

# The European Fire Ant in British Columbia: Identification and Approaches to Control



Photo Credit: S. McCann

Dr. Rob Higgins  
Thompson Rivers University

Chilliwack

22 April 2015



Images: R. Higgins

There are almost 100 species of ants in BC.

Currently I am watching about 5 invasive species with one more I am expecting to see appear.

# The Ants



Images courtesy: Sean McCann (ibcyter.com)

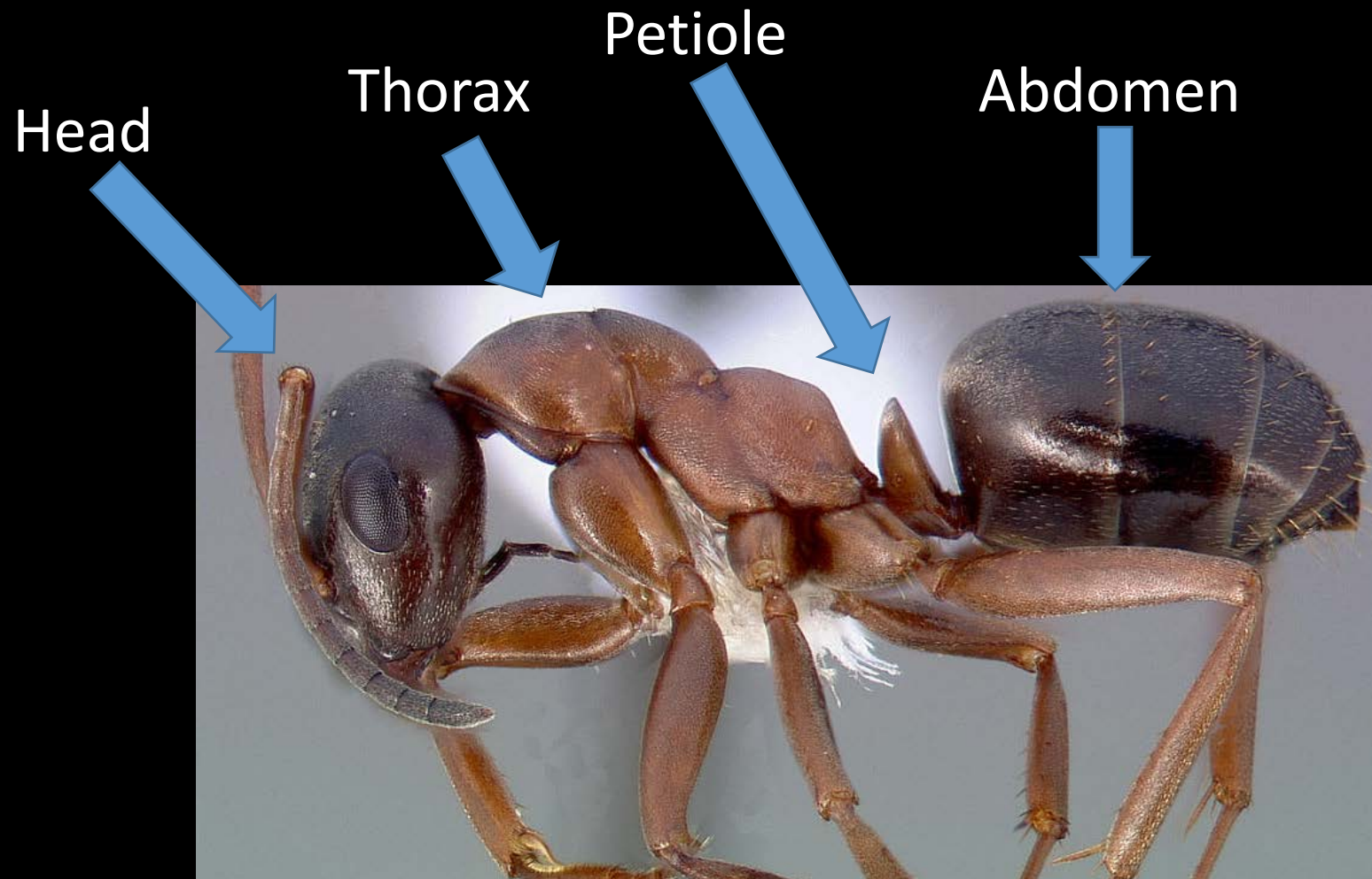


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**Ant Anatomy: Typical of most ants in BC but not fire ants**

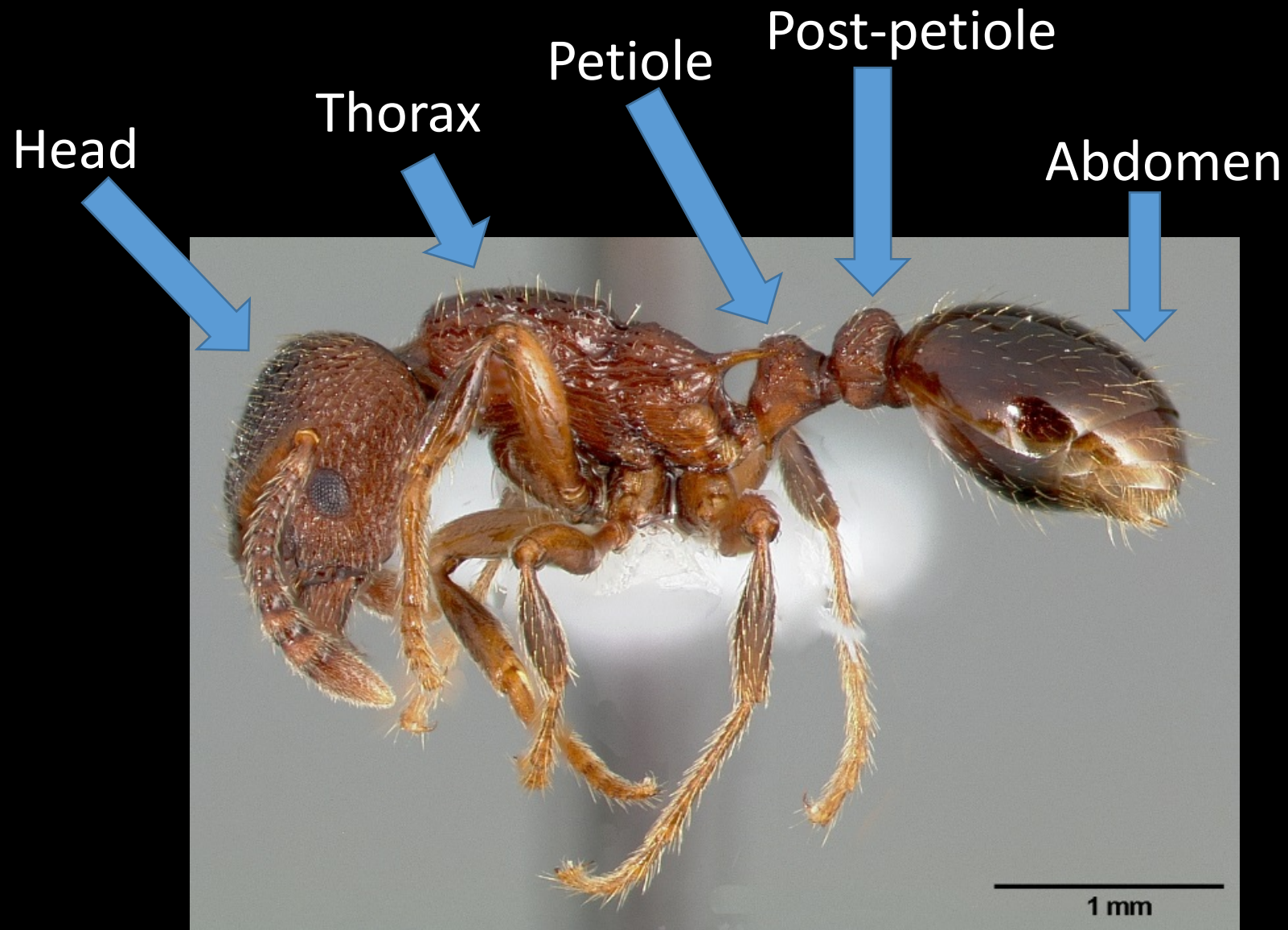


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Ant Anatomy: Typical of fire ants and some native species





Photo: Sean McCann (ibcyter.com)

Impressive fire ant (*Myrmica specioides*)



Image: R. Higgins





Image: Courtesy Sean McCann (ibycter.com)

The European fire ant (*Myrmica rubra*)



Photo: Sean McCann (ibcyter.com)

Impressive fire ant (left) and European fire ant (right).

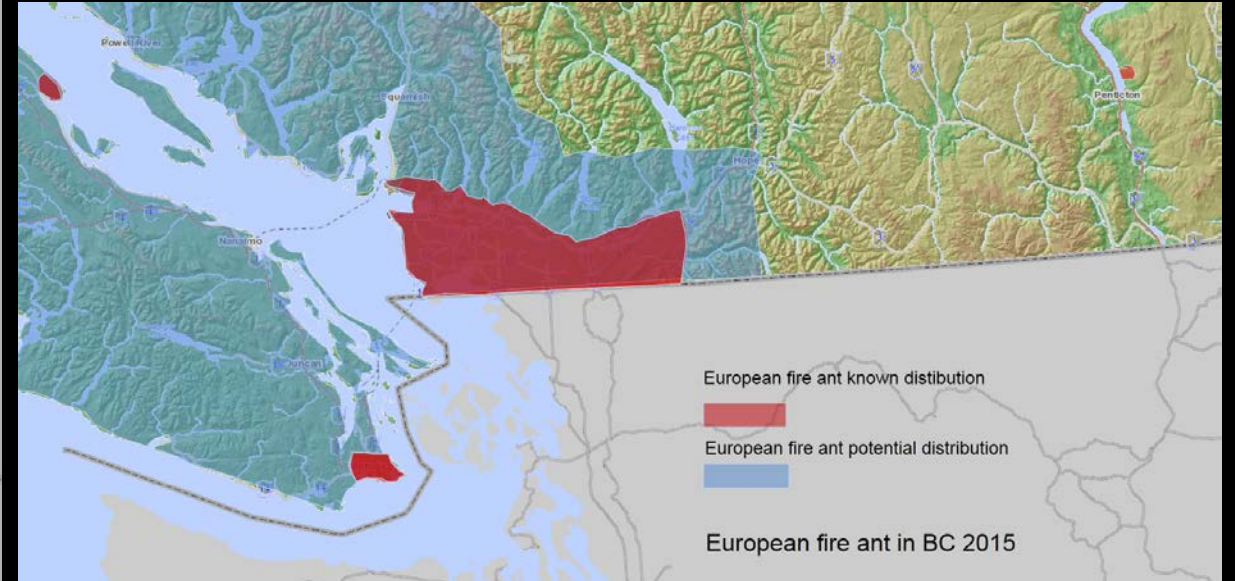


Images: Courtesy Sean McCann (ibycter.com)

# The European Fire Ant (*Myrmica rubra*)



Image: R. Higgins



Maps created by R. Higgins using iMapBC

## Distribution of the European fire ant (*Myrmica rubra*) in BC

# Source



Photo credit: C.G.P. Grey. Wikicommons CCA 3.0

# Source



Image: R. Higgins

# Known Locations

Burnaby

Chilliwack

Coquitlam

Courtenay

Delta

District of North

Vancouver

Electoral Area A (UBC)

Maple Ridge

Naramata

New Westminster

Oak Bay

Richmond

Surrey

Pitt Meadows

Vancouver

West Vancouver

Victoria



# Estimated Economic Impact of the European fire ant in British Columbia

Table 4.2: Preliminary damage estimates for European fire ant in 2012 CAD.

Impacts	Number of Units	Final Estimate (\$/unit, 2012; including 50% reduction)	Preliminary Damage Estimate
Households	572,511	149	85,282,174
Schools	948	4,897	4,642,218
Municipalities	77	1,267	97,559
Golf Courses	160	62,492	9,998,720
<b>Total</b>			<b>100,000,901</b>

Source: Robinson et al. 2013

# Affected Stakeholders

Residences

Parks/Municipalities

Botanical Gardens

Commercial Landscaping Operations

Equestrian Areas

Community Gardens

Pest Control Professionals

## E-mail from a resident April 14, 2014

Right now our yards are totally unusable, and has been this way for a number of years. A few of my children as well as my husband has been stung and can't play anywhere that there is grass. So now, they play in the carport but the ants have begun to come up in the cracks. As is stands, they are running out of places to play. Really need help! 5 kids in the house all summer is not really a fun idea to me so I would love to begin fixing this issue asap!



Photo: R. Higgins

## An issue at VanDusen Botanical Gardens

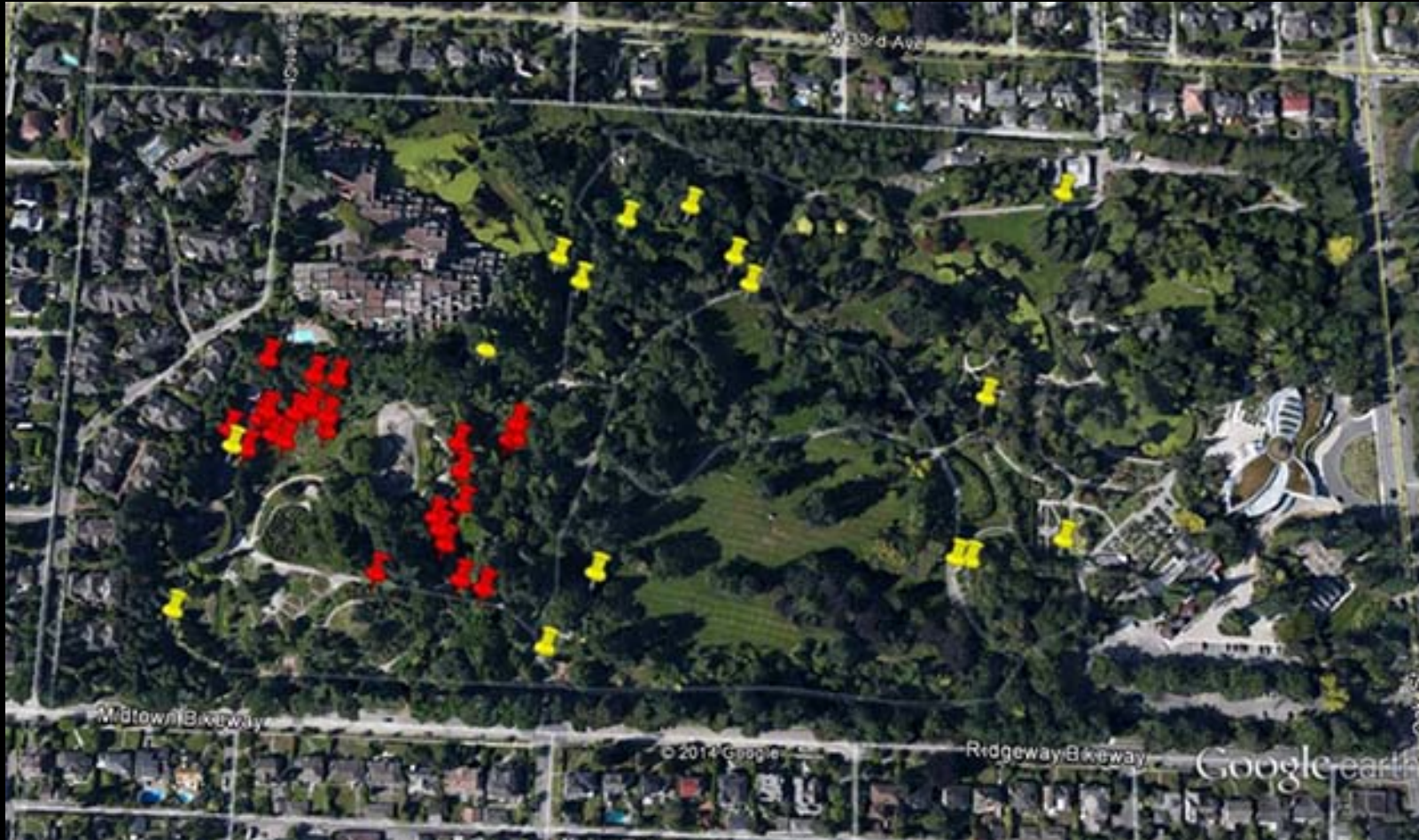


Image created by R. Higgins using Google Earth

Distribution of *Myrmica rubra* (red) and the *Myrmica specioides* (yellow) at VanDusen July 2014

# What's at stake for VanDusen?

- Integrity of our plant collections and reputation
  - Garden closures
  - Impacts to operations (loss of service yard)
  - Potential source of spread to adjacent properties
  - Potential litigation
  - Potential lost revenues from garden rentals, special events, admissions & memberships
  - Direct control costs
  - Staff wages & lost productivity (8 staff stung)
- \$190,495 and counting! (based on 2014 figures)**



# European Fire Ant Biology



Image: Courtesy Sean McCann (ibycter.com)



Image: R. Higgins

Fire ant colonies have no visible structure at the surface once the nest is more than a few weeks old.





Image: R. Higgins

EFA nests below ground are often offset from where they appear above ground

*M. rubra* is strongly attracted to sugars



Image: R. Higgins



Image: Loracco CC 3.0 (Wikimedia Commons)

Good News: they do not like to move indoors

Good news: they do not seem to like  
crossing paved roads



Source: Google Earth Street View

Bad news: they like backyard lawns where fences, trees and shrubs allow sunlight to reach the ground but create enough shading to hold moisture. They prefer tall grass to short cut grass.



Source: Susan Horton, Halifax

# Bad news: they like raised garden beds



Source: BARAGA Community Garden

# Control



Image: Jim Henderson CCA 1.0 (Wikimedia)



Small (e.g., garden beds)

# Scale



Large (e.g., parks, airports)



Medium (e.g., home and neighborhood)







Image: R. Higgins

Small scale  
Experimental plots at BARAGA  
(Burnaby Community Gardens)

# Anything Else?



Image: Wikicommons, Abhi, CC 3.0, Maharashtra, India

Neem (*Azadirachta indica*) tree.

Can this wood, in chip form, be used as a barrier?

Cloves (contain eugenol)

Peppermint/Spearmint (contains pulegone)



Medium scale (e.g., home and neighborhood)

# Digging and Torching

## TORCHING

- Propane torch applied to infested soil
- Requires 2 people: one to turn over soil to expose ants while second person applies torch

**PROS:** chemical-free and effective for small scale infestations

**CONS:** safety considerations, labour-intensive, difficult to reach all ants, repeat application likely needed



# Diatomaceous Earth



## Perma-Guard Fossil Shell Flour

Applied in thick lines around heavy infestations to prevent EFA spread

**PROS:** easy to apply, relatively safe for public areas

**CONS:** NOT effective or practical for outdoor use in our region. Must be re-applied immediately after a rainfall. Even wet soil absorbs the products, rendering it inactive

# Nematodes

## Nematodes

Applied nematodes (two applications) to test plot in moist, shady conditions

## Results

- No apparent impact on EFA density
- 6-8 weeks after second application a gardener was stung at treatment site

## Conclusion

NOT effective



# Traps + Freezing

## TRAPS + FREEZING

- Clamshell container lined with paper towel and landscape cloth, filled with moist soil & mulch
- Bury so flush with soil surface; cover with paver
- Check after 5 days, remove colonized traps and surrounding soil, double-bag, and freeze for 7 days
- Return soil to original site



# ....Traps + Freezing

## Conclusions

- Pavers highly effective at isolating colonies to make them accessible (12/17 bricks had colonies after 1 week)
- Pavers alone work better than traps
- Freezing is time-consuming

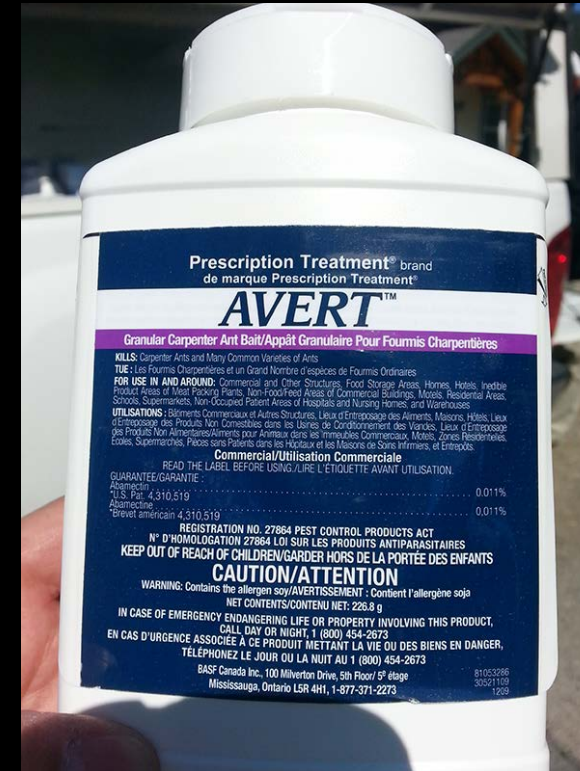




# Baits



Image: Etiproducts CCA 3.0 (Wikimedia)



Images: R. Higgins

## Baits Stations vs Broadcast Granular Baits



Image: R. Higgins

# Digging and Treating with Permethrin

How does this Work?

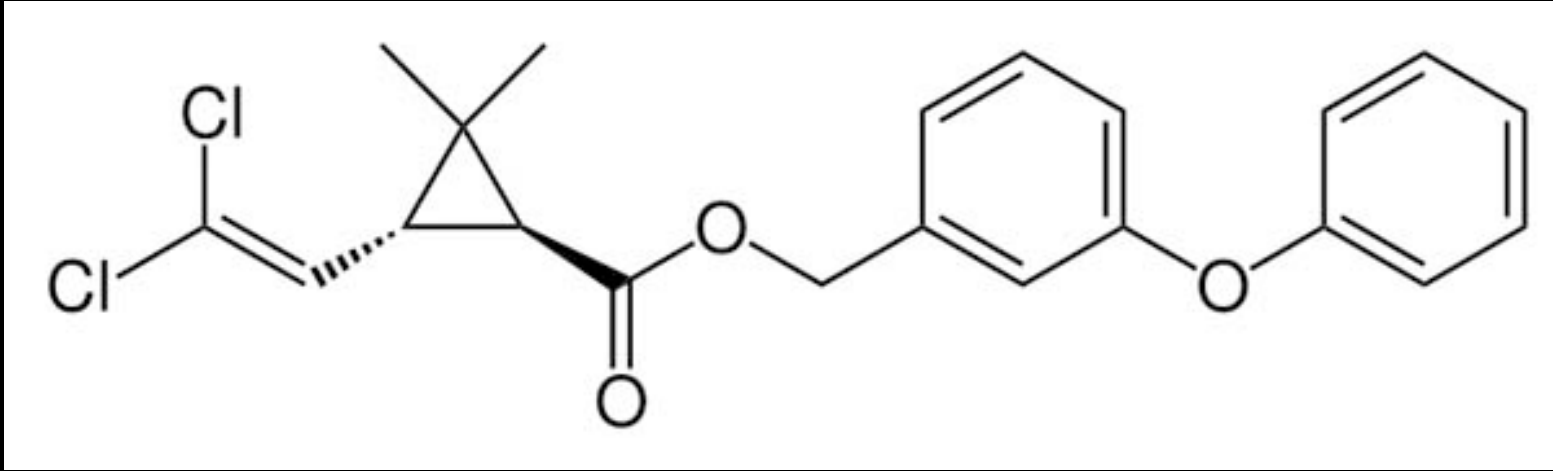
# 2014 success story!

## Meditation Garden Reopened! How?

- Removed surface leaf litter and debris
- When nest identified, sprayed systematically, from perimeter to prevent escapees, honing in on nest
- Applied 0.25% permethrin (Ant Out)
- Turned over soil while spraying
- Sprayed infested moss
- Single treatment effective 90% of time
- Repeat as needed




# What is Permethrin?



Permethrin is a pyrethroid, a synthetic variant of pyrethrins. Pyrethrins are extracts of chrysanthemum seed cases. They have low vertebrate toxicity (except to fish and cats) and a half-life of approximately 40 days within soil.

# Control trials at Van Dusen – What's next?

## NEEM Trials

- Neem plant is native to India.
  - Used in cosmetics, traditional medicine and as a natural insecticide
- 
- Plan to trial Neem as potential EFA control at VanDusen
  - Working with Terramera and ES CropConsult, a local IPM research company
  - Goal is to register Neem for use to control ants in Canada



Large scale (e.g., parks, airports)



## Decapitating flies *Pseudacteon* spp.



Image source (*S. invicta*): Sanford Porter USDA

Research has examined the utility of using *Pseudacteon tricuspis*, *P. curvatus* and *P. nocens* decapitating flies to control the red imported fire ant in the southern US.

Impacts suggest more of a harassing role adding stress to colonies but not eradicating.

*Pseudacteon brevicauda* is a European species believed to be specific to *Myrmica rubra*.



Photo credit: Pat Teti, Williams Lake

## Fungi

*Formica argentea*  
infected with the  
zombie fungus,  
*Pandora* sp.

# Infectious Disease Risk Management in Fire Ants



A metal expansion joint on bridge (Annacis Island) where fire ants that die or show signs of infection in the nest are dumped for the purpose of sterilizing the remains

Image: Courtesy Sean McCann ([ibcyter.com](http://ibcyter.com))

# Broadcast Baits

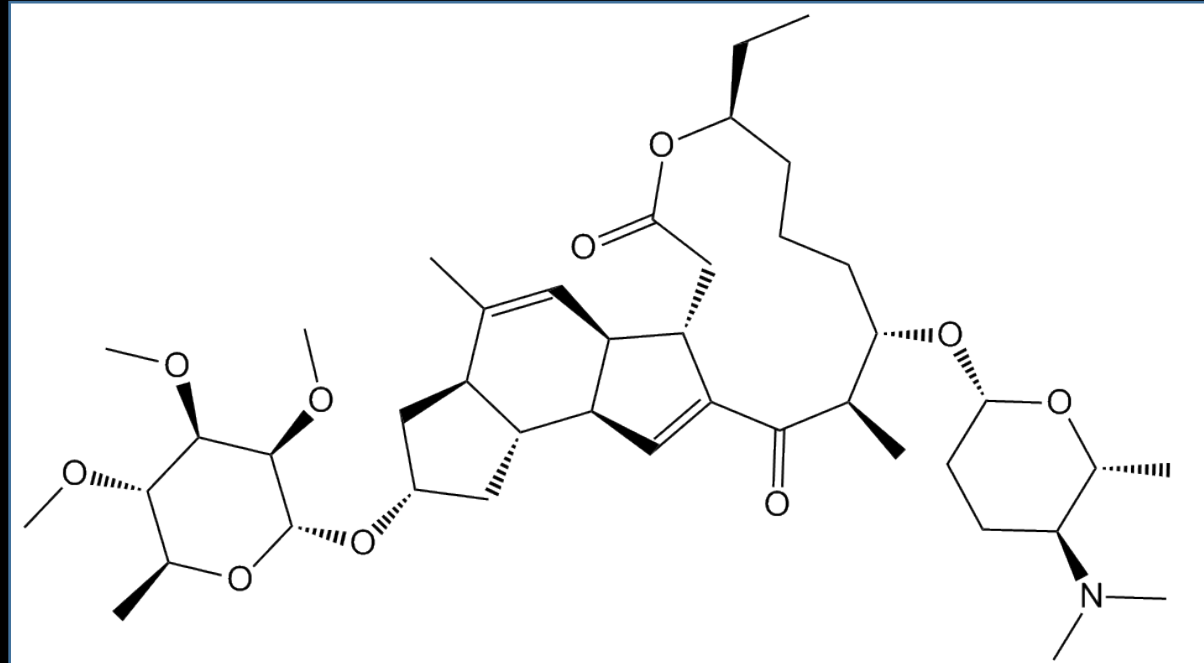


Image: WikiCommons, Capaccio, CC 3.0

Spinosad

# Best Practices

1. Inspect all plants/soil coming onto property for ants
2. Keep all soil on site
3. Reducing watering as much as possible
4. Remove lawn clutter that ants are able to nest beneath
5. Keep grass short
6. Consider replacing wooden garden bed frames with aluminum
7. Map using slices of apple
8. Use pavers to help lure colonies into more vulnerable areas
9. Dig and Treat with low concentration Permethrin

It Could Be Worse









# Acknowledgments

BC INTER-MINISTRY INVASIVE SPECIES WORKING GROUP



PROTECTING BC'S RESOURCES



*Invasive Species Council  
of British Columbia*



Ministry of **Agriculture**



ROYAL **BC** MUSEUM

Active participation of residents, botanical garden managers, regional invasive species councils, commercial landscaping operation managers, community gardeners, pest control professionals, and the municipalities of southwestern BC.

Field and lab work with Dr. Sean McCann, Erin Adams, Hester Williams, Brittany Lowe, Dominic Torheiden, Mitchell Johnson