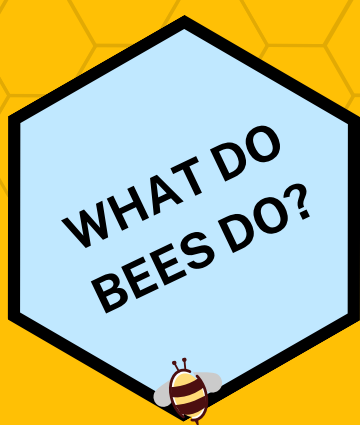


NATURAL PESTICIDE: SAVE THE BEES



**1:3 BITES OF
FOOD**

rely on pollinators
[10]



30% of all crop species
require pollinators [10]



CURRENT CHEMICAL PESTICIDES...

- Are one of the largest contributors to bee population decline
- Primarily consist of neonicotinoids that bind to and damage major receptors in bees [2]
- Have caused a reduction of vision, growth, and reproduction in bee populations [2]



Current natural pesticides, composed of essential oils, are not widely used in the market due to disparity in price. These pesticides also have a higher degradation rate in opposition to their chemical counterparts [8].

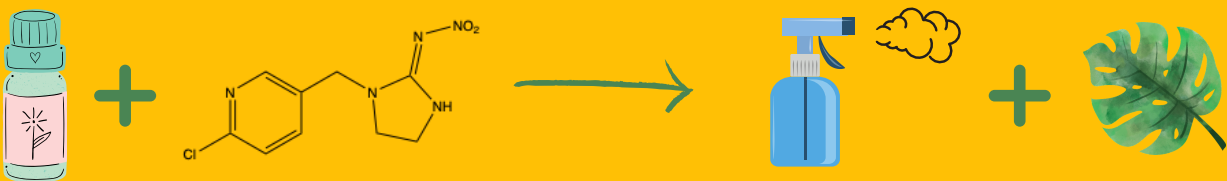
OUR NATURAL PESTICIDE SOLUTION



SERIAL DILUTIONS

According to scientific research, thymol oil and imidacloprid, when combined, have synergistic repellent effects against common vermin [6]. Since thymol oil has traditionally been used to ward off Varroa mites, it is mostly harmless to bees. In contrast, imidacloprid, a compound found in many current pesticides, has proven to have adverse side effects on bees at certain concentrations [7]. Despite this, scientific research has discovered concentrations of imidacloprid that have proven to have little to no effect on bees' behavior or mortality rate [7]. Based on this scientific research, serial dilutions of thymol oil and imidacloprid that are harmless to bees have been created as shown below. The proposed solution is to test these serial dilutions by spraying them onto plant leaves containing vermin. Then, create a natural pesticide harmless to bees based on the serial dilution that possessed the most insecticidal properties.

0.3E4 - 10E4 mg/L Thymol Oil + 0.5µg - 5µg/kg imidacloprid and Tween-80 with 1% Acetone



REINFORCEMENT WITH ZEIN NANOPARTICLES

USE OF ZEIN NANOPARTICLES
WERE OBSERVED TO BE

86±0.5%

EFFECTIVE

Zein Nanoparticles are biodegradable capsules that strengthen the natural pesticide [15].

↑ **Durability**

↑ **Effectiveness**

↑ **Shelf-life**

- No significant harm to honeybees at sublethal dose [15]
- Users encouraged to practice safe application to minimize user-health risk



ACCORDING TO THE ENVIRONMENTAL PROTECTION AGENCY:

- Cold-pressed neem oil is safe for human health [3]
- All thyme derivatives (ie. thymol oil) are safe for human consumption [4]
- Eucalyptus oil does not damage human genetic information, nor does it cause mutations [5]

LONG TERM FUTURE

- After testing and hopefully finalizing a successful product, we would continue to raise **awareness** about a safer natural alternative
- With increased durability, agriculturists should be encouraged to **invest** in biopesticides and as the market grows, the cost is expected to reduce.
- The ultimate goal is to slow the decline and aid the restoration of the bee population to **increase the pollination** capacity of honeybees to support crop yields. Other outcomes would be relieving strain from other pollinators and preserving **biodiversity**.



For sources and
more information:



SCAN ME

