

Recent fipronil and bifenthrin trials
around homes and on a constructed
wall in Riverside: Efficacy of
treatments and urban runoff

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Measuring insecticide runoff

Driveway sample collection



Constructed wall

- Wall is 36 ft wide and 3 ft high, divided into 12 3-ft segments on each side of wall, for a total of 24 segments
- Simulated rainfall set up with sprinkler system
- One side of wall run at a time
- 1 L samples collected from each segment
- Sample collection took about 8 mins

Constructed wall



Masking section to be treated



Collecting 1 L sample



Monitoring Control Efficacy

Sucrose water consumption

- **1 ml of consumption corresponds to about 3,300 ant visits**
- **Leave out for 24 hrs**
- **10 monitors around house, 10 in yard**

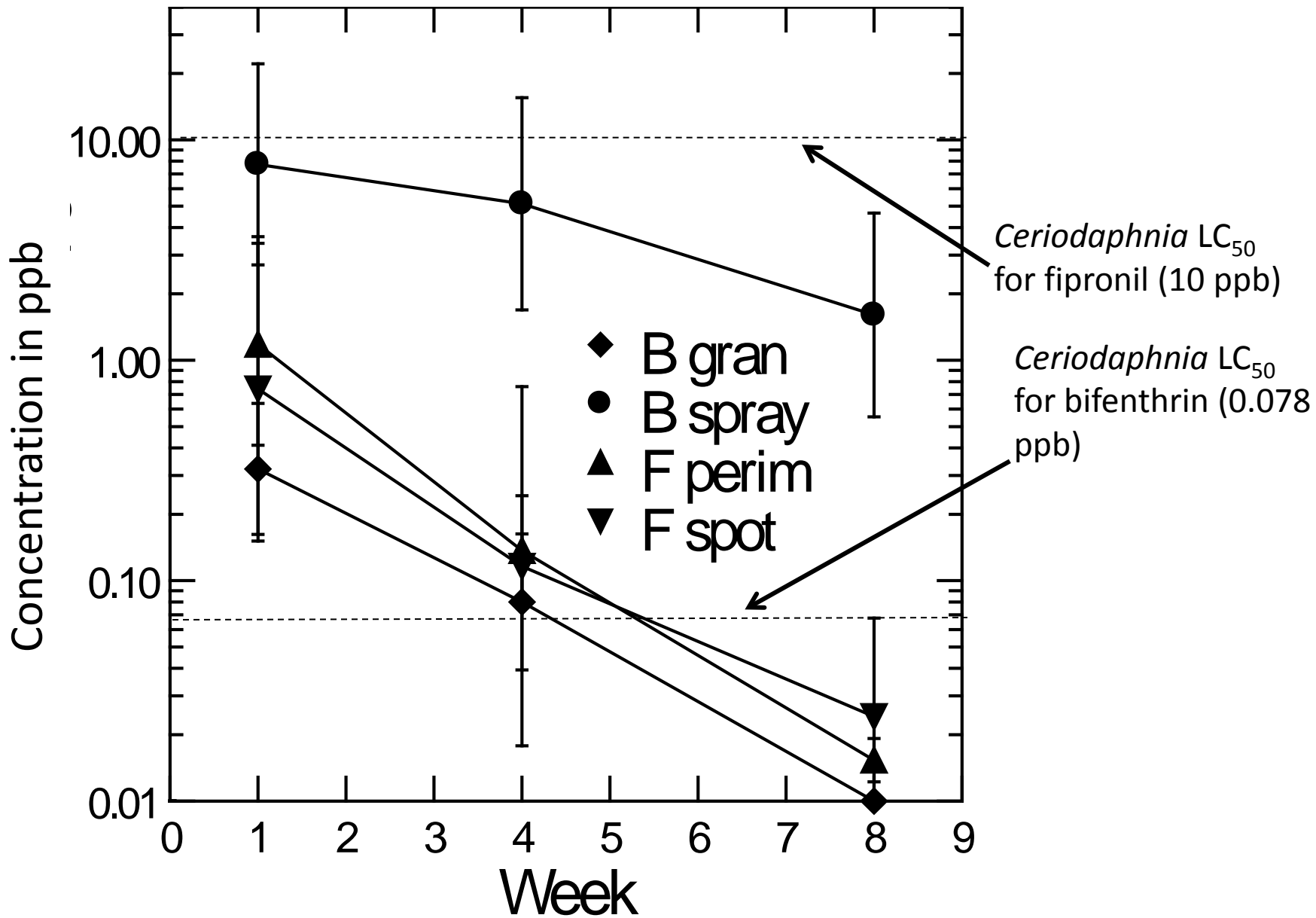


**Tube placed on ground and then covered
with a clay pot;
Evaporative controls done**



SOME PREVIOUS FINDINGS

**FIRST RUNOFF TRIALS, 2007:
BEFORE LABEL CHANGES FOR FIPRONIL
AND PYRETHROIDS**



Fipronil runoff 2010

Variety of applications

Fipronil treatments

- Perimeter spray
- Perimeter spray minus driveway
- Wet foam perimeter
- Dry foam perimeter
- Perimeter spray with narrow band at garage door

1-gal 0.06% fan spray limited to house foundation, 1 ft up and 1 ft out



1-gal pin stream application around entire house foundation and narrow band at garage



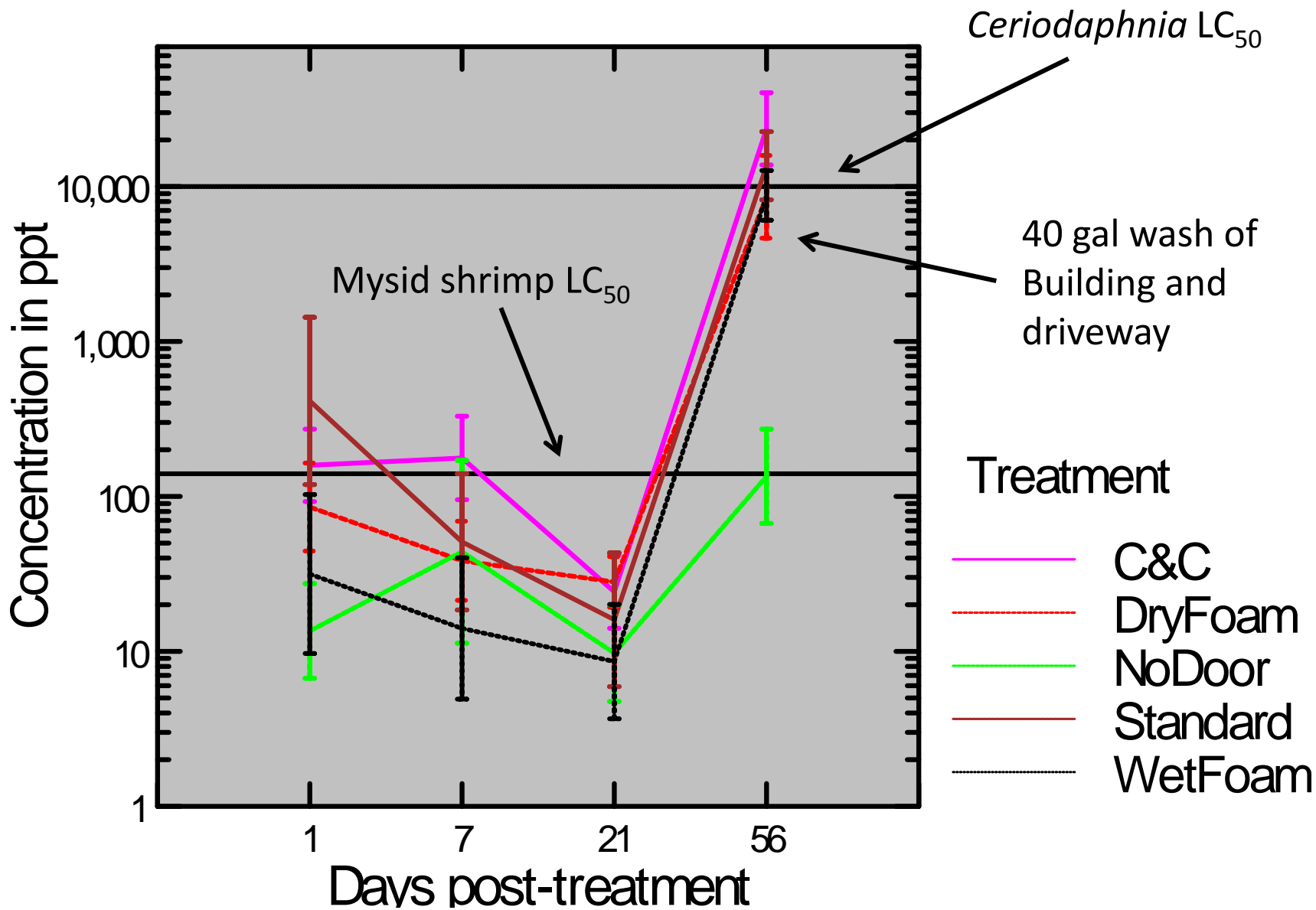
Wet foam application of 0.06% fipronil 1 ft up and 1 ft out from foundation



Dry foam aerosol application of 0.65% fipronil



Fipronil runoff

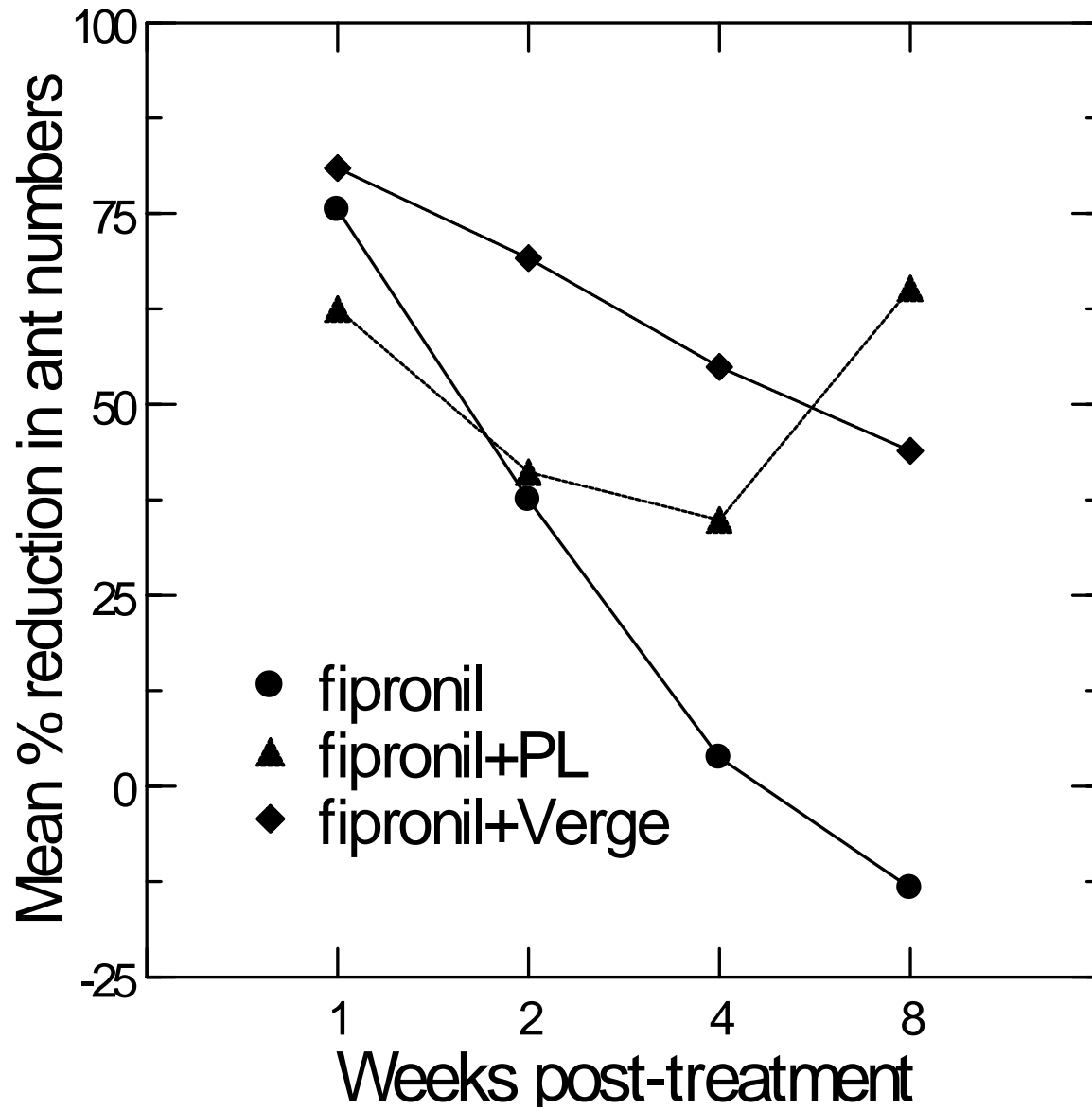


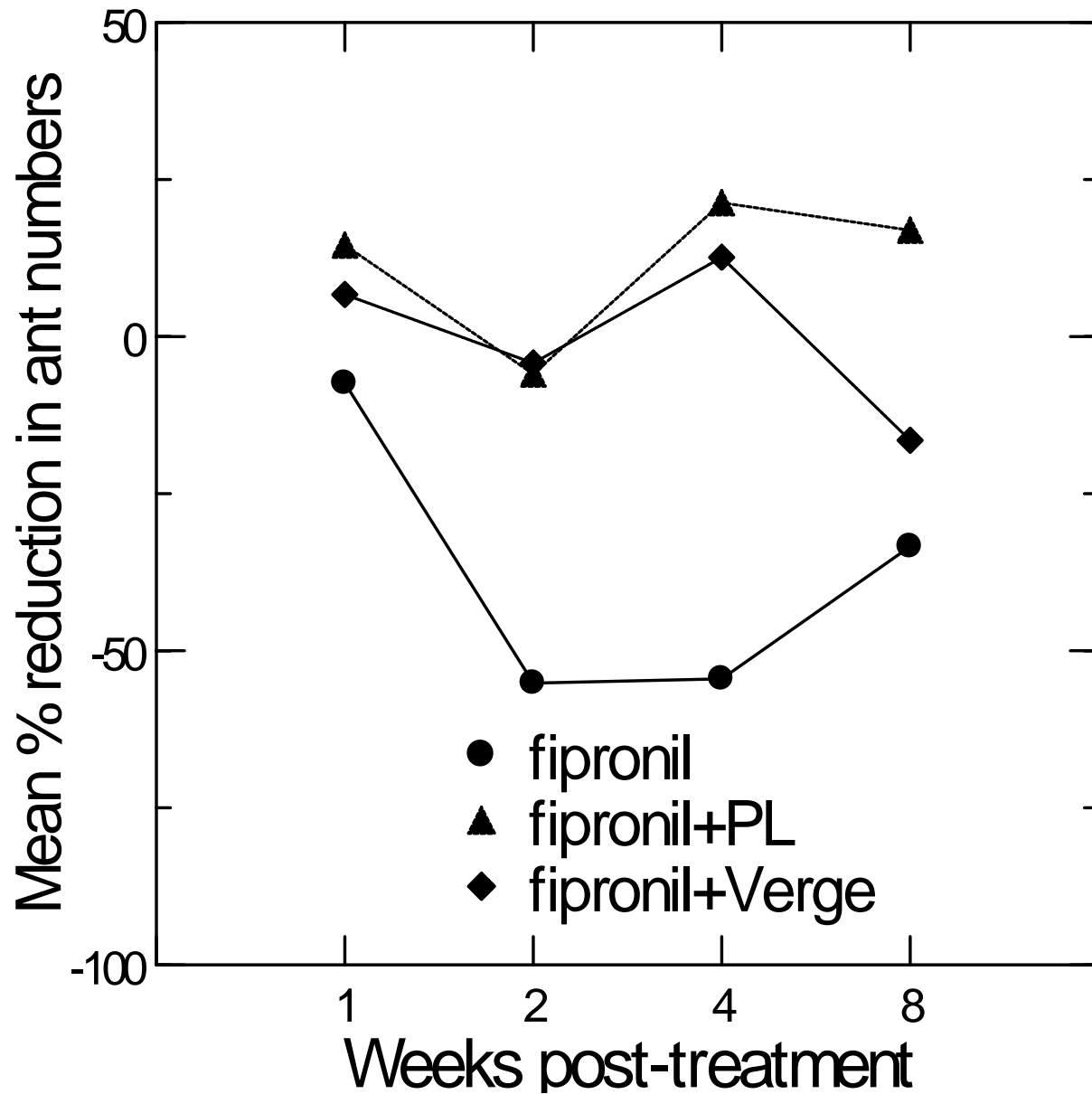
2011

Bifenthrin spray alternatives

Fipronil spray and bifenthrin granules

- 0.5 gal pin stream fipronil, avoiding garage door and driveway completely
- Supplementing fipronil with two kinds of bifenthrin granules
 - Talstar PL, sand matrix
 - Talstar Verge, clay particles

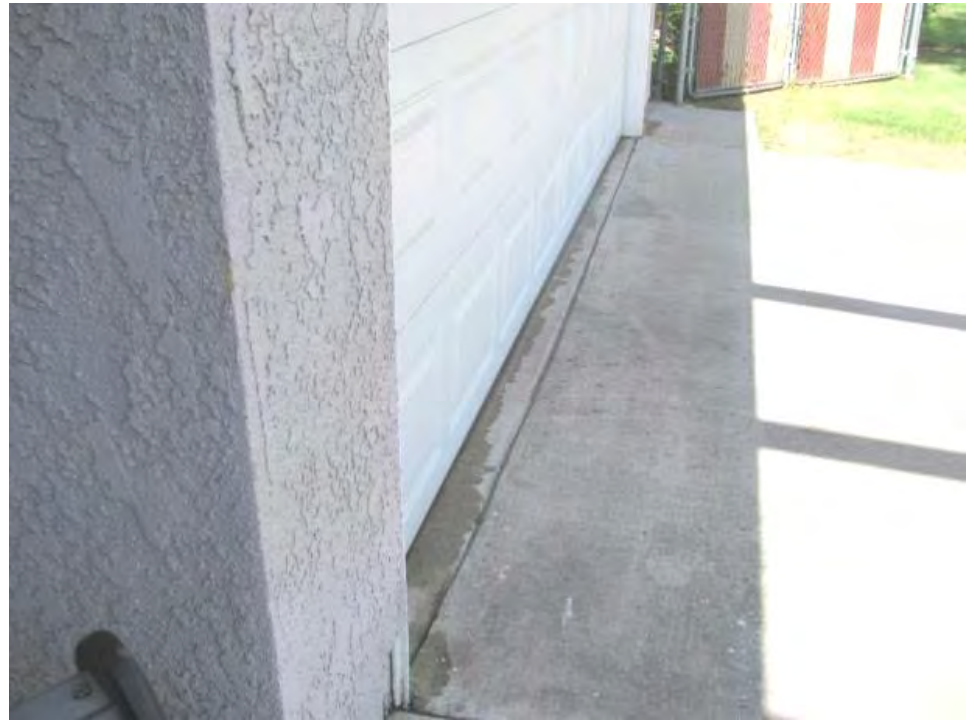




Comparing narrow band pin stream vs. crack and crevice in expansion joint at garage door for fipronil runoff

2012

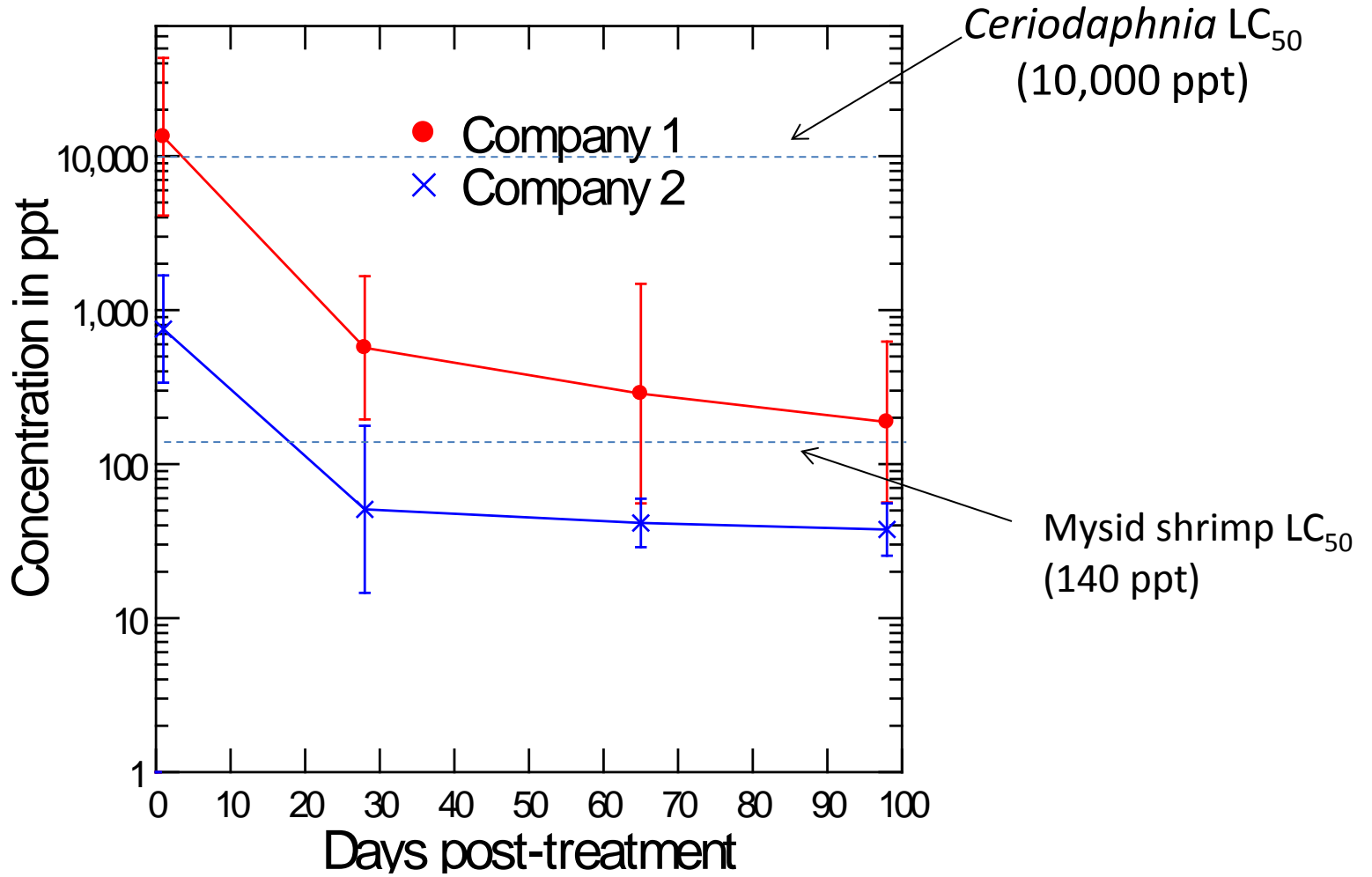
Pin stream at garage



Crack and crevice at garage



Fipronil runoff

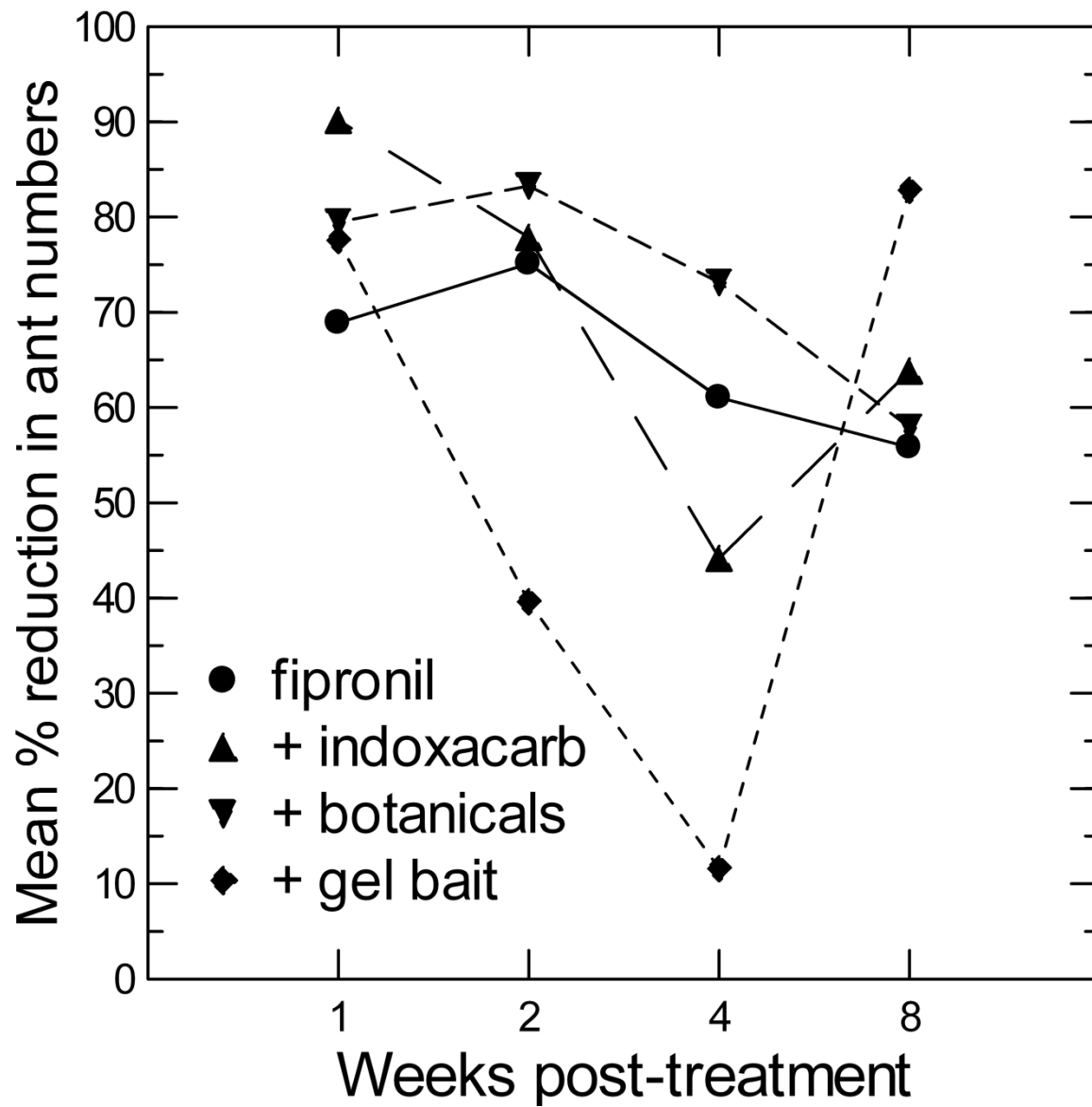


2013

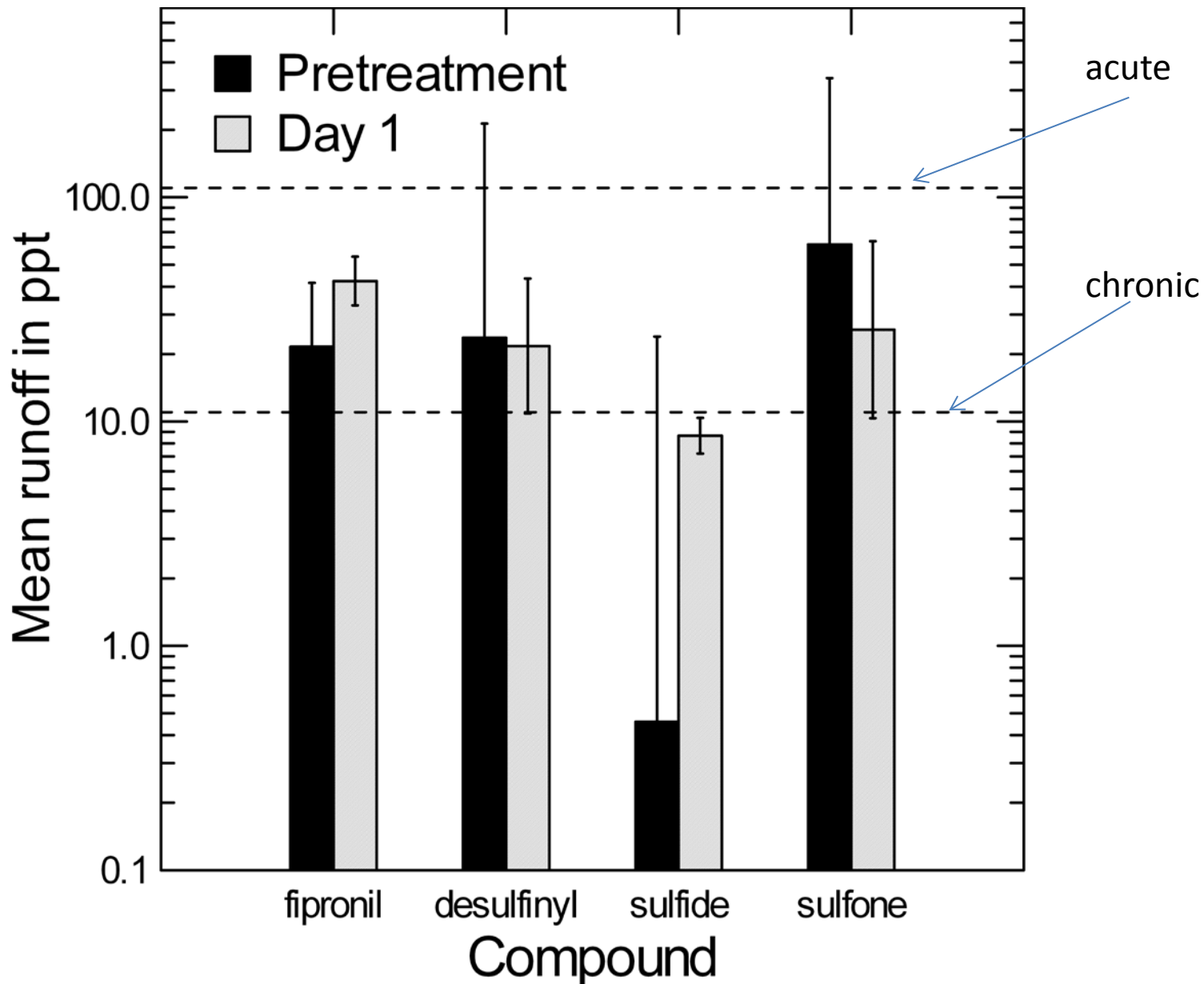
DRIVEWAY TREATMENT ALTERNATIVES

Testing driveway alternative treatments

- Houses treated only with pin stream fipronil (0.5 gal) around the house foundation, and not closer than 1 ft from driveway
- Driveway substitutions
 - Botanical sprays
 - Indoxacarb sprays
 - Thiamethoxam gel in buried bait stations



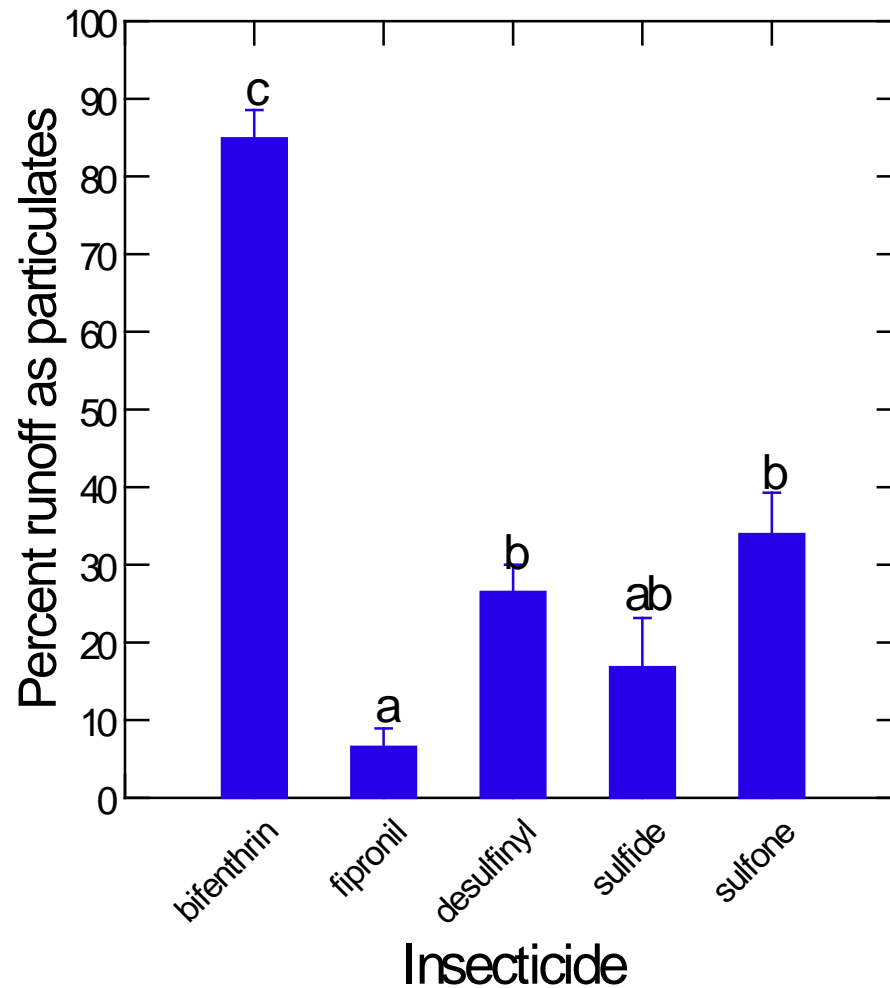
2013 DRIVEWAY RUNOFF



2013

RUNOFF FROM DRIVEWAY OF PARTICULATES VS. LIQUIDS

Particulate and liquid runoff



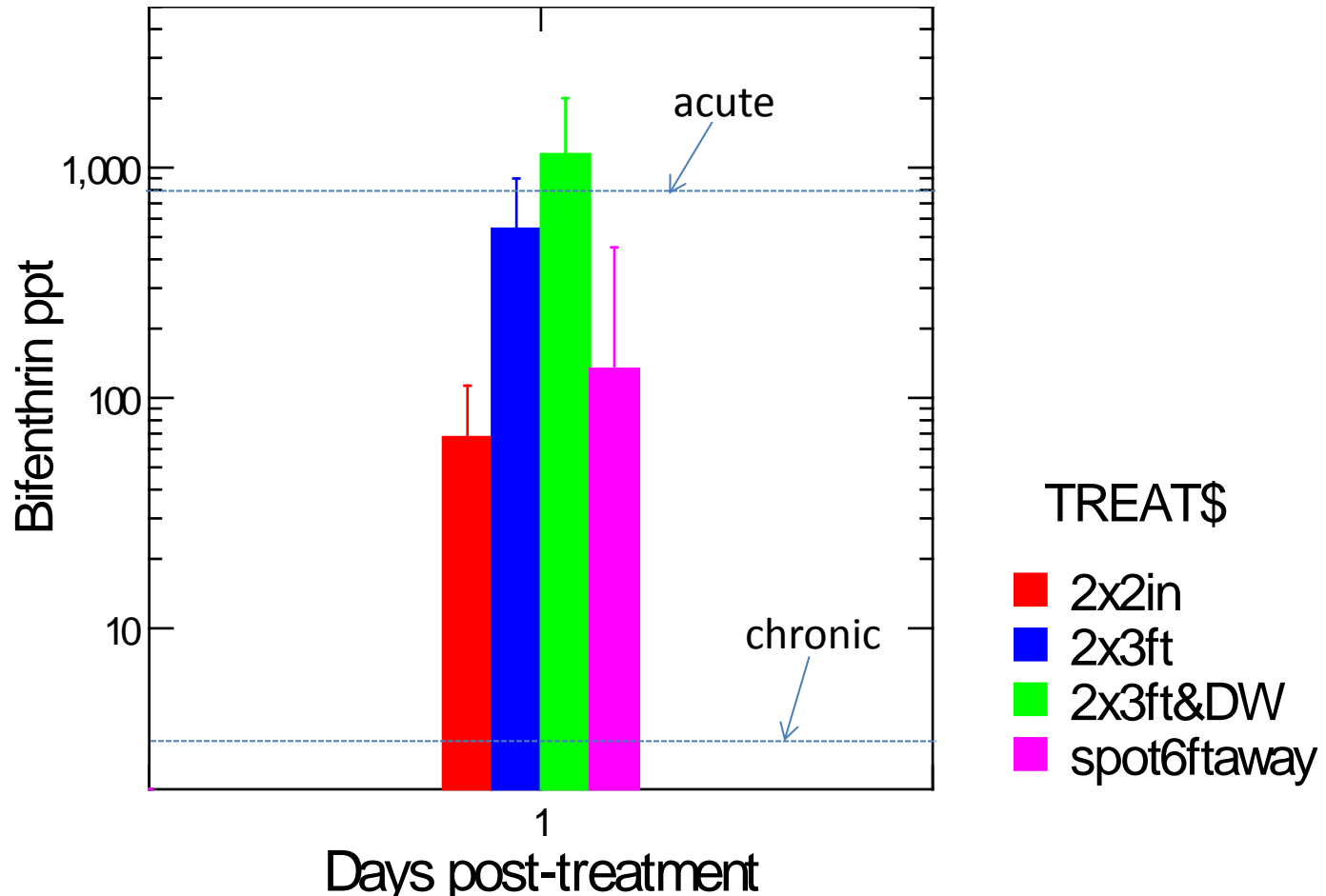
2014

BIFENTHRIN TRIALS

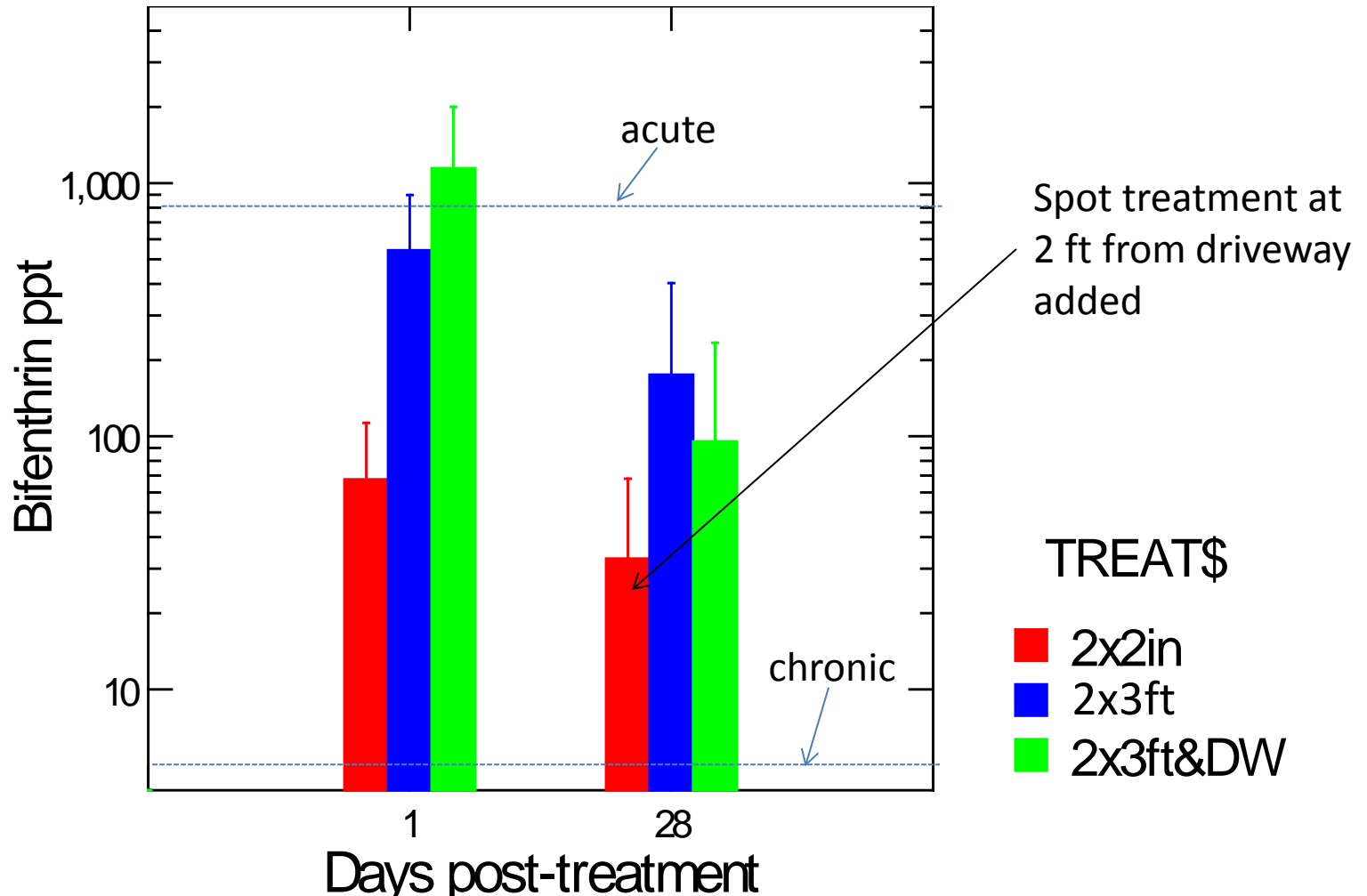
Runoff from different bifenthrin applications

- Narrow band, 2x2 in
- Wide band, 2 ft up, 3 ft out
- Wide band, 2 ft up, 3 ft out, plus crack and crevice along driveway edges
- Spot treatment at 2 ft from driveway
- Spot treatment at 6 ft from driveway
- 5 houses per treatment
- No treatment at garage door

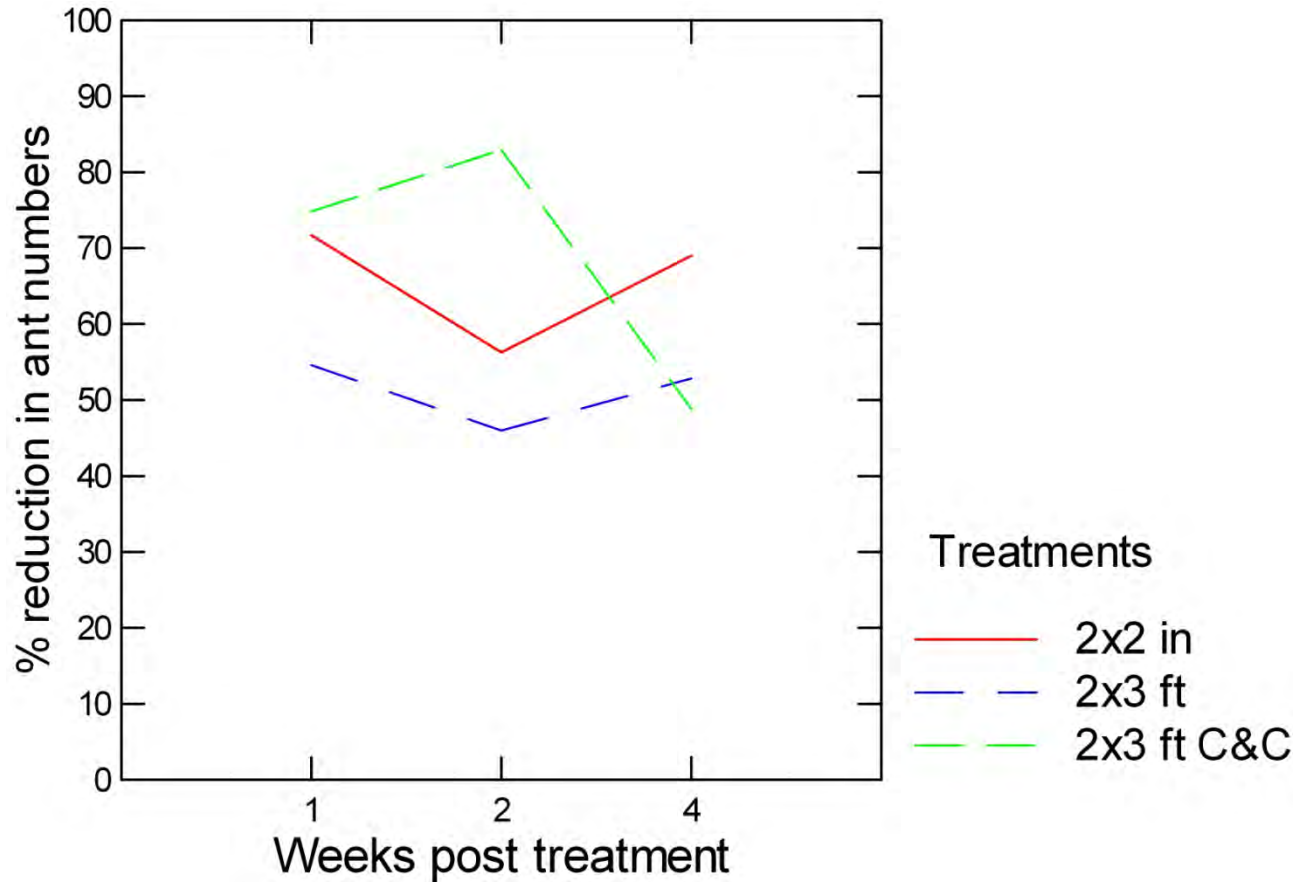
Bifenthrin runoff



Band width runoff comparisons



Bifenthrin efficacy

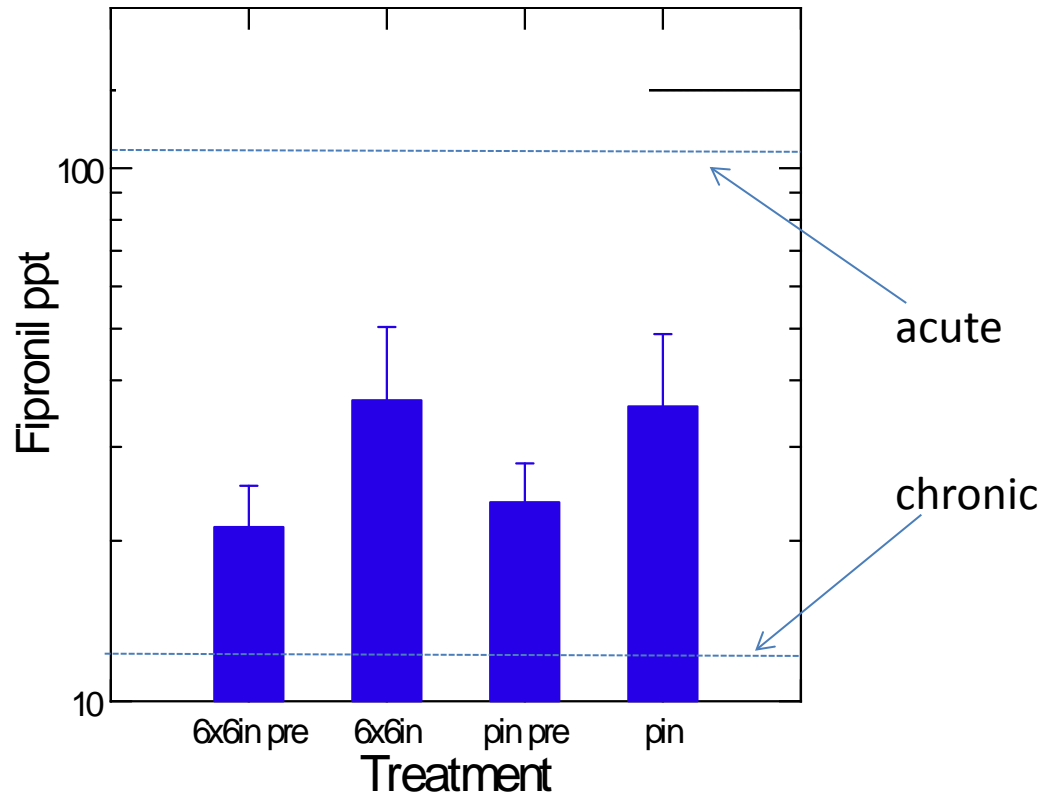


Fipronil runoff

2014

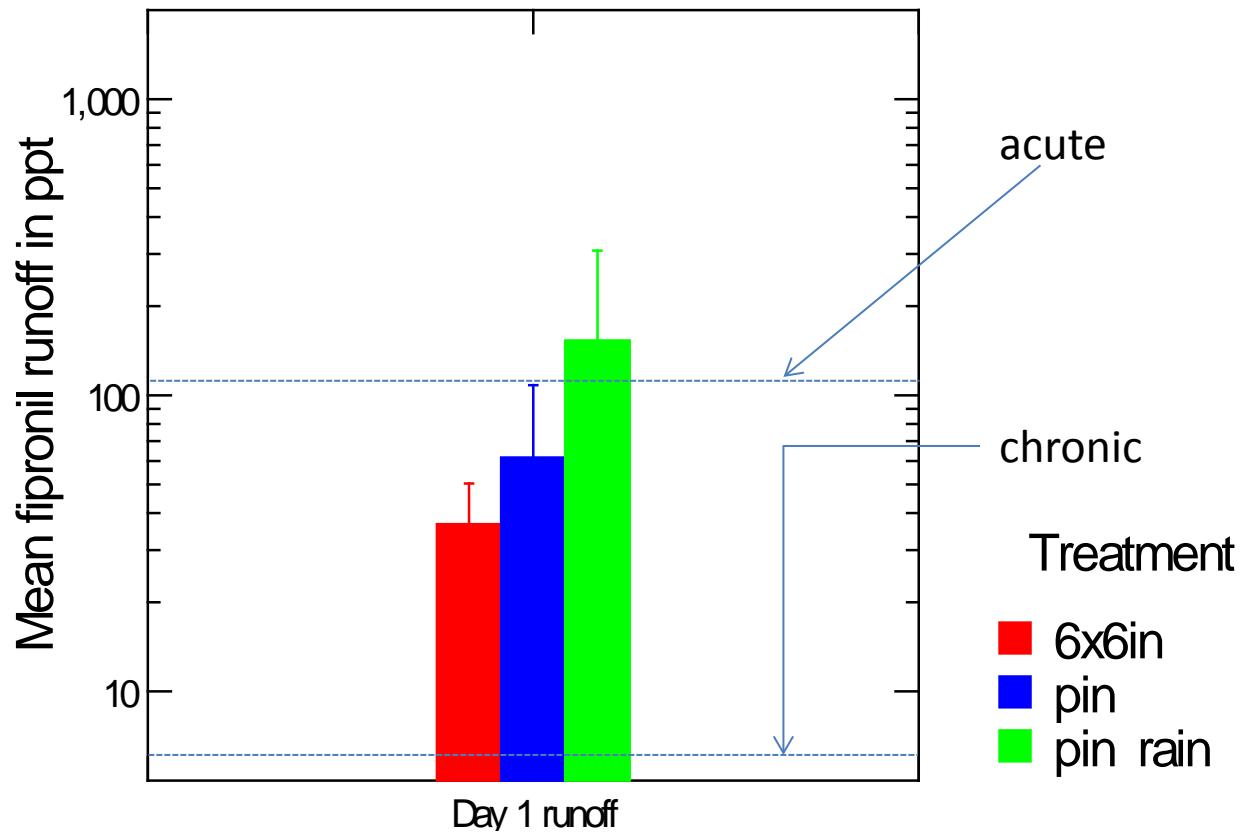
Fipronil runoff 2014

No driveway treatment



Fipronil runoff 2014

No driveway treatment
(corrected for pre-treatment values)



Annual Report

CONTRACT #13-C0031

HOME EFFICACY AND RUNOFF

Home treatments 2015

(Pin stream at garage door)

Treatment (Contract Treatment)	Treatment swath at base of wall	Projected treatment area	Actual amount of Termidor SC used/area
Labeled rate (standard treatment) (A)	1 foot up, 1 foot out band application	2 quarts a of 0.06% Termidor SC solution per 160 linear feet (320 square feet) (0.2 fl. oz/ft ²)	3.8 µg/cm ²
Pin Stream (C1)	1 inch up, 1 inch out pin stream application	1 qt. of a 0.06% Termidor SC solution per 160 linear feet (26.67 square feet) (1.2 fl. oz/ft ²)	22.9 µg/cm ²
Reduced swath (D)	6 inches up, 6 inches out band application	1 quart a 0.06% Termidor SC solution per 160 linear feet (160 square feet) (0.2 fl. oz/ft ²)	3.8 µg/cm ²

Why pin stream on garage door?

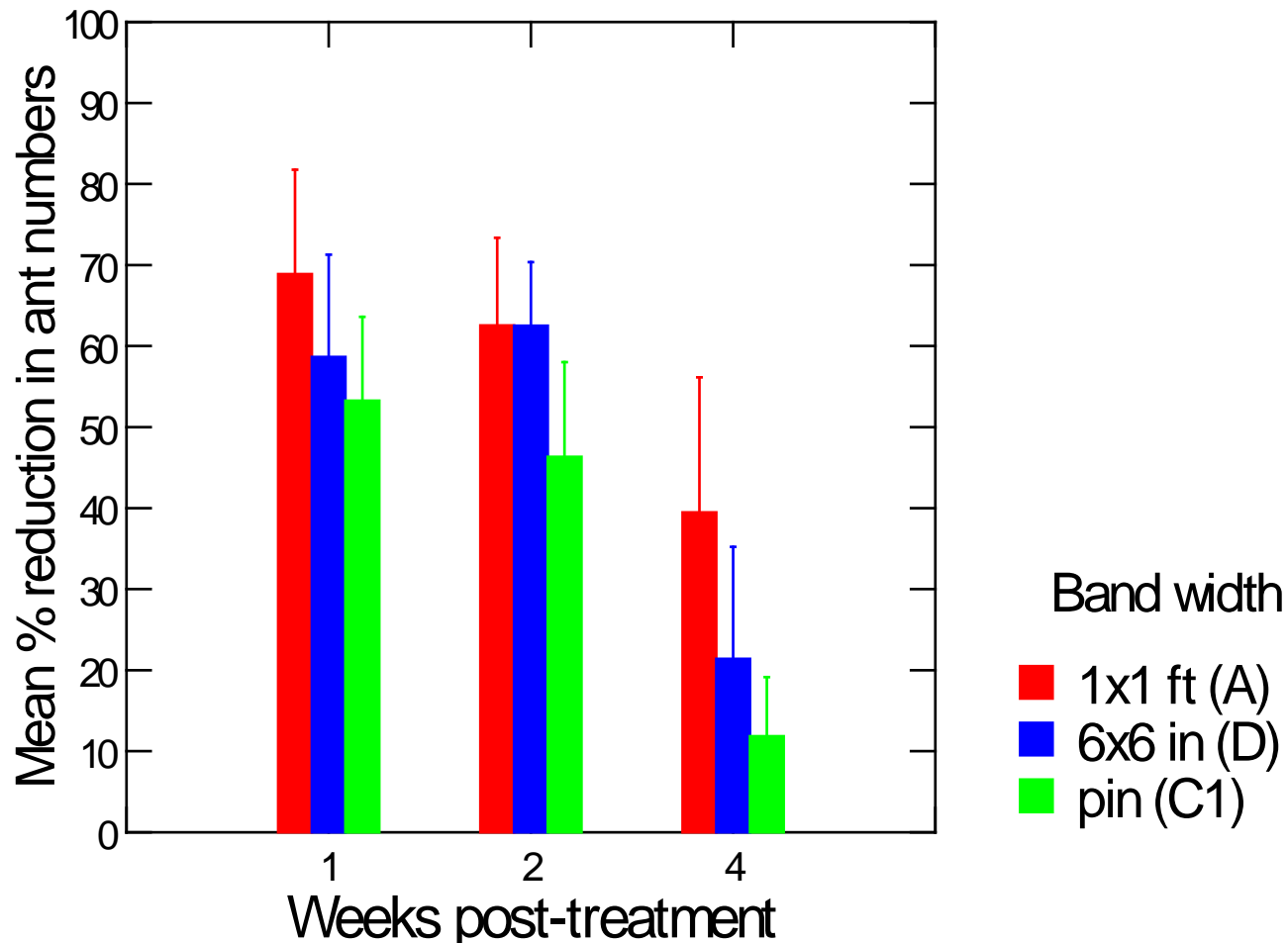
- For these house trials a pin stream was done at the garage door so as to simulate an application done by a Pest Management Professional. These values can be compared with other results where the treatment was not done on the driveway. Our goal is to reduce the runoff and maintain efficacy.

Spray durations

- Measured spray volume/sec for each band width at 20 psi with a backpack sprayer
- Determined how many seconds of spray needed to cover 10 linear feet at the table rate
- For spraying the wall, where each segment is 3 ft wide, multiplied above duration x 0.3 for each wall segment

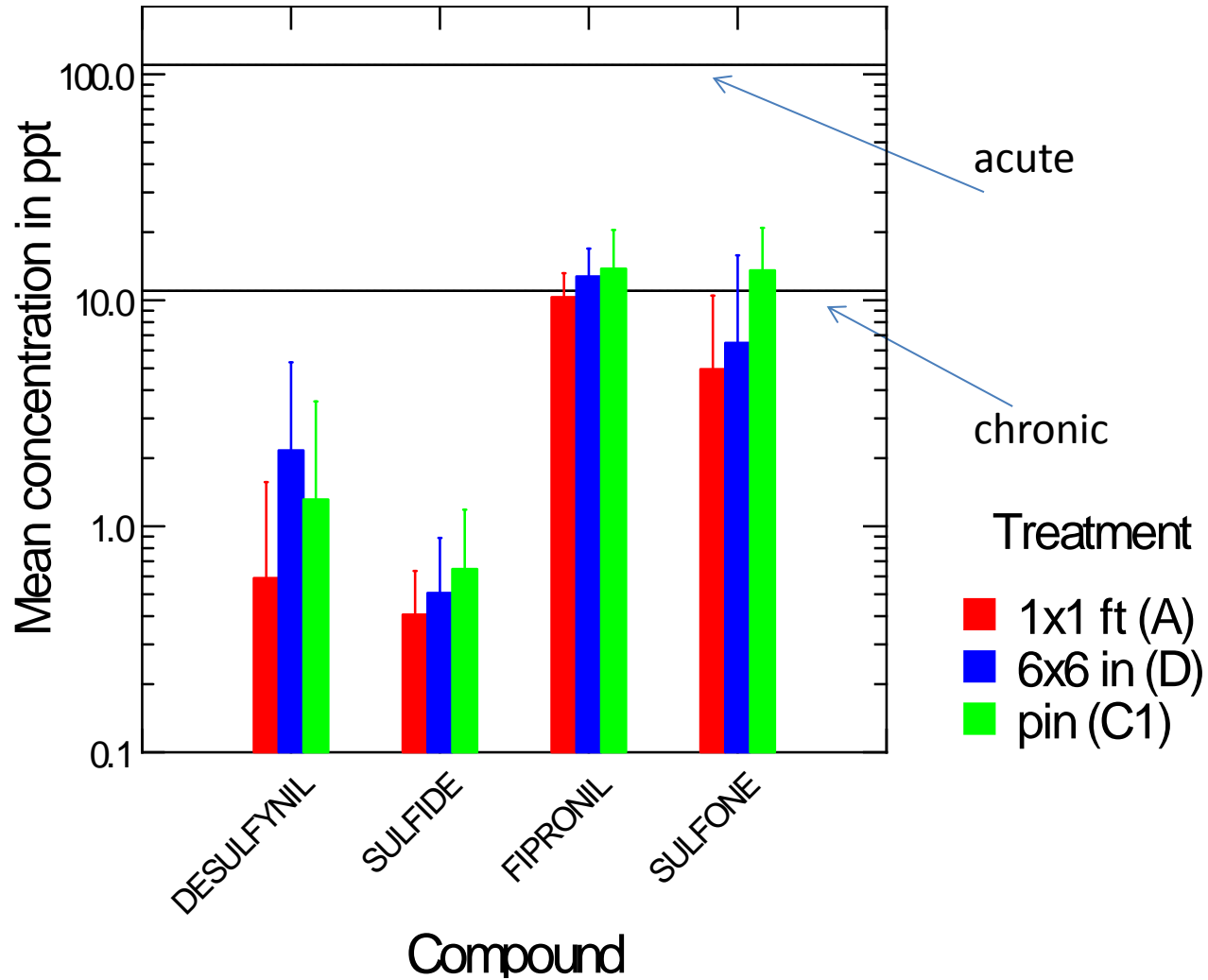
EFFICACY OF TREATMENTS 2015

Efficacy of fipronil treatments

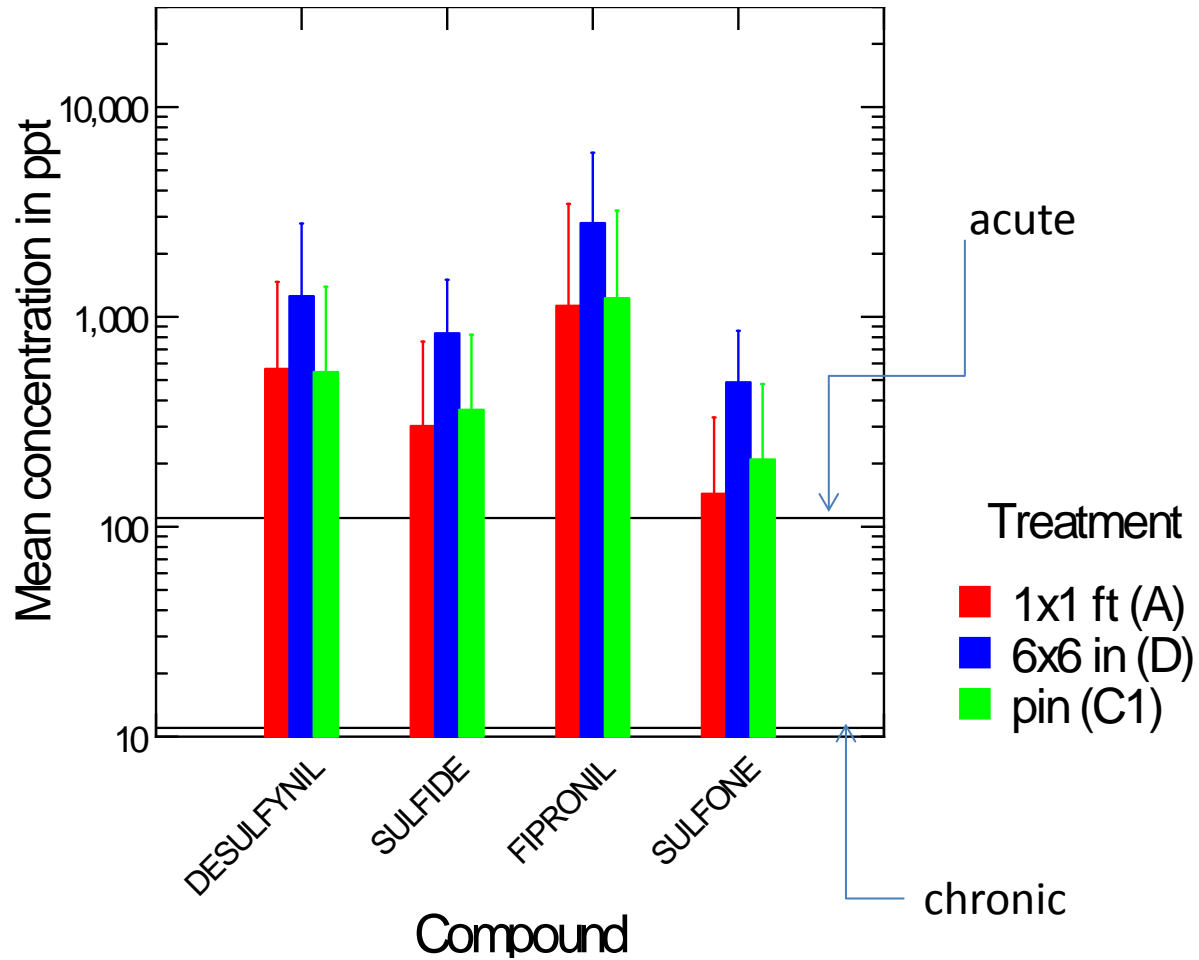


RUNOFF ANALYSIS 2015

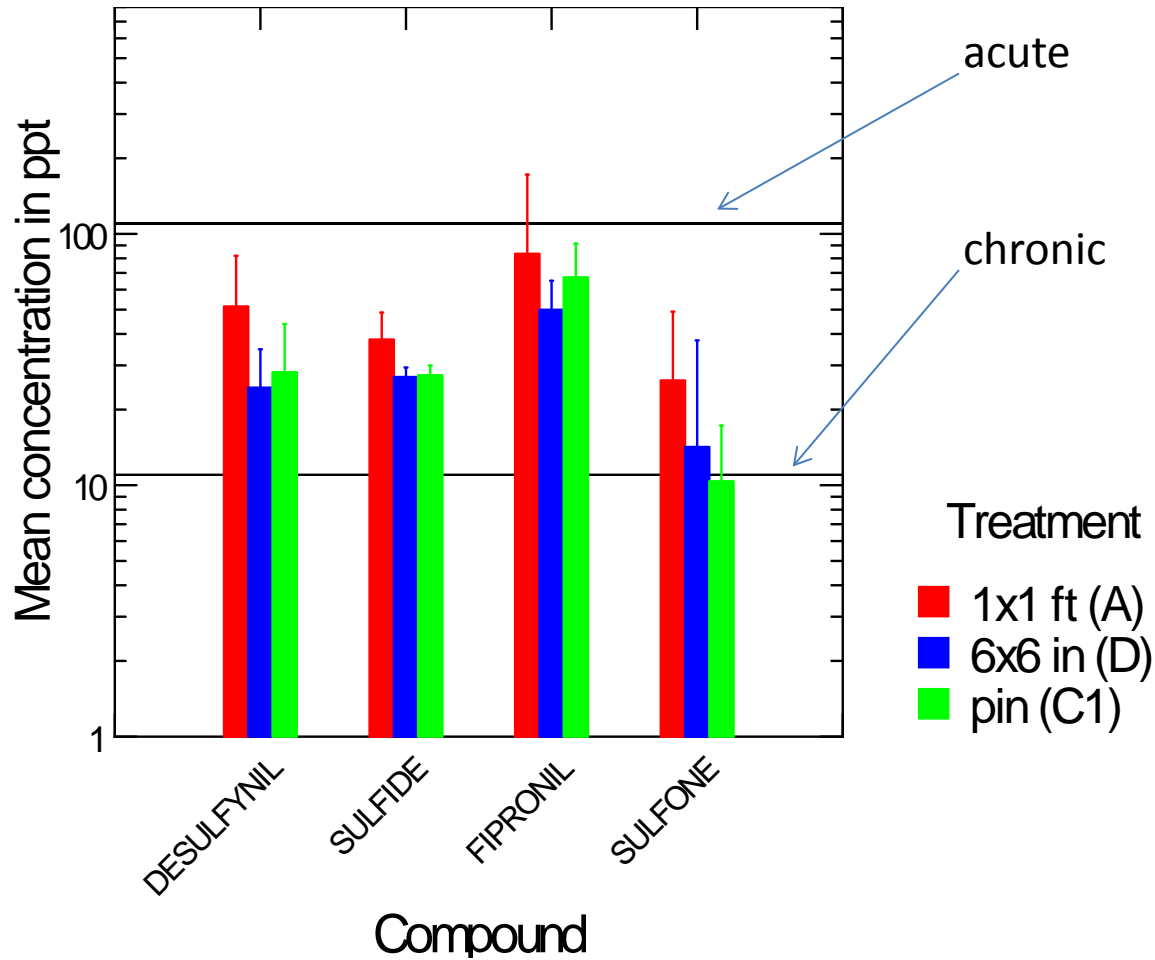
Home Pretreatment Values



Home 1 Day Post-treatment



Home 30 days post-treatment



House 30 day post-treatment

All except bold values are below acute benchmark

	1x1 ft	6x6 in	1x1 in
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Medians

Fipronil	88.25	64.26	64.13
Desulfynil	81.77	21.78	22.75
Sulfide	33.11	27.67	25.95
Sulfone	3.80	3.28	0.0

Means

Fipronil	205.33	53.05	54.62
Desulfynil	90.90	38.99	52.37
Sulfide	40.05	28.00	27.97
Sulfone	22.55	12.63	5.22

House Conclusions

- Pin stream efficacy is trending down at 4 weeks
- Day 1 runoff when pin stream was done at garage above acute aquatic benchmarks
- Day 30 runoff mostly below acute aquatic benchmarks
- To maintain efficacy another product needs to be used to supplement the fipronil treatment
- Fipronil not readily migrating to driveway without a heavy rain

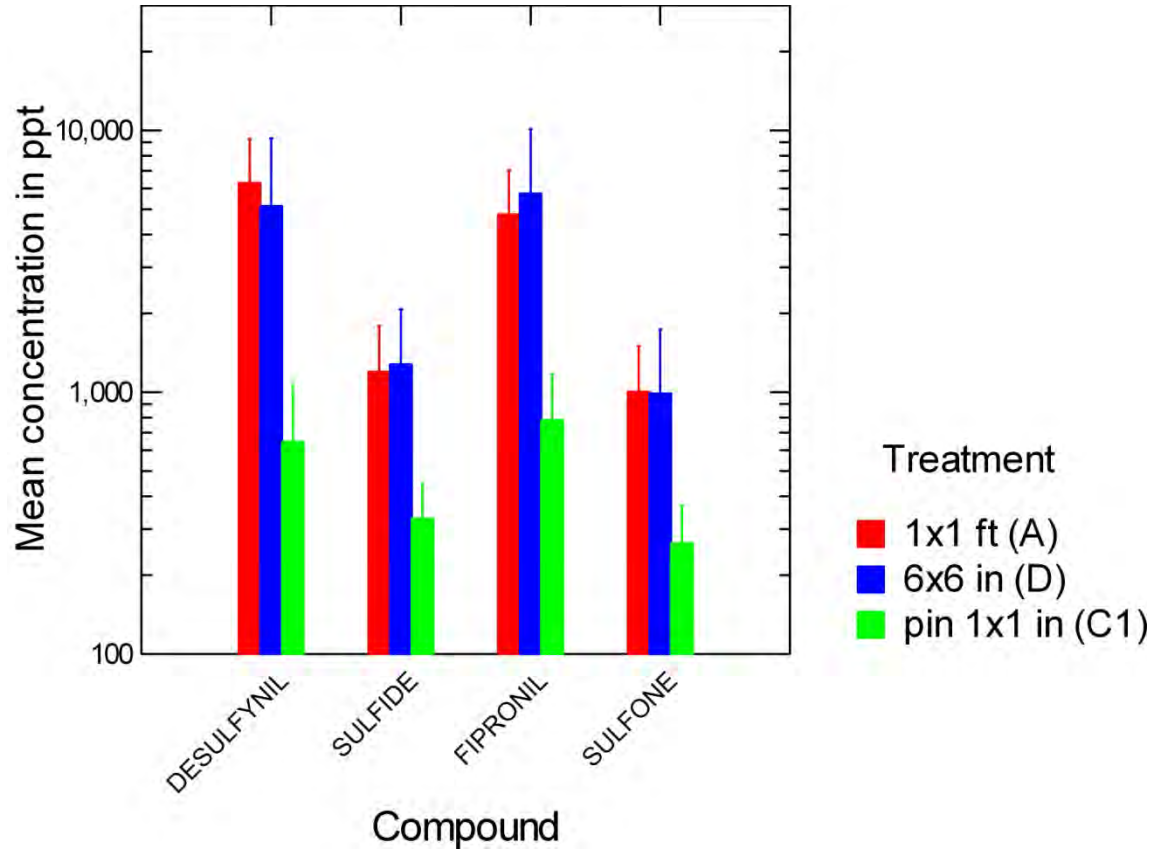
CONTRACT #14-C0102
CONSTRUCTED WALL RUNOFF

Wall treatments 2015

Treatment (Contract Treatment)	Treatment swath at base of wall	Projected treatment area	Actual amount of Termidor SC used/area
Labeled rate (standard treatment) (A)	1 foot up, 1 foot out band application	2 quarts a of 0.06% Termidor SC solution per 160 linear feet (320 square feet) (0.2 fl. oz/ft ²)	3.8 µg/cm ²
Pin Stream (C1)	1 inch up, 1 inch out pin stream application	1 qt. of a 0.06% Termidor SC solution per 160 linear feet (26.67 square feet) (1.2 fl. oz/ft ²)	22.9 µg/cm ²
Reduced swath (D)	6 inches up, 6 inches out band application	1 quart a 0.06% Termidor SC solution per 160 linear feet (160 square feet) (0.2 fl. oz/ft ²)	3.8 µg/cm ²

Wall 1 day post-treatment

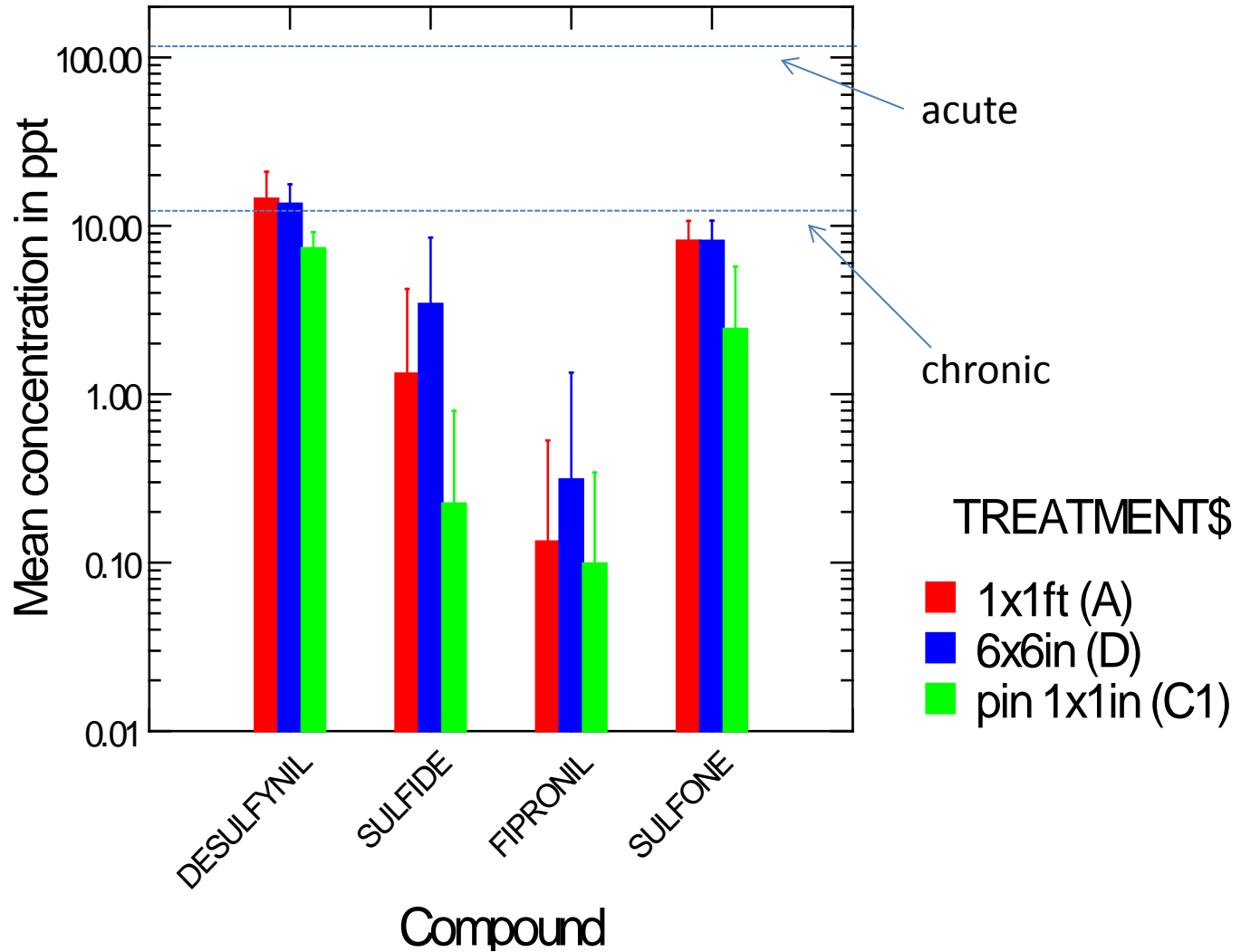
All values above acute aquatic benchmark



Day 1 percent reduction between a standard (2 qt) 1x1 ft treatment and a pin stream (1 qt) 1x1 in treatment

Compound	Mean % reduction	Median % reduction
Fipronil	80.2**	92.9**
Desulfynil	84.2**	94.2**
Sulfide	71.6*	87.8**
Sulfone	71.6*	87.3**

Wall 30 days post-treatment



Thirty day post-treatment wall runoff medians and means in ppt

All values below chronic aquatic benchmark except those in bold

Compound	1x1 ft	6x6 in	1x1 in
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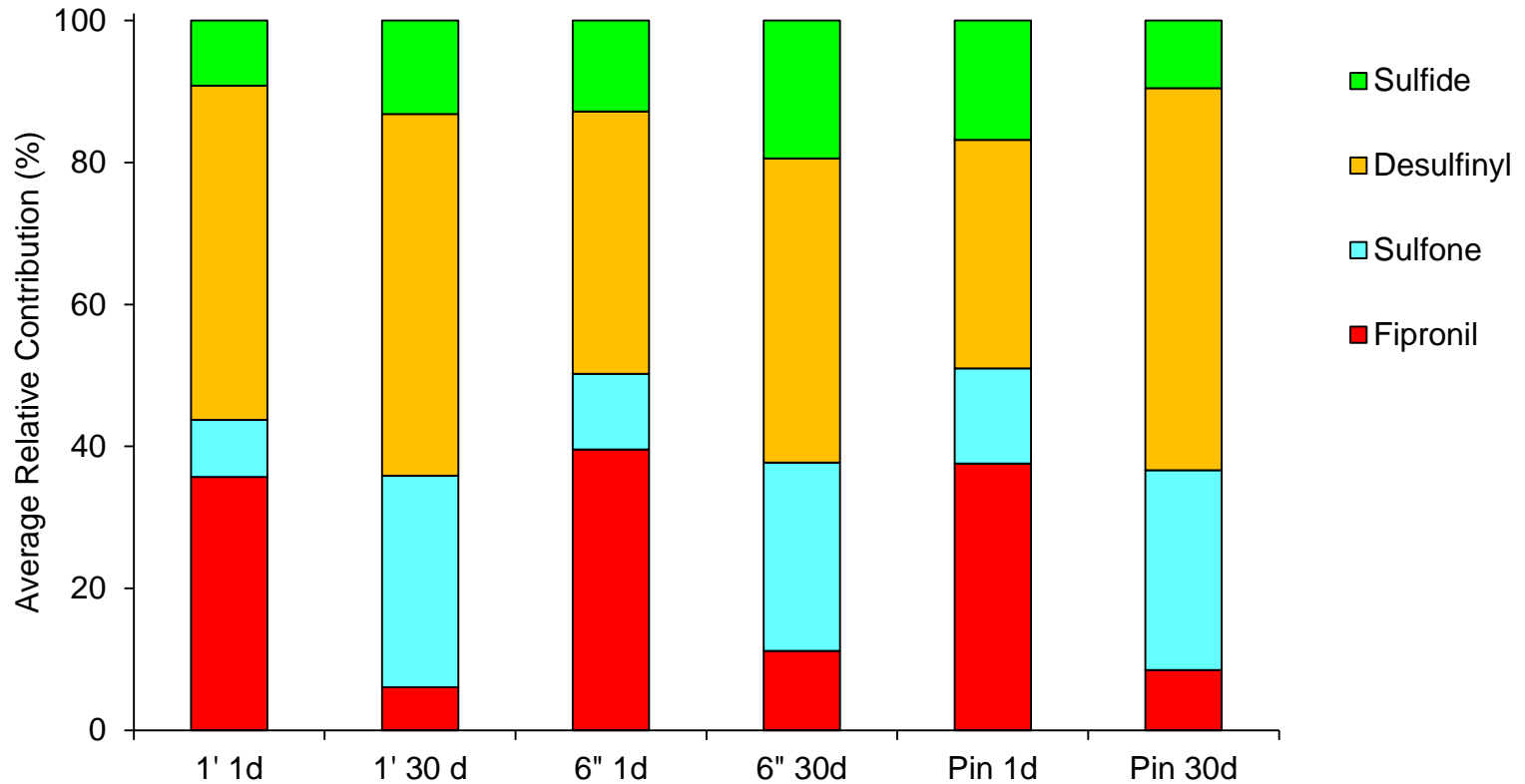
Medians

Fipronil	0.01	0.01	0.01
Desulfynil	12.96	13.13	6.28
Sulfide	5.01	6.02	2.09
Sulfone	6.75	5.87	4.76

Means

Fipronil	5.15	7.33	3.69
Desulfynil	23.97	13.75	8.58
Sulfide	5.53	6.63	2.57
Sulfone	10.46	9.28	4.88

Relative contributions (%) of fipronil and degradates from constructed wall runoff



Wall conclusions

- At Day 1 the 1 qt pin stream application of fipronil and its degradates had significantly less runoff than either the 2 qt standard or the 1 qt 6x6 in band
- The fipronil-desulfinyl was a major contributor to runoff concentration at Day 1, followed by the parent fipronil

Collaborators

- Michael K. Rust
- Dong-Hwan Choe
- Fred Ernst
- Zachary Cryder
- Mike Ensminger
- Jay Gan