Alternative management strategies for outdoor nuisance cockroaches in California

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What’s an Urban IPM Advisor?! 

- New (2012) program area for UCCE and UC IPM
- Clientele: urban pest management professionals
- Goals: reduce unnecessary pesticide applications, improve surface water quality, increase provision of and demand for IPM services
Central tenets of IPM

- Education
- Prevention
- Monitoring
- Treatment Thresholds
- Multiple Tactics
- Integration
- Evaluation
Outdoor cockroaches in California

• Omnivorous detritivores
• Highly dependent upon moisture, humidity
• Typical habitat: water meter box, pavement voids, drains, loose mulch, compost
• Warm weather = increased activity
• Low moisture = emergency water seeking
• Landscape dry-down = water seeking behavior
Oriental cockroaches

- **Oriental cockroach**, *Blatta orientalis*
- Live, breed in dark, damp outdoor locales
- Cannot climb slick surfaces
- Sometimes called ‘water bug’ in CA

**Adults:** 1 ¼ inch long, black to brown, flightless, males with reduced wings

**Nymphs:** ¼” to 1 ¼”, reddish to dark brown
Turkestan cockroaches

- Females: 1 inch long, dark brown, flightless
- Males: ~ 1 inch, light brown, well-developed wings
- Nymphs: 1/6” to 1”, reddish brown

Turkestan cockroach, *Blatta lateralis*

- Live, breed in dark, damp outdoor locales
- Cannot climb slick surfaces
- Relatively new to CA
Turkestan cockroaches

- Native to the Middle East
- Most common outdoor nuisance species in southern CA
- Becoming more common in the Central Valley (Bakersfield to Redding)
- Isolated populations elsewhere (Ukiah)
Turkestan vs. Oriental roaches

• Turkestan roach is displacing Oriental roach in much of the American SW

• Why?
  – Faster development (~ 250 d vs ~ 500 d at 25°C)
  – More egg cases produced (up to 25 vs up to 10)
  – Decreased cuticular water loss
Turkestan vs. Oriental roaches

- **Width of thorax**: space between wing buds
- **Two pale stripes**: on Turkestan wing buds

**Females:**
- A: Turkestan
- B: Oriental
Turkestan vs. Oriental roaches

Males:
A: Turkestan
B: Oriental

- Wings: fully developed vs. brachypterous
- Base color strikingly different
Turkestan vs. Oriental roaches

Nymphs:
A: Turkestan
B: Oriental

• Turkestan nymphs slightly smaller
• Color of head and thorax differ (degree of red)
Other (large) outdoor cockroaches

- **American cockroach**, *Periplaneta americana*
  - Sewers, zoos
  - Warm (> 80°F), humid
  - Very large (2”)

- **Smokybrown cockroach**, *Periplaneta fuliginosa*
  - Rare in CA
  - Landscapes, woodpiles
Another new species

- Threelined cockroach, *Luridiblatta trivittata*
Threelined cockroach

- Very small: adults 7 – 9 mm (1/3 inch)
- Wingless
- Detritivores
- Native to Mediterranean region
- Restricted to SF Bay Area and North Coast in CA
Threelined cockroach
IPM for outdoor nuisance cockroaches

• **Prevention**
  – Moisture management
  – Habitat modification
  – Exclusion

• **Monitoring**
  – Sticky traps / glue boards
IPM for outdoor nuisance cockroaches

• Thresholds…

• Multiple tactics
  – Chemical tactics
    • Baits
      – Granules
      – Gels
      – Bait stations
    • Foams
    • Liquid contact
    • Liquid barriers
On July 19, California’s Department of Pesticide Regulation (DPR) introduced new regulations for pyrethroid insecticide applications made in outdoor nonagricultural settings (California Code of Regulations, Title 3, Division 6, Sections 6000, 6970, and 6972; http://www.cdpr.ca.gov/docs/legbills/calcode/chapter_9.htm). The United States Environmental Protection Agency has identified pyrethroids as toxic to indicator species representing the small arthropods that make up the base of the aquatic food web. The new regulations address applications of 17 different active ingredients (Table 1; see Page 3) during rain, to standing water, to areas in close proximity to surface waters, and to horizontal and vertical impervious surfaces.
Bait Evaluations: Lab Methods

- Lab of Professor Mike Rust (UC Riverside)
  - Plastic containers
  - + 5 ♂, 5 ♀, 25 nymphs
  - + 1 g bait (14 d exposure) as fresh or aged (7 d) deposit

<table>
<thead>
<tr>
<th>product</th>
<th>active ingredient, formulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advion Cockroach Gel Bait (Syngenta)</td>
<td>0.6% indoxacarb, gel</td>
</tr>
<tr>
<td>Advion Insect Granule (Syngenta)</td>
<td>0.22% indoxacarb, granule</td>
</tr>
<tr>
<td>MaxForce FC Magnum Roach Bait (Bayer)</td>
<td>0.5% fipronil, gel</td>
</tr>
<tr>
<td>Optigard Cockroach Bait (Syngenta)</td>
<td>0.1% emamectin benzoate, gel</td>
</tr>
<tr>
<td>Vendetta Plus Cockroach Gel Bait (MGK)</td>
<td>0.05% abamectin B1, 0.50% pyriproxyfen, gel</td>
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</table>
Laboratory mortality (%) of *Blatta* cockroaches after 14 days exposure to various baits

* indicates Turkestan cockroaches exposed to fresh bait deposits
** indicates oriental cockroaches exposed to gel bait allowed to dry for seven days within the laboratory
Bait Evaluations: Lab Results

Summary

• Baits tested were extremely effective against both species
• Males easiest to kill, nymphs most difficult
• Aged (7D) baits remained very effective
• Activity may be due to contact rather than ingestion (very little eaten) in some cases
• Additional aging, drying trials underway
Field demonstrations: Turkestan cockroach control at public schools

- Mendocino County, Riverside County
- CA Healthy Schools Act requirements
  - no sprays, bait within stations only
Case study: Turkestan cockroaches in public schools

• New approaches:
  – Extensive structural exclusion / habitat modification
  – Hardscape sealing
  – indoxacarb (Advion) and clothianidin (Maxforce Impact) baits
    • Granules in dry, inaccessible harborages
    • Gels in locked stations in wet harborages
  – thiamethoxam (Optigard) foam
Structural exclusion and habitat modification
<table>
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<tr>
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<th>application rates, frequencies used, Mendocino County</th>
<th>application rates, frequencies used, Riverside County</th>
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<tr>
<td>Advion Cockroach Gel Bait (Syngenta)</td>
<td>0.6% indoxacarb, gel</td>
<td>3 g / bait placement, 12 g per treatment area, monthly June 2017 – October 2017 and March 2018 – June 2018</td>
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<td>1.0% clothianidin, gel</td>
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Mendocino County, very high density

observed decreases in Turkestan cockroach density during a one-year bait-only IPM demonstration

inactivity / overwintering

Note: no bait was applied and no data were collected during the period of inactivity / overwintering (October - March)
Southern CA Field Study

- Midland Elementary; Moreno Valley (Riverside County)
- Turkestan cockroaches present at lower density, some complaints (staff, students)
Cumulative Turkestan cockroach density during a one-year bait-only IPM program.
Bait Evaluations: Field Results

Summary

• Exclusion tactics have been successful
• All baits tested appear to be extremely effective against both *Blatta* species
• Targeted foams have been successful
• Entire population appears to have crashed at northern CA site (foraging ranges may be large)
• Significant reductions at southern CA site
Overall Project Findings

• Outdoor bait-only programs can be used to manage *Blatta* cockroaches in CA
• Targeted foam applications can be used to help reduce large populations
• Such programs help manage insecticide resistance and can be used at sensitive sites or when regulations do not allow for perimeter sprays
Thanks!...Questions?

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