Influence of Temperature on the Rate of Grandlure Released from Boll Weevil Pheromone Lures

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Background

The quality and timely replacement of pheromone lures are critical to the success of boll weevil eradication programs. Currently, the Texas and Mexico programs use lures dosed with 10 mg of grandlure and replace lures in traps biweekly. However, it has been speculated that the trapping regime in southern Texas and northeastern Mexico may have to be modified to account for the subtropical climate. We examined the influence of temperature on the rate of pheromone released from three commercial pheromone dispensers (Hercon, Plato, and Scentry) under both laboratory and field conditions. Presented herein is an overview of our findings.

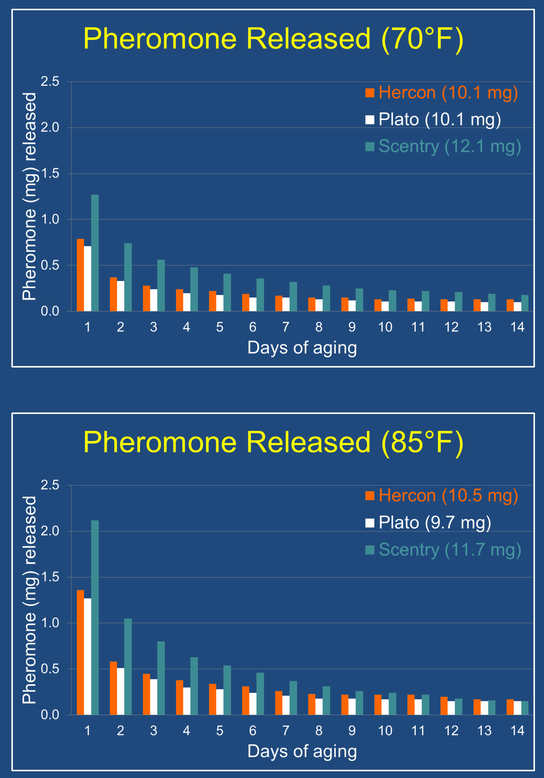
Experimental Approaches

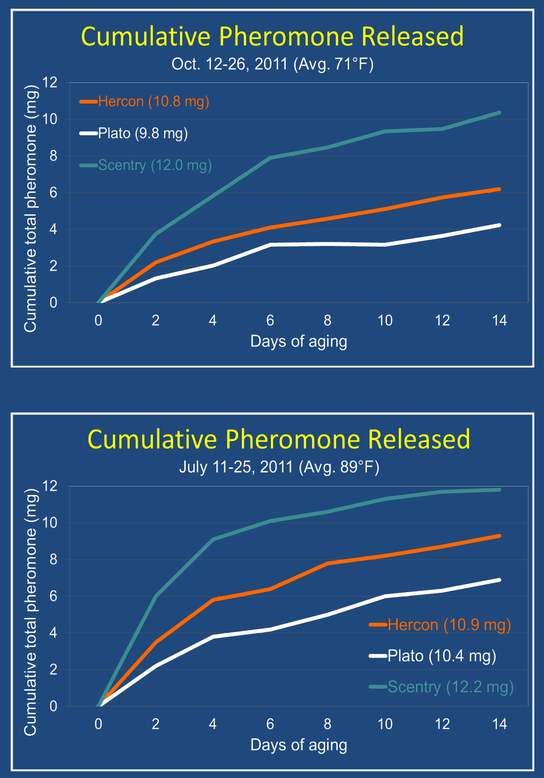
Laboratory evaluation (70 and 85°F)

- Five or six lures from each manufacturer placed individually in pheromone collection vessels
- Pheromone released into headspace of vessels collected and measured daily for 14 d
- Two trials each at 70 and 85°F

Field evaluation

- Lures aged within traps under field conditions
- Ten lures of each type collected at 0, 2, 4, 6, 8, 10, 12, and 14 d of aging
- Four trials (June 6-20, July 11-25, Sept. 12-26, and Oct. 12-26)
- Pheromone release based on the initial (0 d) and residual pheromone content of lures on the day of collection





Results & Discussion

- Percentages of the four grandlure components remained consistent throughout the 14-d aging period and under different air temperatures.
- Although there were substantial differences in the total amount of pheromone released among lure types, the overall influence of temperature on the pattern of pheromone release was similar among lures.
- In general, increases in air temperature resulted in increased release of pheromone.
- A substantial of amount of pheromone was released during the first 3 to 4 d of aging, regardless of temperature. However, this initial burst of pheromone was more pronounced under warmer temperatures.
- The amount of pheromone released during the first week of aging was generally 3-4 times greater than the amount released during the 2nd week of aging.
- Such reductions in pheromone release during the 2nd week of aging may be responsible for the inconsistent performance of traps in detecting incipient weevil populations.

Conclusions

Although the total amount of pheromone released differed substantially among lure types, air temperature had a similar effect on the pattern of pheromone released from lures. In general, 70 to 80% of the total pheromone released from lures was emitted during the first week of aging. Consequently, the reduced amount of pheromone released during the 2nd week may limit the detection efficiency of traps. In order to maximize detection of weevils with traps in southern Texas and northeastern Mexico, our findings suggest the dose of grandlure should be increased in lures to ensure a sufficient amount of pheromone is released during the 2nd week or alternatively, lures need to be replaced more frequently.

Composition of Pheromone

Environment	Lure	Mean ± SD % content of pheromone			
		Comp I	Comp II	Comp III	Comp IV
Laboratory	Hercon	32 ± 1	38 ± 1	15 ± 1	15 ± 1
	Plato	31 ± 1	36 ± 2	17 ± 1	16 ± 1
	Scentry	31 ± 1	37 ± 3	16 ± 2	16 ± 2
Field	Hercon	32 ± 1	41 ± 1	14 ± 1	13 ± 1
	Plato	33 ± 1	40 ± 1	14 ± 1	13 ± 1
	Scentry	32 ± 1	41 ± 2	14 ± 1	13 ± 1

Avg. Daily Pheromone (mg) Released

Temperature	Lure (mg)	Week 1	Week 2
70°F	Hercon (10.1)	0.32	0.14
	Plato (10.1)	0.28	0.11
	Scentry (12.1)	0.59	0.22
85°F	Hercon (10.5)	0.52	0.20
	Plato (9.7)	0.46	0.16
	Scentry (11.7)	0.85	0.21

Avg. Daily Pheromone (mg) Released

Trial	Lure (mg)	Week 1 (0-6 d)	Week 2 (8-14 d)
June 6-20	Hercon (9.3)	0.80	0.28
Avg. 87°F	Plato (9.8)	0.75	0.28
	Scentry (11.9)	1.60	0.17
July 11-25	Hercon (10.9)	1.07	0.25
Avg. 89°F	Plato (10.4)	0.70	0.32
	Scentry (12.2)	1.68	0.20
Sept. 12-26	Hercon (10.5)	0.95	0.28
Avg. 82°F	Plato (9.7)	0.62	0.33
	Scentry (11.7)	1.53	0.30
Oct. 12-26	Hercon (10.8)	0.68	0.27
Avg. 71°F	Plato (9.8)	0.53	0.17
	Scentry (12.0)	1.32	0.32

Acknowledgment

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