Treading Carefully on Fire Ants in the Urban Landscape

Image: JamesZ_Flickr, CCA 2.0. Wikimedia.org

Invasive Species Council of BC post-Forum Workshop
09 February 2017

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Associate Professor
Thompson Rivers University

Argentine ant

Linepithema humile

Photo source: R. Higgins

These appear to have moved indoors this winter (2017)as temperatures have dropped in Victoria.

Appears to be less common in some businesses where they were well established and more abundant in others

The pavement ant (*Tetramorium* sp E)

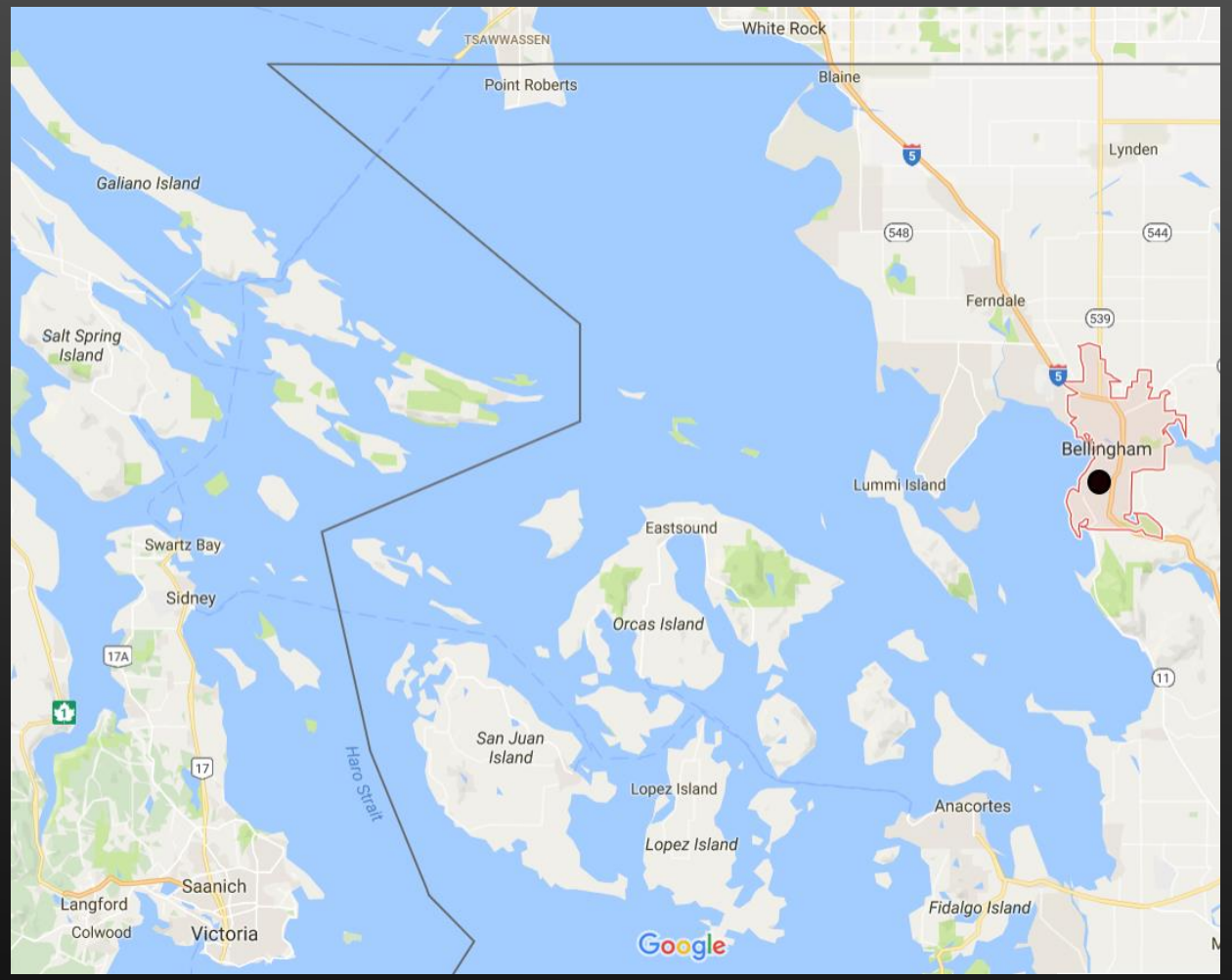
Images: Alex Wild (alexanderwild.com)

From first finding in 2006 in Tsawwassen this ant is now throughout southern BC and appeared in 2017 in multiple locations in Kamloops

Asian Needle Ant

Pachycondyla (Brachyponera) chinensis

Image: Alex Wild (alexanderwild.com)



Asian Needle Ant: Bellingham, Washington
Collected from a child's cookie (School of Ants project) in 2012. Could not be relocated in 2013.

Image: S. McCann

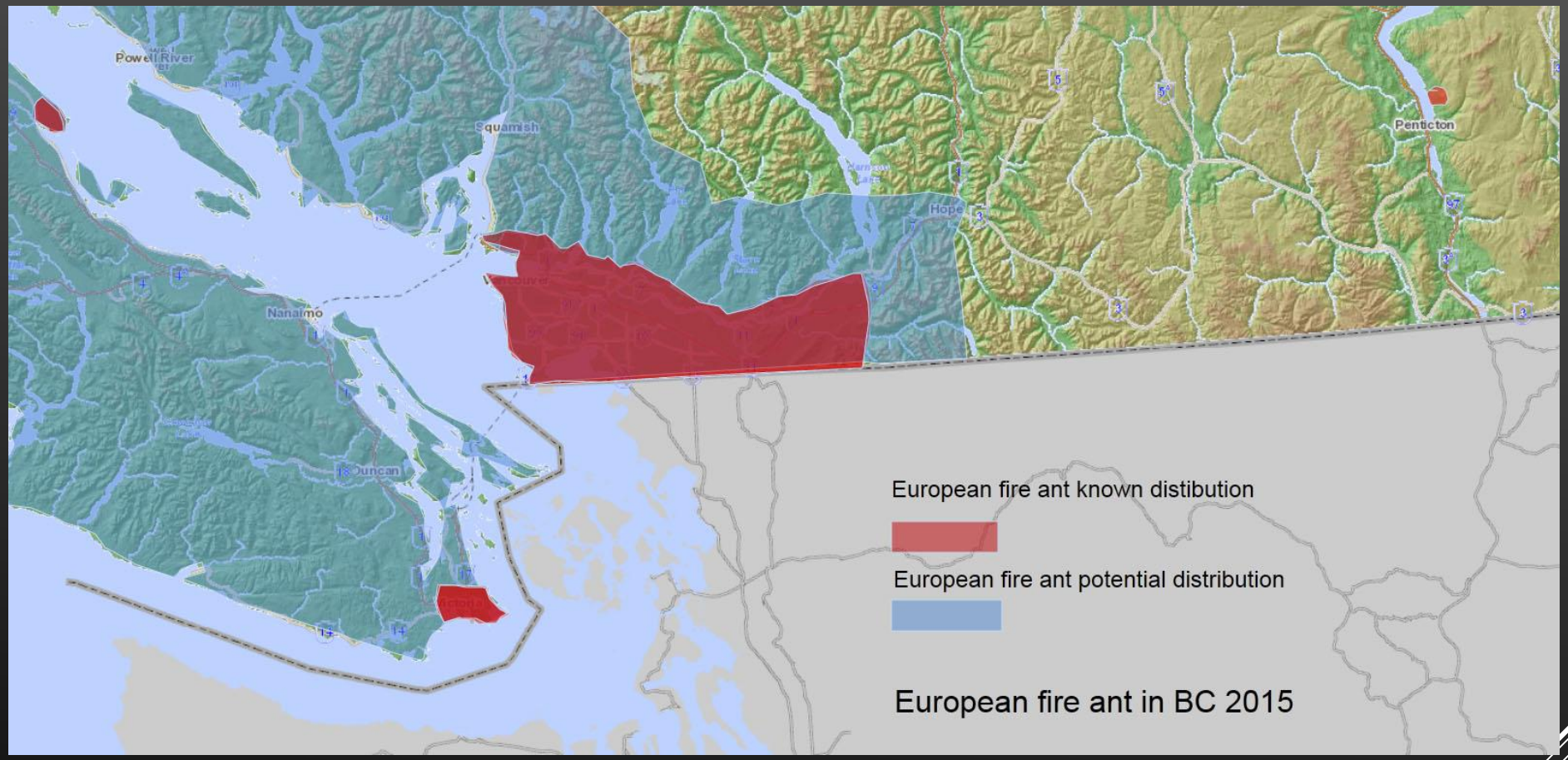
Myrmica specioides, impressive fire ant, turned up in 2011

Image: YVR. R. Higgins

There is roughly one colony of the impressive fire ant in 10 m^2 within the runway infield. Each colony may produce around 300-800 reproductives per season.

Impressive fire ant, *Myrmica specioides*, mating swarm at YVR

The European Fire Ant (*Myrmica rubra*)



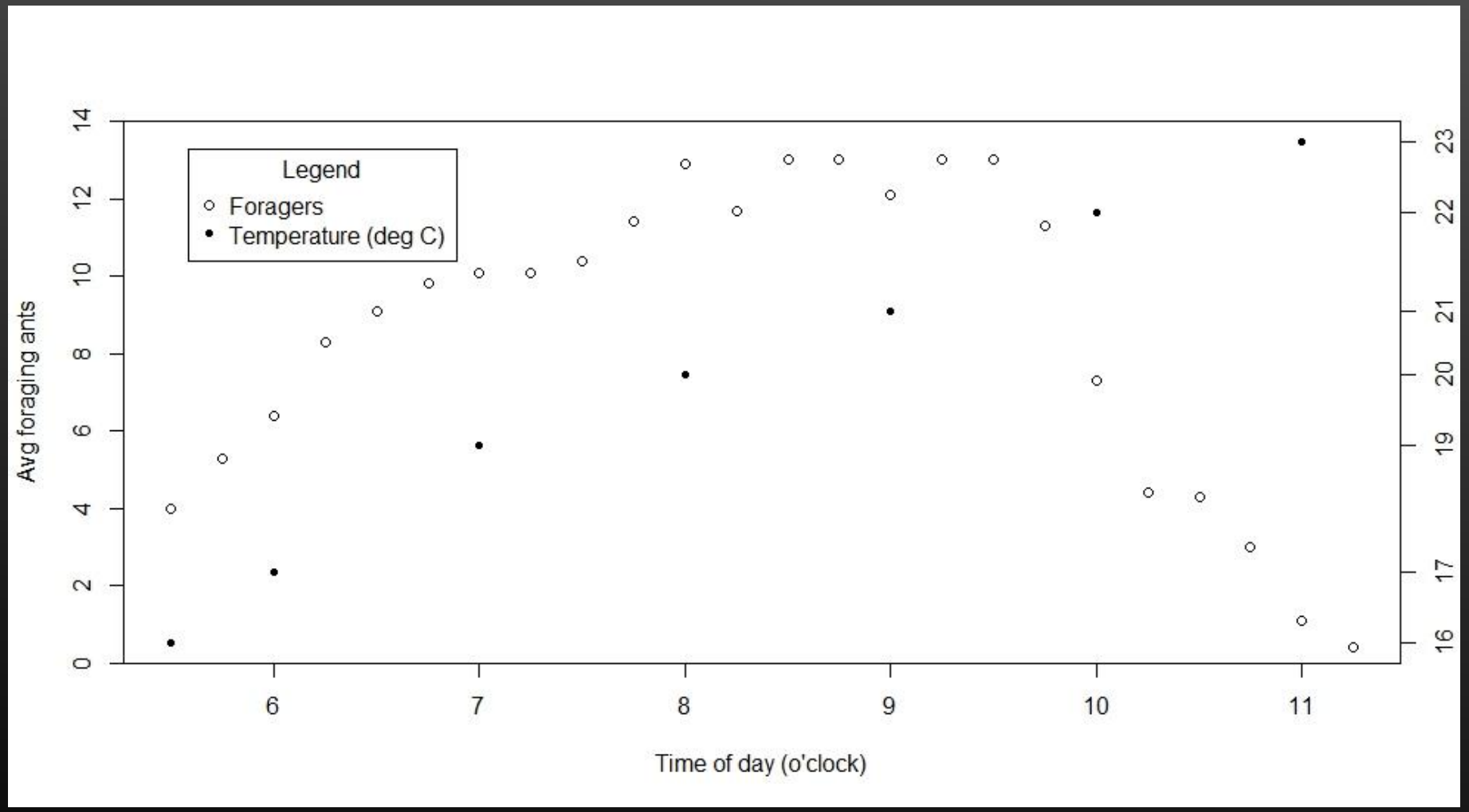
Current distribution of the European fire ant in British Columbia

First Case of Anaphylaxis
Ralph Olsen
Summer (2016) in New Westminster.

Image: Ralph Olsen. Vancouver Sun, 02Sept2016.

UBC Botanical Gardens Service Yard

The European fire ant and Temperature



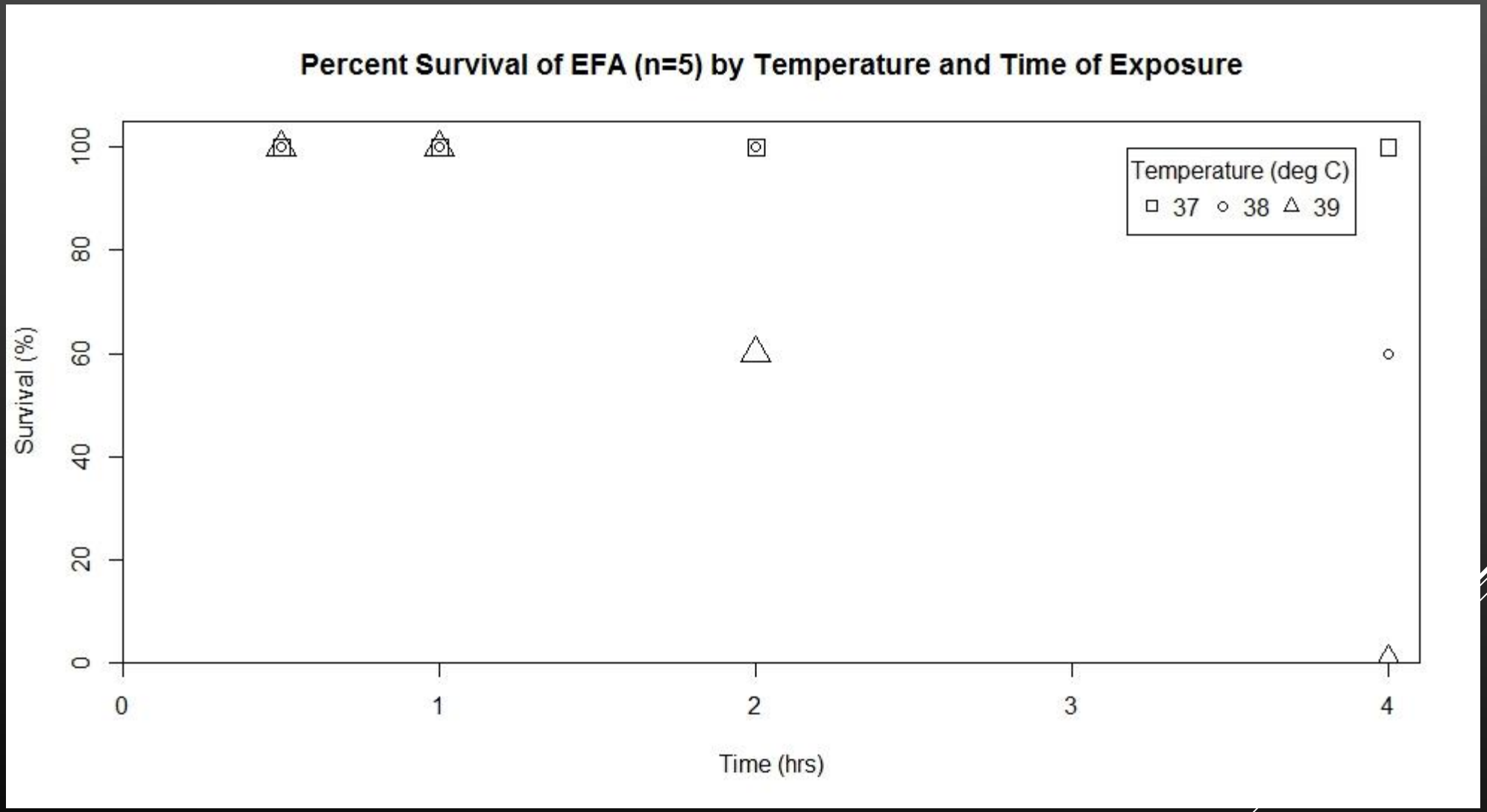
Foraging activity and Temperature

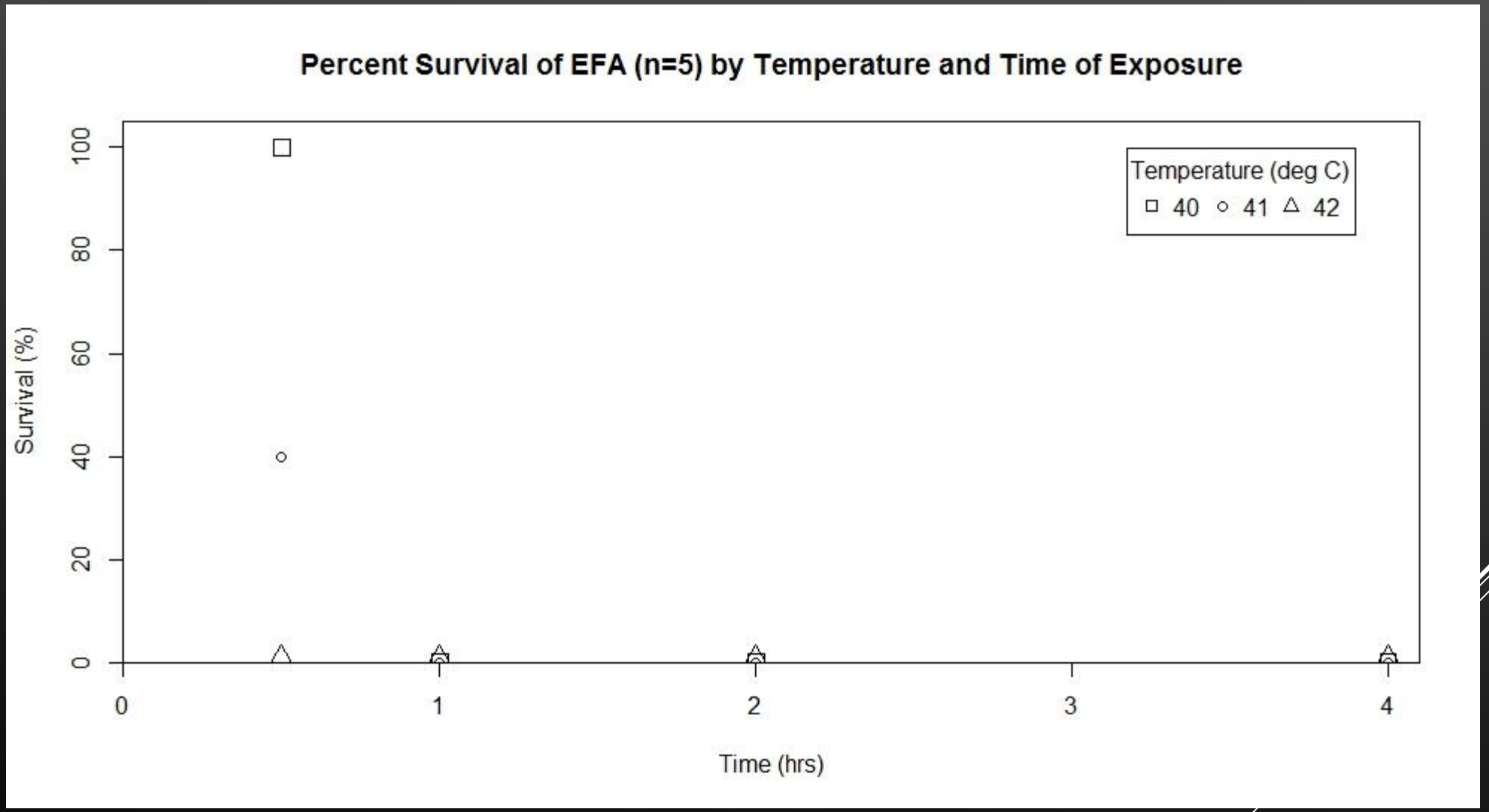
Examined at Arbutus Corridor

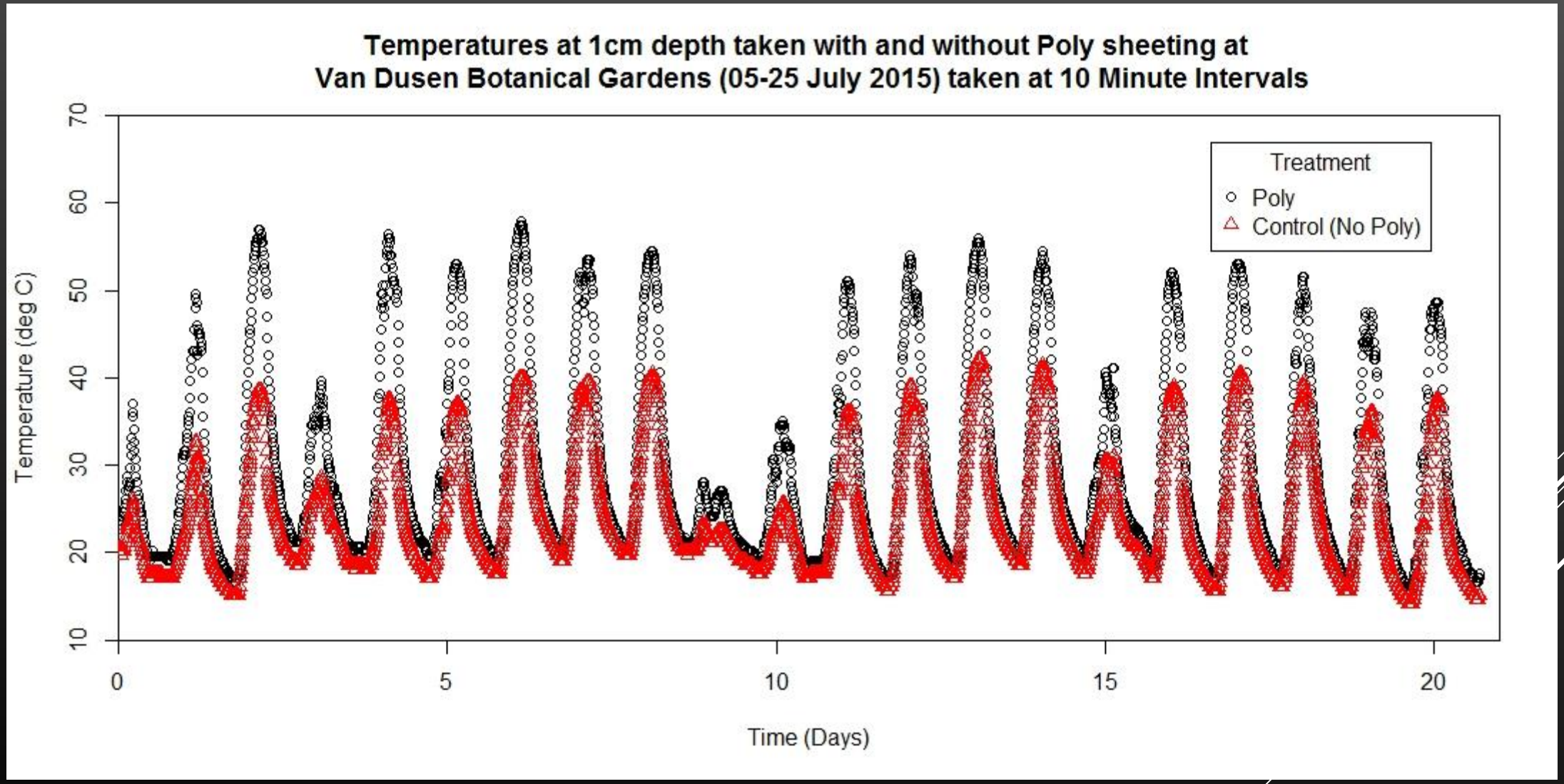
Maximum air temperature this day was 25 C. Surface temperatures at 11:00 ranged from 21 C on shaded grass to 48 C on railroad tie

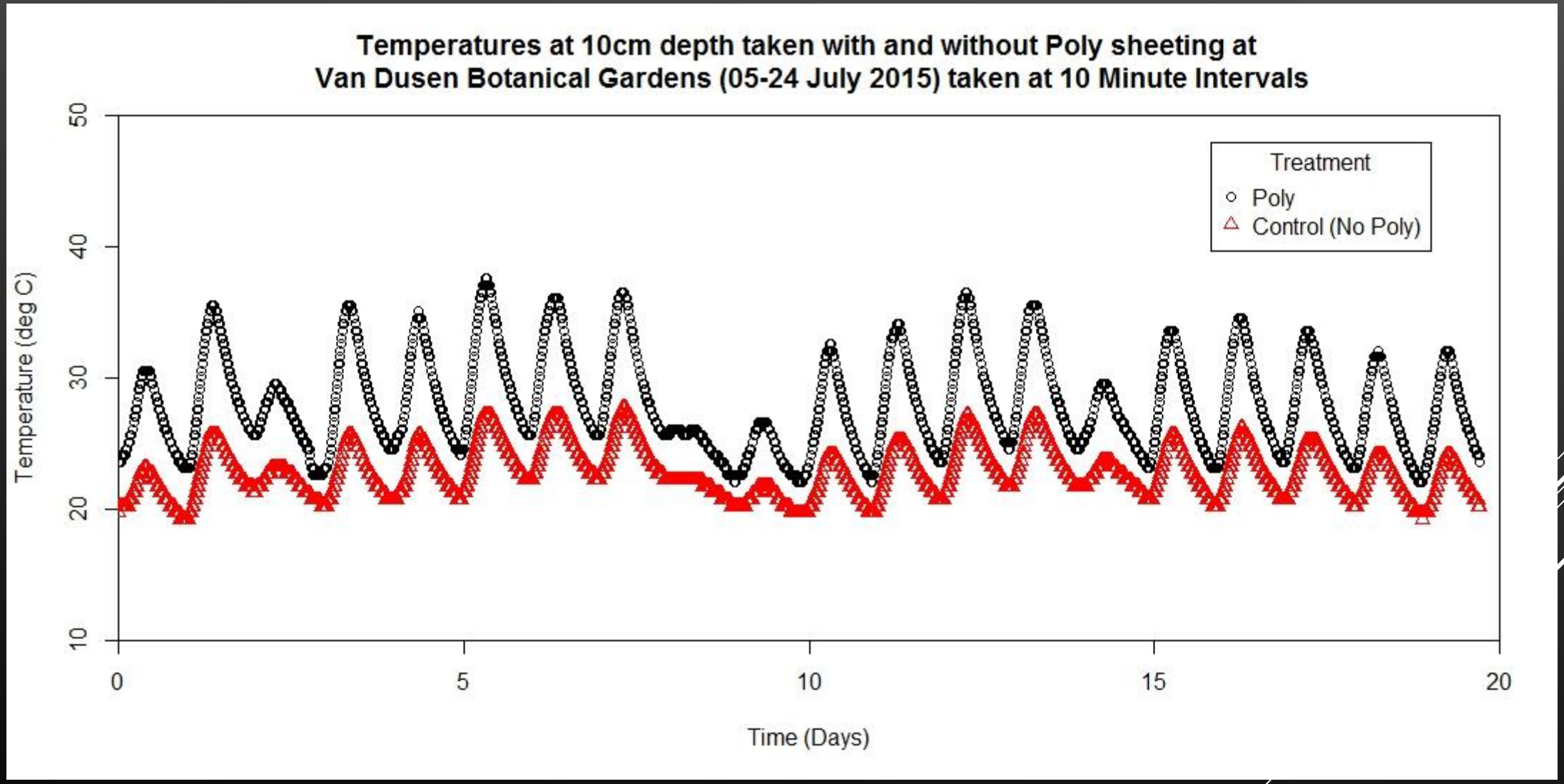
Lethal Temperatures

Image: PCR Machine. R. Higgins


Percent Survival of EFA (n=5) by Temperature and Time of Exposure
Survival (%)
0
20
40
60
80
100
0
1
2
3
4
Time (hrs)
Temperature (deg C)
37
38
39


Percent Survival of EFA (n=5) by Temperature and Time of Exposure
Survival (%)
0
20
40
60
80
100
0
1
2
3
4
Time (hrs)
Temperature (deg C)
40
41
42


Temperatures at 1cm depth taken with and without Poly sheeting at
Van Dusen Botanical Gardens (05-25 July 2015) taken at 10 Minute Intervals
Temperature (deg C)
10
20
30
40
50
60
70
0
5
10
15
20
Time (Days)
Treatment
Poly
Control (No Poly)


Temperatures at 10cm depth taken with and without Poly sheeting at
Van Dusen Botanical Gardens (05-24 July 2015) taken at 10 Minute Intervals
Temperature (deg C)
10
20
30
40
50
0
5
10
15
20
Time (Days)
Treatment
Poly
Control (No Poly)

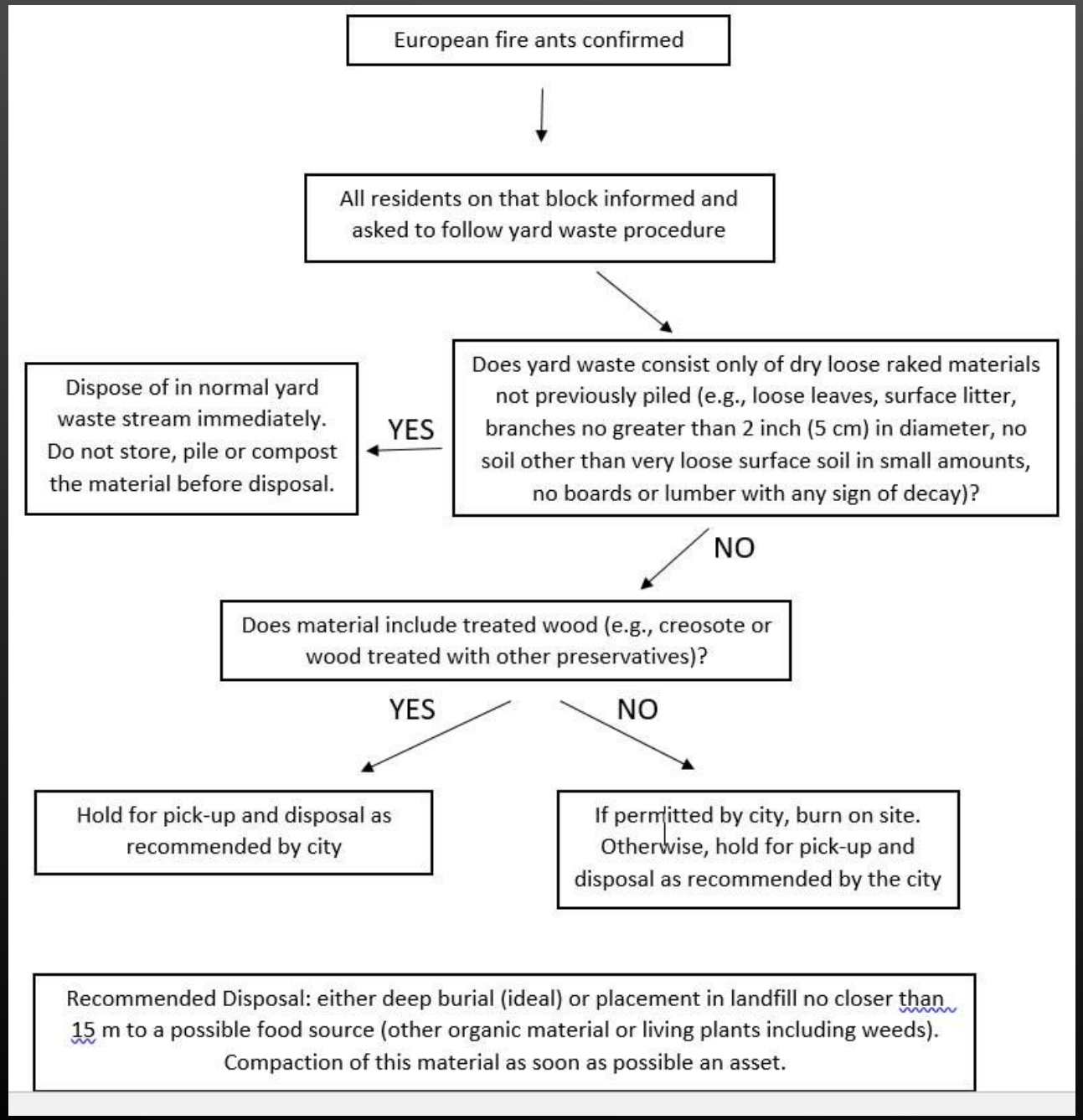
Presents the possibility of sterilizing soil by placing quantities into a steel container and allowing summer heat to raise the temperature.

Source: Ymsoncincor, CCA 4.0. Wikimedia Commons

Can we pump hot dry air into tunnels and kill colonies?

Source: SourceForage, Public Domain. Wikimedia.org

Source: Jmdestefanis, CCA3.0. Wikimedia.org



Municipal Management Guidelines

Pesticides

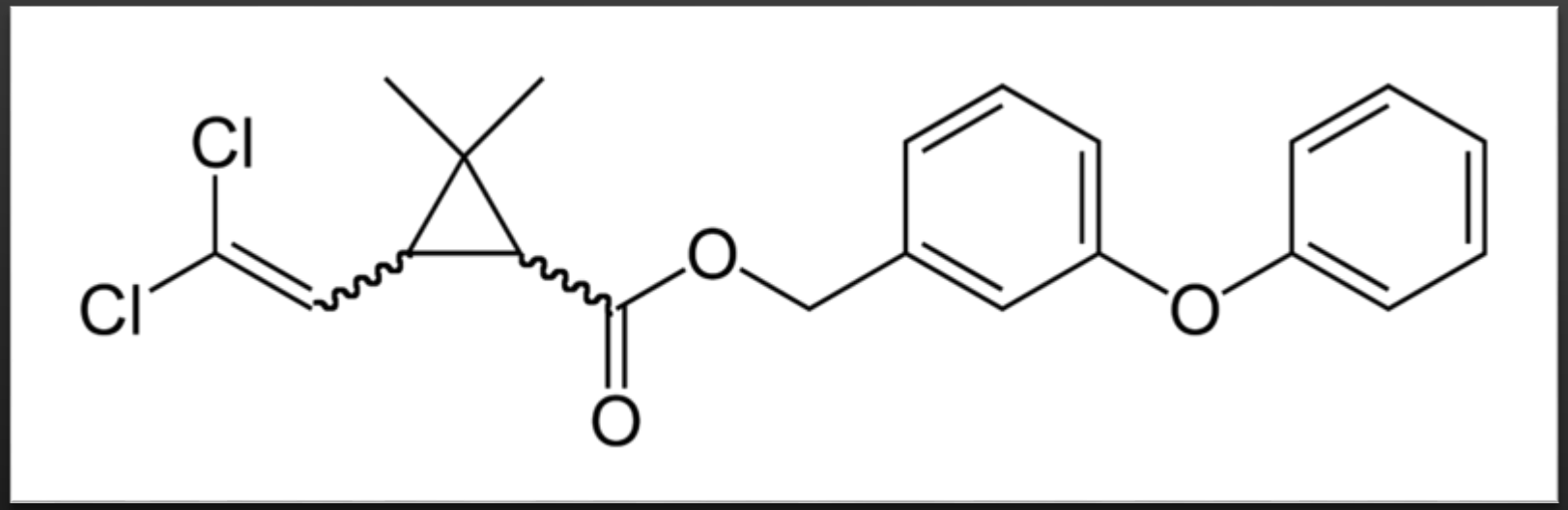
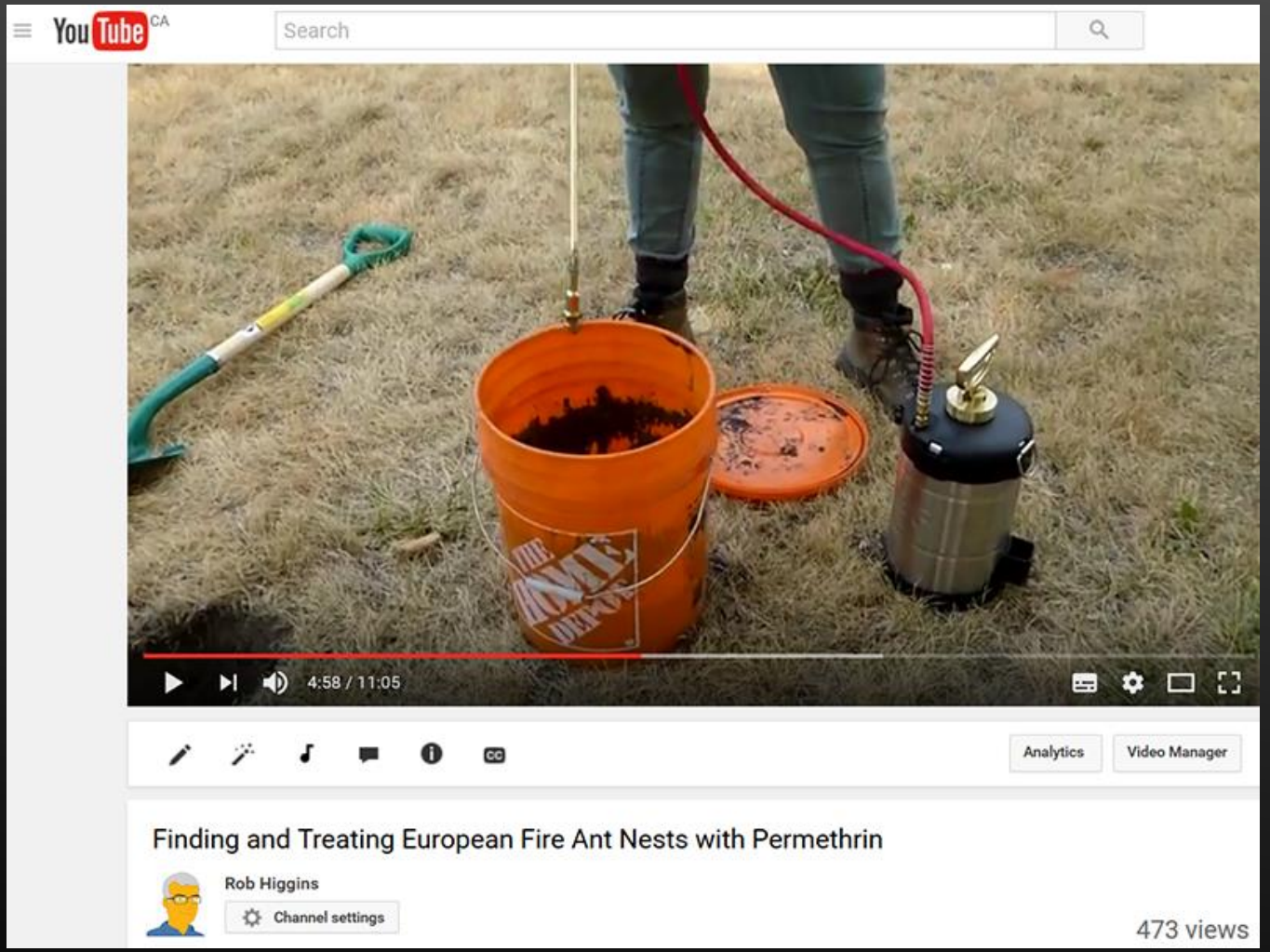


Image: Permethrin. Public Domain (Wikimedia Commons)

Permethrin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Analytics
Video Manager
Finding and Treating European Fire Ant Nests with Permethrin
Rob Higgins
Channel settings
473 views

Ben van Drimmelen in Victoria used the permethrin technique to eradicate >30 nests in his backyard in 2015. In 2016 he allowed fire ants from surrounding properties to re-invade. His yard gained about 3 colonies per month and ended 2016 with 16 colonies.

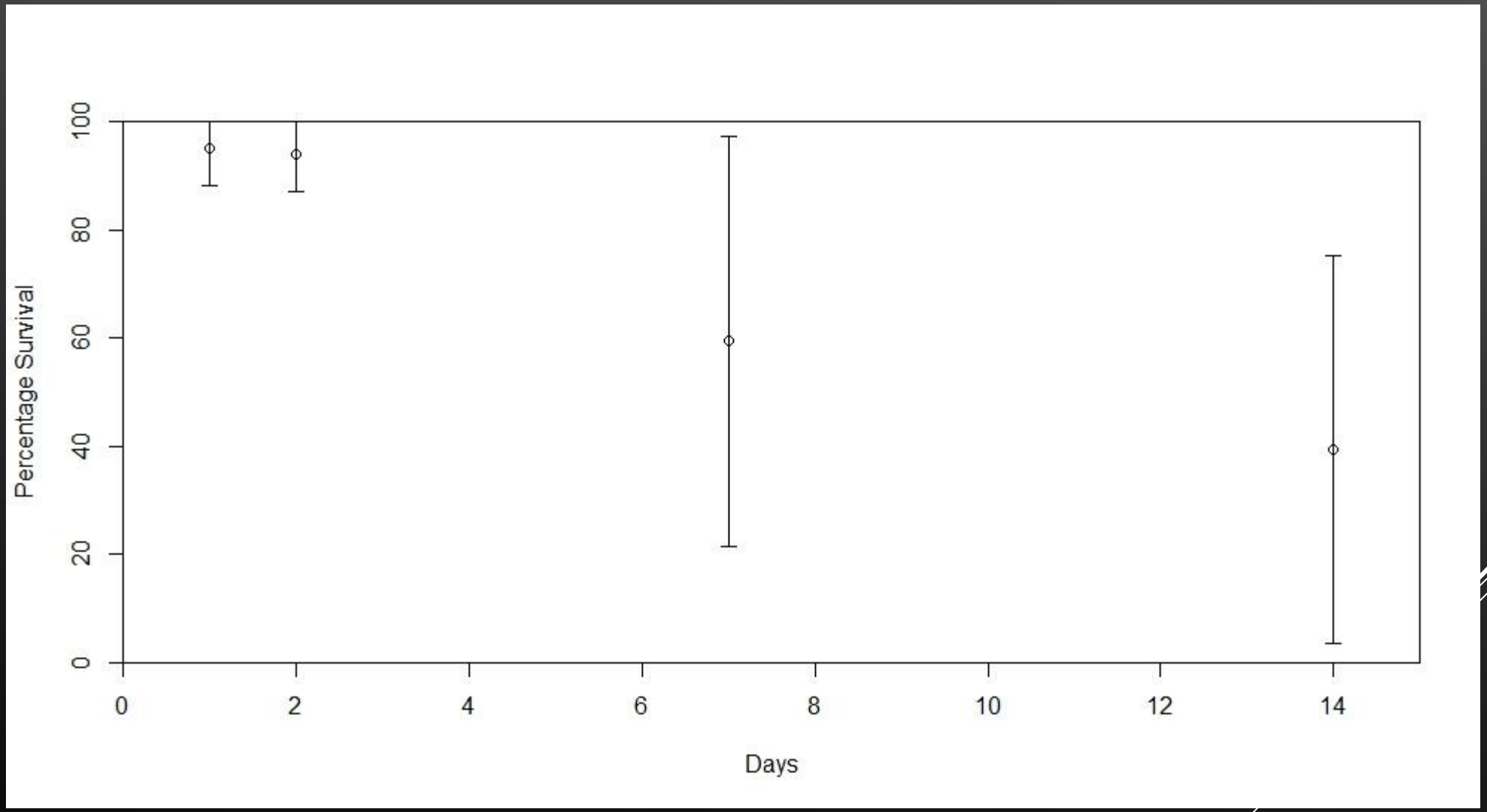
Spinosad?

It is an insecticide derived from the bacterium, *Saccharopolyspora spinosa*. Discovered in 1985 in decaying sugar cane in an abandoned sugar mill in the Virgin Islands.

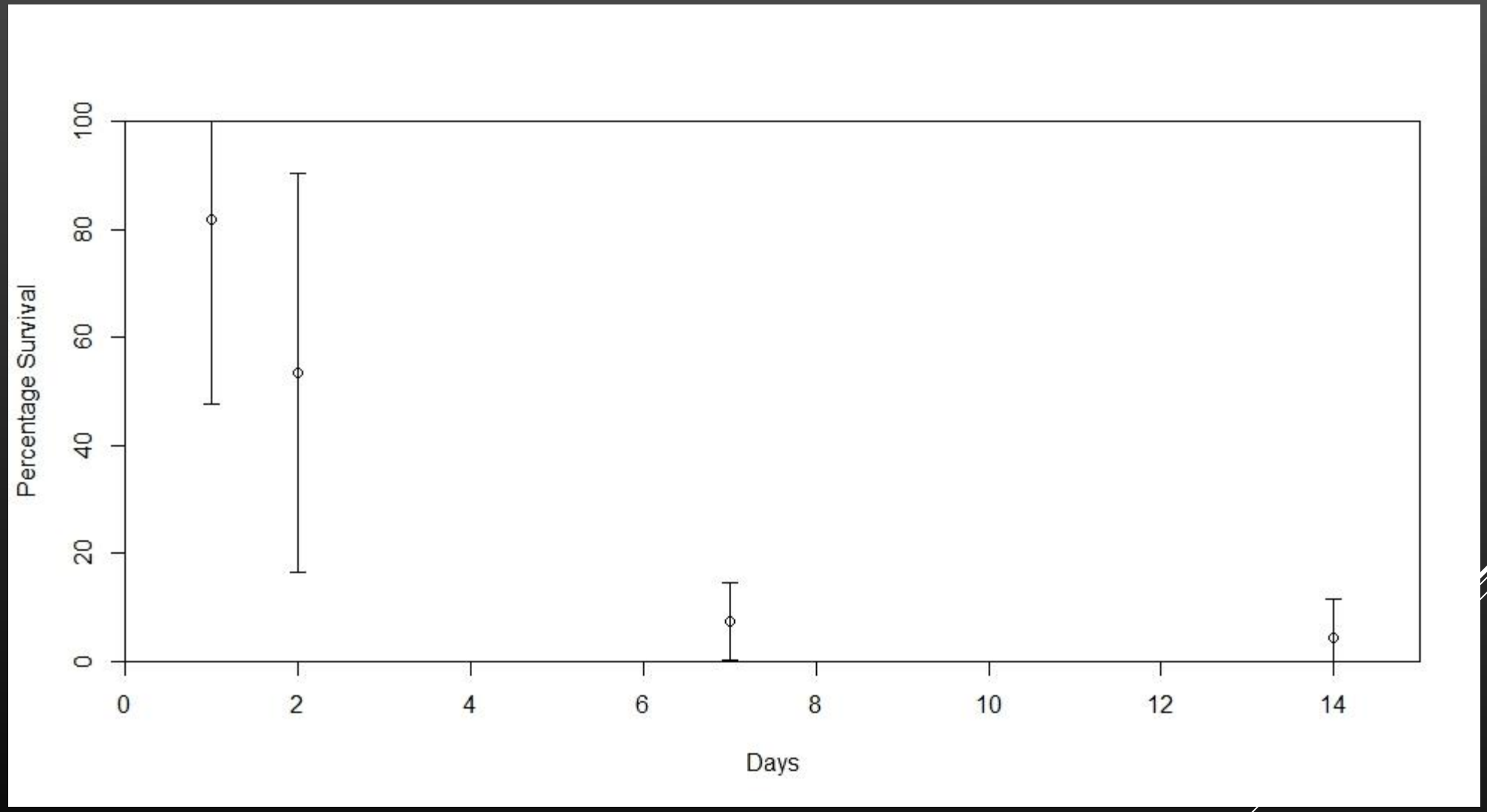
Rat LD_{50} is >5 grms/kg body weight

More toxic to fish (LD_{50} approx. 30 mg/kg)

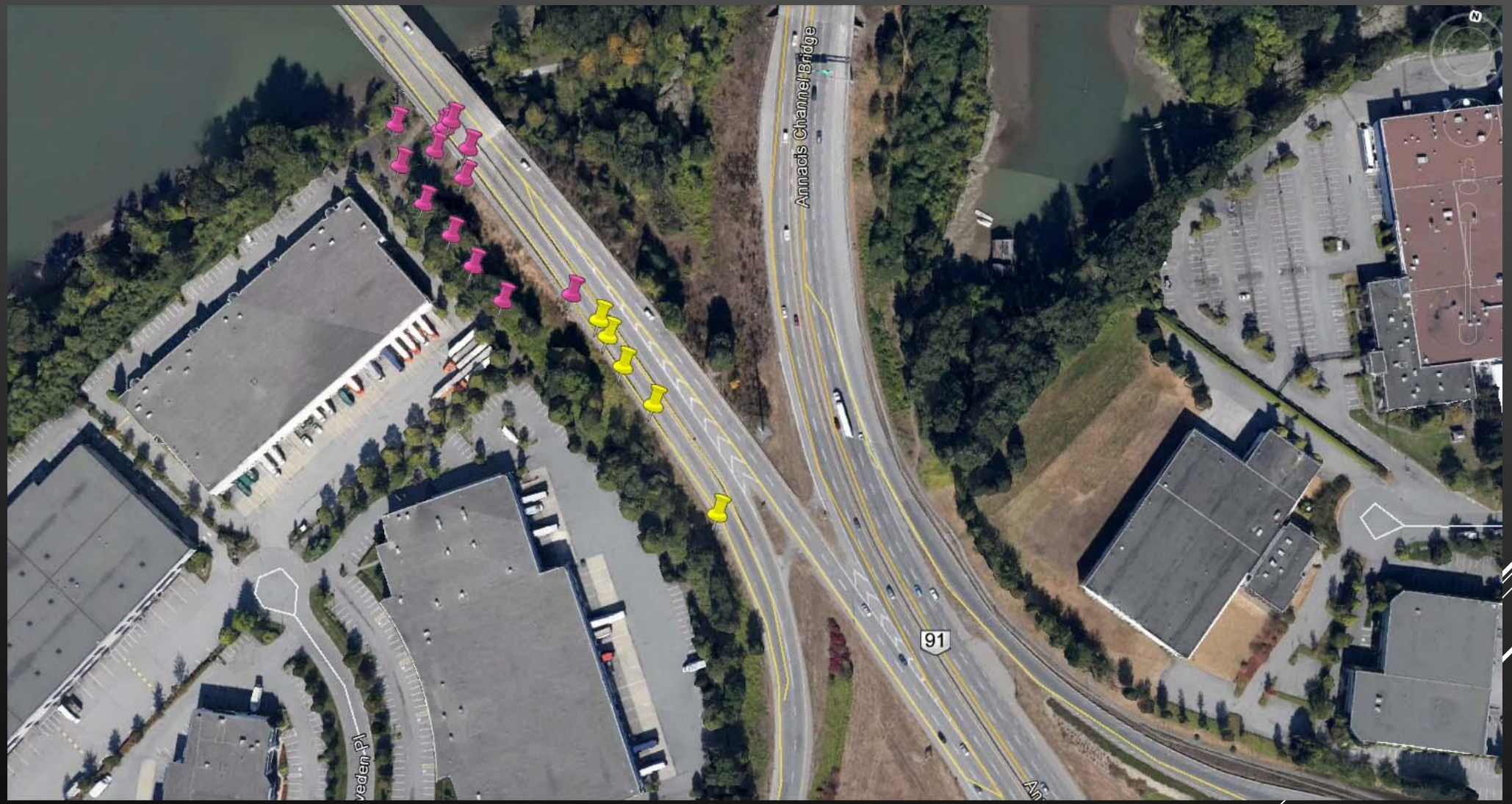
Half-life in soil is 9-17 days (believed via microbial action)
Half-life in water is 1-2 days (via photolysis)



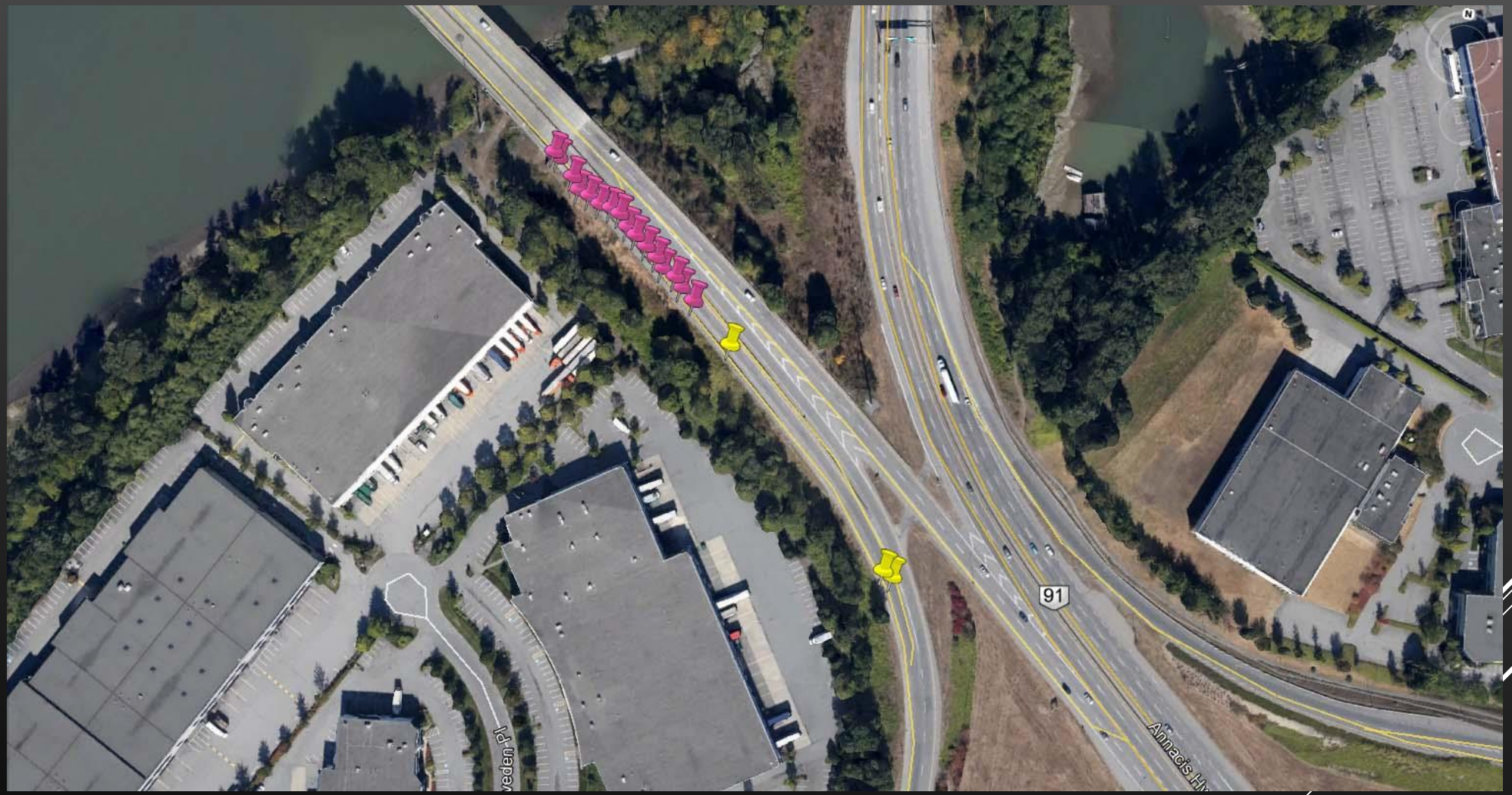
Spinosad formulation 8-100-8. Product source: EcoCare/ Neudorff North America



Spinosad formulation 8-100-6. Product source: EcoCare/ Neudorff North America



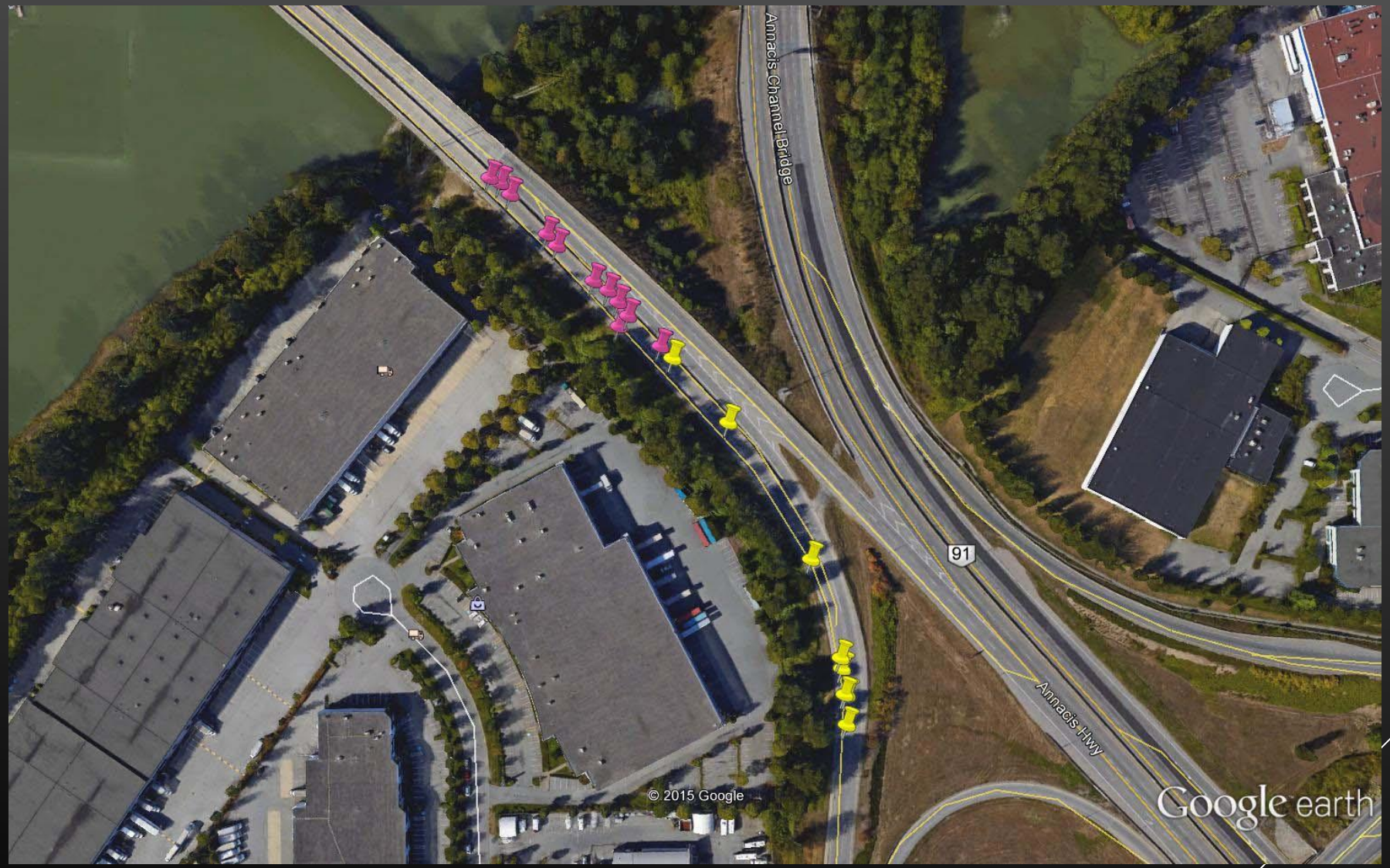
Annacis Island. EFA (Red) and Formica oreas (yellow). May 2014



Annacis Island. EFA (Red) and Formica oreas (yellow). June 2014

Annacis Island. EFA (Red) and Formica oreas (yellow). July 2014

Annacis Island. EFA (Red) and Formica oreas (yellow). September 2014



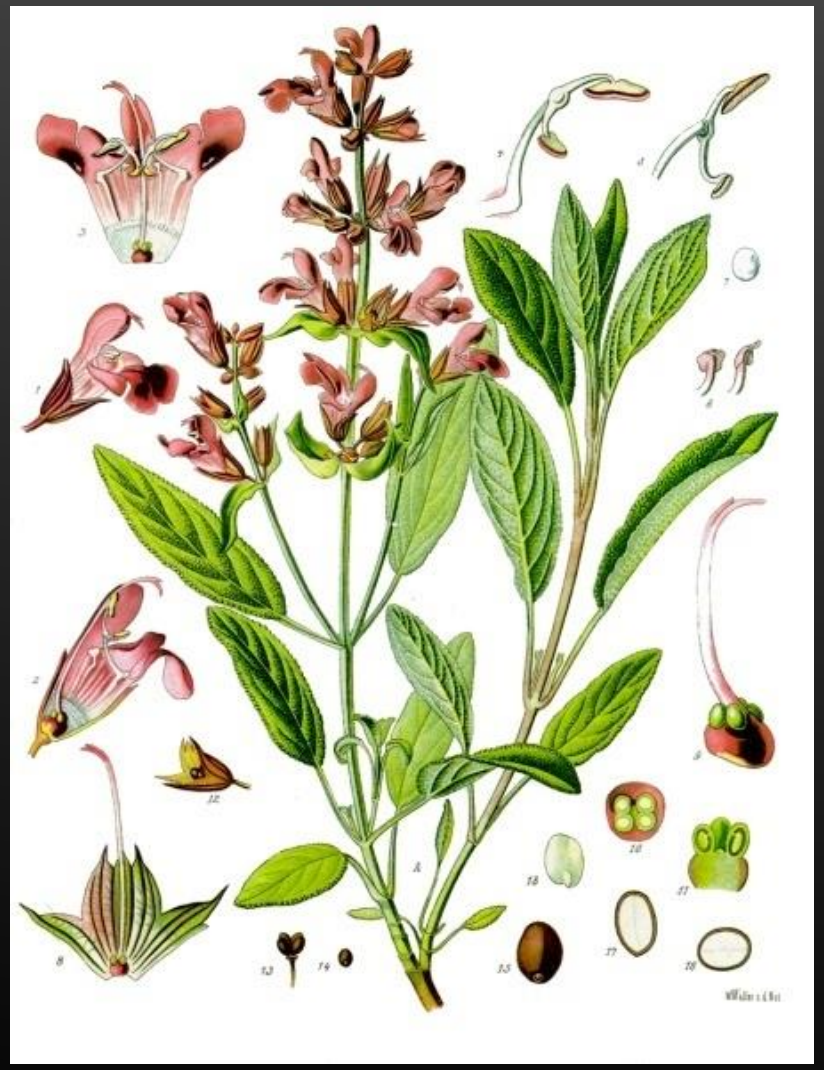
Annacis Island. EFA (Red) and Formica oreas (yellow). May 2015

Alternative approaches

Image: Xeriscaping for fire ants. Vancouver. R. Higgins

Xeriscaping and compartmentalizing soil/plant areas

Alternative approaches



Salvia officinalis: Franz Eugen Köhle, Public Domain. Wikimedia.org

Cynthia Sayre, Curator of Collections, at VanDusen has indicated that the European fire ant does not seem to have spread under sage.

Murray Isman at UBC had a student in his lab examine the essential oils of rosemary for toxicity on the EFA.
They did find clear toxicity.

It is unclear if plants in the mint family, *in situ*, may act to deter fire ants from spreading

Alternative approaches

Gerhard Gries at SFU has a student working on European fire ant pheromones. Intent is to manipulate pheromones to disrupt colony activity.

Work began in 2016

Summary

Tools

-permethrin treatment
-possible poly sheeting treatment
-management guidelines
-xeriscaping

Questions

-is there a better way to find nest entrances?
-can temperature sensitivity be exploited?
-is the EFA sensitive to growing mint plants
-can the ability of *Formica oreas comptula* to hold territory in presence of the EFA offer something we can exploit?
-can we sterilize soil using containers?

Outstanding Issues

-storage and movement of soil

-no effective large scale treatment options

Acknowledgments

Ministry of Environment

Ministry of Transportation and Infrastructure

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 by Sean McCann, Naomi Harder, Erin Adams, Hester Williams, Brittany Lowe, Dominic Torheiden, Lexa Huyghebaert, Amanda Jorgensen, Mitchell Johnson, Drayden Kopp