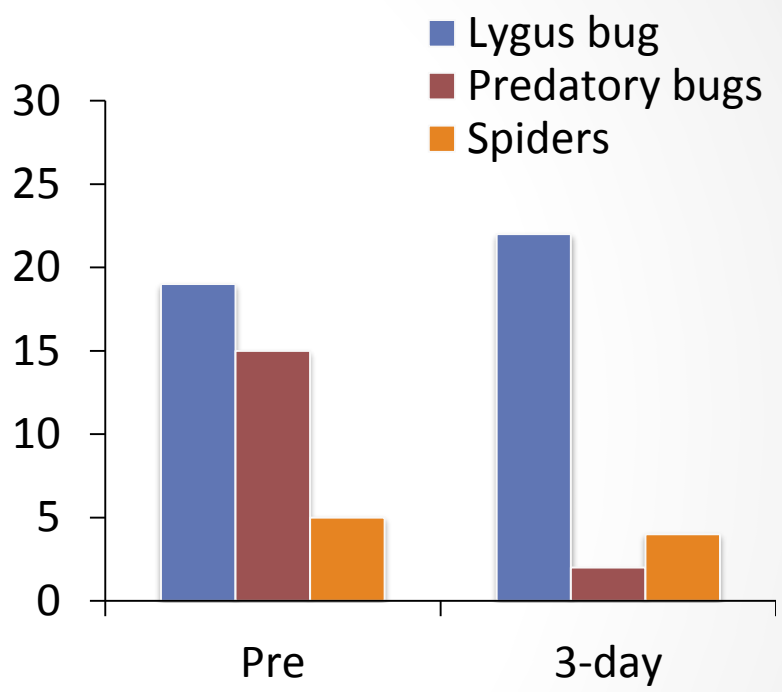
Site 1

31 May 2013



Malathion 22 fl oz

7 June 2013

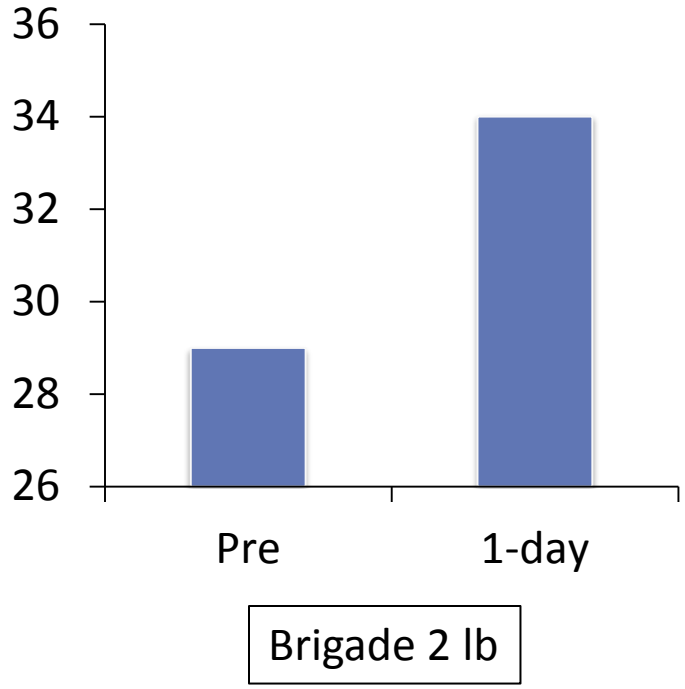


Rimon 12 fl oz
Malathion 32 fl oz
Dibrom 16 oz

Site 1 (second year strawberry)

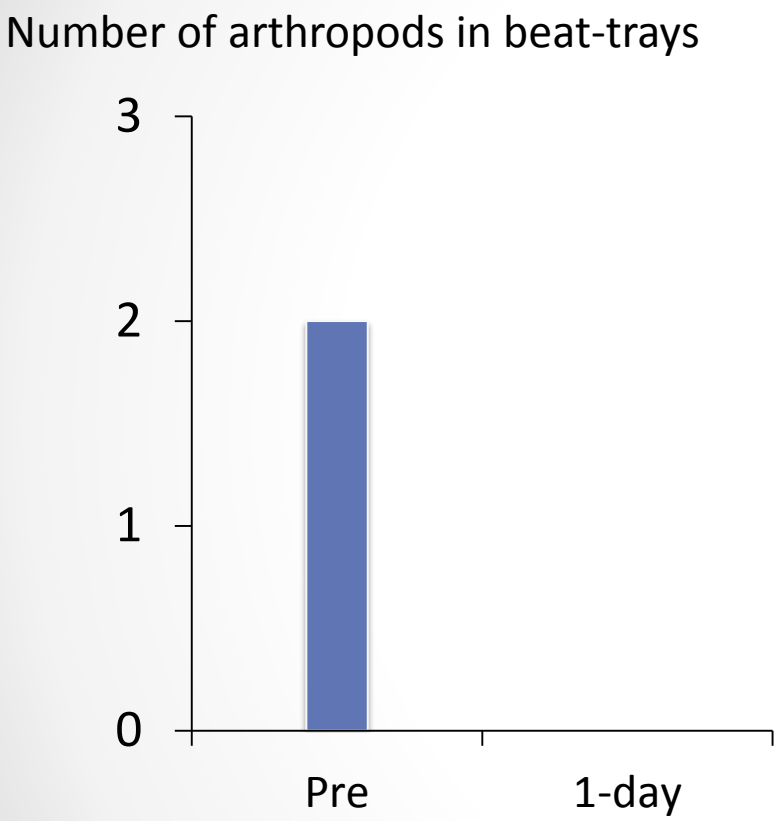
22 May 2013

Number of arthropods in beat-trays



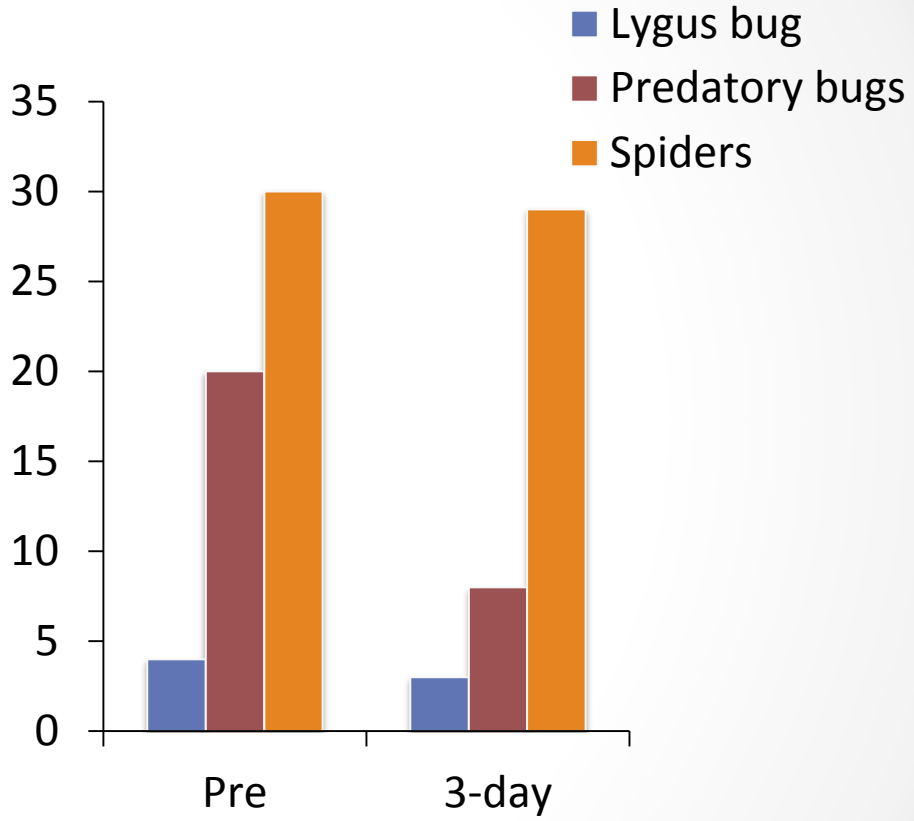
Site 2

23 May 2013



Beleaf 2.8 oz

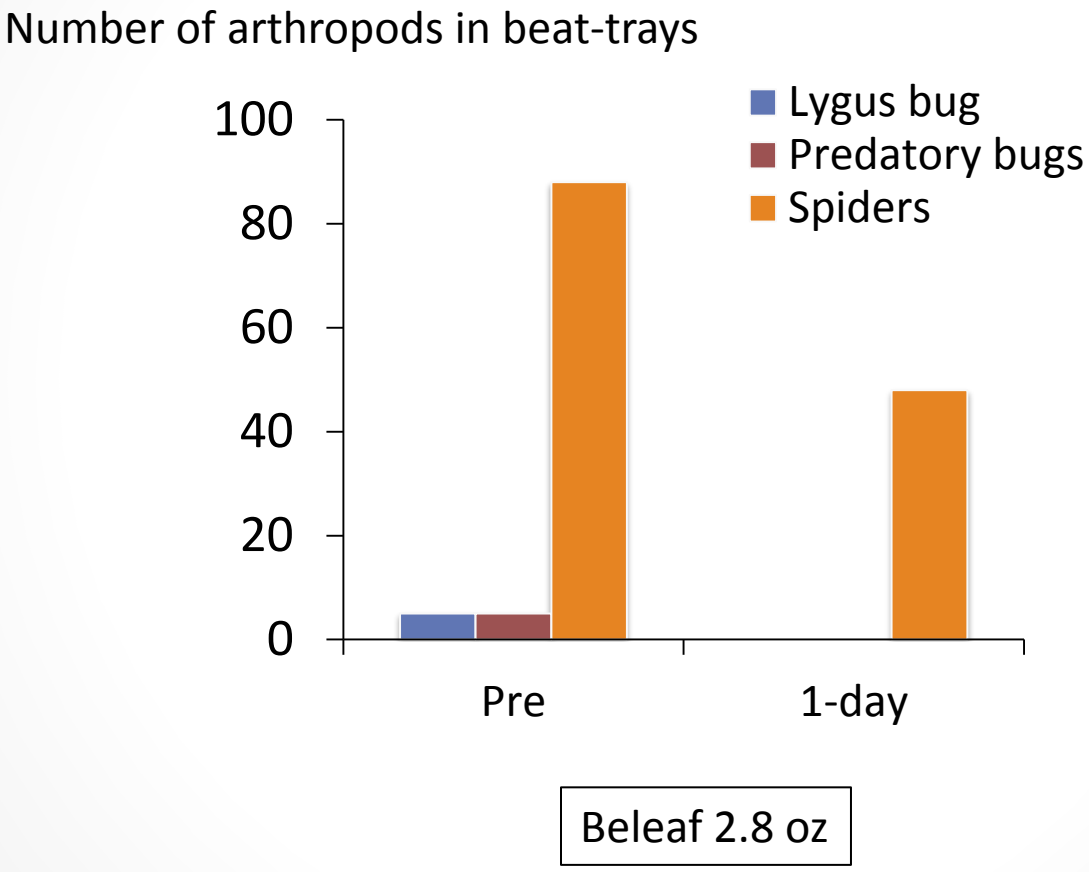
6 June 2013



Rimon 12 fl oz
Malathion 32 fl oz

Site 3

29 May 2013



Summary

- Small plot trial: no conclusion could be drawn and will consider few options
- Closer trial: Efficacy of Closer was comparable to growers standard applications on lygus bug
- Commercial field: More work is needed to conclude the efficacy of insecticides

Acknowledgements

- PCAs and growers
- Student interns: Jesus Martinez and Jorge Zarate; Technician: Monise Sheehan
- Funding: Agro chemical companies