



# Apiguard® efficacy for controlling *Varroa destructor* in honey bee (*Apis mellifera*) colonies in Canada

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# Introduction

## Varroa mite (*Varroa destructor*)

- **1989:** First seen in Canada
- **1997:** Québec  
(Boucher 2000)
- All Province in Canada are affected except the province of Newfoundland
- Fight against **mites**, but also against **resistance**



Source:

[https://papyrus.bib.umontreal.ca/xmlui/bitstream/handle/1866/10492/Giovenazzo\\_Pierre\\_2011\\_th](https://papyrus.bib.umontreal.ca/xmlui/bitstream/handle/1866/10492/Giovenazzo_Pierre_2011_th)

# Introduction

## Varroacide

- **Chemical Controls:**

- Synthetic chemical

- *Examples:* Amitraz, Fluvalinate, Coumaphos

- Essential Oils

- *Examples:* Thymol, Eucalyptol, Menthol

- Acids

- *Examples:* Formic acid, Oxalic acid

- **Non-Chemical Controls:**

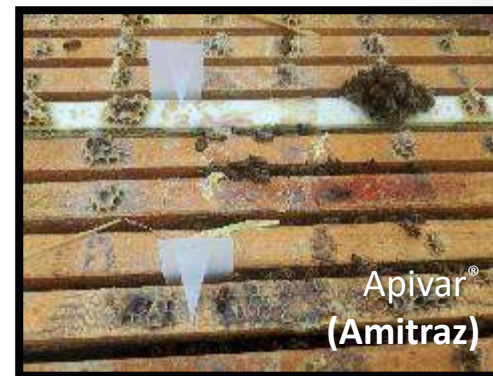
- *Examples:*

- Drone brood removal
    - Varroa sensitive hygiene (VSH)

**\*\*Most of treatments happen this time of year (in the province of Québec)**



Pictures: Kelsey Ducsharm;  
Marilène Paillard





# Introduction

## Thymol



- Essential Oil originated from thyme (all natural)
- Vaporization rate depends on temperature
- **Thymol is only effective on phoretic mites**



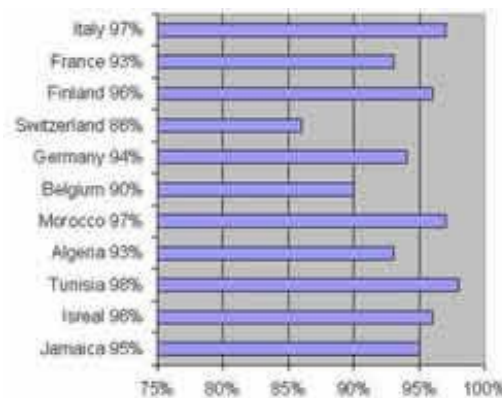
Source: <https://www.canada.ca/en/health-canada/services/consumer-product-safety/reports-publications/pesticides-pest-management/decisions-updates/registration-decision/2016/thymol-rd2016-16.html>

# Introduction

## Apiguard®

- **Composition:**
  - Gel containing 25% thymol
- **Two complementary modes of action:**
  1. Thymol vapours spread in the colony;
  2. The workers transport and spread the gel in the colony.
- **Advantage of granular gel:**
  - Regulates the release of vapours in the hive
- **Best time to use Apiguard:**
  - Spring and autumn
  - Temperature: treatment optimal when used between 15-25°C
- Apiguard® has been the subject of many trials worldwide since 1995 and has proven efficacy.
- Apiguard® is a registered trademark of VITA Bee Health - United Kingdom
  - Available in Europe and the USA

**Not in Canada**



# Objectives

1. To evaluate efficacy trial of Apiguard® under typical Canadian apicultural conditions.
1. To permit the registration of Apiguard® in Canada.



# Materials and Methods

## Protocol

- August 2018 to June 2019
- Centre de recherche en sciences animales de Deschambault (CSRAD), Quebec, Canada
- Langstroth commercial hive
  - Single brood chamber (10 frames)
- 36 colonies
  - Randomized design
  - Brood strength and natural varroa drop



# Materials and Methods

## Treatments

Group 1	Group 2	Group 3
Negative control (No treatment)	Apiguard® 2 consecutive applications: 50g/colony/2 weeks	Apiguard® 3 consecutive applications: 25g/colony/2 weeks
	<u>Total dosage:</u> <u>100g/colony/6 weeks</u>	<u>Total dosage:</u> <u>75g/colony/6 weeks</u>
N=12	N=12	N=12





# Materials and Methods

## Treatment applications

- **Group 1** : Negative control
- **Group 2** : Apiguard® dosage 100g/colony/6 weeks  
(2 consecutive applications of 50g)
- **Group 3** : Apiguard® dosage 75g/colony/6 weeks  
(3 consecutive applications of 25g)
- **Apivar®** : A follow-up treatment was performed on all the colonies
  - (active ingredient: amitraz; 2 strips/colony)



# Materials and Methods

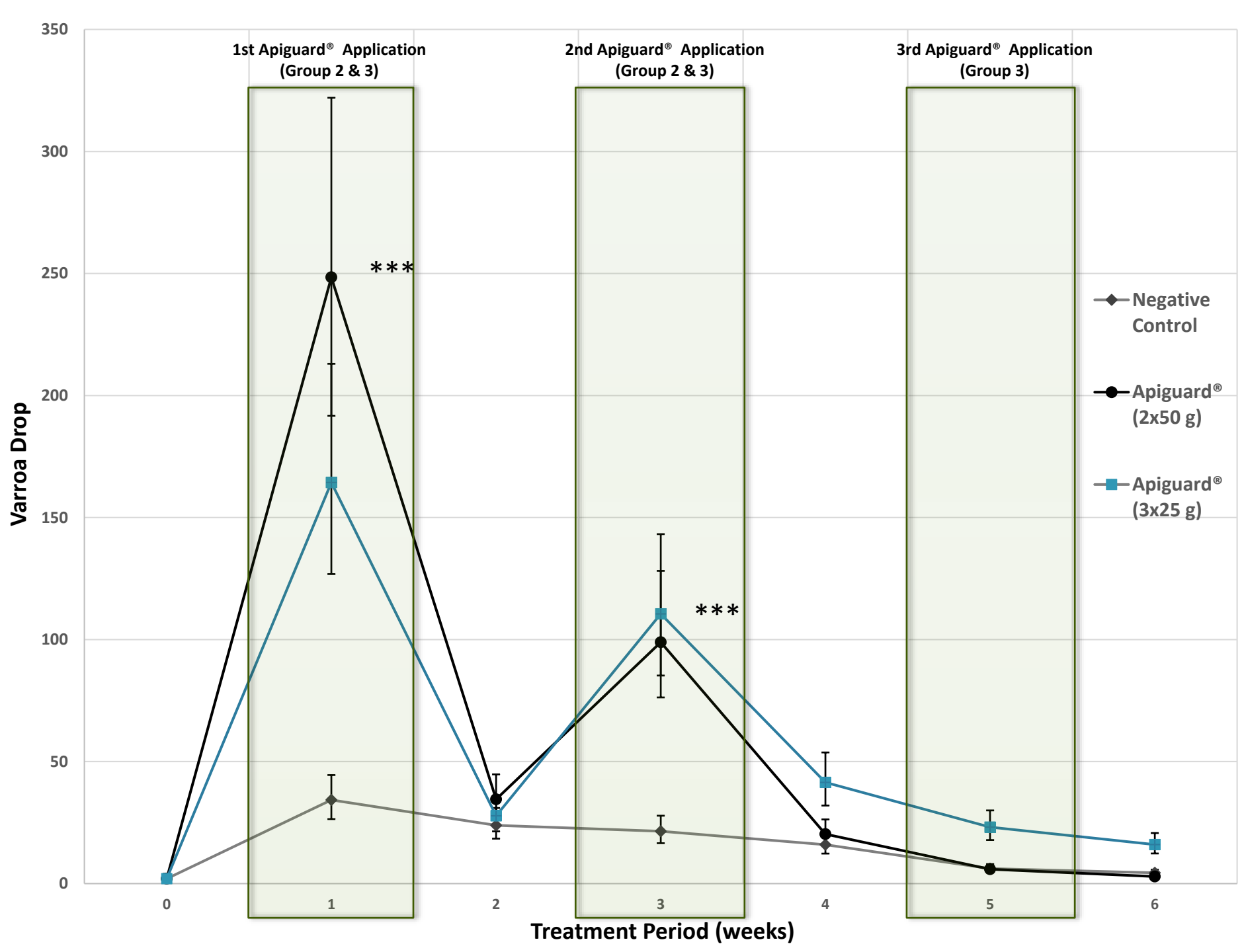
## Varroa mite count

- Mite drop was monitored with sticky boards once a week throughout the duration of the treatment (6 weeks) and follow up treatment (6 weeks)



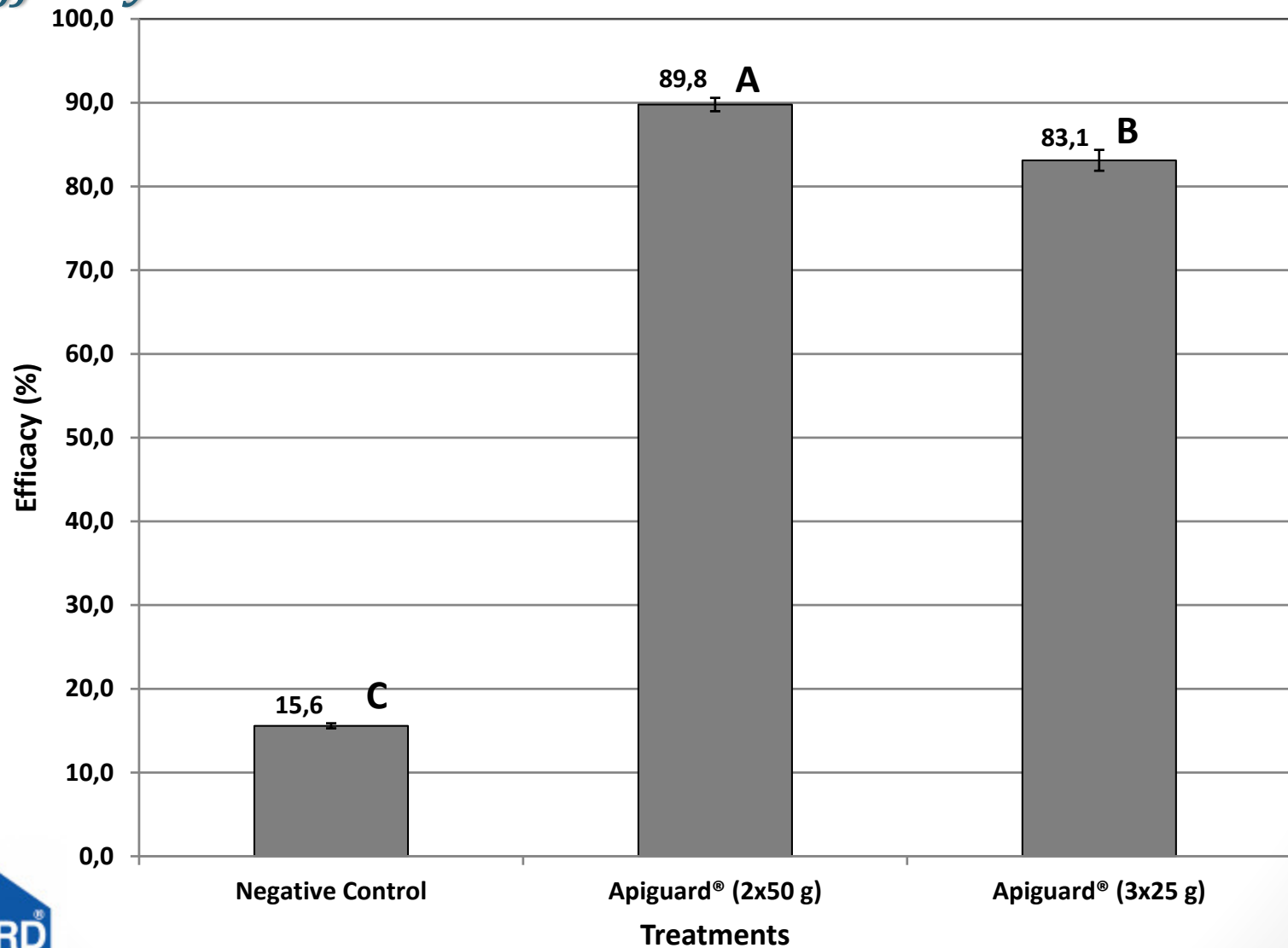
**% Efficacy** = (total number of mites killed during fall treatment x 100) /  
(total number of mites killed during fall treatment + total number of  
mites killed during follow-up treatment with Apivar®)





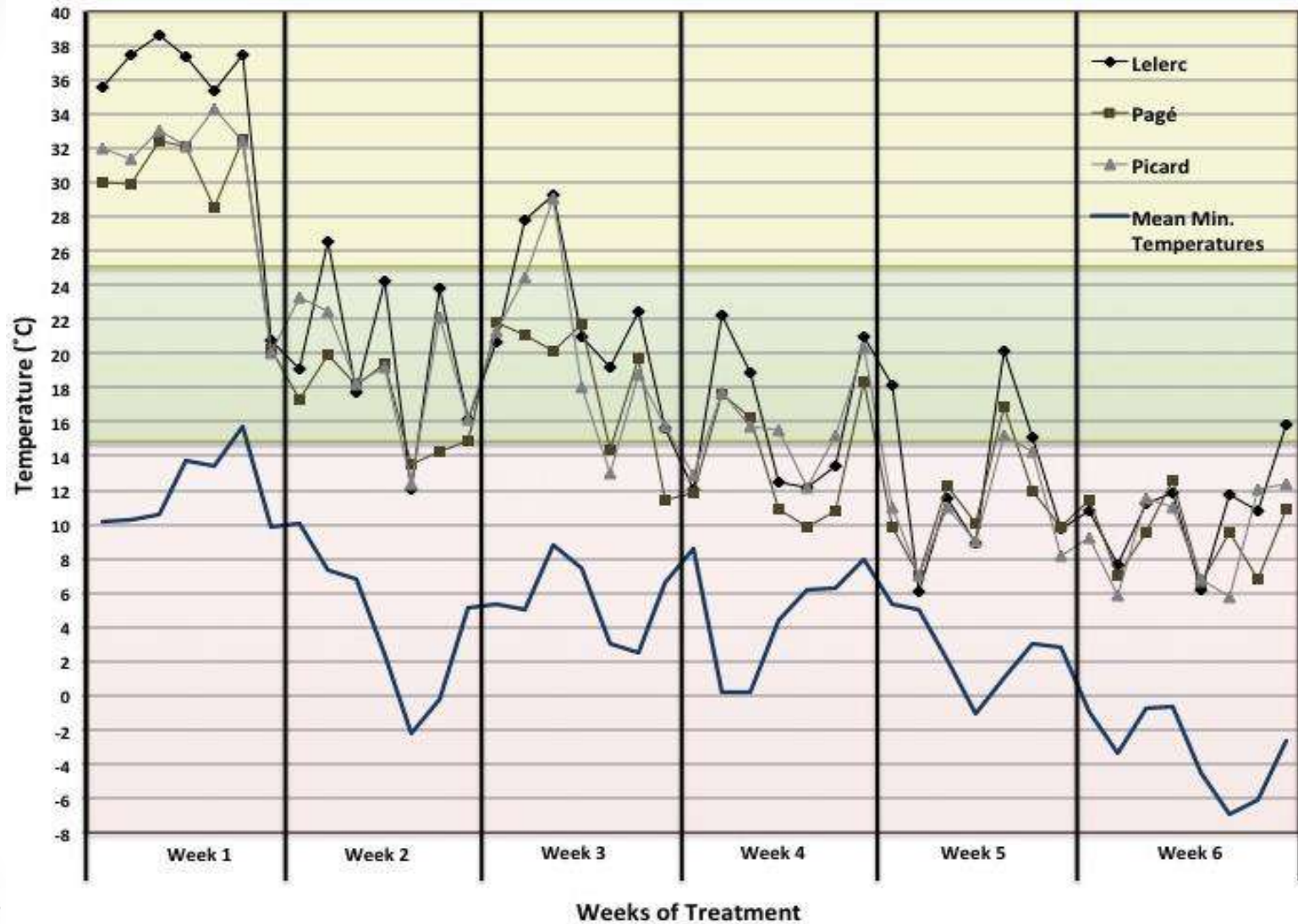
# Results

## *Efficacy*





# Results



# Discussion

## Significant difference between Apiguard® treatments and the negative control

- Apiguard® treatment seemed to be very effective during application period (week 1 and 3).
  - Increase varroa drop during the first and second application!
- The third application in group 3 (3x25 g Apiguard®) did not significantly increase varroa drop.
  - Temperature
  - Treatment quantity

## The Best Efficacy

- Both Apiguard® treatments have higher efficacy than the negative control.
- The highest efficacy observed was with the treatment of 2x50 g Apiguard (89.8 %  $\pm$  0.8):

## Colony Survival

- Apiguard® treatments did not have an effect on colony strength after treatments tested in this trial ( $P > 0.05$ ).



# Conclusion

- Application of 2 x 50g is preferred
  - Time saver for beekeepers
  - Temperatures (Hot and cold for a short period of time)
- Apiguard® is an effective fall varroa treatment
- Easy to use, we hope Apiguard® will be available for all Canadian beekeepers.



# Acknowledgement

- **CRSAD Bee Team:**
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- **Daniel Rico (CRSAD)**
  - Statistical Analysis



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