

RNAi-based Miticide Synergists to Sensitize Resistant Varroa Mites and Enhance Miticide Efficacy

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ABSTRACT

Researchers at the University of California, Davis and the USDA Agricultural Research Service (ARS) have developed RNAi-based compositions and methods that enhance miticide efficacy to control resistant Varroa destructor mites.

FULL DESCRIPTION

This technology employs RNA interference (RNAi) targeting an ABCB1-like transporter gene in Varroa destructor mites to sensitize them to various miticides such as amitraz. By administering ABCB1-like-specific double-stranded RNA (dsRNA), the resistance-conferring transporter is downregulated, increasing the mites' susceptibility to the miticide. This technology offers a novel and effective approach to addressing rising miticide resistance in Varroa populations, a major threat to honeybee health worldwide. Enhanced miticide efficacy was shown in mite populations with enriched resistance-associated octopamine receptor mutations (97-99% homozygous resistant genotype across treatment groups), indicating that the technology is effective against current resistant Varroa field populations.

APPLICATIONS

- ▶ Beekeeping industry for Varroa mite management.
- ▶ Development of RNAi-based pest control kits and formulations.
- ▶ Agricultural biotechnology products targeting parasitic pests.
- ▶ Sustainable apiculture health and colony protection solutions.
- ▶ IPM (or resistance management) programs that are designed to extend the effective lifespan of limited arsenal of current-use miticides

FEATURES/BENEFITS

- ▶ Enhances efficacy of existing miticide treatments against resistant Varroa mites.
- ▶ RNAi method is specific, reducing non-target effects on honeybees.
- ▶ Non-toxic to honeybees, ensuring colony safety.
- ▶ Compatible with current apicultural management practices.
- ▶ Addresses increasing amitraz resistance in Varroa mite populations.
- ▶ Reduces need for higher miticide doses or alternative chemicals which lowers the total chemical burden on a hive and supports honey quality.
- ▶ Improves long-term sustainability of honeybee colony protection.
- ▶ Mitigates negative impacts of chemical miticides on bee health.

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INVENTORS

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OTHER INFORMATION

KEYWORDS

ABCB1-like transporter,
 miticide resistance,
 honeybees, varroa
 destructor, mite control,
 miticide, RNA
 interference, RNAi
 synergists, pest
 management, gene
 silencing

CATEGORIZED AS

- ▶ **Agriculture & Animal Science**
 - ▶ Animal Science
- ▶ **Materials & Chemicals**
 - ▶ Pesticides and Insecticides
- ▶ **Veterinary**

► Works synergistically with existing registered miticides (no active ingredient registration necessary)

► [Therapeutics](#)

PATENT STATUS

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Patent Pending

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