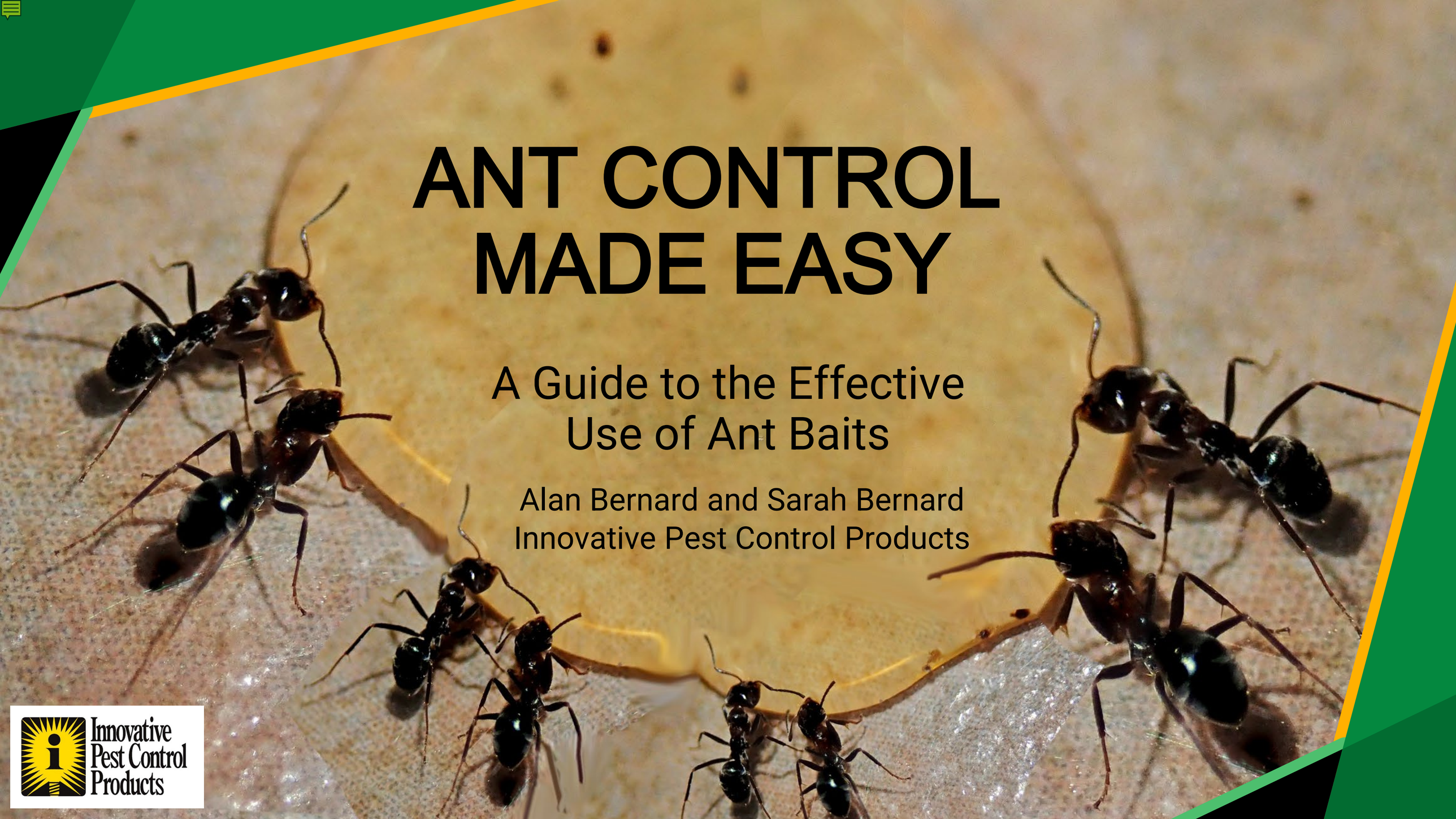

ANT CONTROL MADE EASY

A Guide to the Effective Use of Ant Baits

Alan Bernard and Sarah Bernard
Innovative Pest Control Products

Innovative Pest Control Products

OBJECTIVES

To understand pest ant behavior

- Geographic, Food specific, Time specific, Temperature specific

To use this understanding to:

- Reduce food sources, harborage sites, and entryways into the structure
- Select the proper baits
- Place baits most effectively

To develop a program to eliminate current and future ant infestations

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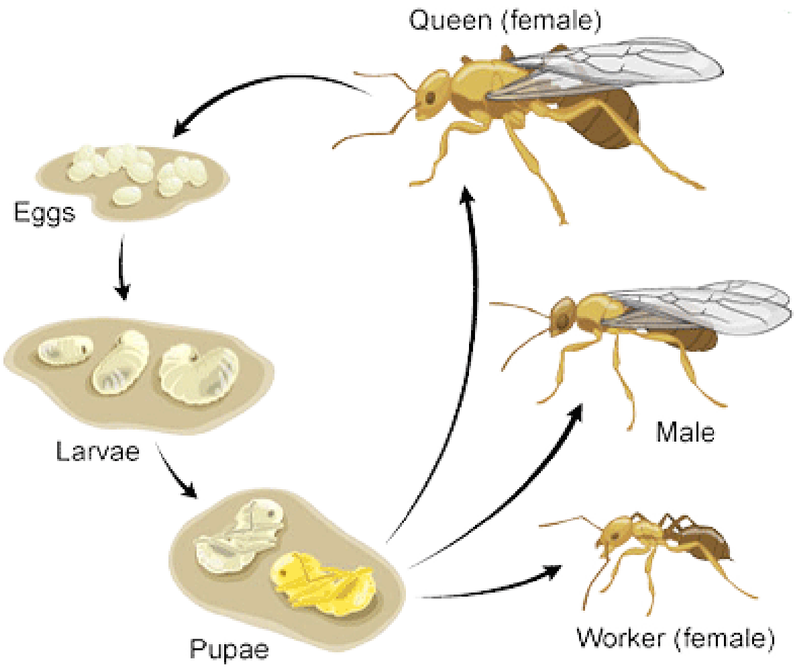
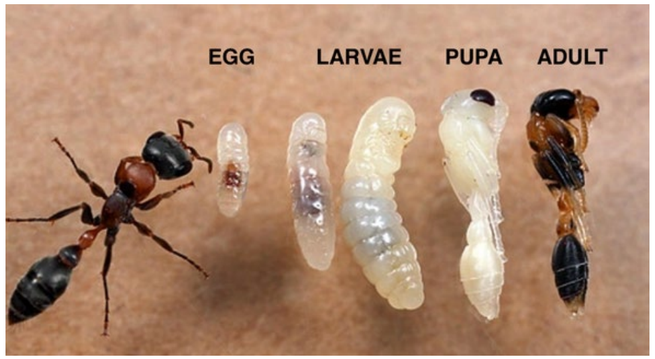
ANTS

Ants develop through a process of complete metamorphosis with specialized functions as adults



- Fertile female
- Winged male
- Infertile worker



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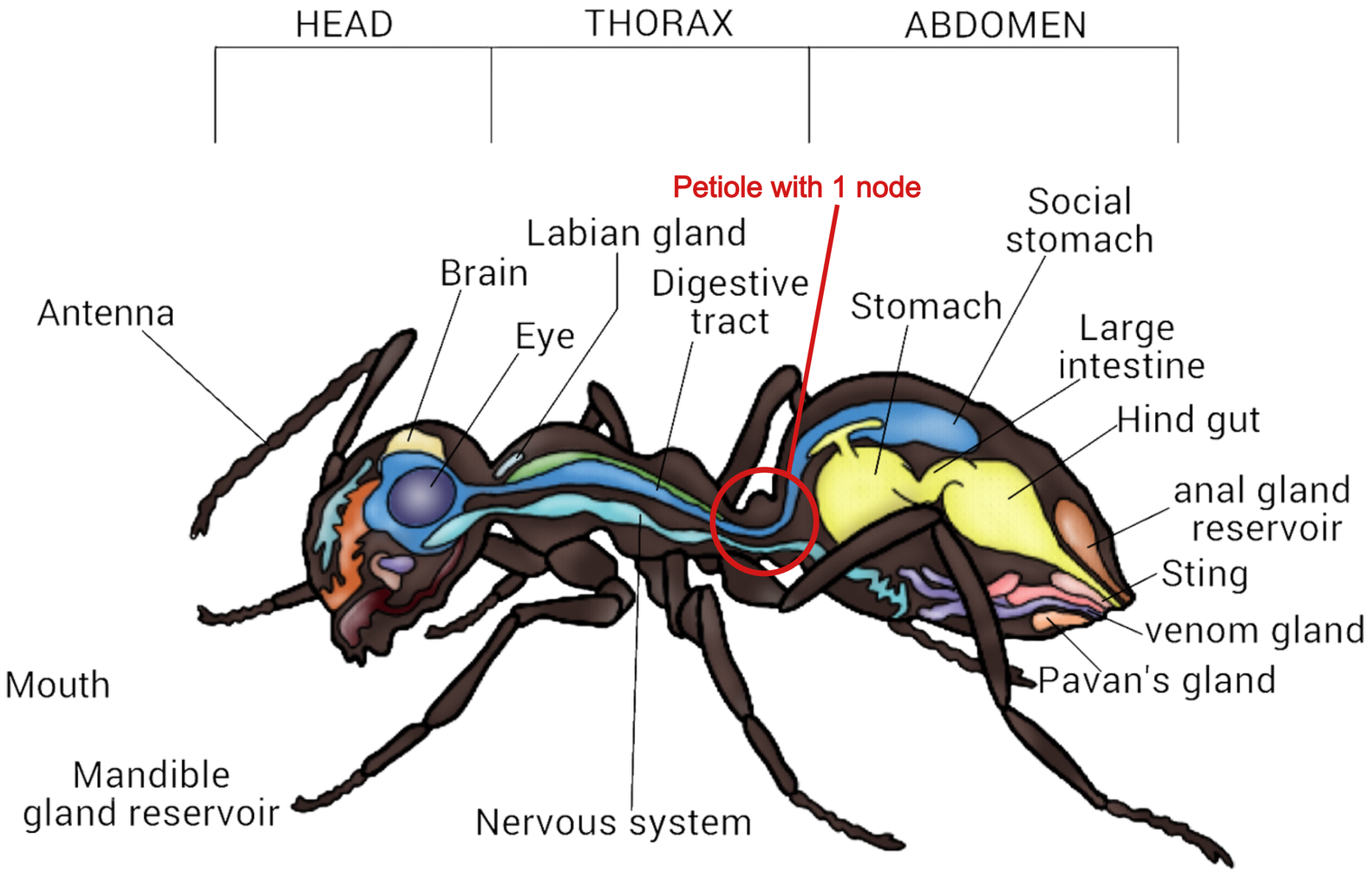
ANTS

Morphology

- Antennae
- Head
- Thorax
- Petiole
- Abdomen



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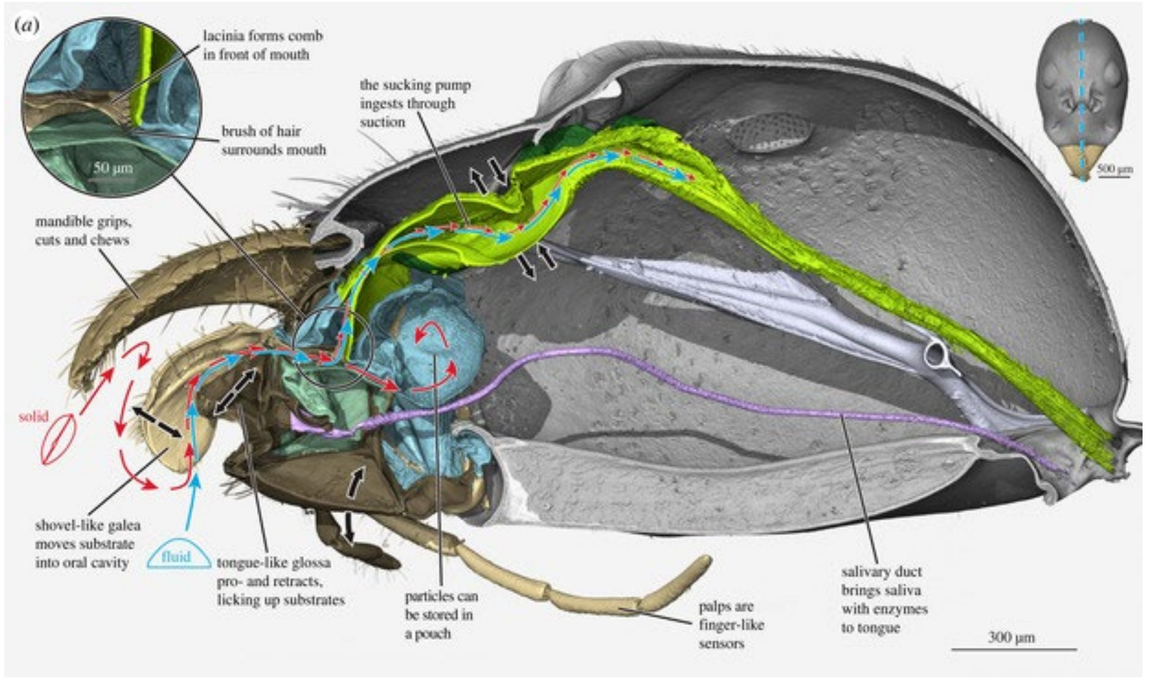
ANTS

Morphology

- Mandibles
  - Used to break down solid food
  - Infrabuccal plate filters solids from liquids
- Petiole (waist)
  - physical constraint limiting food to liquids
- Crop (social stomach)
  - stores liquid food to share with colony (trophallaxis)



Richter Adrian and Economo Evan P. 2023

Ant trophallaxis - transfer of liquid food from social stomach

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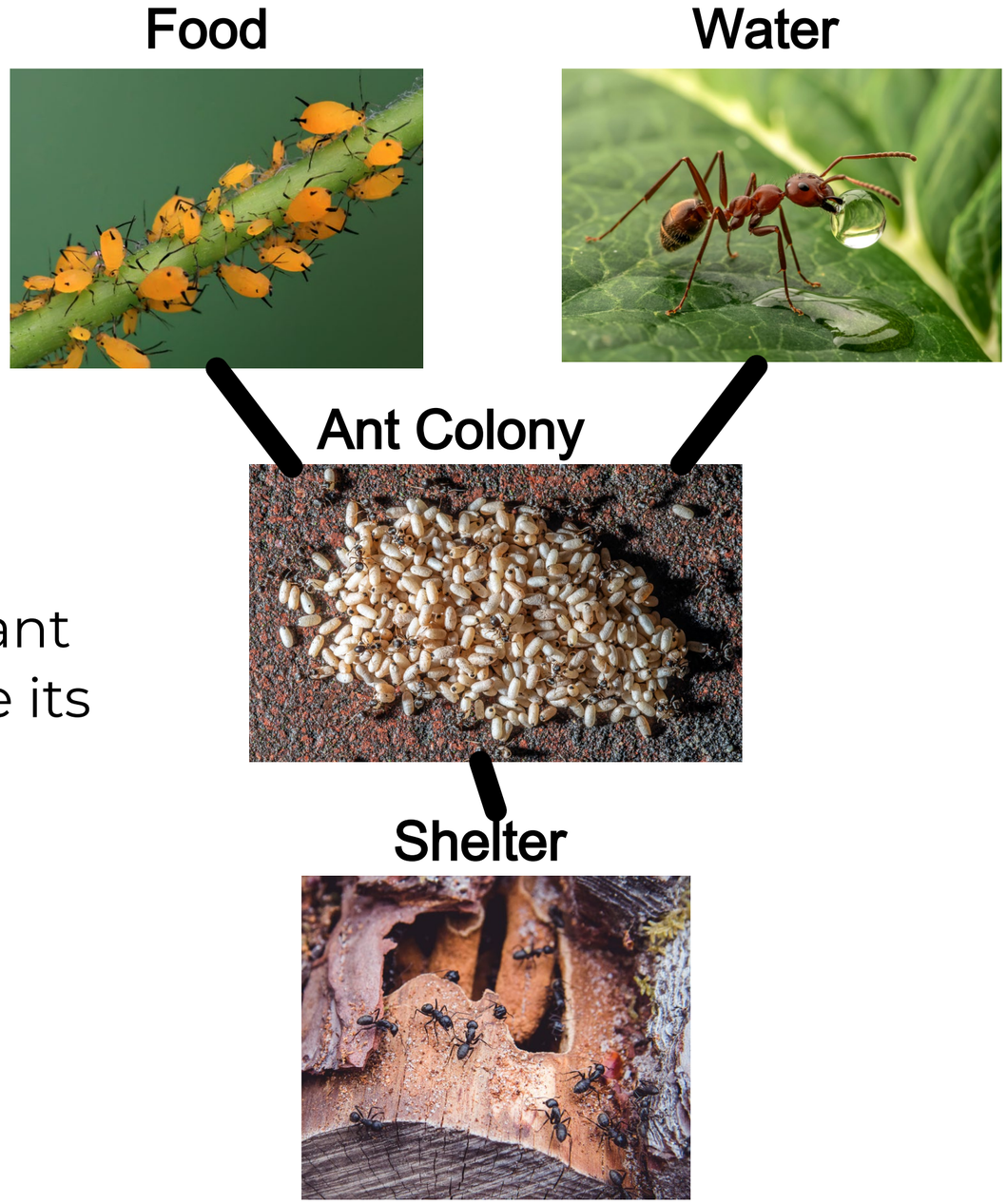
ANTS

The most important goal for an ant colony is to reproduce

To accomplish this goal the ant colony must efficiently utilize its members to:

- Maintain the nest
- Defend the nest
- Secure food
- Secure water



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COMMON PEST ANTS

The most common pest ants are “Tramps”

Tramp Ants:

- Primarily disbursed by human activity
- Complex social structure often w/ multiple queens
- Monomorphic workers (non specialized)
- Can reproduce by budding
- Very large colonies
- Very territorial (interspecies aggression)

“The Last Ant Standing” California Grey Ant, shot by Matt Witman at Witman Ranch, 2007

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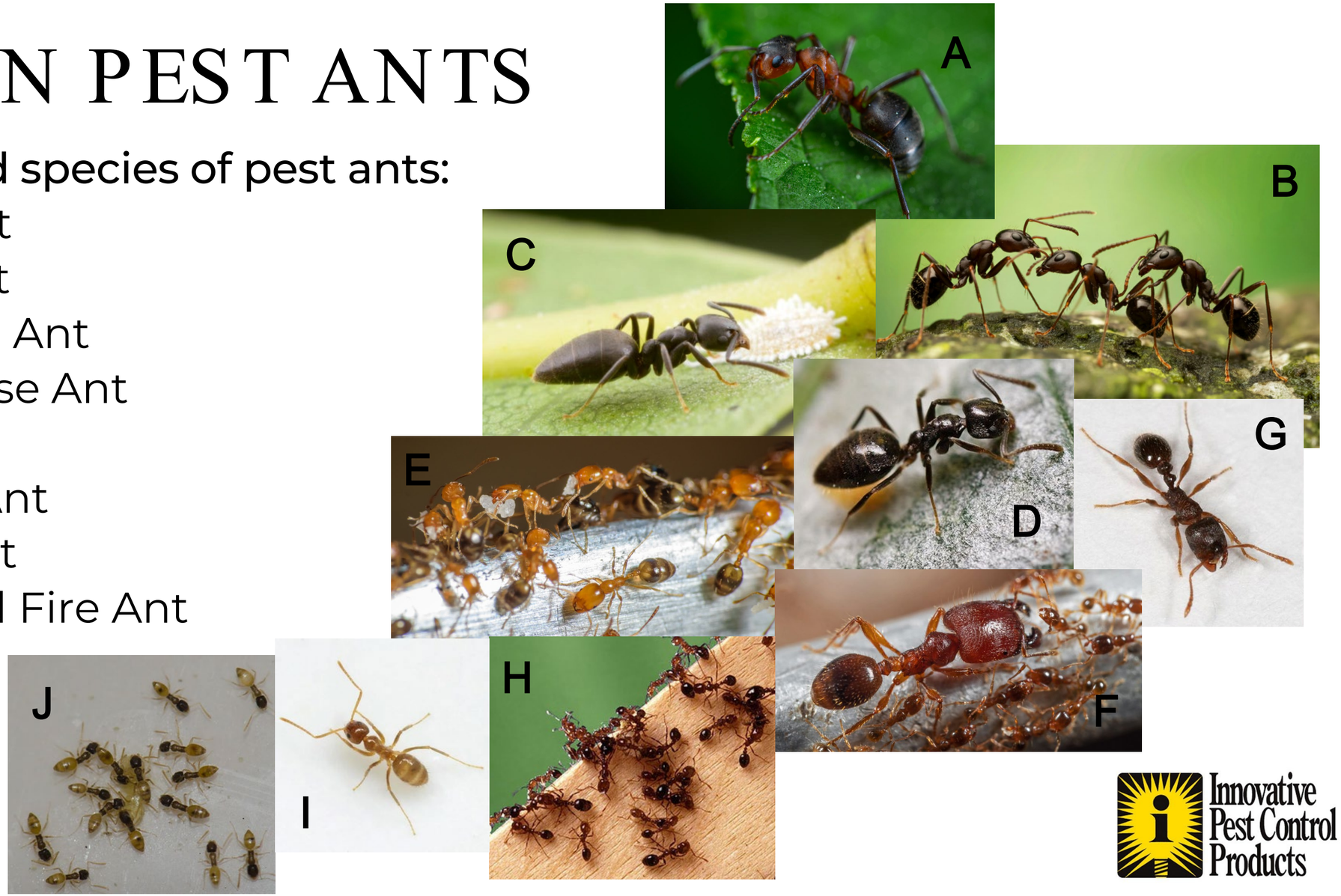
COMMON PEST ANTS

Commonly found species of pest ants:

- Carpenter Ant
- Argentine Ant
- White Footed Ant
- Odorous House Ant
- Pharaoh Ant
- Big Headed Ant
- Pavement Ant
- Red Imported Fire Ant
- Crazy Ant
- Ghost Ant



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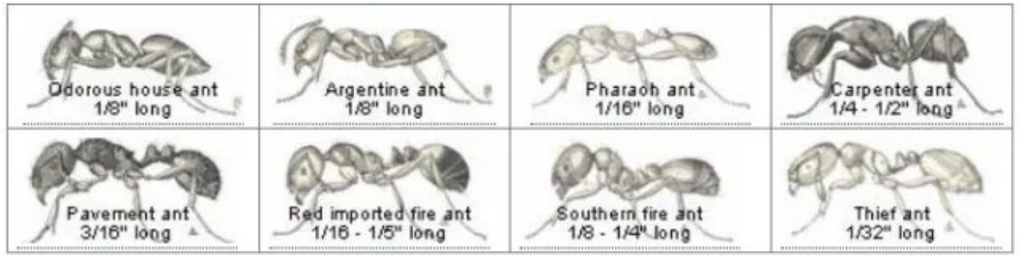
PEST ANT IDENTIFICATION

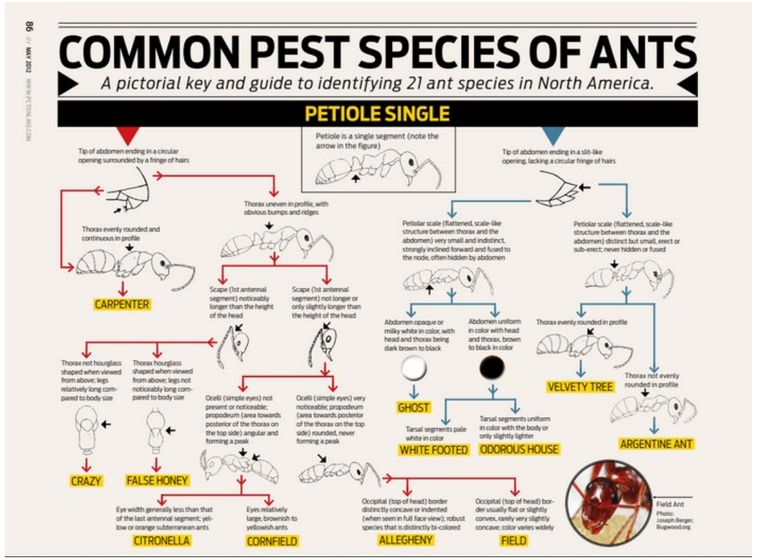
MANY more pest ant species now than in the past

- Many ID resources available
  - Pest Ant Keys
- Important to ID for effective pest management
- More classes available
  - Invasive Ant Boot Camp (UF)

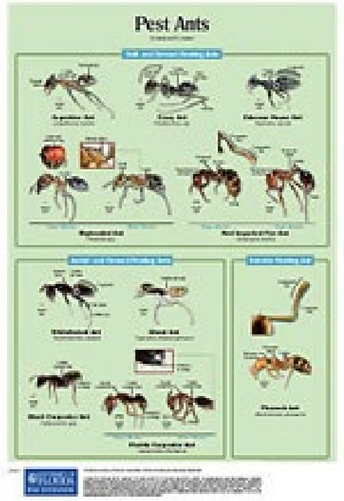


https://ucanr.edu/county/ucce -sonoma -county/ant -identification

MGK Ant Pest Key



PCT Online



University of Florida

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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- A single ant does not think, it only reacts to stimuli in its environment
- Ants rely on pheromone trails for foraging
- Only a small portion of colony workers forage for food (about 10%)
- Foragers are oldest workers in colony

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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Most ants in the colony work at maintaining the nest, feeding the queen(s) and brood
- When food is located, workers are recruited to exploit food source
- Larger food sources elicit a larger response

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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- The colony's nutritional preferences may vary by season, stage of colony development, or ease of acquisition

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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Ants are territorial and will keep less aggressive species out of their feeding areas

Youtube Video: "How Ants Get Angry"

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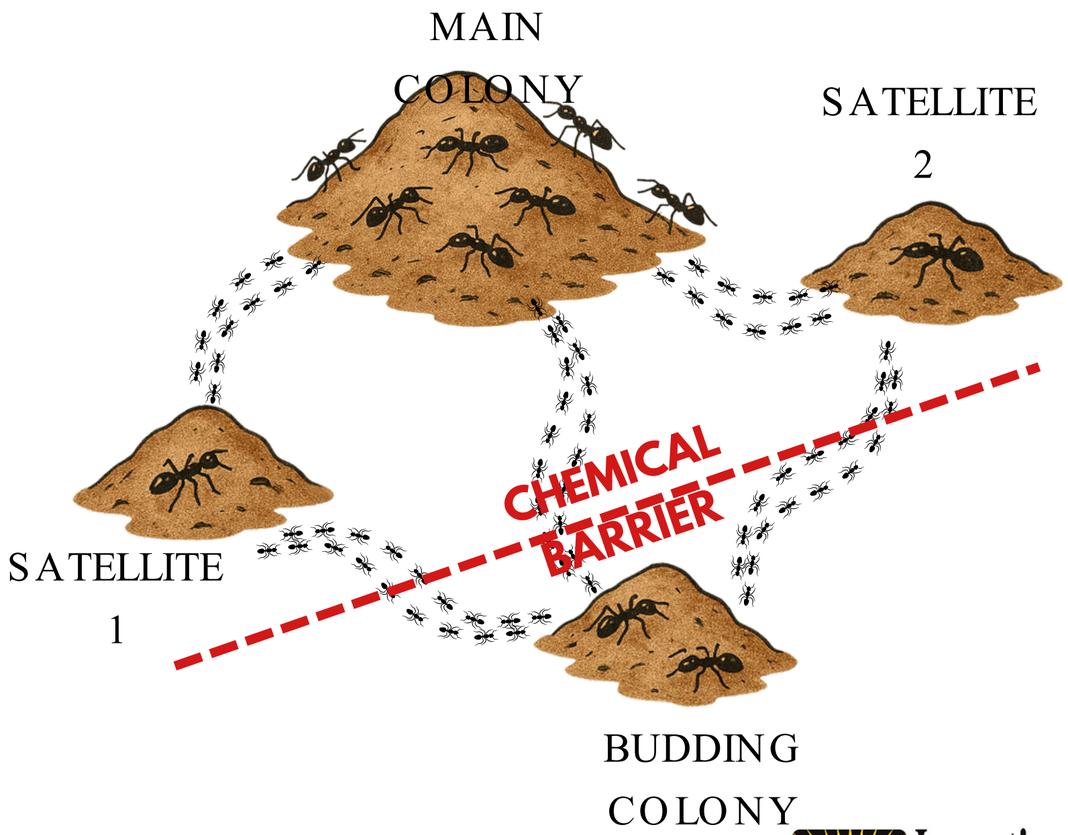
UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Often have multiple queens and sub-colonies connected to the main colony that share workers
- If Sub-colonies are cut off, they can survive and create additional colonies (budding)



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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Pest ants are often brought into disturbed sites by human activity (construction, landscaping, commerce, etc.)
- Foraging behavior can be altered by repellent or irritating chemical odors

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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Ants will explore an area randomly until a food source is found. They will then return to the colony using straight lines in the environment. They mark this trail with pheromones for other workers to follow.

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UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Foragers cannot digest large particles of food and must bring these back to the colony to be digested by the larvae and will then feed on digested liquid
- Foragers can take nourishment from liquid and gel food sources they encounter

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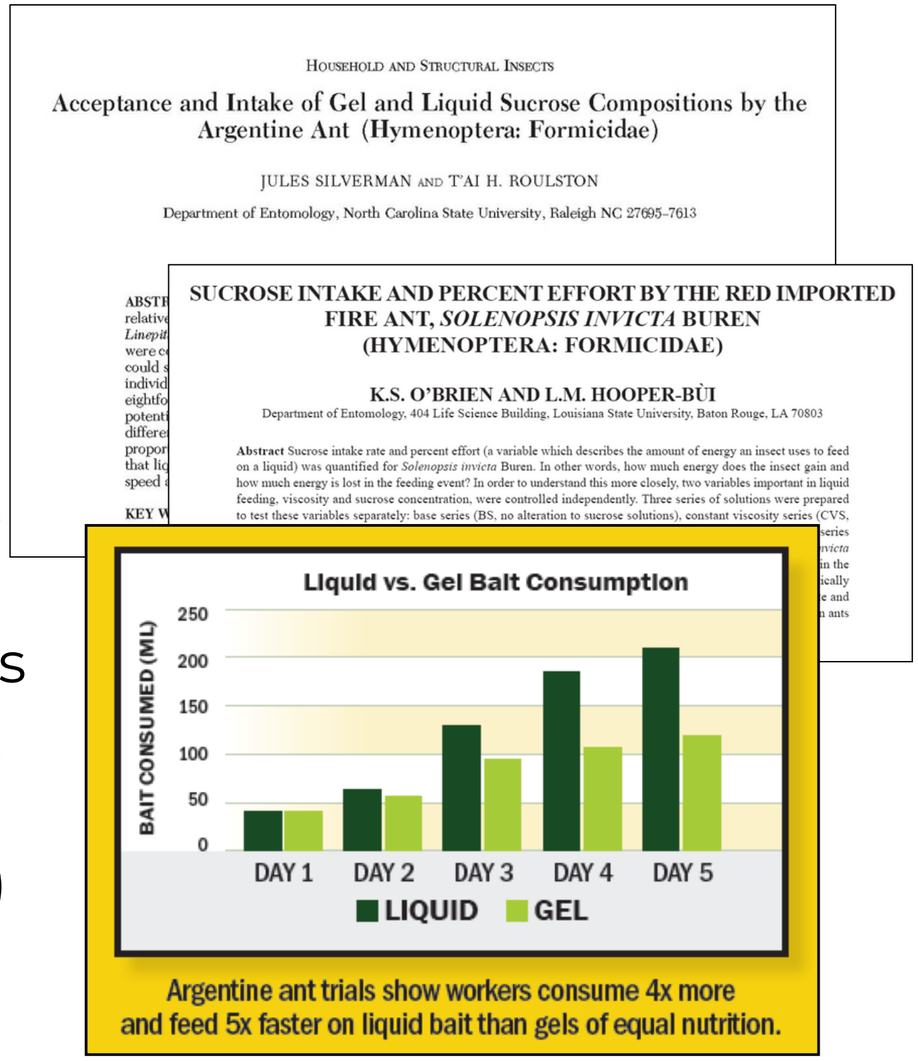
ANT FEEDING BEHAVIOR

Feeding experiments - Liquid vs Gel

- Argentine Ant Study (Silverman & Roulston, 2001)
  - Liquids of equivalent nutritional value were preferred over gel baits
  - Ants fed 5 times faster and ingested 4 times as much bait when feeding on a liquid bait, when compared to a gel bait
- Fire Ant Viscosity Study (O'Brien & Hooper-Bui)
  - The thicker the liquid, the slower ants were able to ingest it



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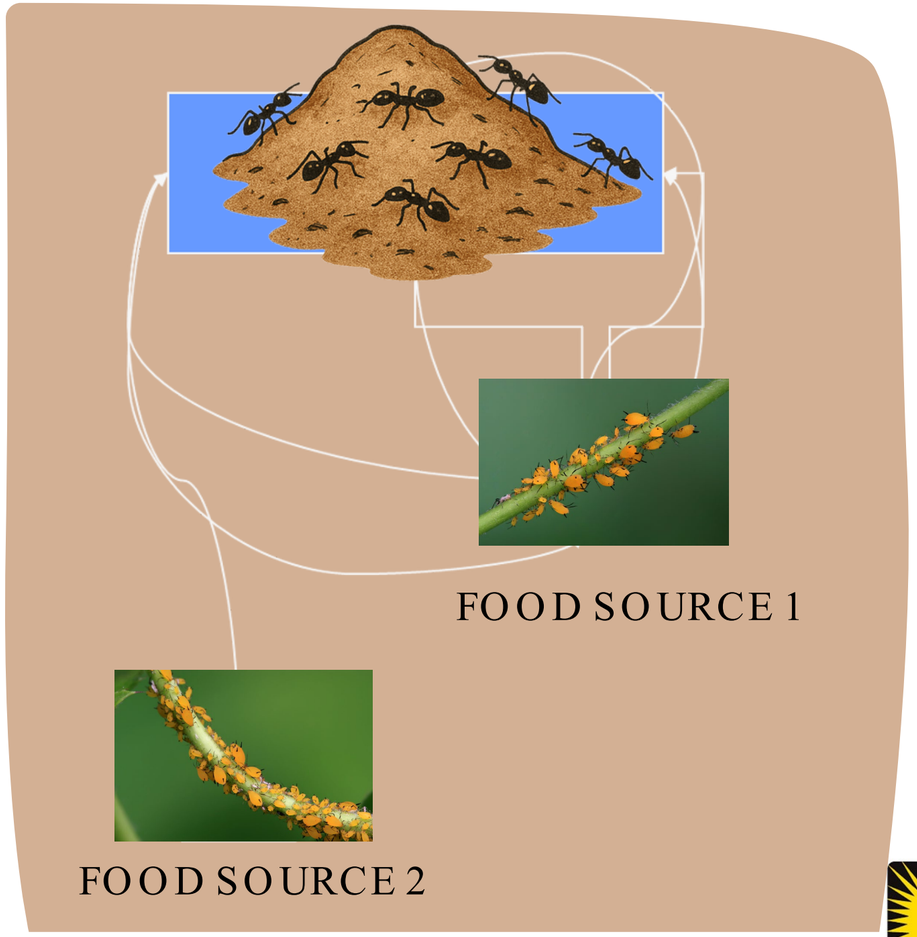
UNDERSTANDING ANT BEHAVIOR

Pest Ant Behaviors:

- Given equivalent food sources, foragers will recruit workers to the source closest to the nest



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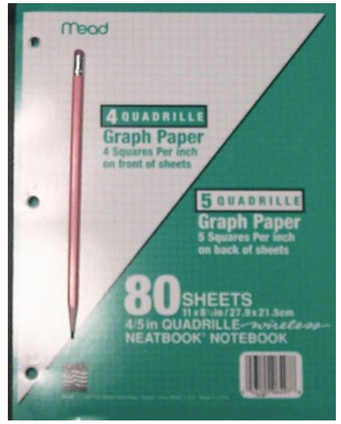
INSPECTING FOR ANTS

Tools of the trade

- Flashlight
- Screwdrivers
- Hand Lens
- Ant “Key”
- Pliers
- Ladder
- Moisture Meter
- Graph Paper/ Pencil



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INSPECTING FOR ANTS

Talk to the customer

Look For:

- Trails
- Food sources
- Nesting sites
- Water sources

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INSPECTING FOR ANTS

Look For:

- Entries into structure
- Branches touching the building

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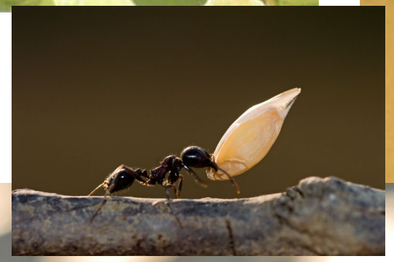
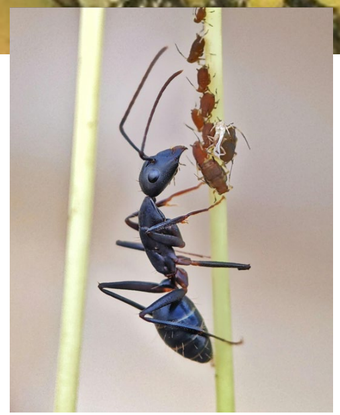
FOOD SOURCES FOR PEST ANTS

Natural:

- Plant nectar
- Pollen and seeds
- Honeydew from aphids, scales, and mealy bugs
- Fungus
- Other insects
- Animal excretions
- Decaying animals





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FOOD SOURCES FOR PEST ANTS

Human Made:

- Unused food
- Open or spilled beverages
- Garbage
- Pet food
- Soap

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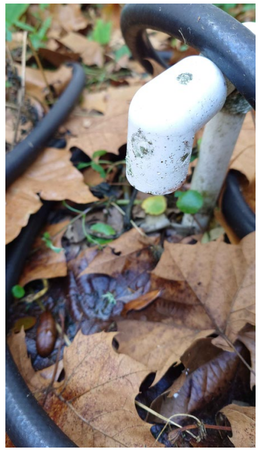
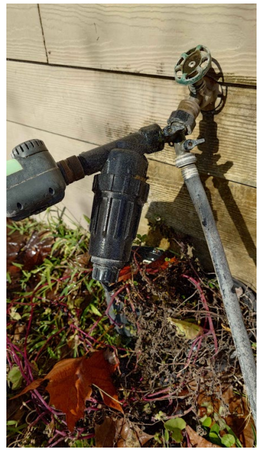
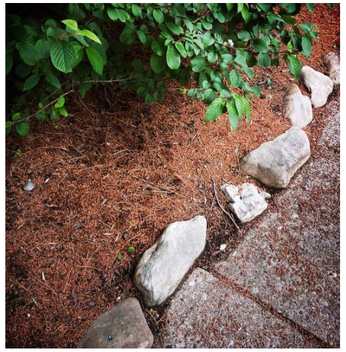
COMMON NESTING SITES

Around the structure:

- In sheltered areas of trees
  - Under bark
  - In knot holes or recesses
  - Around the roots
- In dead tree stumps
- Under wood or rocks used for landscaping
- Under mulch or stones
- Around stored wood
- Around areas where moisture is abundant

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COMMON NESTING SITES

On the structure:

- Under shutters
- Around downspouts
- In clogged gutters
- In rotten doors, door frames and window frames
- Behind fascia board (especially where moisture damage is present)





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COMMON NESTING SITES

In the structure:

- Around window & door frames
- In wall voids (especially where moisture is or was present)
- In & under cabinets in kitchens & bathrooms
- Around infrequently moved stored items
- In attics, crawlspaces, basements & garages

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ANT CONTROL STRATEGY

Create a program for ant control

- Inspect the property
- Identify the pest ant
- Identify potential nesting sites
- Make a graph of the property noting critical areas of concern
- Develop a plan using sanitation, residual treatments and baits
- Communicate actions to be taken by the customer

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ANT CONTROL TECHNIQUES

Environmental modification

- Trim bushes and trees away from the structure
- Eliminate water sources
- Remove nesting sites and clean up debris that provides harborage
- Seal cracks and holes to prevent entry into the structure
- Replace plants and lights that attract insects

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ANT CONTROL TECHNIQUES

Residual treatments

- Treat nests & nesting sites
- On plants to eliminate aphids, scales, & Mealybugs
- On structure
  - Gives temporary control of foragers
  - May repel ants & cause budding of satellite colonies
- On turf
  - Gives temporary control of foragers
- Effects are limited to areas treated (nests on adjacent property are unaffected)

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ANT CONTROL TECHNIQUES

Baiting

- Takes advantage of normal ant behavior to eliminate the colony
- Gives longer lasting control than spraying
- Fewer toxic chemicals in the environment
- Can eliminate nests far removed from treatment areas
- Generally more labor intensive than spraying but more effective in achieving control

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ANT BAIT BASICS

To Eliminate a colony, ant baits must:

- Be attractive to the target ant
- Be available in sufficient quantity
- Be available for a sufficient length of time
- Work slowly to allow the toxicant to affect the ability of the colony to sustain itself
    - By sterilizing or killing the queen(s)
    - By causing a precipitous fall in workers that gather food and maintain the colony

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ANT BAIT BASICS

Food Source (Attractant)

- Carbohydrate (Sugar)
- Fat (Oils)
- Protein
- Combination

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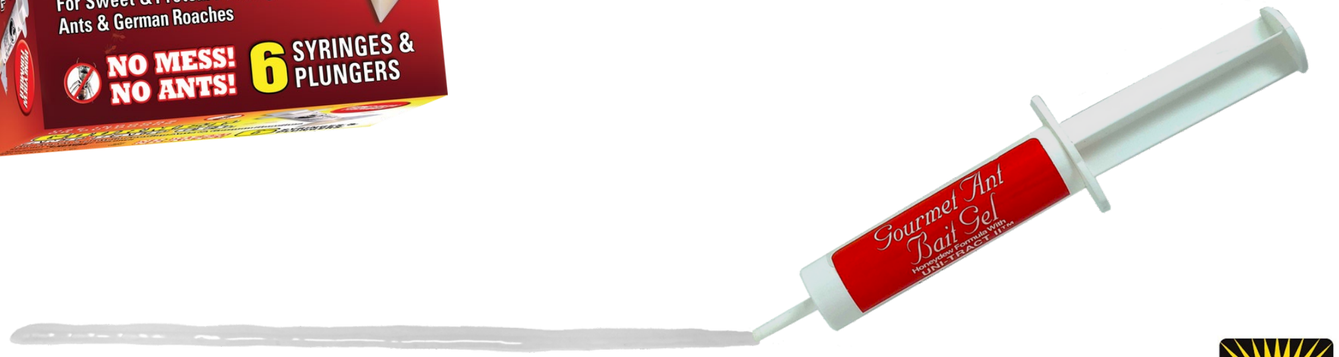
ANT BAIT BASICS

Formulations:

- Liquid
- Gel
- Granular
- Solid



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ANT BAIT BASICS

Diluting a liquid bait may enhance its overall effectiveness:

- Smaller pest species to allow for bait to be taken back to nest (needs slower kill)
- Adding oil/protein to sweet baits (tuna water)
- Remember that diluting may increase spoilage in some baits- use food grade additives

Green Way - formerly Gourmet - liquid ant killing bait

Legacy Images -(who remembers??)

Gourmet Ant Bait Mix Kit

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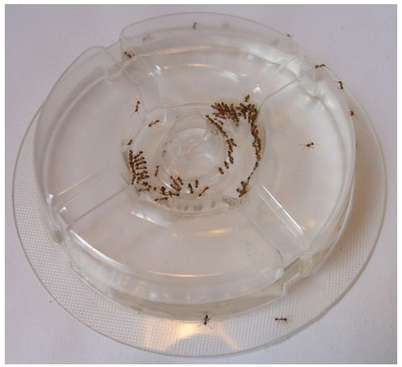
BAITING TECHNIQUES

- Broadcast baiting
  - Appropriate for field foraging species (Fire Ants)
- Open placements
  - Good for attracting ants to a feeding site
- Bait stations
  - Preferred application method



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OPEN BAITING VS. BAIT STATION

- Baits stay effective longer in a quality station
- Baits can be placed and relocated more easily in a bait station
- Bait stations protect children & pets
- Look more professional

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BAITING TECHNIQUES

Key bait station features:

- Versatile, can be used in different situations
- Easy for the ant to enter & exit
- Protects bait from drying out (limiting air flow)
- Keeps bait from being contaminated or washed away
- Keeps bait from contaminating the surrounding area
- Tamper resistant or securely locking
- Easy to secure and move
- Easy to clean & reuse
- Durable and weather resistant materials

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RIGHT BAIT STATION, RIGHT SITUATION

	Ant Café®	Bug Bar®	ANTOPIA® 6	KM Sentinel Pro®
Bait Capacity	~1/4 oz	~1/3 oz	6 oz	18 oz
Bait Types	Liquid, gel, granular	Liquid, gel, granular	Liquid, granular	Liquid only
Ideal Location	Indoor/Outdoor	Indoor/Outdoor	Outdoor	Outdoor
Key Features	Zip ties and double sided tap for secure placement and child-resistance	Compact square, child-resistant snap-cover	Feeding Float, UV protective cover, weather-tolerant, tamper-resistant tabs, screw in ground anchor	360° feed-on-demand, gravity feed, weather-tolerant, tamper-resistant
Best For	Discreet indoor ant or small roach control	Discreet indoor ant or roach control	Multi-season outdoor colony elimination, structural perimeter control	Long-term perimeter control of large colonies with minimal maintenance, Agriculture

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BAITING TECHNIQUES

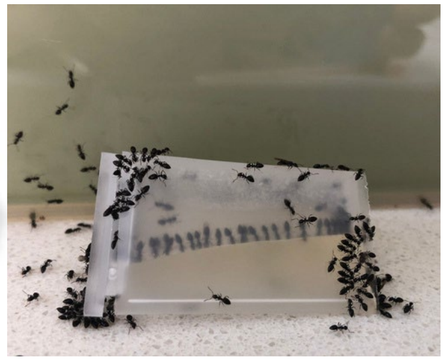
- Small bait placements can be used To locate the nest
  - Use small bait stations in many sites with different types of bait (protein, fat, & carbohydrate) to determine feeding preferences
- Set up multiple feeding sites then follow the feeding trails back to the nest
  - Small bait placements can be used for control in species with small colonies, such as Pharaoh Ants, Crazy Ants or Acrobat Ants

Sugar Bait

Protein Bait

"Ant and Roach Buffet"

"Bug Bar"



"Ant Café"

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BAITING TECHNIQUES

Using the Ant Cafe:

- Adjusting the entryway(s)
- Locking with a flat tie
- Attaching double stick tape
- Using liquid baits (vertical positioning)
- Using gel or granular baits (vertical or horizontal)
- Reuse by cleaning with mild detergent and water
    - Place bait stations in pail of soapy water, let sit overnight, and rinse with fresh water

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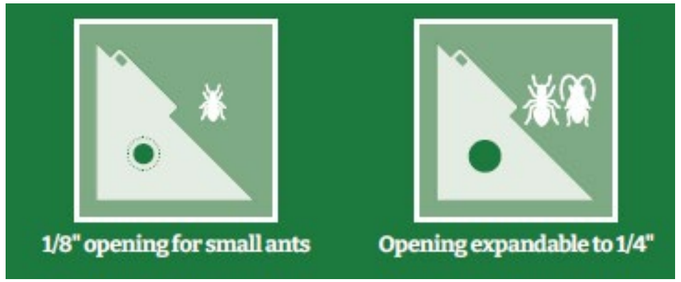
BAITING TECHNIQUES

Using the Ant Cafe:

- Adjusting front entry hole for larger ants and small cockroaches
- Additional entry hole can be opened on back to provide 2 entries (gel and granular placements)



Front side (1/8" opening expandable to 1/4")

Back side (closed to start)

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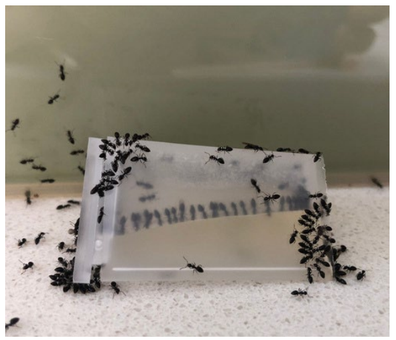
BAITING TECHNIQUES

Using the Ant Cafe:

- Locking with a flat tie
- Attaching double stick tape
- Position vertically or at an angle if using liquid baits
- Any position when using gel or granular baits



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BAITING TECHNIQUES

Using the Ant Cafe:

- Reuse by cleaning with mild detergent and water
  - Place bait stations in pail of soapy water, let sit overnight, and rinse with fresh water

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BAITING TECHNIQUES

Special placement techniques
- Ant Café:
  - Hang from branch or pipe
  - Tilt 45° or 60° degree angle and attach to wall
  - Adding toothpicks for traction
  - Tape around trunk of tree or branch

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BAITING TECHNIQUES

Using the Bug Bar:

- Use liquid, gel, or granular baits
- Ribbed steps for ant/roach traction
- Two wide entry-ways
- Use double sided tape or Hercules putty to attach to surfaces (when using gel)
- Hole at top to quickly refill with gel syringe
- Recycled PET, disposable

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BAITING TECHNIQUES

Large bait placements can be used for colony control

- Determine the preferred bait from examination of small bait placements
- Or, use several different types of bait material in each station
- Set up large placements along established feeding trails
- Bait as close to the nest as possible

Antopia 6

- Holds 6 oz liquid or granular bait

KM Sentinel Pro

- Holds up to 16 oz liquid bait (gravity fed reservoir)

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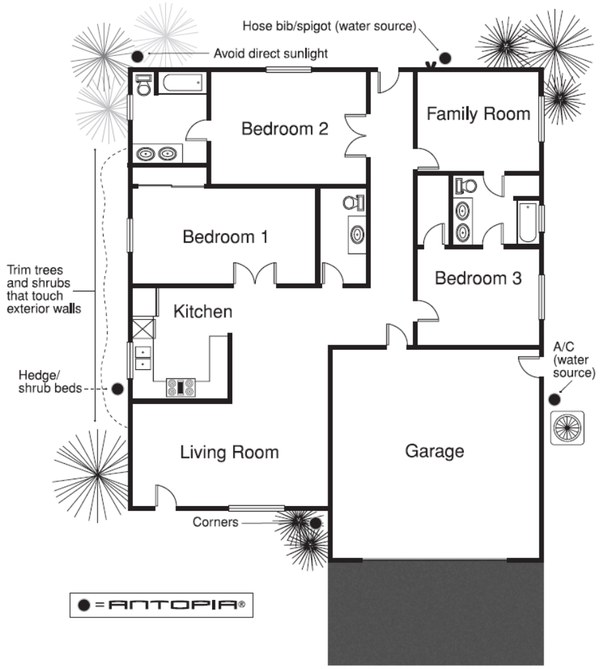
BAITING TECHNIQUES



Using larger capacity bait stations (Antopia 6 or KM Sentinel Pro) outdoors

- Initial placement of 1 station every 50 feet
- If emptied in less than a week:
  - double initial placement
  - replace bait as needed until activity stops
- Placements near moisture, shaded areas, as close to nest as possible
- Use proactively prior to peak season to prevent colony growth at accounts with difficult to manage species

Antopia 6

KM Sentinel Pro

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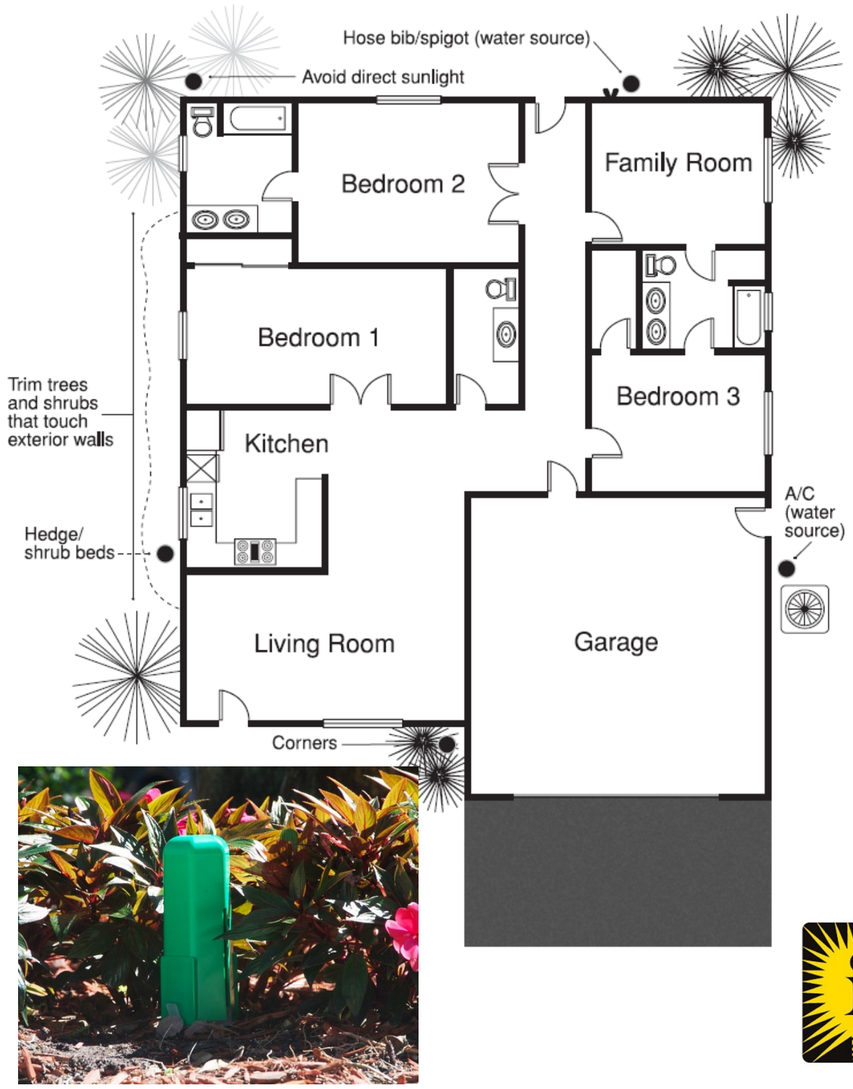
BAIT PLACEMENTS

- Place baits as close to the nest as possible (determine through location baiting)
- Bait outside of structure whenever possible
- Locate baits along “Structural Guidelines”
    - straight lines in the environment that ants will use to travel from a food source to the nest and back again.



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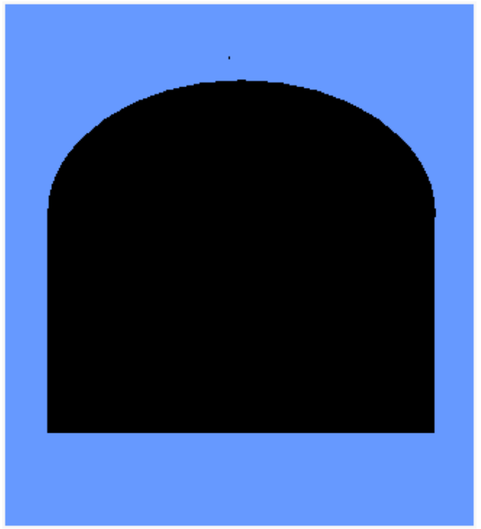
BAIT PLACEMENTS

Examples:

- Bilateral-elevated



A

B

C

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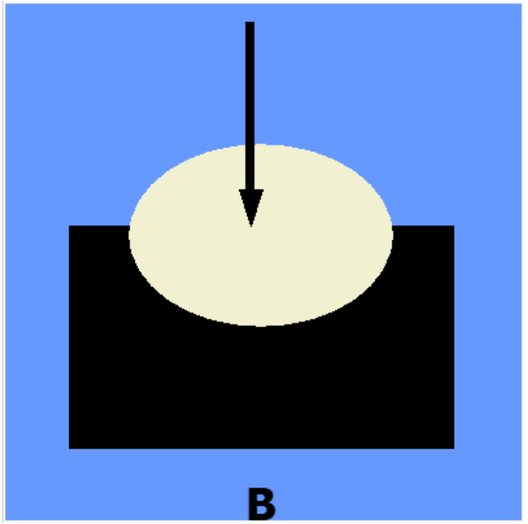
BAIT PLACEMENTS

Examples:

- Bilateral-depressed



A

B

C

D

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BAIT PLACEMENTS

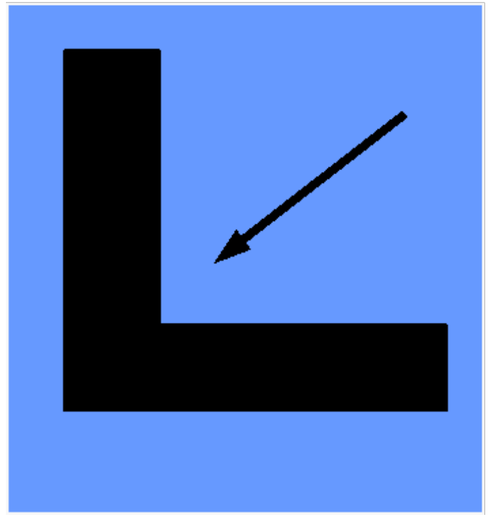
Examples:

- Unilateral-raised

A

B

BAIT PLACEMENTS



Examples:

- Unilateral-depressed

A

B

C

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BAITING TIPS

Tips For Successful Baiting

- Keep baits fresh
- Keep sufficient bait available
- Keep bait stations free of odors & contamination
- Start with location baiting use a variety of baits in small amounts
  - The type of food carrier a bait uses can make a difference
  - Feeding preferences may change. Have carbohydrate, protein and fat based bait available

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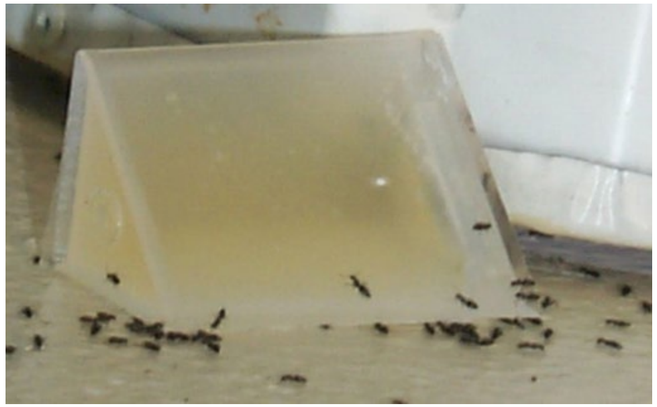
BAITING TIPS

Tips For Successful Baiting

- Place & move baits to areas of highest activity
- If baits seemed to have worked temporarily, original target pest may have been replaced by another species with different food preferences



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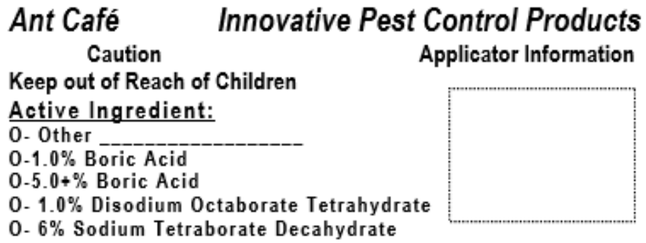
LABELING BAIT STATIONS

- According to the EPA, under federal law we are encouraged, but not required to label bait stations.
- Individual states may have different requirements
- Universal Label Templates are available from our website www.antcafe.com


Ant Café ***Innovative Pest Control Products***

Caution **Applicator Information**

Keep out of Reach of Children

Active Ingredient:

O- Other _____

O-1.0% Boric Acid

O-5.0+% Boric Acid

O- 1.0% Disodium Octaborate Tetrahydrate

O- 6% Sodium Tetraborate Decahydrate

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BAITING VS. SPRAYING

Does the program work?

- Spraying alone
  - Probably not, result:
    - Repeated callbacks
    - Unhappy customer
- Baiting alone
  - Yes, result:
    - After initial control is achieved, fewer callbacks
    - Happy customer, referrals
- Baiting & Spraying
  - Yes, if spray is non-repellent and is used to eliminate ant food sources and nesting sites

SPRAYS	BAITS
Only kills foragers	Feeds colony via trophallaxis
Causes colony budding or relocation	Reaches queen and brood
Temporary suppression	True colony elimination
Harms beneficial insects	Targets pests specifically

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BAITING VS. SPRAYING - CALLBACKS

Preventing callbacks with baiting

- Proactive outdoor baiting around structures prior to peak season
  - Suppress colonies before growth
  - Draw ants outside structure instead of indoors
- Educate customers on process
  - Sets realistic expectations for timeline
  - Builds trust

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CUSTOMER EDUCATION

Educate customers on baiting milestones to set realistic expectations and builds trust

Feeding	Distribution	Queen Exposure	Colony Collapse	Long-Term Suppression
• Foragers feed freely; no alarm • 40-96 hr delay; ants feed and share before effects	• Workers share bait through trophallaxis • Active ingredient spreads throughout colony • Noticeable decline in 2–4 weeks	• Shared food reaches queens and brood • Reproduction slows; brood fails • Colony cohesion weakens	• Worker loss ends foraging • No budding or relocation • Collapse completes over several weeks	• Queens eliminated; no rebound • Residual bait stops new colonies • Sustained, low-toxicity control

**Timelines will vary based on ant species and colony size*

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SUMMARY

Control of Structure Infesting Ants Can Be Accomplished by:

- Inspecting the property
- Identifying the pest ant properly
- Use your understanding of ant behavior to design a program of ant control that eliminates:
  - Harborages
  - Food
  - Moisture sources
- Emphasize the use of baits for long term control
- Use Ant Cafe, Bug Bar, Antopia 6, KM Sentinel Pro, other bait stations to implement your baiting program more cost effectively

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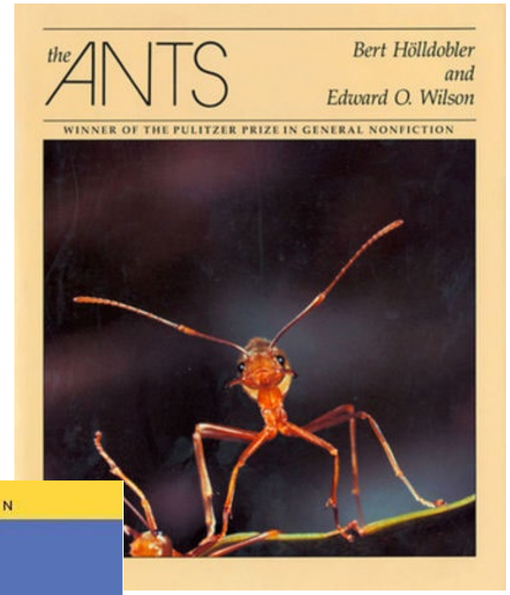
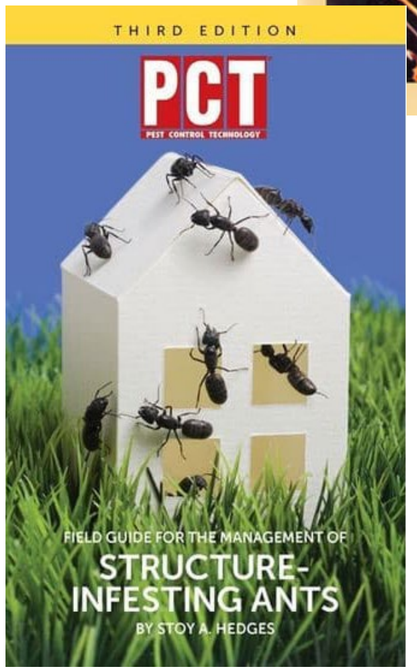
MORE RESOURCES

- www.antcafe.com additional training materials, label templates
- www.maxforce.com free downloadable graphs & training Material
- PCT Online has many different trainings and videos
- PMP Ant resources: www.mypmp.net/ant-resources/
- University IPM/Extension websites
  - UF: sfyl.ifas.ufl.edu/
  - UC: ipm.ucanr.edu/
- BugGuide.net
- AntWiki.org





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NEXT STEPS

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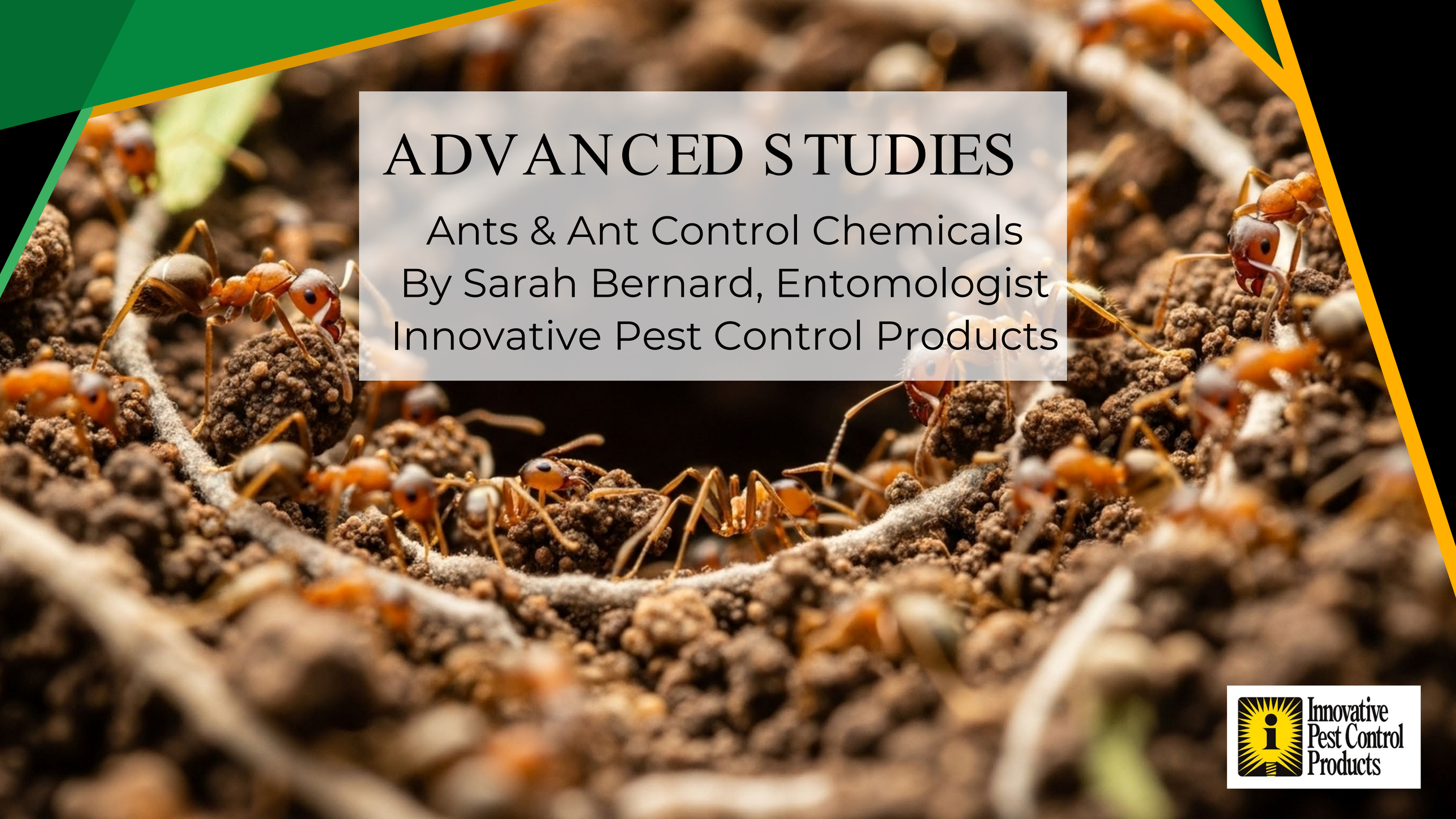
Contact your local distributor for more information or:

- www.antcafe.com
- orders@antcafe.com
- 561-483-4997



ADVANCED STUDIES

Ants & Ant Control Chemicals

By Sarah Bernard, Entomologist
Innovative Pest Control Products

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PEST STATUS

1995 survey of pest ants of Florida reported highest percentages of customer calls to pest control companies:

1. Red imported fire ant, *Solenopsis invicta* - 14%
2. Ghost ant, *Tapinoma melanocephalum* - 14%
3. Crazy ant, *Paratrechina longicornis* - 14%
4. Florida carpenter ant, *Camponotus floridanus* - 12%
5. Pharaoh ant, *Monomorium pharaonis* - 11%
6. Tortugas carpenter ant, *Camponotus tortuganus* - 8%
7. Bigheaded ant, *Pheidole megacephala* - 7%
8. Paratrechina bourbonica (now *Nylanderia bourbonica*)- 4%.

Klotz et al.
1995

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PEST STATUS

Changes in the last 30 years?

- Tawny (Caribbean) crazy ant – *Nylanderia fulva*
  - wasn't on the radar in 1995
- White-footed ant – *Technomyrmex difficilis*
  - wasn't a huge issue in 1995, now a major player
- Bigheaded ant – *Pheidole megacephala*
  - aggressive species has displaced many others
- More diverse pest species now than in the past
  - accurate ID needed to treat effectively
  - more tramp/invasives than ever before

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PEST CHANGES

Emergence of Important Pest Ant Species Over Time (1990s–2020s)

1990s

- Argentine ant recognized as major urban pest (*Linepithema humile*)
- Longhorn crazy ant prevalent (*Paratrechina longicornis*)
- Bigheaded ant spread accelerates
- Ghost ant becomes major indoor pest

2000s

- White-footed ant clarified (*Technomyrmex difficilis* ; misidentified as *T. albipes*)
- Rover ant emerges across southern U.S. (*Brachymyrmex patagonicus*)
- Asian needle ant begins notable expansion (*Brachyponera chinensis*)
- Structural carpenter ant issues rise with aging housing stock
- Expanded recognition of odorous house ant as a widespread pest (*Tapinoma sessile*)

2010s

- Tawny/Caribbean crazy ant explodes (*Nylanderia fulva*)
- Widespread genus revisions move many “crazy ants” from Paratrechina → Nylanderia
- Robust crazy ant recognized (*N. bourbonica*)
- Argentinian ant expands east/southeast in irrigated landscapes
- Odorous house ant confirmed as **cryptic species** complex with different behaviors

2020s

- Asian needle ant pushes northward into mid-Atlantic & Northeast
- Rover ants now common in many states
- *Monomorium, Tetramorium, Nylanderia* , and *Tapinoma* groups get refined ID keys
- PMPs now routinely handle 18–22+ species, depending on region

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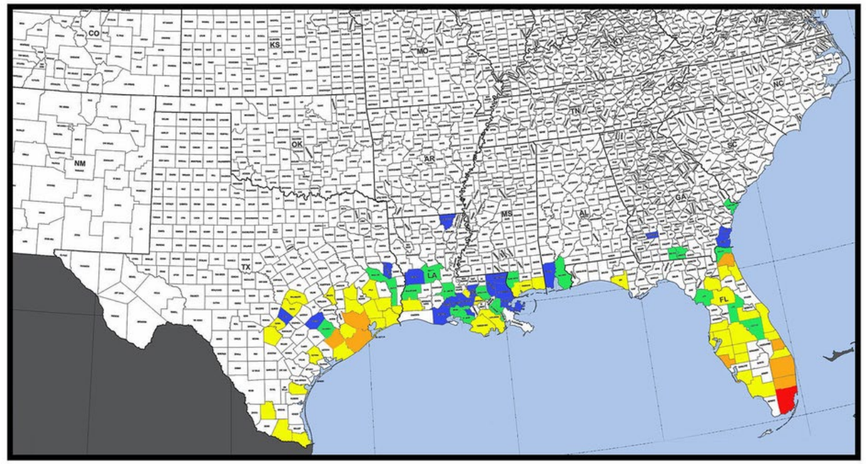
PEST STATUS

Changes in the last 30 years?

- Invasive species are spreading geographically
  - tropical ants have moved further northward
  - species common in South Florida 30 years ago now found in other southern states
- Taxonomy changes
  - must keep training up to date
  - may miss key IDs/how to handle difficult species



Spread of tawny crazy ant (Nylanderia fulva) in the U.S. by county and decade (Mississippi Entomological Museum, Mississippi State University).

Common Name	Old Name	Current Name	Change Year
Argentine ant	*Iridomyrmex humilis*	*Linepithema humile*	~1990s
White-footed ant (Florida)	*Technomyrmex albipes*	*Technomyrmex difficilis*	~2007
Tawny/Caribbean crazy ant	*Nylanderia pubens* / *Paratrechina* sp.	*Nylanderia fulva*	2012
Robust crazy ant	*Paratrechina bourbonica*	*Nylanderia bourbonica*	2000s–2010s
"Crazy ant" group revisions	Many spp. in *Paratrechina*	Reassigned to *Nylanderia*, *Paratrechina*, *Paraparatrechina*	2010–2015
Asian needle ant	*Pachycondyla chinensis*	*Brachyponera chinensis*	mid-2000s

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PEST STATUS

WHY all the changes??

- Global movement of goods & plants
  - ants hitchhike in nursery stock, soil, mulch, shipping containers
- Urban irrigation & landscaping changes
  - creates stable moisture-rich habitats year-round
- Warmer winters / climate shifts
  - tropical/subtropical species survive farther north
- New tramp/invasive introductions
- Supercolonial species outcompete natives
- Human structures create new niches

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PEST STATUS

Still a problem:

- Fire ants still critical
  - health implications
  - more IPM and broadcast baiting strategies
  - scheduled, programmatic management
- Carpenter ants still important structural pest issue
  - aging structures with moisture issues
  - risk profile is higher - structural damage anxiety
    - premium-priced inspection/management services justified

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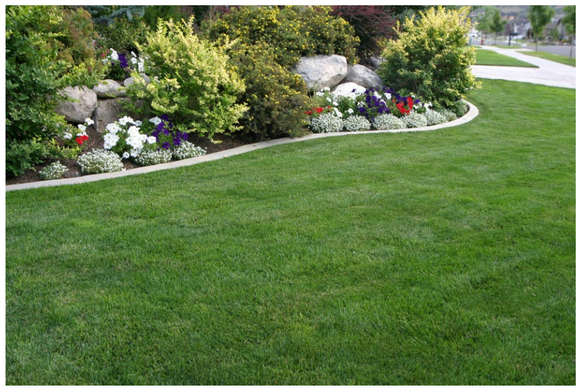
PEST STATUS

Opportunities:

- Long-term contracts rather than one off jobs
  - landscape ants for recurring service programs
    - bigheaded, white-footed, fire ants, tawny crazy
- Training investments
  - better product choices leading to fewer callbacks
  - IPM programs more defensible
  - proactive services



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COMMON PEST ANTS

Ant diversity review:

- Pest ants today show greater diversity and more complex behaviors
- Many species form massive, multi-queen, polydomous colonies
    - reduced genetic diversity from small number of introductions actually increases success of invasives
- Rise of sweet-feeding tramp ants affects bait selection
- Invasive species can dominate whole landscapes
- Some ants are now major structural opportunists
- Effective control requires species-level ID and tailored strategies

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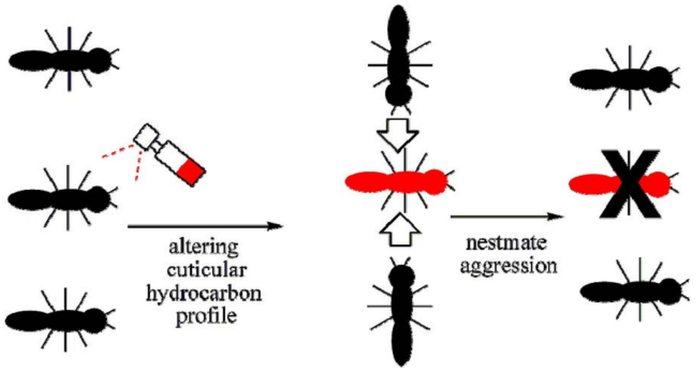
COMMON PEST ANTS

Success of dominant invasive ant species can be attributed to lack of genetic variation:

- Initial ant introduction → genetic bottleneck
- Lower genetic diversity → similar hydrocarbon profiles (how ants identify each other as nestmates)
- Reduced intraspecies aggression
- Multiple nests fuse → polydomous, unicolonial
- Multiple queens → rapid growth, fast rebound after treatments
- Spread aggressively, outcompete native species
- Difficult to control: hidden nest networks, frequent budding, rapid reinfestation



Examples: Argentine ant, tawny crazy ant, bigheaded ant, little fire ant, and polygyne fire ant

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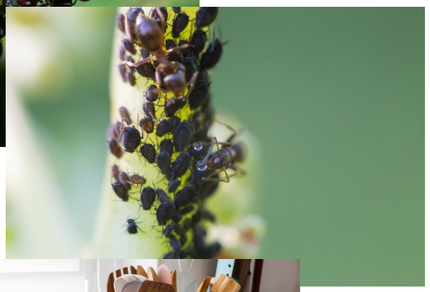
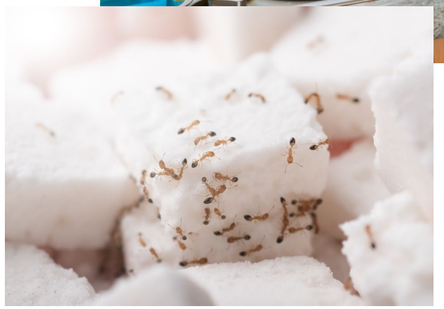
COMMON PEST ANTS

Many successful multiple nest/queen colonies are sweet-feeding invasives:

- Rely heavily on carbohydrates (honeydew)
- Human environments create abundant, continuous sugar sources
- Cooperative, low-aggression colonies expand rapidly across landscapes
- Massive worker populations require large, stable sugar inputs to sustain colony
- Control is harder: multiple nests, high recruitment, fast rebound, wide foraging





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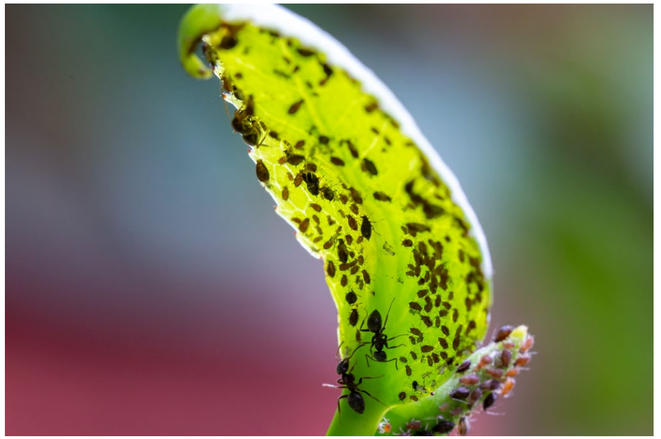
SWEET-FEEDING TRAMPS

Key traits:

- Heavy reliance on honeydew
- Tend to form multi-queen, polydomous colonies
- Strong trail recruitment
- Very difficult to control without stable sweet baits
- Many show reduced aggression / supercolony behavior

Examples: Argentine, White-footed, Ghost, Rover, Crazy



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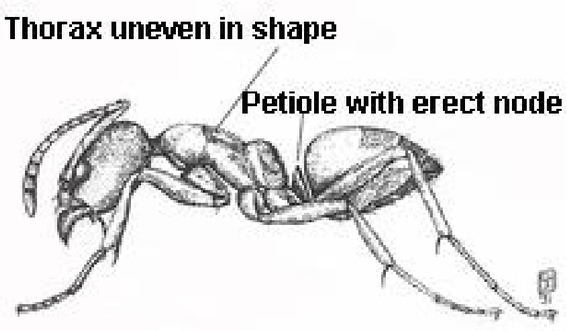
SWEET-FEEDING TRAMPS



Argentine Ant (***Linepithema humile***)

- Workers monomorphic
- Petiole: 1 erect node
- Form huge super colonies (millions)
    - multiple queens, satellites
    - may fragment in spring and summer
- Tend honeydew producing insects
- Thrives in irrigated landscapes (residential & agricultural pest)

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SWEET-FEEDING TRAMPS

White-Footed Ant (*Technomyrmex difficilis*)

- Workers monomorphic
- Petiole: 1 node
- Large colonies with many reproductives
- Household nuisance; heavy trailing behavior
  - no sting or bite
  - does not cause structural damage
- Nests in trees, roofs, soffits, and moist voids

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SWEET-FEEDING TRAMPS

Ghost Ant (***Tapinoma melanocephalum*** **)**

- Workers monomorphic; tiny (1.3–1.5 mm) and pale
- Petiole: 1 node (hidden under abdomen)
- Highly polydomous with many small satellite nests
- Multiple queens; colonies split/bud easily
- Prefers moisture—common in kitchens, baths, wall voids, potted plants
- Strong preference for sweet baits

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SWEET-FEEDING TRAMPS

Rover Ant – *Brachymyrmex patagonicus*

- Workers monomorphic
- Petiole: 1 node (partially concealed)
- Very small workers; common around structures
- Nests in soil, mulch, leaf litter, cracks, and potted plants
- Strongly associated with honeydew; trails into kitchens & bathrooms
- Large, polydomous colonies with many small nest sites
- Persistent nuisance but no sting or structural damage

Alexander Wild

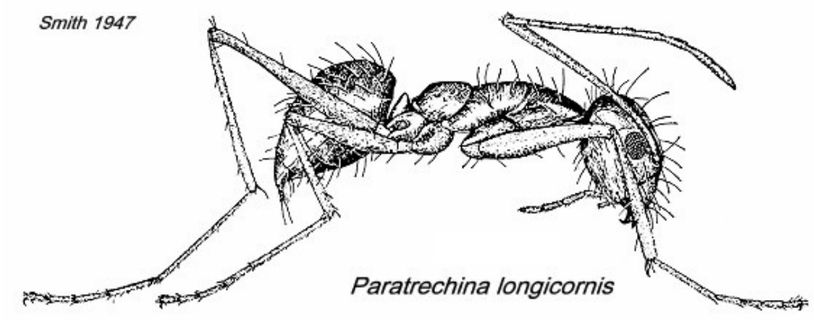
Innovative Pest Control Products

SWEET-FEEDING TRAMPS

Crazy Ant (***Paratrechina longicornis*** **)**

- Workers monomorphic
- Petiole: 1 node
- Fast, erratic movement; long legs and antennae
- Large, mobile colonies; multiple queens
- Readily buds/expands; highly invasive
- Widely nests indoors and outdoors in debris, voids, and potted plants

Several Paratrechina longicornis carrying a Camponotus floridanus.
(Jesse Christopherson 2017)



Alexander Wild

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SWEET-FEEDING TRAMPS

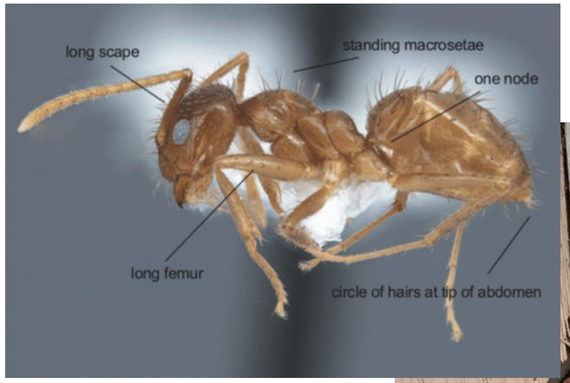
Tawny (Caribbean) Crazy Ant (*Nylanderia fulva*)

- Workers monomorphic
- Petiole: 1 node
- Dense, massive supercolonies
  - Multiple queens; colonies spread rapidly
- Heavy trailing

How It Differs From *Paratrechina longicornis*:

- Strong tendency to invade electrical equipment
- Lacks fast, erratic “long-legged” movement of *P. longicornis*
- Prefers ground-level, moisture-rich debris nests, whereas *P. longicornis* nests more broadly, including elevated voids.
- Causes area-wide ecological displacement far more aggressively than *P. longicornis*.

Joe MacGown, Mississippi State University



Michael Bentley

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TRAMP-LIKE

Big Headed Ant (***Pheidole megacephala***)

- Workers polymorphic (minor + major “bigheaded” soldiers)
- Petiole: 2 nodes
- Extremely large, supercolonial populations
  - Multiple queens; colonies readily expand
- Forms soil galleries and covered foraging tubes
- Strong competitor—displaces other ants in landscapes
- Prefers moist turf, mulch, and landscaped areas

Foraging tubes

R. H. Scheffrahn, UF/IFAS

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STRUCTURAL OPPORTUNISTS

Key traits:

- Nest in moisture-damaged or compromised structural components
- Often associated with voids, insulation, electrical boxes
- Food preference is mixed (sweets + proteins)
- Trails appear seasonally or with environmental triggers

Examples: Carpenter, Acrobat, Odorous house, Pavement

- Require different diagnostics (locating nest sites in structures) and different expectations around baiting and moisture.
- Odorous house ants can act like a tramp ant (polydomous, sweet feeders) but still invade structures opportunistically.

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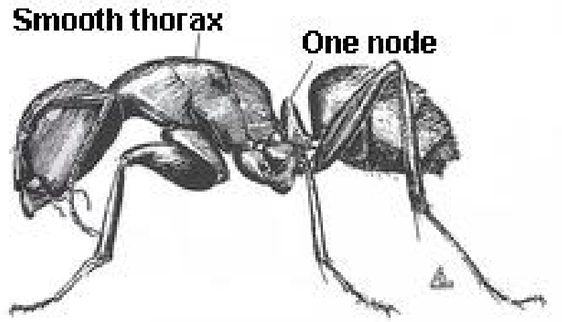
STRUCTURAL OPPORTUNISTS

Carpenter Ant (***Camponotus spp.***)

- Workers polymorphic
- Petiole: 1 node
- Nests in/near moist wood, decayed wood
- Indoor colonies associated with moisture
  - often form satellite colonies
- Nocturnal foragers; commonly found in wall voids and attics



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STRUCTURAL OPPORTUNISTS

Acrobat Ant – ***Crematogaster spp.***

- Workers polymorphic (slight size variation)
- Petiole: 2 nodes
- Distinct heart-shaped gaster
  - held over the thorax when disturbed
- Nests in wood:
  - voids, insulation, foam board, tree limbs, and wall cavities
  - moisture-damaged wood or preexisting termite damage
- Can strip insulation from wires; may produce a pungent odor
- Will bite and may sting slightly; aggressive defenders of nests

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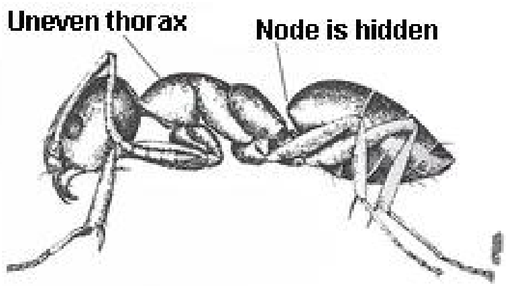
STRUCTURAL OPPORTUNISTS

Odorous House Ant (***Tapinoma sessile***)

- Workers monomorphic (1/8 inch)
- Petiole: 1 node, hidden under abdomen
- Strong odor when crushed (rotten coconut)
- Large multi-queen colonies
  - highly polydomous
  - Buds readily; difficult to eliminate without colony-level control
- Nests in soil, mulch, logs, and inside wall voids



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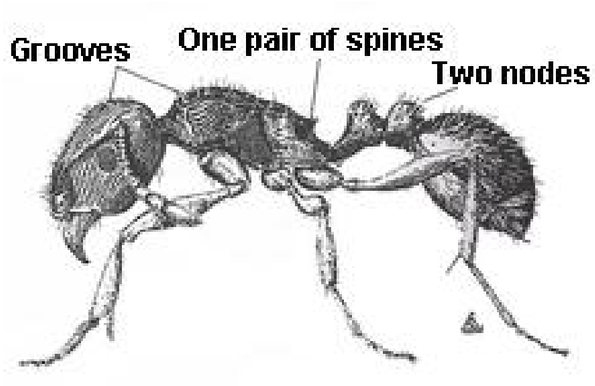
STRUCTURAL OPPORTUNISTS

Pavement Ant (***Tetramorium caespitum)***

- Workers monomorphic
- Petiole: 2 nodes
- One large nest with multiple queens but no satellites
- Nests outdoors under slabs, sidewalks, stones
- Frequently forages indoors for sweets and proteins
- Characteristic “sand piles” at cracks from nest excavation



[Utah State University]

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OPPORTUNISTIC/ PROTEIN DRIVEN

Key traits:

- More protein-oriented
- Can sting or bite
- May cause health or regulatory concerns
- Control strategies differ significantly

Examples:

- Red imported fire ant
  - Medically important
- Pharaoh ant
  - Strongly protein-focused during brood rearing
  - Indoor-only pest with budding colonies

Polygyne red imported fire ants with multiple queens

Multiple queens of Pharaoh ant

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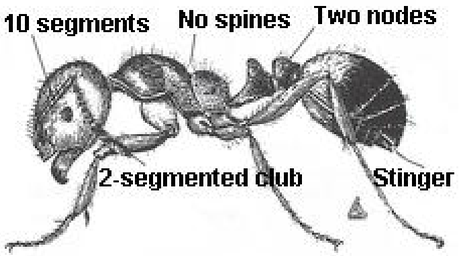
MEDICALLY IMPORTANT



Red Imported Fire Ant (*Solenopsis invicta)*

- Workers polymorphic
- Petiole: 2 nodes, no spines on thorax
- Monogyne or polygyne colonies
  - multiple queen colonies can get very large
- ***AGGRESSIVE***
  - health threat - species of medical concern
  - agricultural threat
- Opportunistic feeders
- Found in highly disturbed areas
  - construction sites
  - cow pastures

Fire ants form rafts on water surfaces, adding to their spread

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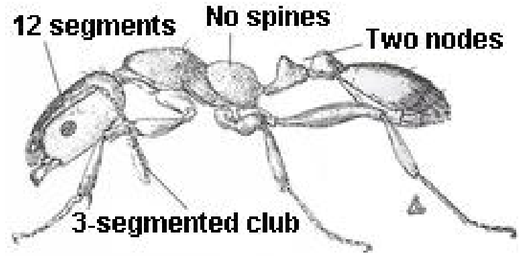
PROTEIN-DRIVEN

Pharaoh Ant (*Monomorium pharaonis*)

- Monomorphic workers
- Petiole: 2 nodes
- Large, mobile colonies
  - Multiple queens
  - Bud/fragment readily - especially if disturbed
- Numerous satellites inside structures

Thrives indoors, often year -round; highly polydomous; responds badly to repellent sprays (colony budding)



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ANT BAITS

Active ingredients used in ant baits with examples of commonly used products:

Active Ingredient	Example Product	% Active	Bait Form
DOT (Disodium Octaborate	Green Way Liquid Ant Bait	1% DOT	Liquid
	Gourmet Ant Bait Gel	6% DOT	Gel
Borax (Sodium Tetraborate)	Terro Liquid Ant Bait	5.4% Borax	Liquid
Boric Acid	Niban Granular Bait	5% Boric Acid	Granule
Hydramethylnon	Maxforce Complete	1% Hydramethylnon	Granule
	Amdro Fire Ant Bait	0.73% Hydramethylnon	Granule
Abamectin	Ascend Fire Ant Bait	0.011% Abamectin	Granule
Imidacloprid	Maxforce Quantum/Fleet	0.03% Imidacloprid	Liquid/Gel
Fipronil	Maxforce Carpenter Ant Bait Gel	0.001% Fipronil	Gel
Thiamethoxam	Optigard Ant Gel	0.01% Thiamethoxam	Gel
Indoxacarb	Advion Ant Gel	0.05% Indoxacarb	Gel
Dinotefuran	Formitrol Ant Bait	0.5–1% Dinotefuran	Liquid/Gel

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ANT BAITS

Active Ingredients: History in United States

- 1940's: Borates - slow acting stomach poisons
  - Boric acid
  - Sodium tetraborate decahydrate (Borax)
- 1980: Hydramethylnon - mitochondrial complex III inhibitor
- 1983: Disodium octaborate tetrahydrate (DOT)- 2nd gen borate
- 1987: Abamectin - avermectin macrocyclic lactone
- 1987: Sulfuramid - PFOS-based uncoupler, discontinued in 2005
- 1994: Imidicloprid - neonicotinoid, nAChR agonist
- 1996: Fipronil- phenylpyrazole; Na channel blocker
- 1999: Thiamethoxam - neonicotinoid, nAChR agonist
- 2000: Indoxacarb - oxadiazine; Na channel blocker
- 2004: Dinotefuran - neonicotinoid, nAChR agonist

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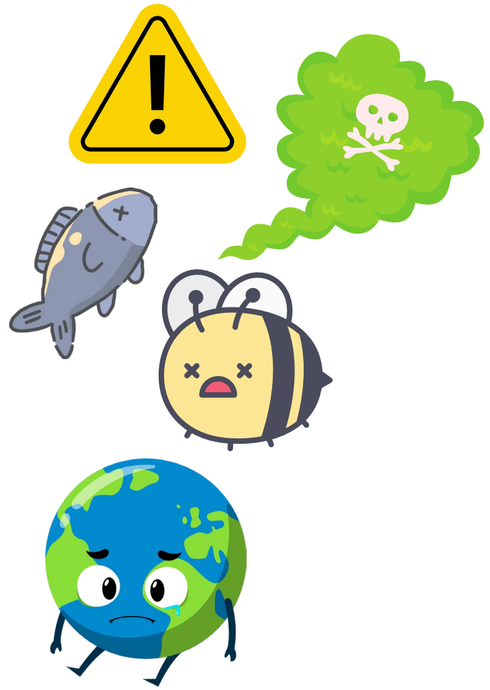
ANT BAITS

Active Ingredient Safety Profiles

Tier	Active Ingredient	IRAC	Class	Mode of Action (short)
1	Boric Acid	8D	Borate mineral salt	Metabolic enzyme disruptor
	Borax	8D	Borate mineral salt	Metabolic enzyme disruptor
	DOT (Disodium Octaborate)	8D	Borate mineral salt	Metabolic enzyme disruptor
2	Hydramethylnon	20A	Hydrazone / mitochondrial poison	Mitochondrial Complex III inhibitor
	Indoxacarb	22A	Oxadiazine	Sodium -channel blocker
3	Imidacloprid	4A	Neonicotinoid (chloronicotinyl)	nAChR agonist
	Thiamethoxam	4A	Neonicotinoid (nitroguanidine)	nAChR agonist
	Dinotefuran	4A	Neonicotinoid (nitroguanidine)	nAChR agonist
	Abamectin	6	Avermectin (macrocyclic lactone)	GluCl channel activator
	Fipronil	2B	Phenylpyrazole	GABA / GluCl blocker
4	Sulfuramid (discontinued)	13	Sulfonamide	Oxidative phosphorylation uncoupler



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ANT BAITS

Tier 1 – Lowest -hazard bait chemistries (borates)

Tier properties:

- Low acute toxicity to humans and pets at bait use rates
- Very long history of use in structural pest control
- Ideal for sensitive accounts when used in enclosed stations

Actives in this tier:

- Boric acid- Classic slow-acting stomach poison; long record in ant and roach baits
- Sodium tetraborate decahydrate (Borax) -Same borate family; behaves similarly to boric acid in baits
- Disodium octaborate tetrahydrate (DOT) -“Second-generation” borate with good solubility and formulation flexibility

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ANT BAITS

Tier 2 – Reduced -risk/moderate -hazard synthetics

Tier properties:

- Designed for colony kill with delayed action
- Moderate human-health hazard; good safety margin in bait form
- Strong tools for PMPs when used according to label

Actives in this tier:

- Indoxacarb (Advion line)
  - “Reduced-risk” classification; good transfer, broad spectrum
- Hydramethylnon (Maxforce / Amdro, etc.)
  - Workhorse granular bait active; metabolic inhibitor
  - Watch for aquatic toxicity – keep away from water

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ANT BAITS

Tier 3 – Highly effective but with more environmental baggage

Tier properties:

- Very potent at low doses
- Generally low–moderate acute human toxicity in bait form
- More concern for non-targets; very toxic to bees, aquatic life

Actives in this tier:

- Neonicotinoids: Imidacloprid, Thiamethoxam, Dinotefuran
  - Toxic to pollinators and aquatic invertebrates
- Abamectin
  - Very toxic to aquatic organisms and bees
- Fipronil
  - Toxic to mammals and aquatic life

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ANT BAITS

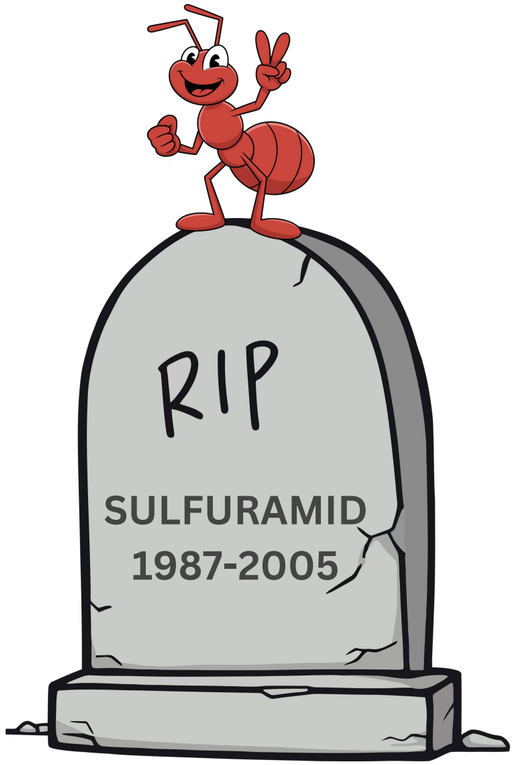
Tier 4 – Legacy / no longer acceptable for ant baits

Tier properties:

- Strong performance but unacceptable persistence or bioaccumulation
- Essentially removed from the U.S. ant-bait toolbox

Actives in this tier:

- Sulfluramid (Sulfuramid)
  - Breaks down to PFOS (persistent, bioaccumulative)
  - U.S. ant bait registrations discontinued; now mainly a regulatory cautionary tale



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ANT BAITS

Food-Handling & Sensitive Accounts

- Hospitals, schools, daycares, restaurants, kitchens, zoos, pharma labs/clean rooms/biotech
  - Borates (Boric acid, Borax, DOT)
    - Best choice for sensitive environments
    - Low-odor, long-duration liquid/gel placements
    - Strong for sugar-feeding species (Argentine, odorous house ants)
  - Possibly Indoxacarb or Neonics, depending on facility policies
    - Closed-bait applications (bait stations)
    - Only use when borates aren’t solving issue

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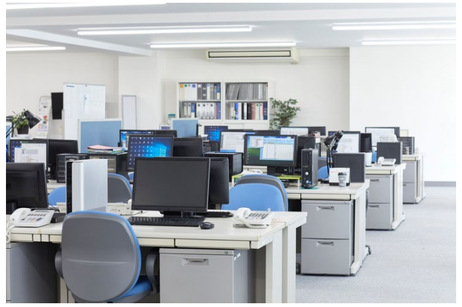
ANT BAITS



General Residential & Light Commercial

- Homes, small offices, retail, apartments
  - Borates
    - Indoor liquid/gel placements and maintenance programs
  - Indoxacarb
    - Versatile
  - Hydramethylnon
    - Perimeter and outdoor granular baiting

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ANT BAITS

Heavy Commercial / Industrial Accounts

- Warehouses, large facilities, multi-structure properties
  - Borates
    - Indoors for ongoing suppression/low-hazard profile
  - Indoxacarb
    - High-activity areas/all purpose
  - Hydramethylnon (granules)
    - Exterior perimeters and large turf or landscape zones
  - Neonics (Imidacloprid, Thiamethoxam, Dinotefuran)
    - For strong immediate colony reduction
    - Heavy trailing and recurring invasions

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ANT BAITS

Hard-to-Control or Structure-Invading Species

- Carpenter ants, Pharaoh ants, crazy ants, pavement ants
  - Borates
    - Sugar feeders
    - Rotation or maintenance programs
  - Fipronil (gels/stations)
    - Effective for carpenter ants and tough species
  - Neonics (Imidacloprid, Thiamethoxam, Dinotefuran)
    - Non-repellent, strong colony transfer
  - Indoxacarb
    - Multi-queen or large, distributed colonies

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ANT BAITS - EXAMPLE APPROACH

Start with borates for:

- Sugar-feeding, trail-building household ants
- Sensitive or food-handling accounts

Add/rotate in indoxacarb when:

- Colonies are large, multi-queen, or persistent
- You need stronger, but still relatively “clean,” chemistry

Bring in neonics, abamectin, fipronil, hydramethylnon when:

- You’re dealing with carpenter ants, fire ants, Pharaoh ants, crazy ants, or heavy recurrent infestations
- Account type and label restrictions allow them
- You need high-powered colony suppression

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EXAMPLE USE: ARGENTINE ANTS

Behavior: Massive multi-queen colonies, heavy sugar preference, big trail systems.

- Borates – liquids & gels
  - Great for sugar-feeding, huge trails, and sensitive accounts
- Neonics – sugar gels/liquids
  - Faster, deeper colony impact than borates alone.
- Indoxacarb – sugar gel
  - Excellent transfer, good in rotation with borates/neonics.

Typical approach:

- Indoors & really sensitive sites: borate liquid/gel as the backbone.
- Perimeter / heavier pressure: add indoxacarb or a neonic gel/liquid to get deep colony kill.

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ANT BAITS

Why not just go straight for the hardest hitting bait if safety isn't a concern? Cost.

- Cost per application?
  - liquids - dilution cost per application
    - must use liquids meant to be diluted
    - many liquids will spoil quickly if diluted
    - change % active when diluted
  - How much liquid/gel per unit purchase
    - fluid ounces per bottle or grams per syringe
    - how many syringes in a box of product
  - How many products get sent to an account
    - products with multiple uses (ant, ant & roach)

Green Way Liquid Ant Killing Bait® may be used at full strength, diluted with distilled water or other water-based, food-grade liquid 1:1 to make bait containing 0.5% active ingredient.

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LIQUID ANT BAITS - DILUTION

Not all liquid baits are suitable for dilution/can't be used long term without developing repellency

- Why dilute?
  - modify the % active for type of ant species/size of colony
    - prevent repellency in more sensitive species
  - cost per service
- Use liquids meant to be diluted
  - follow labels for instructions on dilution to obtain desired concentration
- Many sweet liquid baits will spoil quickly if diluted
  - allowing dilution does not necessarily mean stable when diluted

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LIQUID ANT BAITS - DILUTION

For borate-based baits:

- Boron “power” (relative boron content per % AI):
  - Borax = 1×
  - Boric acid ≈ 1.8×
  - DOT ≈ 2×
- Repellency risk:
  - Boric acid baits above ~1% start to become repellant

Boron Source	Relative Boron Power	Repellency	Notes
Sodium Tetraborate (Borax)	1X	Low	Common but less effective
Boric Acid	1.8X	Moderate at >1%	Historically used
Disodium Octaborate Tetrahydrate [DOT]	2X	Minimal	Active ingredient in Green Way® & Gourmet®

DOT delivers twice the available boron of borax while maintaining neutral pH and low repellency, resulting in more consistent feeding for faster colony suppression (Klotz et al., 2000).

So before dilution, there’s already a sweet spot:

- Strong enough to kill the colony
- Weak enough that ants keep feeding and recruiting
- DOT and boric acid let you hit that sweet spot at lower label % numbers before losing palatability

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LIQUID ANT BAITS - DILUTION

Label allowing dilution doesn't mean it's stable when diluted.
The goal of dilution is to:

- Lower effective boron (reduce repellency)
- Make more suitable for tiny ants (higher % kills too fast)
- Increase volume to lower cost-per-application

Most formulations were not built for longevity after dilution:

- Sugar concentration drops → microbes love it
- Preservative system designed for undiluted formula
- Introduce oxygen and contamination during mixing

Result: AI concentration in non -repellent range, but bait starts to mold, ferment, pick up off -odors and flavor changes, or otherwise spoil and become repellent.

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LIQUID ANT BAITS - DILUTION

At 1% DOT Pre-dilution, Green Way liquid is already at a good active range to avoid repellency. Bait designed specifically for longevity after dilution:

- The active itself (DOT) has some antifungal/antimicrobial effect
- A preservative system tuned for long station life
- A label that anticipates dilution (e.g., 1:1) and keeps matrix stable
  - Drops the effective boron concentration to 0.5%
- Less likely to mold/ferment quickly
  - Remains palatable longer than a typical borax syrup post-dilution

Formulation matters more than the math:

some liquids are not built for longevity after dilution, even if the label allows it.

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THANK YOU

Feel free to reach out for more information, or visit our website for more resources.

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