

Selecting Honey Bees for Resistance to Diseases

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- Chalkbrood (*Ascosphaera apis*) - filamentous fungus
- Nosemosis (*Nosema ceranae*)- microsporidia

Introduction

Breeding for disease resistance is the foundation of an integrated pest management system in honey bee colonies. Disease resistant honey bees will require no chemical treatments to control diseases, and therefore will help to reduce the amount of antibiotics used in honey bee colonies.

Mechanisms of Resistance: Eusocial insects, including the honey bee, have evolved novel behavioral, physiological, and organizational adaptations to combat diseases.

Behavioral mechanism of resistance to chalkbrood (*Ascosphaera apis*) has been described by Gilliam et al, 1988. Hygienic bees detect and remove infected brood before the pathogen produces infectious spores, and therefore prevent transmission of the disease.

Physiological mechanisms: We explore high intra-colonial genetic diversity in bees, a result of multiple mating by queens, to select for variations in immune responses to infectious diseases.



Ascosphaera apis spore cyst



Nosema ceranae environmental spores

Methods:

- 1) *In vitro* tests for colony-level diversity in Immune competence: a) inoculating brood with *A. apis* spores, and b) inoculating adult bees with *N. ceranae* spores



1. *In vitro* test for resistance to Chalkbrood: honey bee larvae were inoculated with fungal spores in cell culture plates.



2. Nosema infection Test: Adult bees were inoculated with *N. ceranae* in small cages.

