OP-125 [Bee Health]
The persistence of acaricides resistance in Varroa destructor population in Canada

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The beekeeping industry in Canada has faced significant challenges due to the ectoparasitic mite Varroa destructor, which has been a major factor in excessive winter colony losses. Control of Varroa mites has predominantly relied on a limited selection of synthetic varroacides including tau-fluvalinate, coumaphos, amitraz, and flumethrin. This dependence raises concerns about the evolution of resistance and the subsequent decline in treatment efficacy. This study assessed the phenotypic and genotypic resistance of Varroa populations in Alberta to amitraz, the most widely used varroacide. Bioassay results confirm that 86% of the samples collected exhibited varying degrees of phenotypic resistance to amitraz. Additionally, the presence of genetic mutations previously linked to varroacide resistance was investigated. The Y215H mutation in the octopamine receptor gene (Octβ2R), associated with amitraz resistance, was detected in 90% of the tested apiaries. This study also revealed widespread resistance to pyrethroids across Alberta. Mutations L925I and L925M in the voltage-gated sodium channel, which indicate pyrethroid resistance, were present in 100% of the apiaries examined. These results underscore the notion that prolonged reliance on a single treatment contributes to accelerated resistance development in Varroa populations. The implications of these findings suggest that implementing a comprehensive, nationwide monitoring program would enhance Varroa management strategies. Moreover, there is an urgent need to develop and integrate new control options to effectively combat Varroa infestations.

The Persistence of Acaricides Resistance in *Varroa destructor* Populations in Canada

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Apimondia 2025- Copenhagen

Lifetime of registered varroacides in Canada

1989
First report in Canada

Apistan
tau-fluvalinate

Low efficacy 2001

1993

2002

CheckMite+
coumaphos

Low efficacy 2003

Apivar
amitraz

?

2008

2016

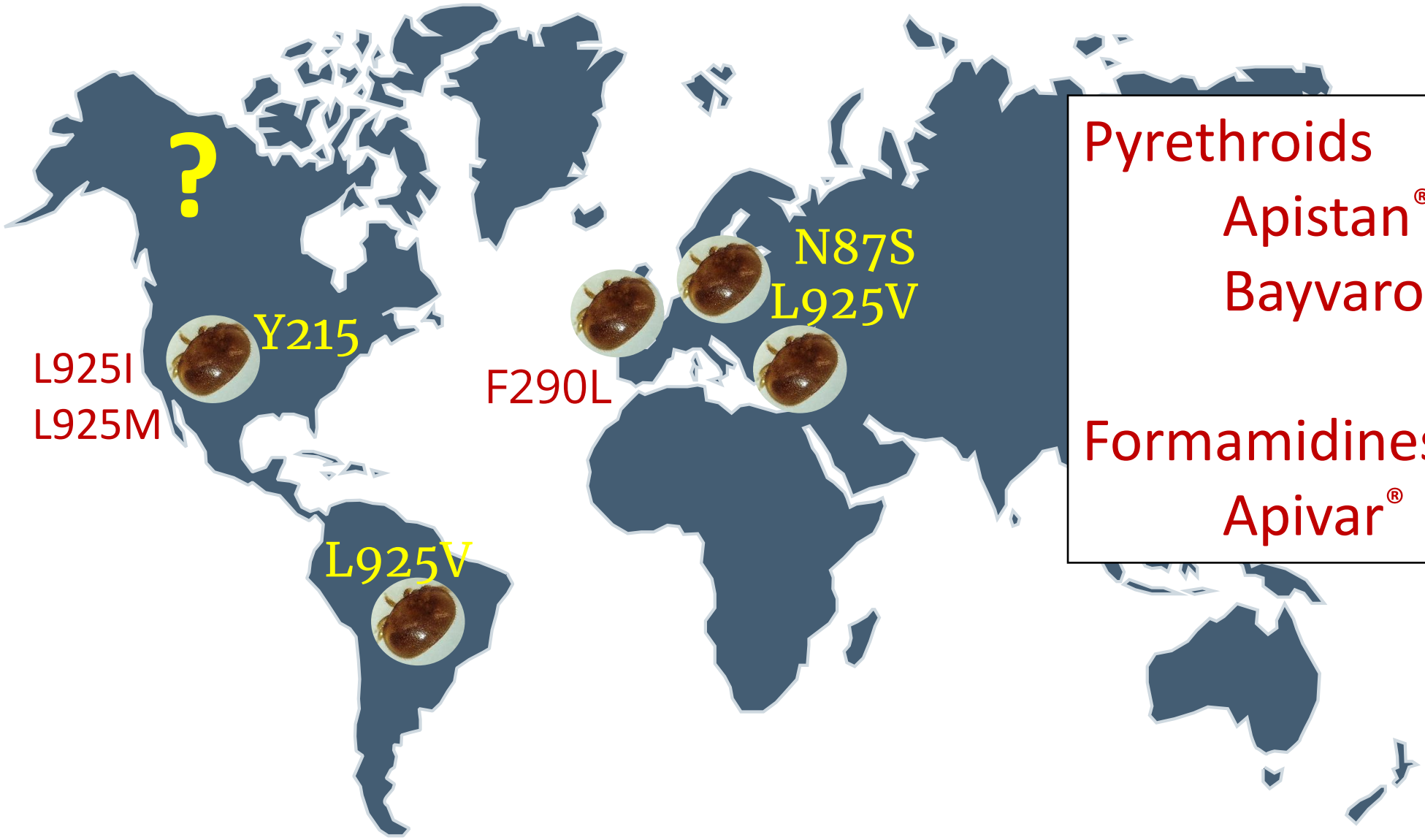
Bayvarol
flumethrin

Low efficacy 2019

Pest Management Regulatory Agency (PMRA)

(Skinner et al. 2003; Currie et al. 2010; Morfin et al. 2022; Muirhead 2023; Bahreini et al. 2025)

Varroa resistance to miticides



Pyrethroids

Apistan®

Bayvarol®

Formamidines

Apivar®

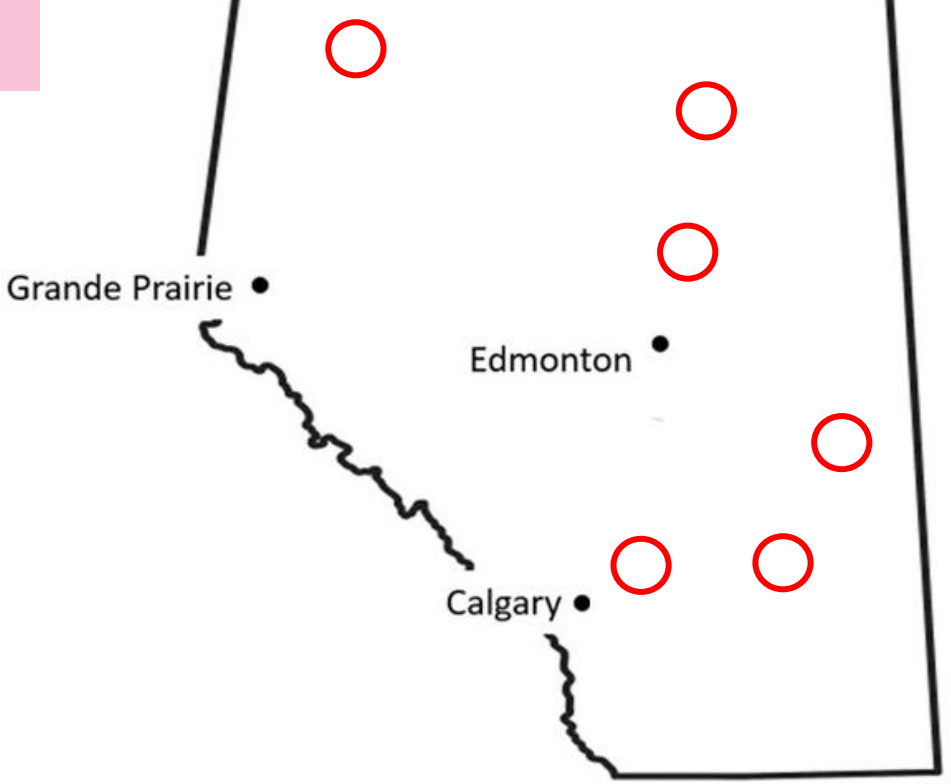
(Millán-Leiva et al. 2021, Hernández-Rodríguez et al. 2022, Marsky et al. 2024, Rinkevich et al. 2023, Vlogiannitis et al. 2021, Mitton et al. 2021)

Alberta miticides resistance study (2020-2022):

Efficacy test → Apivar® (Amitraz)

(Clinincal resisatnce)

5 low efficacy +1 control apiaries (2022)



Alberta miticides resistance study (2020-2022):

Efficacy test → Apivar® (Amitraz)

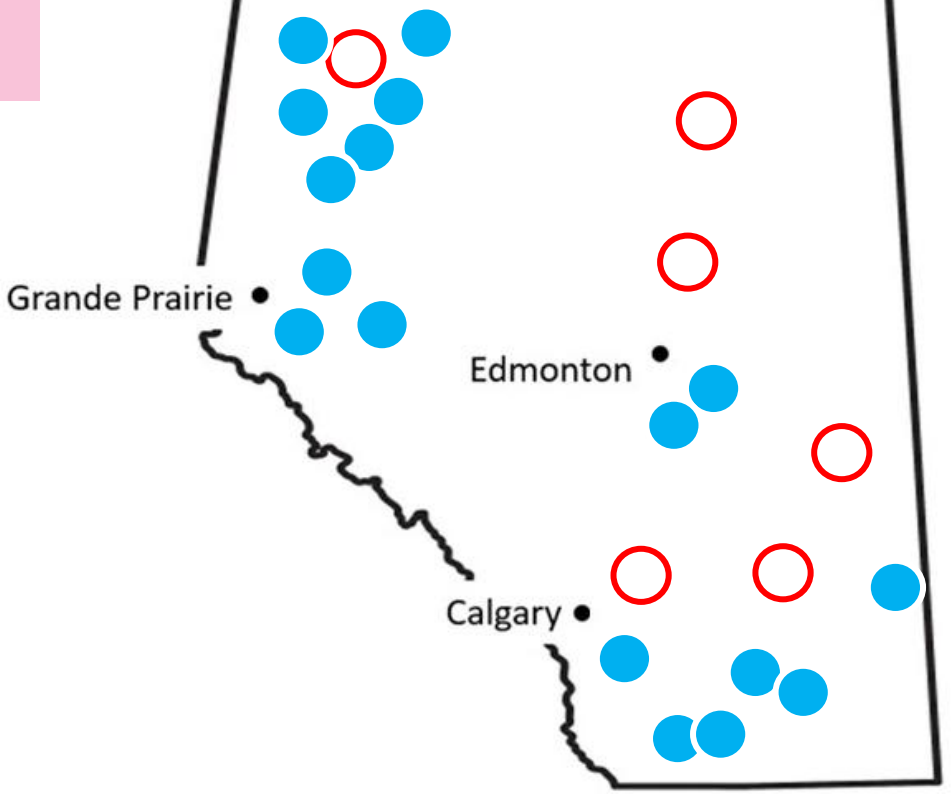
(Clinincal resisatnce)

5 low efficacy +1 control apiaries (2022)

Genotypic resistance test

- Fluvalinate
- Flumethrin
- Amitraz

19 Apiaries (2020 & 2022)



Apivar® efficacy 2022

Apiarium method

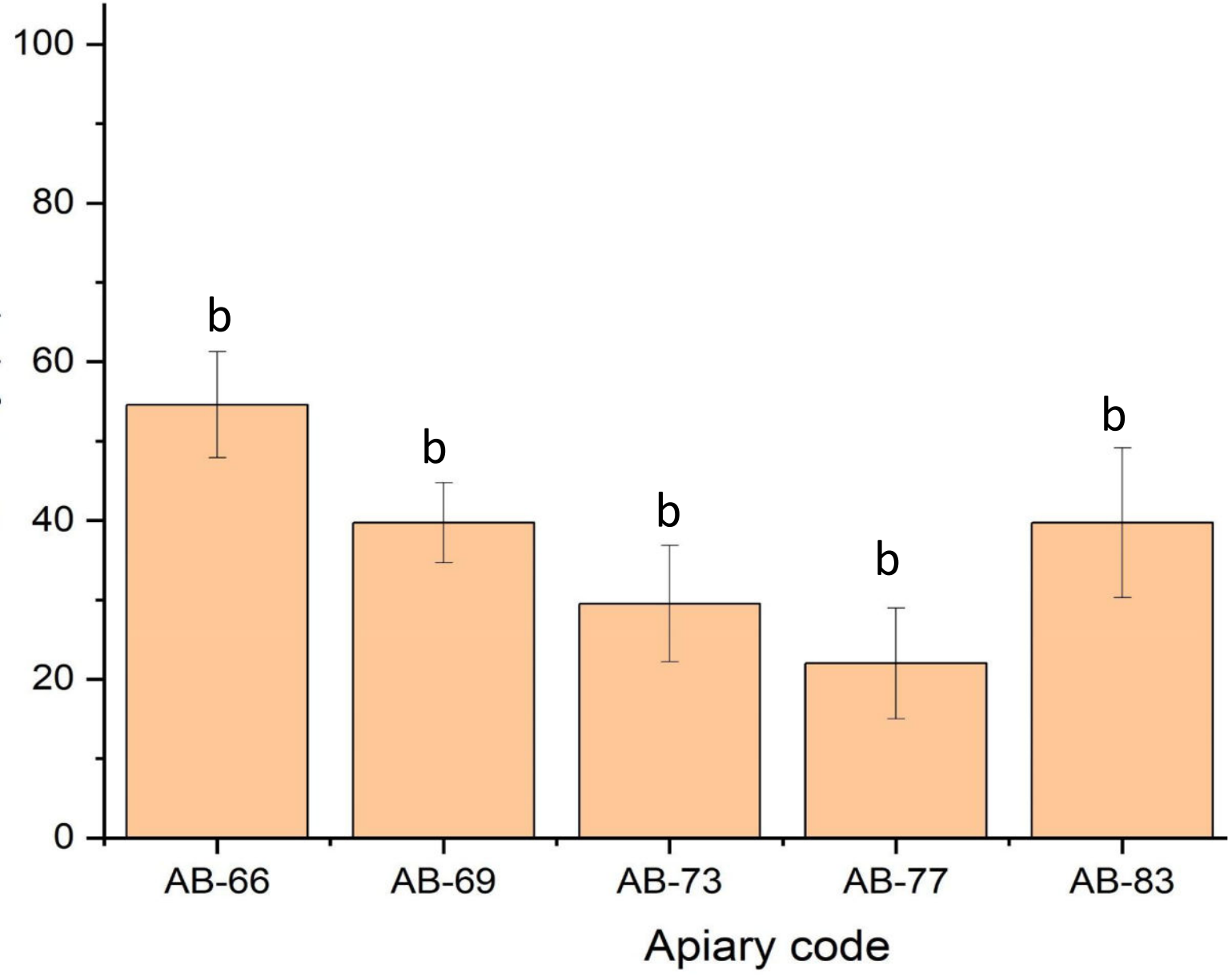
6 apiaries
4-7 colony / apiary

~300 bees per cage
4-5% mite level

4 h exposure to 3 cm Apivar strip
3 cages for Apivar
3 cages for Control

(Bahreini et al. 2023)

Apivar® efficacy

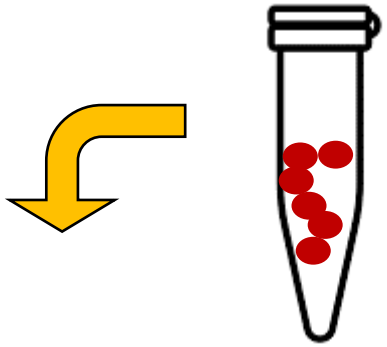


F=5.08
df=5, 26
p= 0.0006

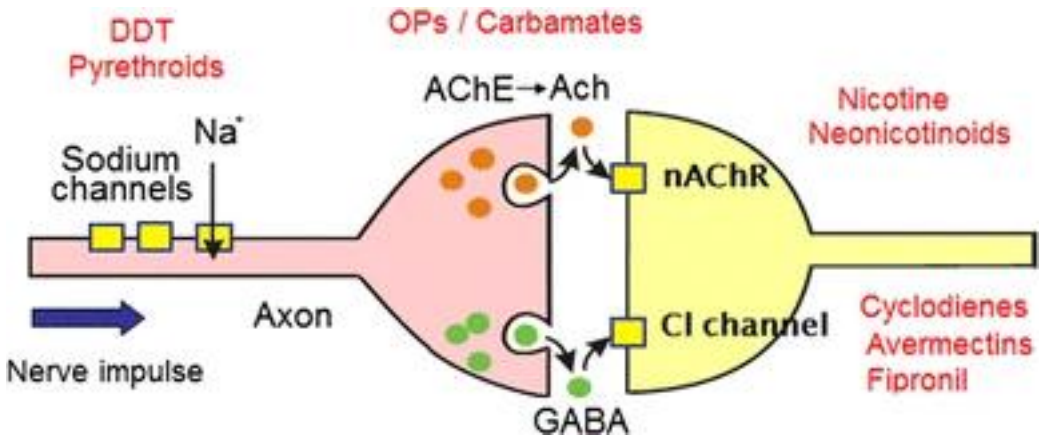
(Muirhead 2023)

Genotypic analysis method

A total of 710 Varroa mites @ 19 apiaries across Alberta

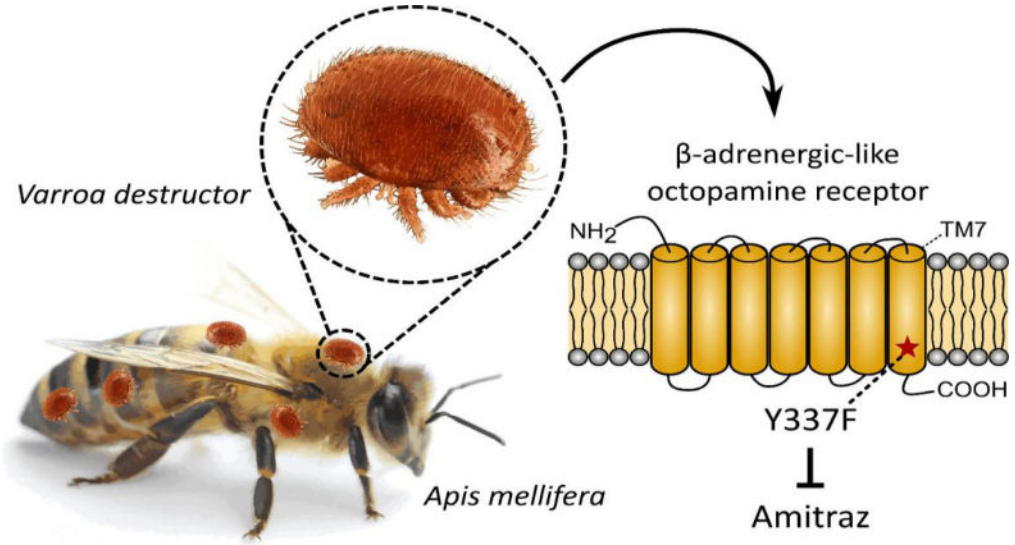


Fluvalinate - resistance
Flumethrin - resistance



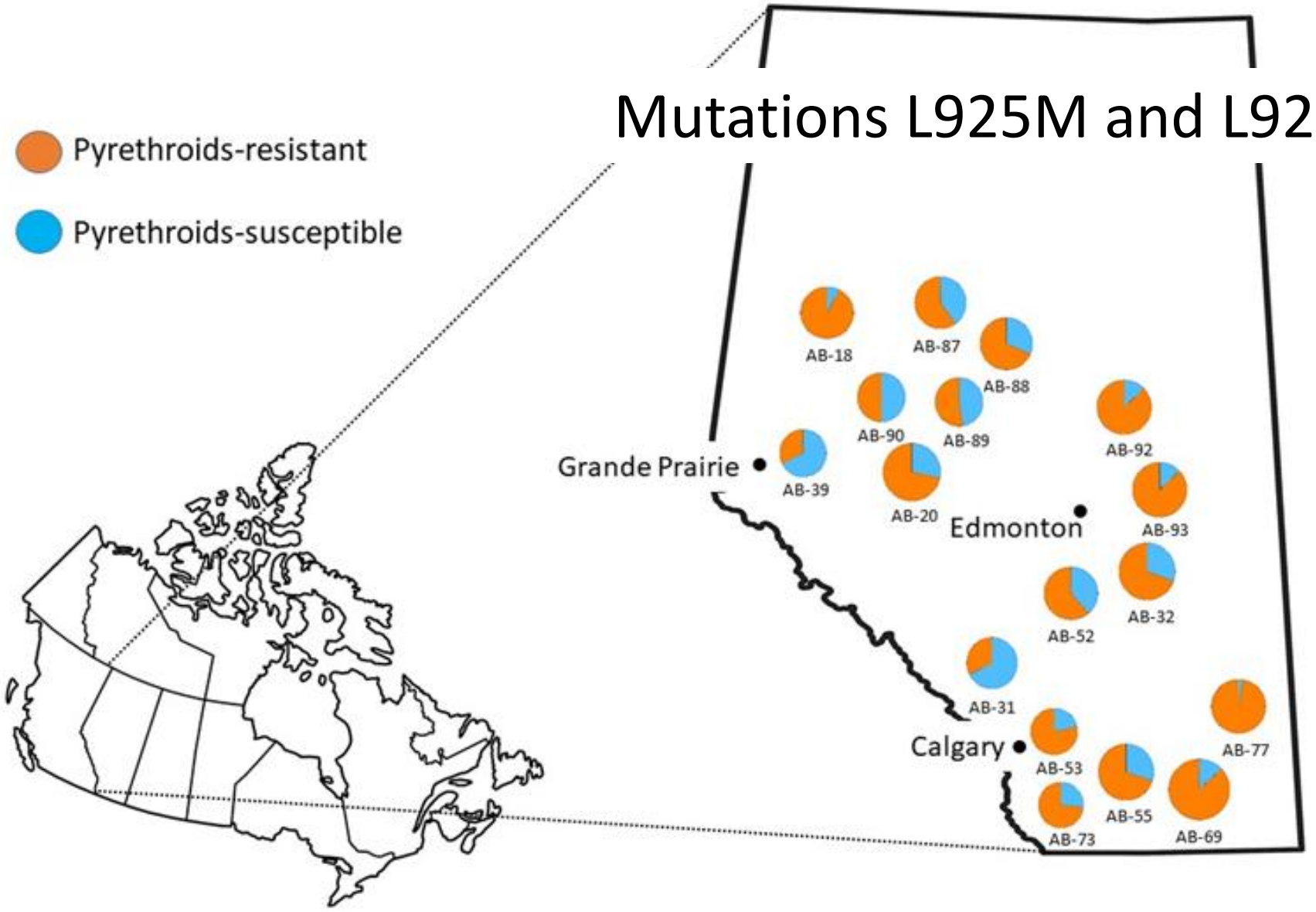
TaqMan™ assay

Amitraz - resistance



(González-Cabrera et al. 2013, 2016; Field et al. 2017; Hernández-Rodríguez et al. 2022; Inka et al. 2024)

Geographical distribution of Pyrethroids-resistance in Alberta

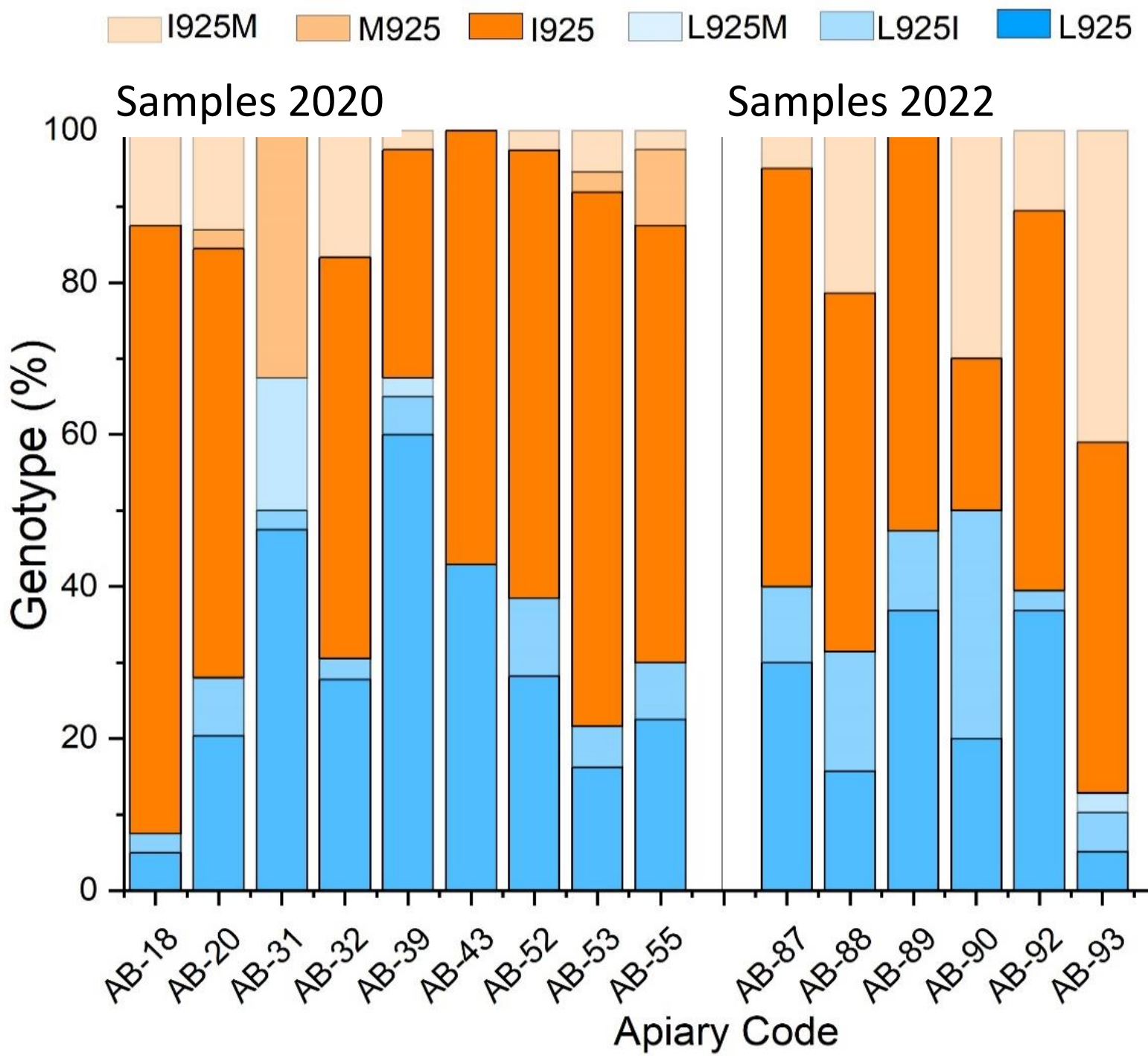


Frequency (%) of genotypic Pyrethroids-resistance

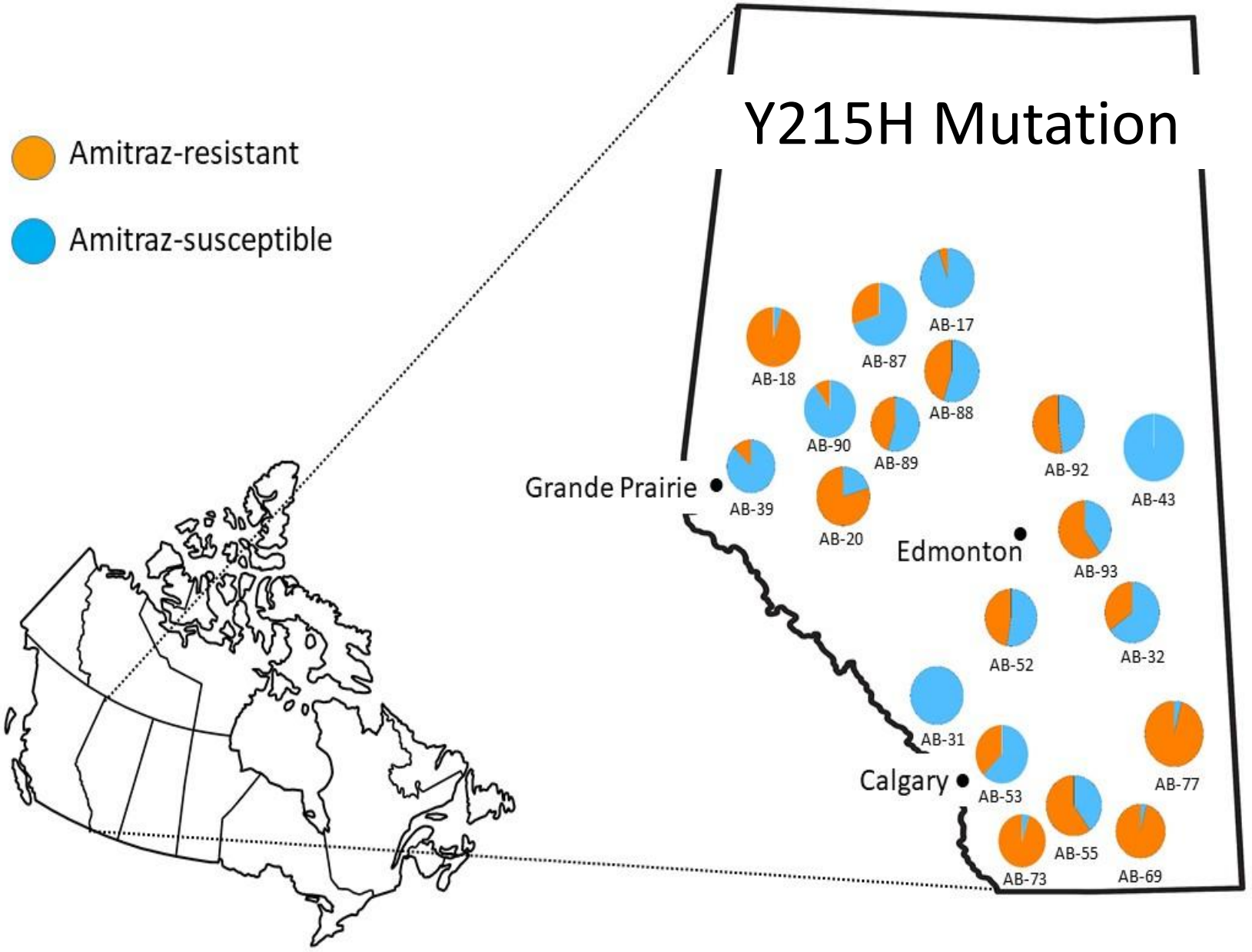
Mutations L92M and L925I

Susceptible

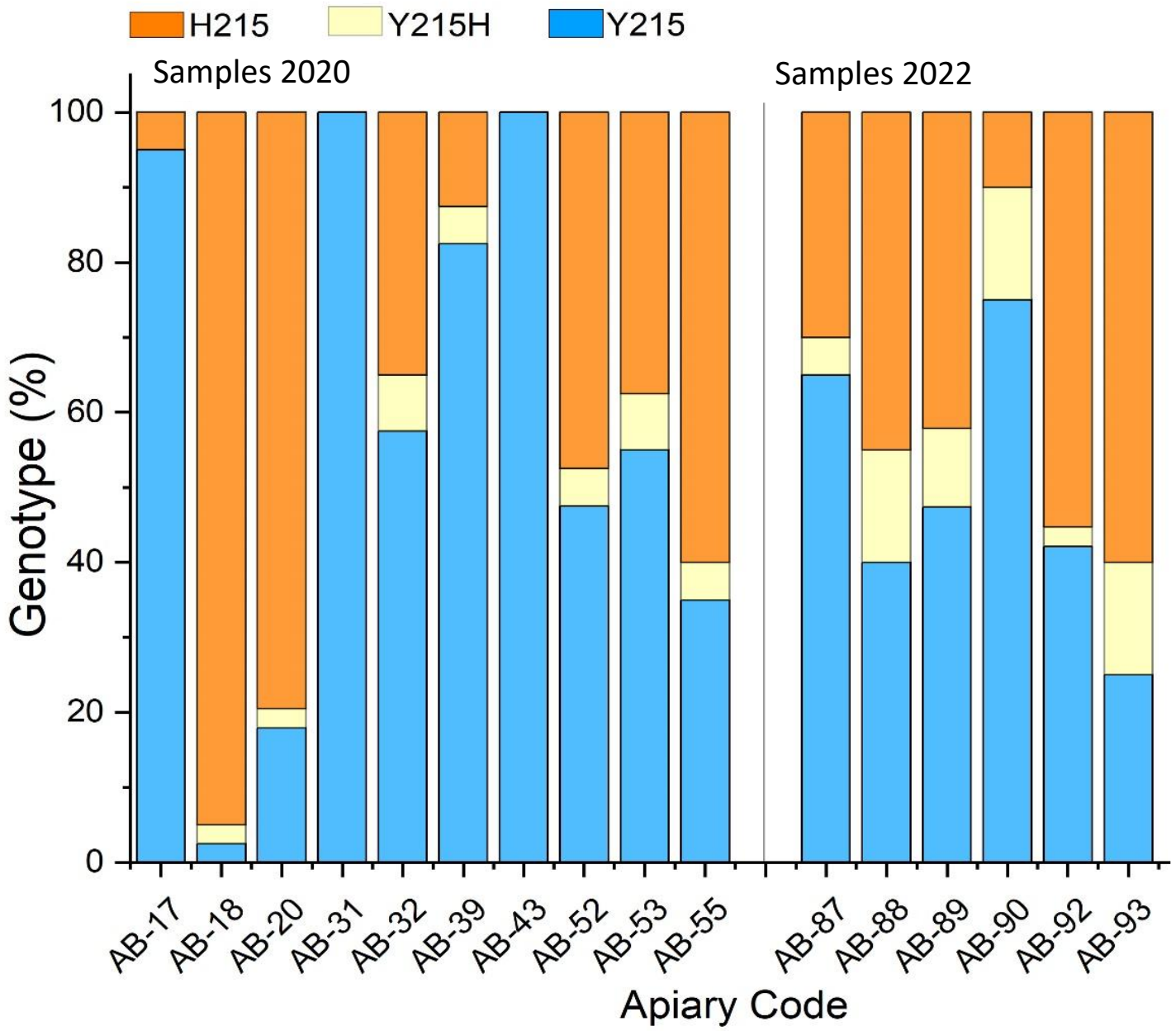
Resistance



Geographical distribution of amitraz-resistance in Alberta



Frequency (%) of genotypic amitraz-resistance



Y215H Mutation

%39 efficacy

%29 efficacy

%22 efficacy

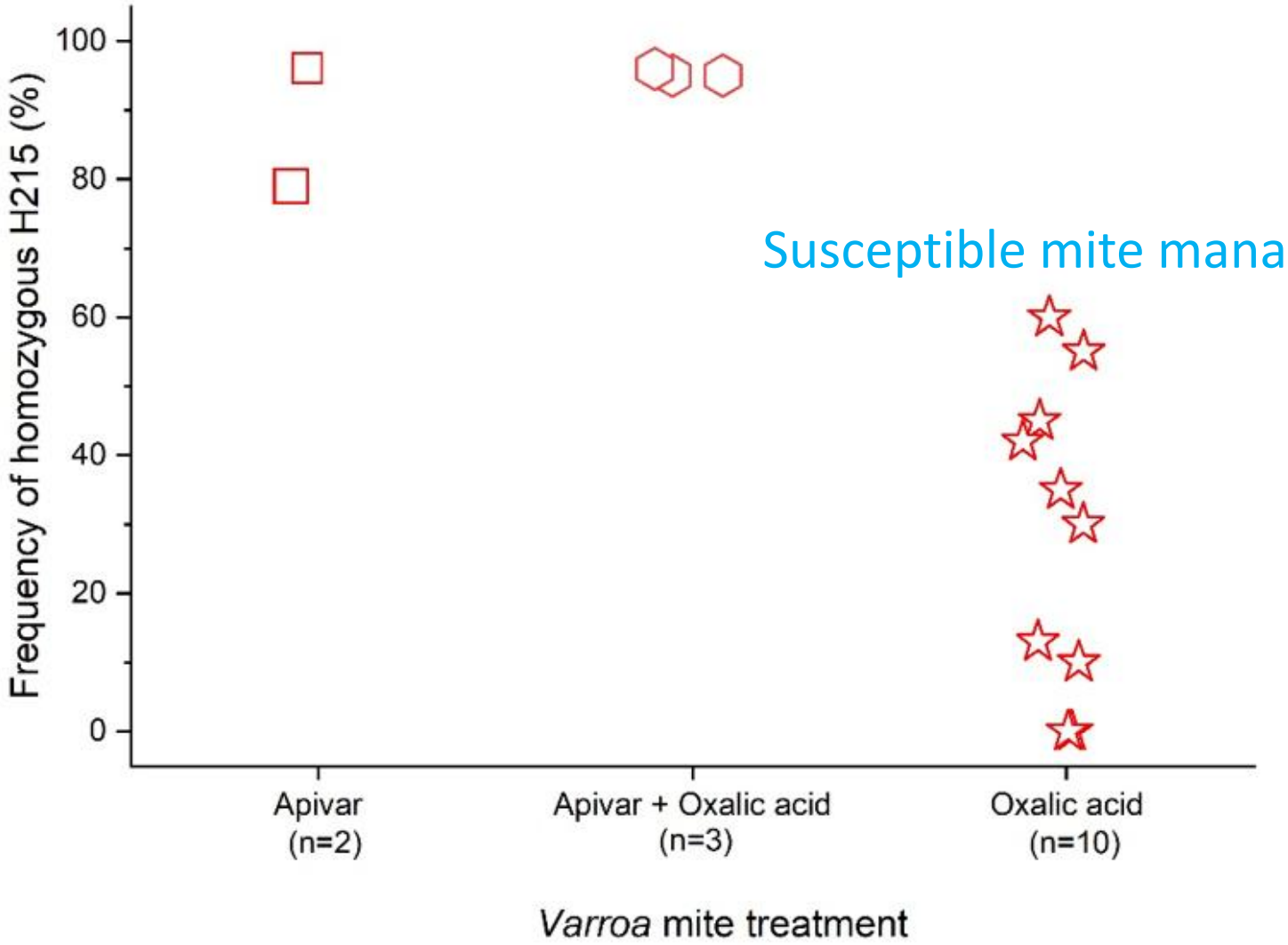
Susceptible

Resistance

History of Varroa treatment and amitraz-resistance

Oxalic acid

Apivar®



Susceptible mite management

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scientific reports

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Arising amitraz and pyrethroids resistance mutations in the ectoparasitic *Varroa destructor* mite in Canada

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The ectoparasitic mite *Varroa destructor* remains a great threat for the beekeeping industry, for example contributing to excessive winter colony loss in Canada. For decades, beekeepers have sequentially used the registered synthetic varroacides *tau*-fluvalinate, coumaphos, amitraz, and flumethrin, leading to the risk of resistance evolution in the mites. In addition to the widespread

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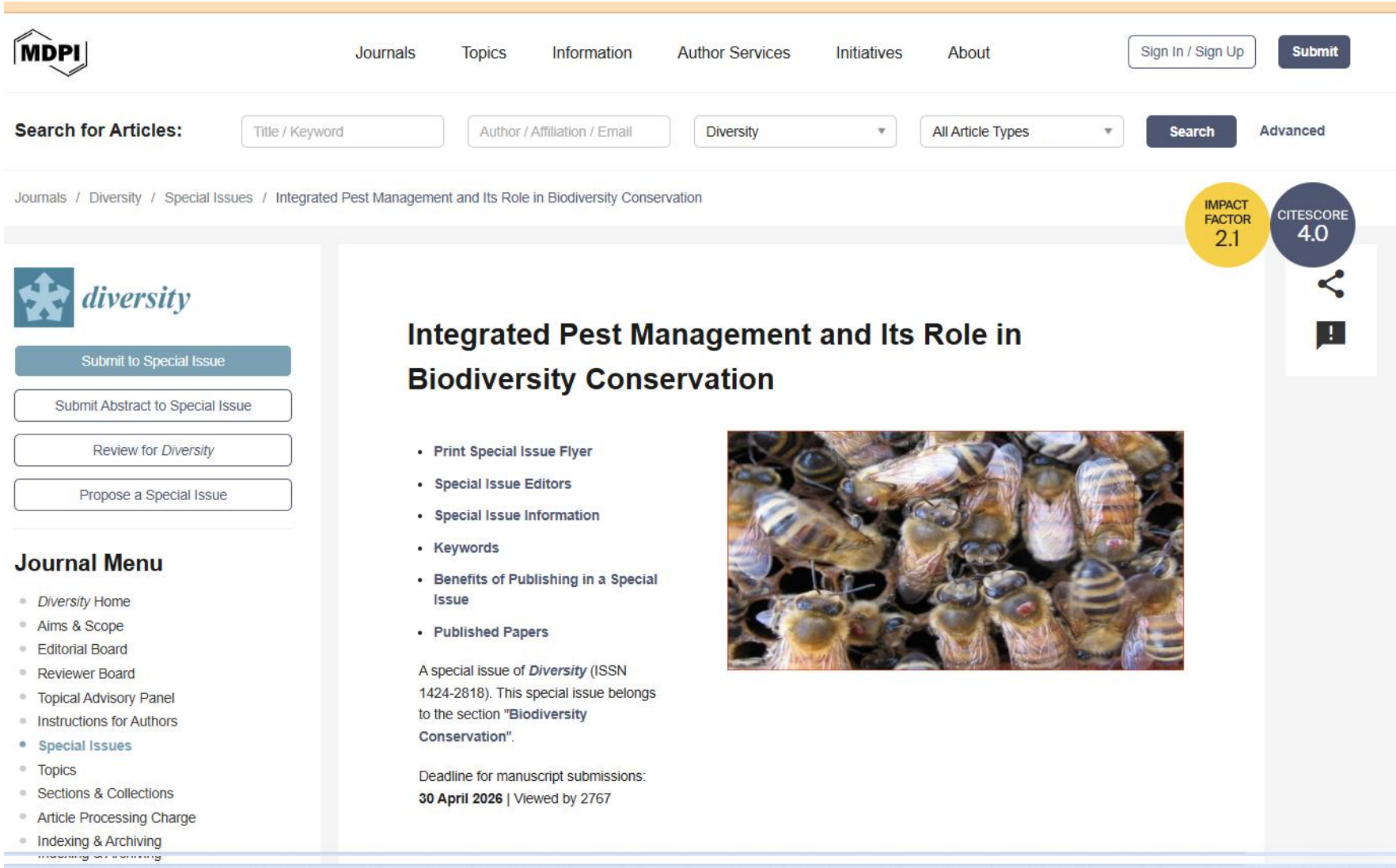

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Thank You!

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