Monitoring Codling Moth and Leafroller: Lure Tests and Field Validation

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http://entomology.tfrec.wsu.edu/jfbhome/growerarticles/monitoring99.pdf

Lure Test Methods

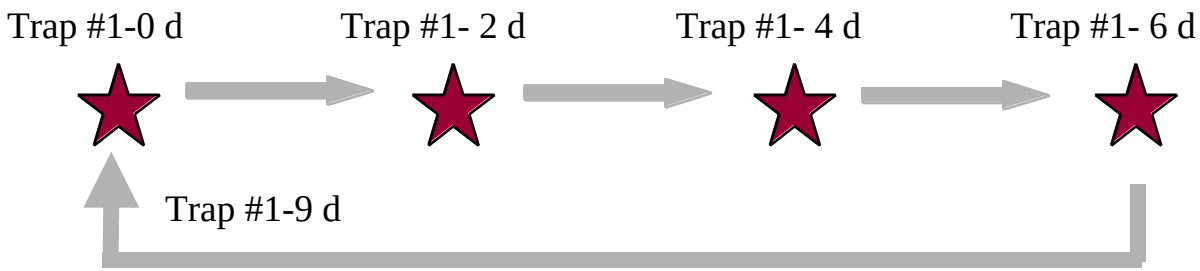
Codling moth lures

- **10X Red Septum**
- **CM Super Lure, aka "the bubble lure (Pherotech, Inc.)**
- **CM-P (Scenturion, Inc)**
- **Megalure (Trece, Inc.)**

Leafroller lures

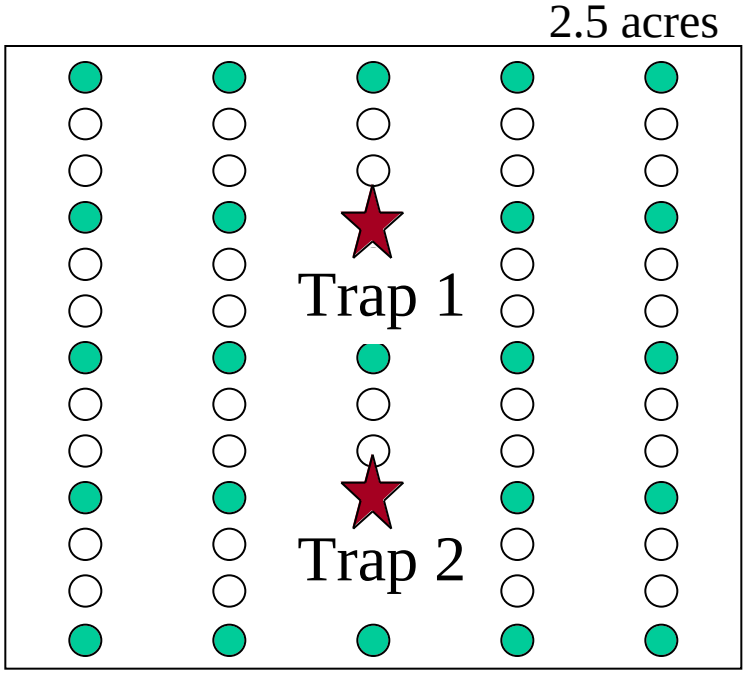
- **Various OBLR loads (Michigan St. Univ.)**
- **"Inhibitor lures" (Scenturion, Inc.)**

All lure tests were replicated 6 times. Traps were rotated every M,W,F. CM septa were changed at the end of each completed rotation (9-12 days). High load CM lures were tested in apple orchards treated with Isomate C+ (Pacific Biocontrol) at 400 disp/acre. Leafroller lures were not changed during a test.

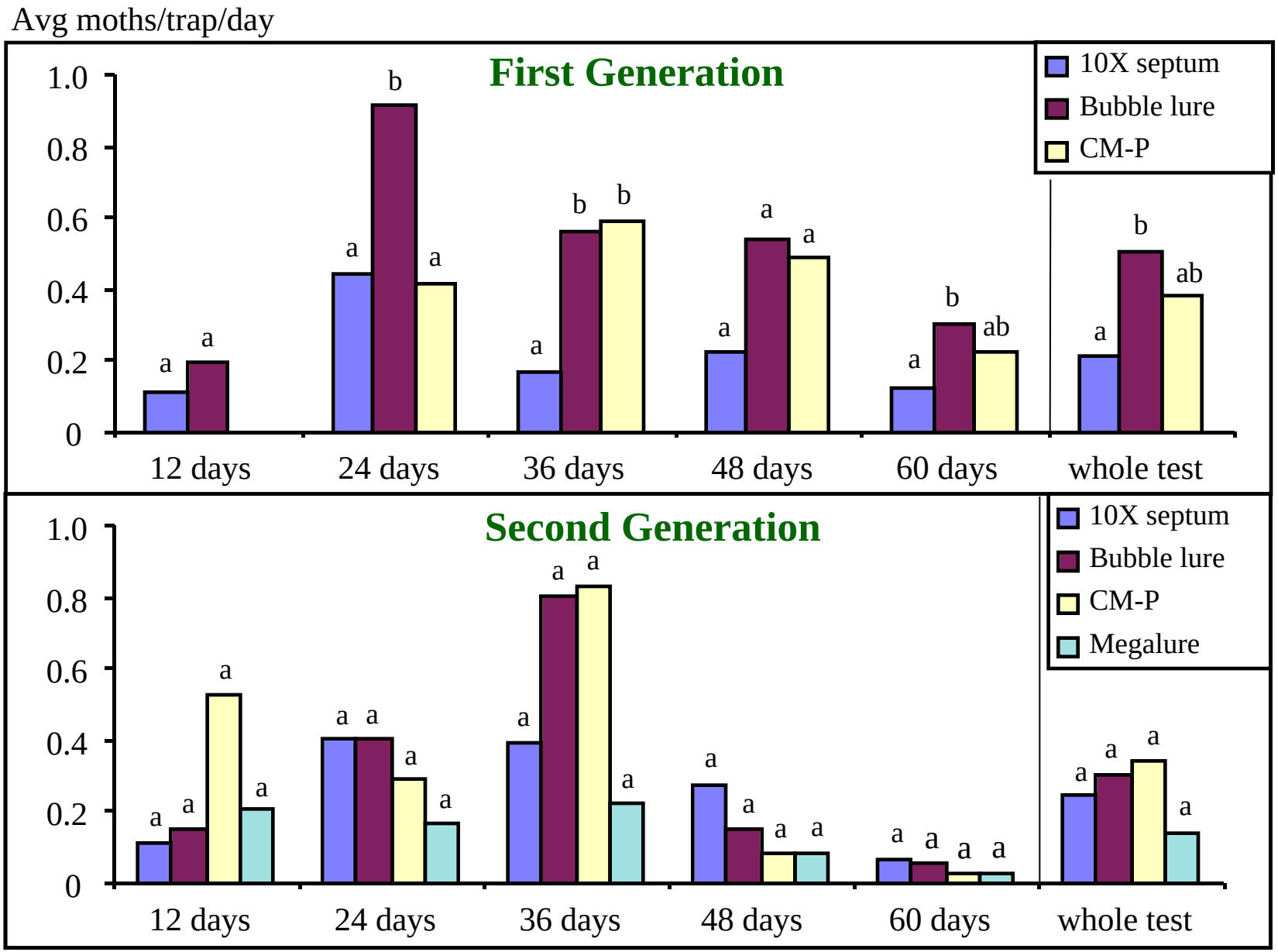


Field Test Methods

Field tests were replicated 25 times for each comparison. Traps were placed in the interior of approx. 2.5 acre plots and checked weekly. All fruit injury or foliage feeding samples were done in a grid-like manner through the entire block.

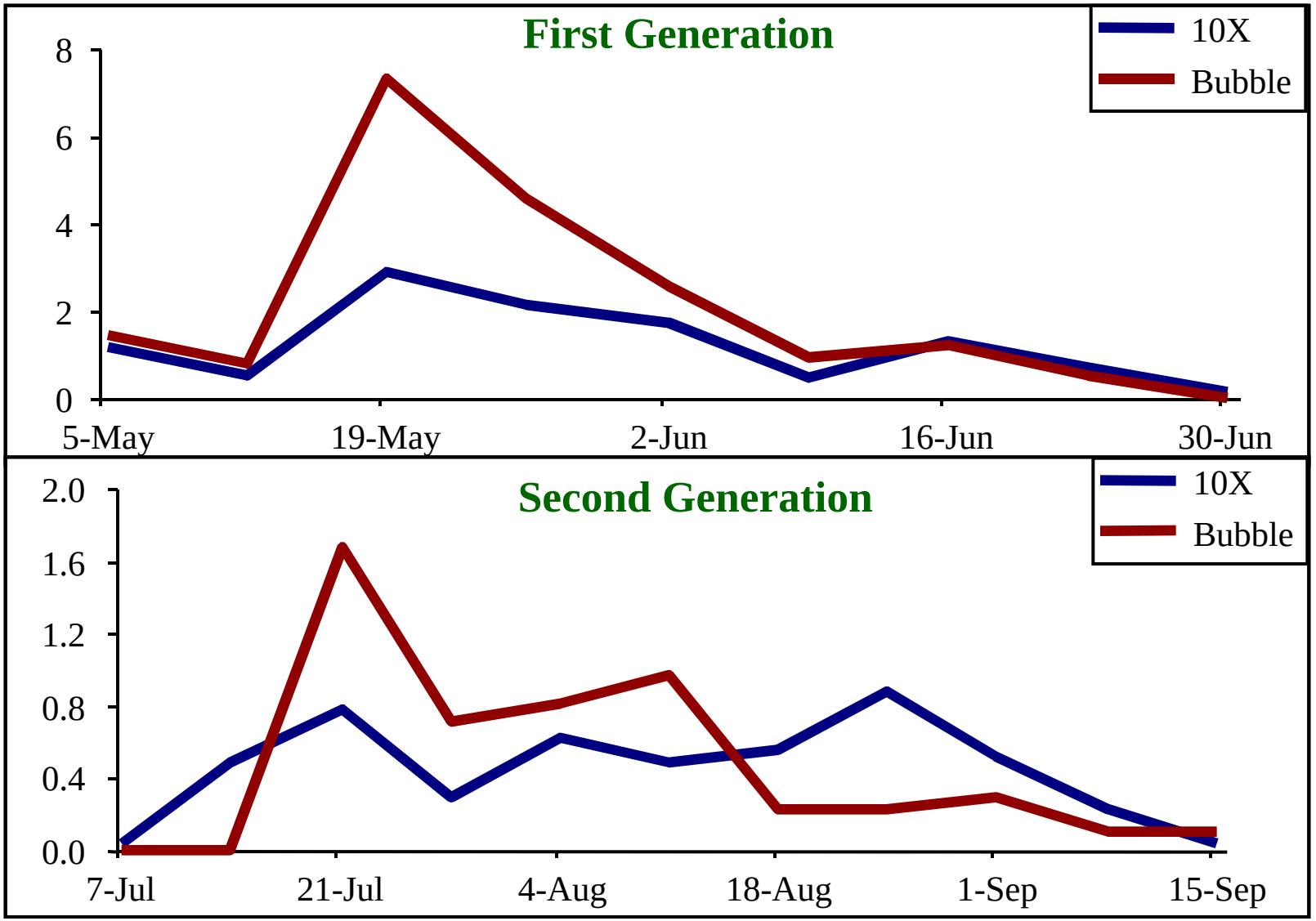


CM Lure Test Results



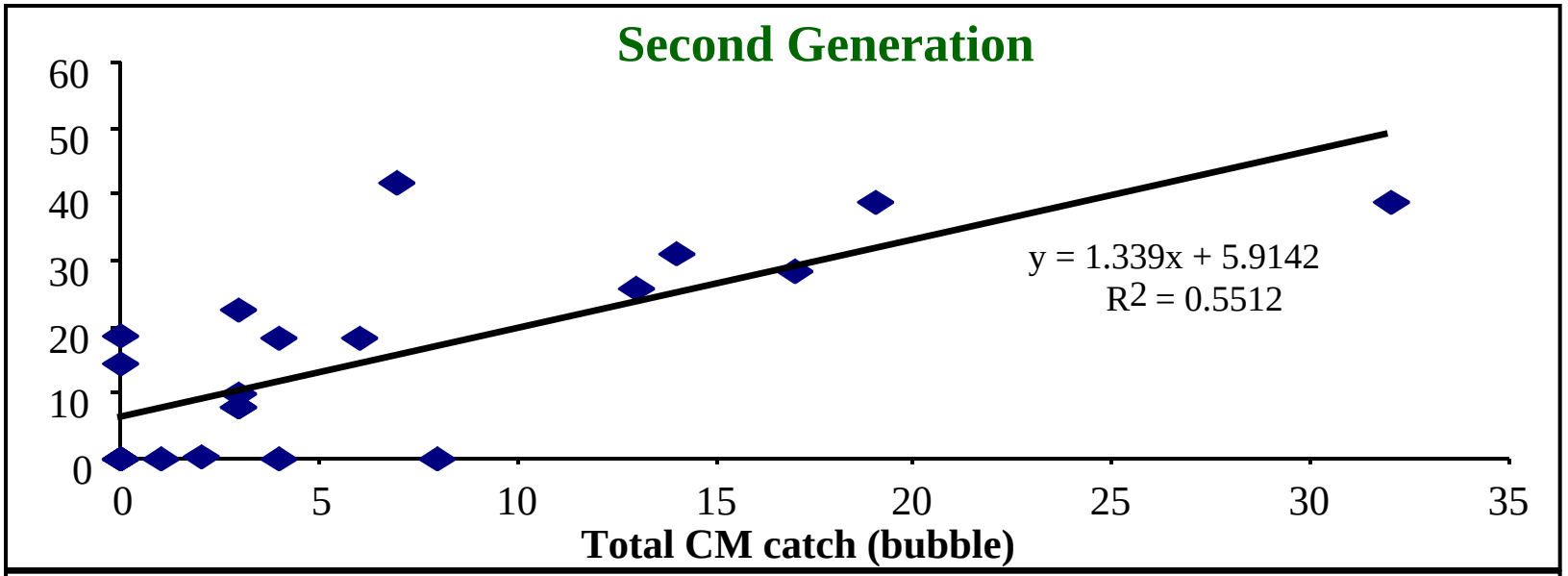
CM Field Test Results

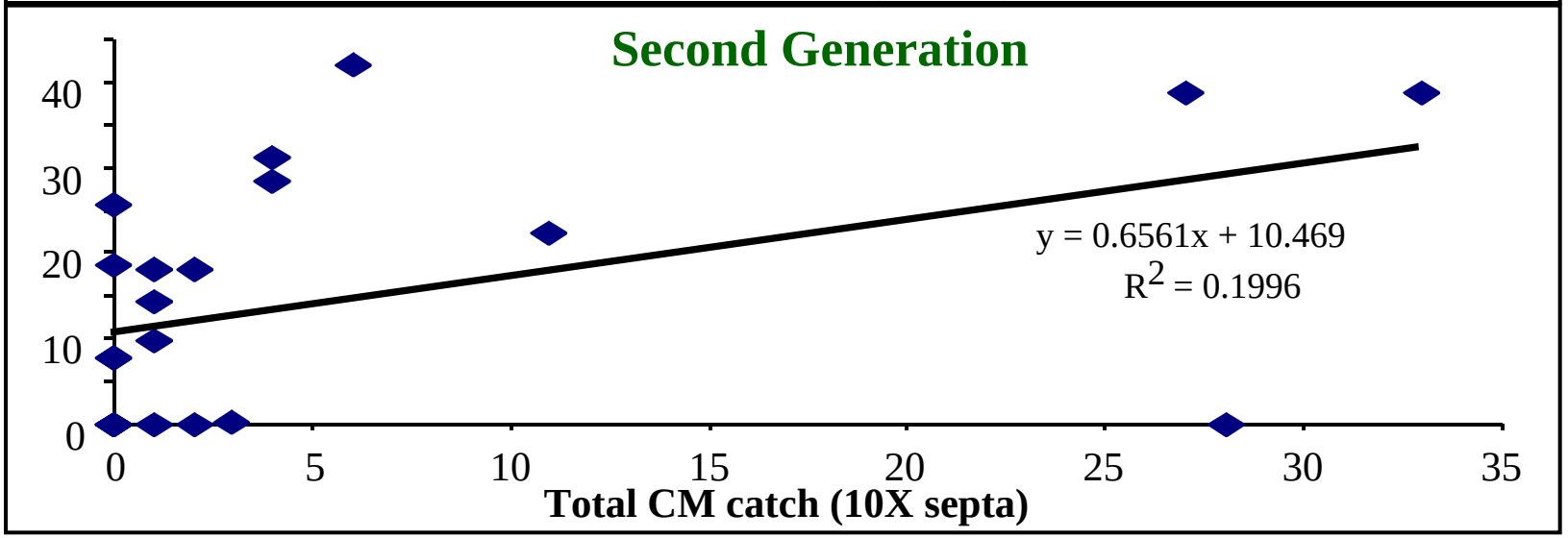
Avg moths/trap/day



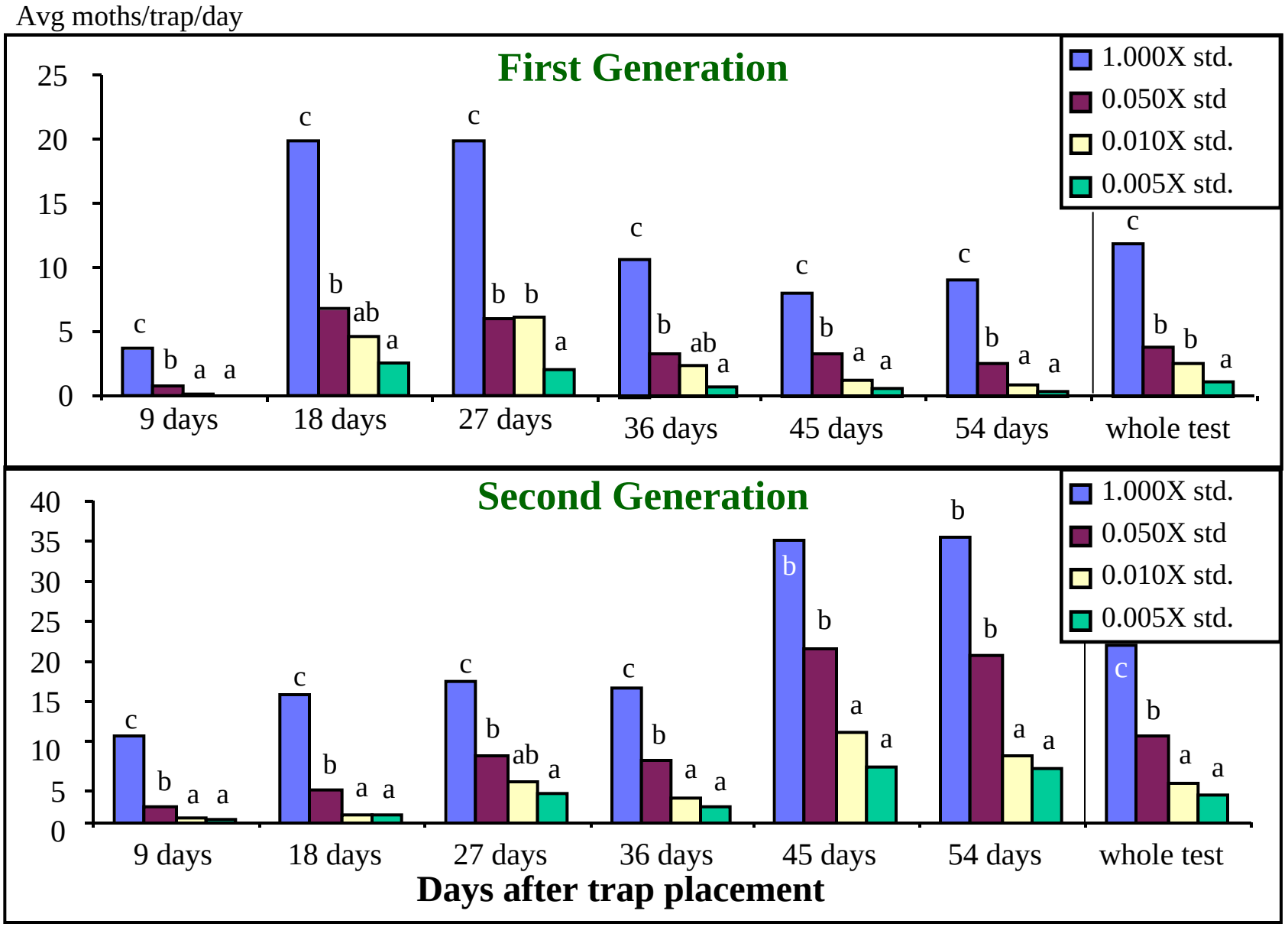
CM Field Test Results

% Fruit inj.

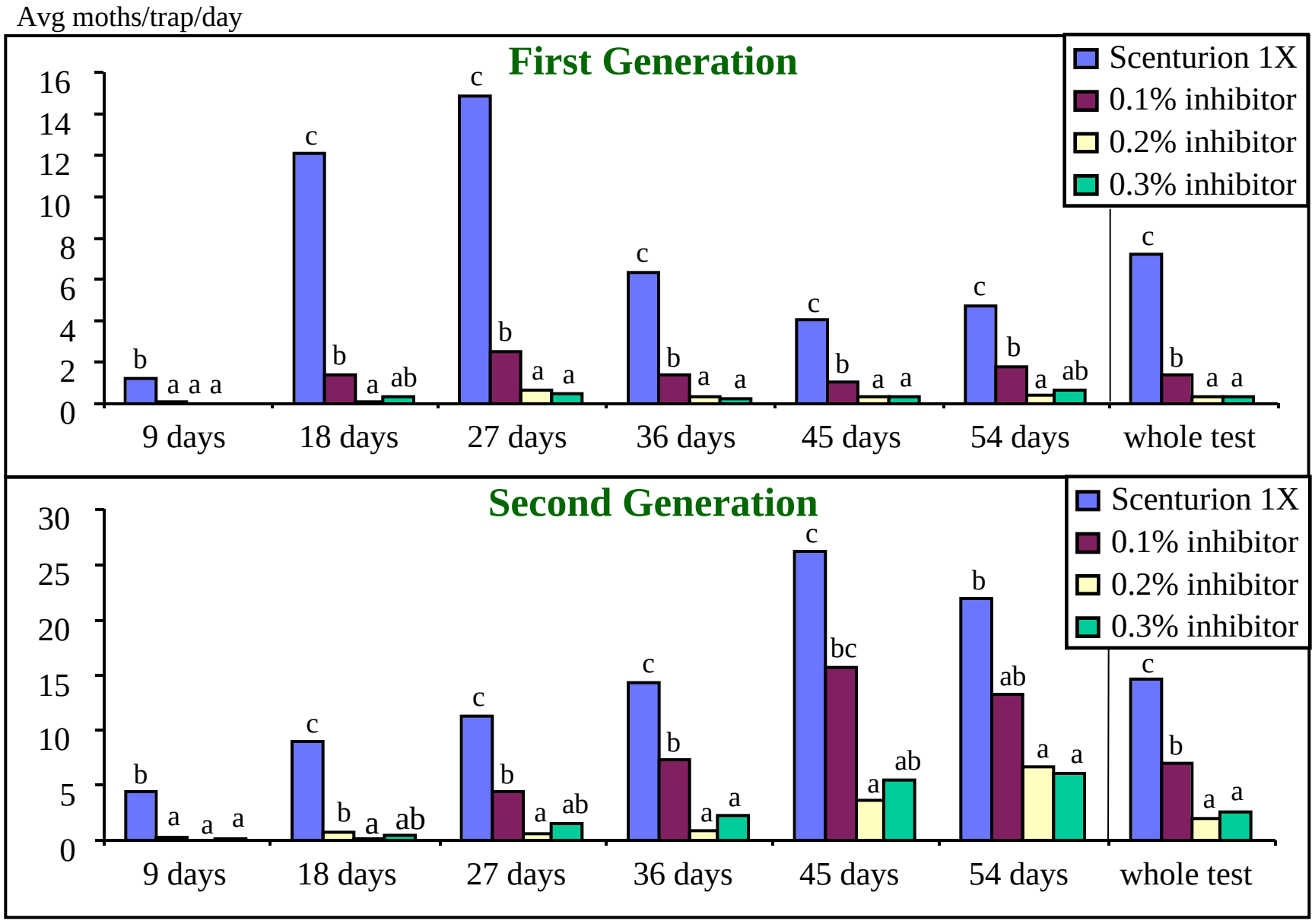




OBLR Lure Test Results

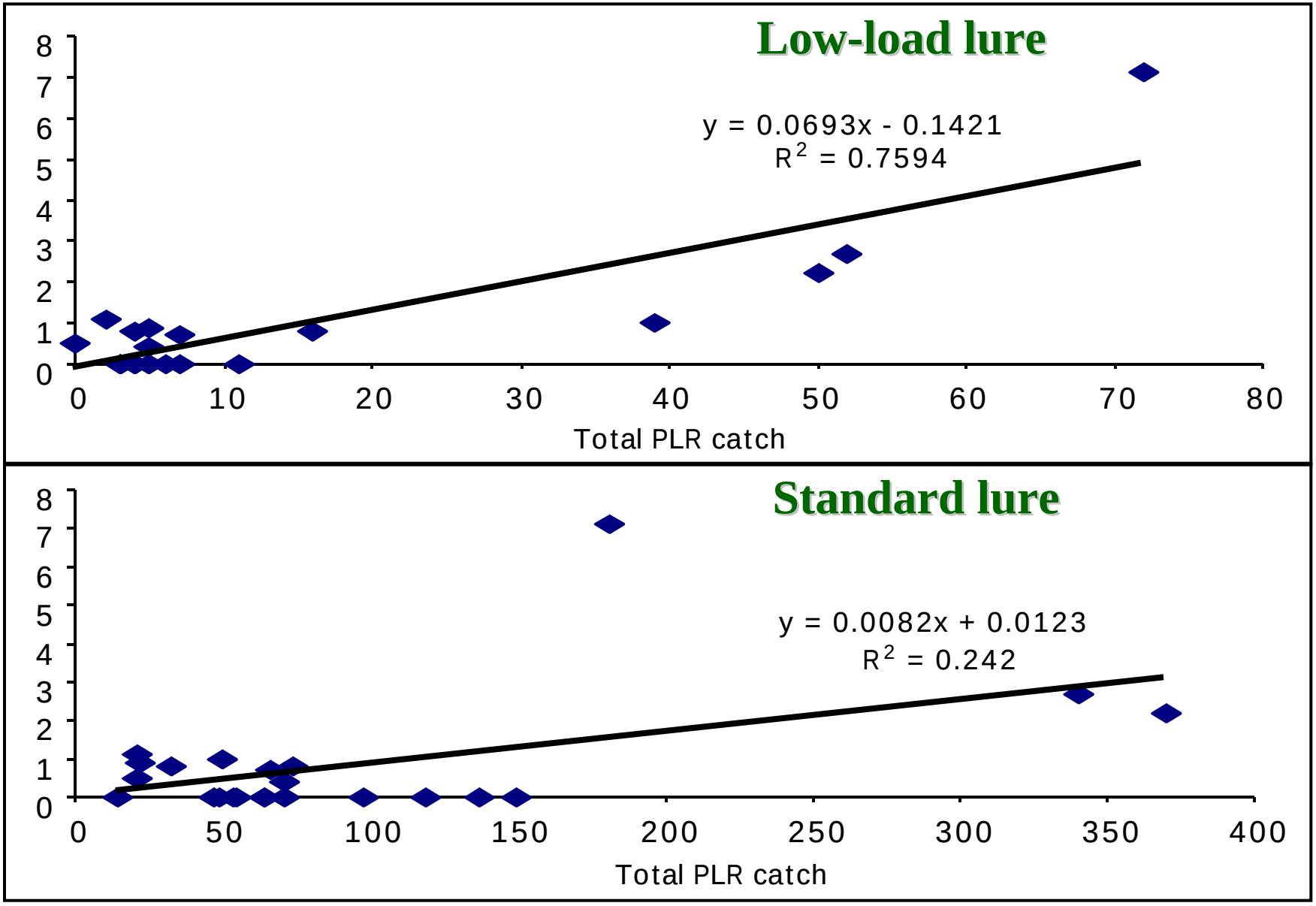


OBLR Lure Test Results

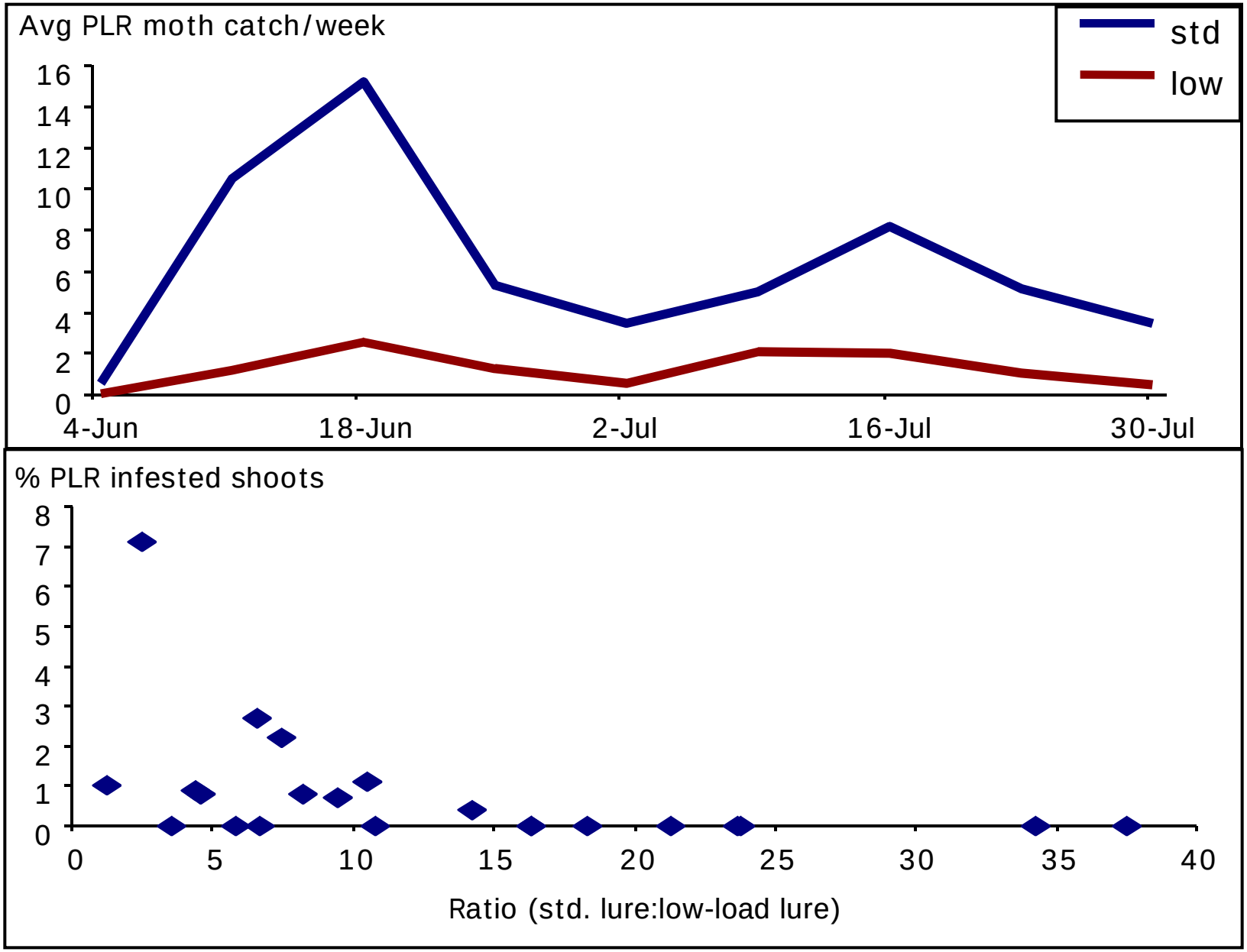


PLR Low-load Lure Results

% PLR infested shoots



PLR Low-load Lure Results



CM Lure Test Summary

Long-life pheromone lures used to monitor codling moth (CM) in pheromone treated orchards were compared for efficacy and longevity. A high load lure referred to as a "bubble" lure (CM Super Lure) engineered by Pherotech, Inc. was the most effective lure during the first generation. It was significantly more attractive than the commercial standard, a red septum loaded with 10 mg of codlemone, and maintained its attractancy for a longer period of time. The bubble lure remained at least as attractive as a red septum replaced at regular intervals (12 days) throughout 60 days of testing during each generation. Two experimental lures (CM-P and CM-S, Scenturion, Inc.) were in place for 48 days of testing during the first generation. The CM-P lure (experimental lure from Scenturion, Inc.) performed statistically equivalent to the bubble. During the second generation there was little difference in the efficacy of all lures tested. Lures tested included the bubble lure, CM-P and the Megalure (Trécé, Inc.). All long-life lures maintained their attractancy at least statistically equivalent to the red septa changed at regular intervals over 60 days of the second generation. Although not statistically significant, the long-life lures appeared to have reduced attractancy after 48 days.

CM Field Test Summary

Bubble lures and 10X red septa (10 mg of codlemone) were evaluated in side-by-side comparisons at 25 mating disruption sites for their ability to monitor codling moth (CM) activity and predict fruit injury at harvest. The bubble lure attracted more CM than the red septum during the first generation and similar numbers during the second generation. During the second flight the bubble lure appeared to attract more moths early in the flight (approx. 30-40 days), and the septum attracted more during the last 3 weeks of the flight. The benefit of the long lasting bubble lure was that a single bubble lure per generation was as effective as the red septum changed 4 times. Therefore, implementation of the bubble lure could result in a significant reduction in labor costs associated with monitoring. Trap catch during the second generation was lower compared to the first generation with both lures. In fact, there were locations with little or no moth capture occurred yet where significant fruit injury was recorded. The bubble lure does not seem to address the problem of poor trapping efficiency during the second generation. There will likely remain situations where fruit injury is detected in orchards with low trap catch. In warmer areas, three bubble lures changed at 45 days may be required to cover the entire growing season.

OBLR Low-load lure Summary

Pheromone lures used to monitor obliquebanded leafroller (OBLR) were compared for efficacy. The industry standard leafroller lure is a red septum loaded with 1 mg of a species-specific pheromone [western blend of the obliquebanded leafroller pheromone (OBLR W)]. The red septa are relatively long lived (at least 6 weeks) and very attractive to OBLR males. The standard red septum has the ability to attract moths from well outside an area of interest. For these reasons, increased longevity or attractancy of experimental lures is not a primary concern. In fact, it may be beneficial to develop a lure that releases less pheromone as a means of measuring within-orchard adult populations that could predict larval densities in the subsequent generation. Three low-load OBLR lures were produced at Michigan State University. The lures tested during both generations had the following relative loads: Standard OBLR W load (1X), 5%, 1% and 0.5% of the standard load (0.05X, 0.01X and 0.005X). A significant dose (load) response was noted during each generation. The 0.05X, 0.01X, and 0.005X load lures attracted 30-40%, 20% and 10% as many moths as the standard load (1X). Earlier tests suggest that reducing trap catch to 15% of the standard may be required to exclude outside populations from traps. The low-load lures appear to have maintained their relative attractancy to the standard load lure through the 54 days of each generation.

OBLR Inhibitor Summary

During synthesis of the OBLR pheromone a contaminate can be produced. It is imperative that the contaminate be removed from the pheromone blend or it will act as an inhibitor and affect attractancy of the lure. In 1997, Scenturion, Inc. loaded rep septa with pheromone containing various amounts of this inhibitor. Tests from our lab showed that pheromone with as low as 0.3% inhibitor reduced lure efficacy. Tests in 1999 were designed to test inhibitor levels below 0.3% during the both generations. Scenturion, Inc. provided lures with pure OBLR W pheromone at the standard load, as well as those with a standard load that contained either 0.3%, 0.2% or 0.1% inhibitor. All lures with contaminated pheromone showed significantly reduced attractancy. The 0.1% inhibitor lure attracted significantly more moths than the lures loaded with 0.2% or 0.3% inhibitor. There was no significant difference noted between the 0.2% or 0.3% inhibitor lures. The same pattern existed for both generations.

PLR Low-load Lure Summary

Standard and low-load pheromone lures used to monitor pandemis leafroller (PLR) were evaluated for their ability to predict in-orchard larval densities of the following generation. The low-load lure reduced PLR moth capture to about 15% of the standard load lure. The level of relative attractancy was maintained through the entire first flight. The correlation between moth capture and larval densities of the following generation was improved using the low-load lure. There were relatively few cases with the low-load lure where significant moth capture was noted and no larvae detected. A poor correlation was noted between moth captures with the standard lure and larval densities the following generation. There was evidence that using a ratio of moth catch, standard:low-load PLR lures, of less than 10 could be used as a system for assessing in-orchard populations of PLR. Reducing the attractancy of the leafroller pheromone lures as a tool to measure in-orchard leafroller popoulations has potential and may aide in developing better treatment thresholds for larvae based on moth capture.