

1. Thresholds,/Monitoring/Sampling
  - b. Monitoring - conventional orchards  
Codling moth, *Cydia pomonella* L., Apple

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**Summary:** Pheromone lures used in traps to monitor codling moth (CM) in conventional orchards were compared for efficacy and longevity. Attractancy of the standard lure, a red septum loaded with 1 mg of codlemone, lasted 3-4 weeks in the spring and about 2 weeks in the summer. Gray septa loaded with 3.5 or 5.0 mg of codlemone were attractive throughout the 8 week flight of each CM generation, although during the peak of second generation flight their performance declined significantly. The period of reduced attractancy corresponded to three weeks when temperatures were consistently at the highest levels. Pheromone release rates from aged septa are currently being analyzed by ion mobility spectrometry techniques. Preliminary release rate results are consistent with moth catch data. Lures were most attractive when release rates were between 0.5 and 3.0  $\mu\text{g}$  per hour. High summer temperatures appeared to increase the pheromone emission rate, thus shortening the effective life of the lure. Evaluation of the gray lures in large commercial orchards indicated they were less effective than the standard red septum. Further research on the performance of gray septum are warranted prior to increased use in commercial orchards.

### **Standard lures - Conventional block monitoring**

**Experimental design:** The effectiveness of three pheromone lures for monitoring CM was determined. The lures tested were the commercially available red septum (Trece, Inc.) and gray septa loaded with either 3.5 or 5.0 mg of codlemone. All lures were aged throughout the duration of the test with the exception of a red septum replaced every 8 d which acted as a relative standard against which to judge the attractancy of other lures. The experimental design was a randomized complete block (6-8 blocks). The number of male moths captured in Pherocon 1CP traps baited with the different lures were recorded every 2 d. To minimize position effects, traps were rotated each time they were inspected. Trap bottoms were replaced after a cumulative catch of 40 moths, more often if dirty.

The relative attractancy of the various lures during the first and second generation flights of CM are shown in Figures 1 and 2. Data are presented as the average capture of moths in traps baited with different lures relative to the standard or "control" (red septum changed every 8 d), shown as a value of one (broken line).

**First generation comparison:** The attractancy of gray septum loaded with 3.5 or 5.0 mg of codlemone was similar to that of a standard red septum (Fig. 1). Both gray lures maintained their attractancy throughout the first generation flight of CM. After 48 d of exposure in the field, there was no significant difference in moth capture in traps baited with gray septa loaded with either the 3.5 or 5.0 mg of codlemone and traps baited with a red septum replaced every 8 d. In contrast, aging had a significant negative effect on the attractancy of the red septum (Fig. 1). Moth capture in traps baited with this lure declined after 2 to 3 weeks. Moth capture in traps baited with the aged red septum was less than half that of traps baited with a new red septum from the third trapping period to the end of the test.

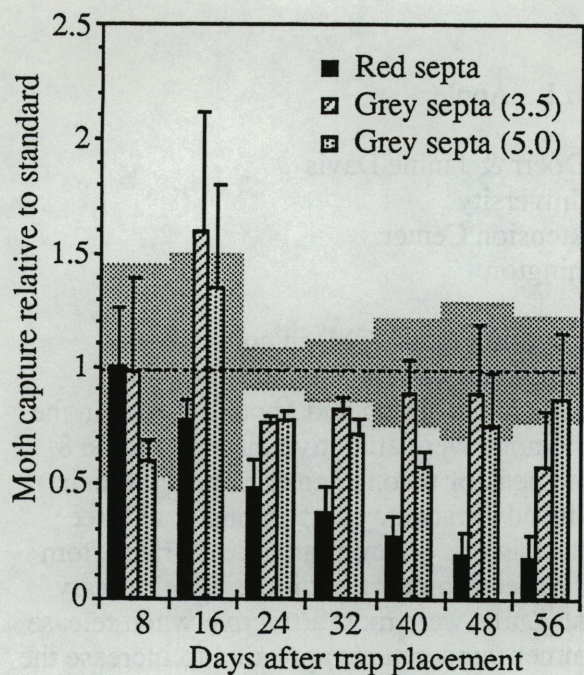


Fig 1. First generation capture of CM males in pheromone traps baited with three types of lures relative to a red septum replaced every 8 days (broken line). The shaded area indicates the standard errors for average moth capture in traps baited with the new red septum.

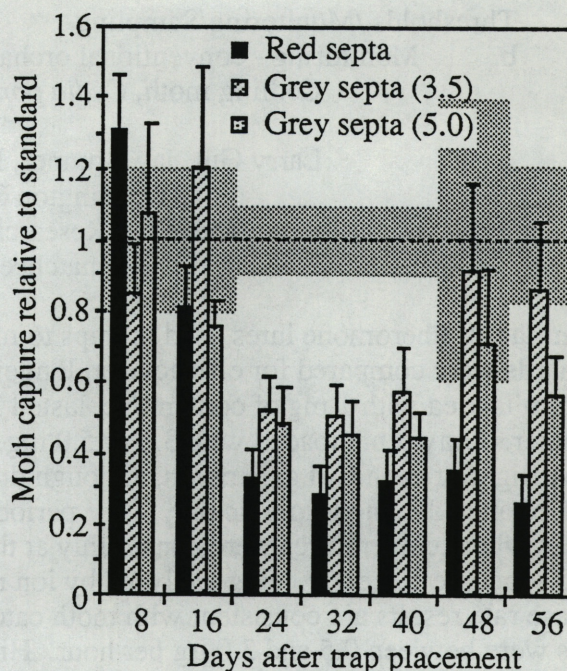


Fig 2. Second generation capture of CM males in pheromone traps baited with three types of lures relative to a red septum replaced every 8 days (broken line). The shaded area indicates the standard errors for average moth capture in traps baited with the new red septum.

**Second generation comparison:** None of the lures performed as well during the second generation CM flight (Fig. 2) compared to the first. The red septum was again attractive for the shortest period of time, but the reduction in relative moth catch between day 16 and 24 was more dramatic compared to the first generation. Red septa baited traps only captured about one third the number of moths as traps baited with new red septa each trapping period for the remainder of the second generation flight. After 16 days exposure in the field, gray septa loaded with either 3.5 or 5.0 mg of codlemone also were significantly less attractive than the red septum replaced at regular intervals. The gray lures continued to attract about 50% fewer moths than a fresh red septum throughout the middle of the summer (Fig. 2, days 24, 32 & 40). However, during the last two weeks of the second generation flight the gray septa, particularly the one loaded with 3.5 mg of codlemone, were again as attractive as the red septum replaced at regular intervals.

**Pheromone emission rates:** Differences in pheromone emission rates were probably the major factor affecting the performance of lures. The rate of pheromone released from different lures is currently being determined by ion mobility spectrometry techniques. Lures were collected at 7-10 d intervals during both CM flights. Preliminary analysis of field aged lures collected in 1994 indicate a strong relationship between measured emission rates and relative moth catch. Lures were most attractive when emission rates were between 0.5 and 3.0  $\mu\text{g}$  per hour. A longer period of high emission from red septum in the spring compared to the summer correlated well with the prolonged attractancy of this lure in the spring reported herein and in earlier studies (Gut and Brunner, 1994). High summer temperatures appeared to increase the pheromone emission rate, thus shortening the effective life of the lure.