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*A Serious Disease in the  
Alfalfa Leafcutting Bee and  
What We Can Do About It*

# CHALKBROOD

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Alfalfa seed production is an important industry in Idaho and other states of the West. Average seed yields have increased substantially over the past 20 years, largely because of the alfalfa leafcutting bee. An efficient pollinator, this bee is managed in large numbers by seed growers. Bee production has become a profitable industry supporting seed production.

Since 1975, alfalfa leafcutting bees in the Northwest have been increasingly affected by a microorganism which causes bee larvae to become diseased and die. This disease, commonly called chalkbrood, is caused by a fungus (*Ascosphaera* sp.) which spreads by means of microscopic spores. The body of an infected bee larva is turned almost completely into fungal cells which eventually produce millions of spores. After a larva dies, it serves as a source of infection. Old dead larvae contaminate nesting holes, the domiciles where bees are housed and the soil surface around domiciles.

Infectious spores, which may number in the hundreds of millions on each bee, adhere to the external hairs of emerging adult bees and are spread around the nesting areas during foraging and mating activities. Spores must be consumed by the developing bee larva to infect it, so the more spores at the nesting site the higher the probability of infection.

## Symptoms and Signs

A larva shows no symptoms of chalkbrood disease during the initial stages of infection. A diseased larva first expresses symptoms when it begins to swell slightly and its color turns from cream to yellow-brown. Within several days of this color change, the larva becomes more swollen, its body stiffens and then it dies. If crushed, the body has a somewhat cheesy consistency. After the larva dies, the body turns a mottled grey color and then changes to a uniform slate grey color with a metallic sheen as spores are produced beneath the integument. The process of infec-

tion to death may take as few as 5 days to possibly weeks. Spore formation occurs from 2 days after death to several weeks, depending on external conditions.

## Prevention Program

No cure is known for larvae that have become infected. However, certain measures can be taken to decrease the chances of spores being eaten by developing larvae and to reduce stresses which can make the developing larvae susceptible to infection. Good management practices can reduce direct stress factors such as unfavorable weather and temperatures and pesticide poisoning, and indirect stress factors such as adult competition for food and shelter. The following techniques will help decrease both the potential and the incidence of chalkbrood disease:

1. Put bee nesting materials in field shelters where they are protected from weather.
2. Arrange ventilation to prevent heat buildup inside the domicile.
3. Design and position domiciles so that they will be warmed by sunlight early in the morning and shaded in the late morning and afternoon.
4. Provide insulation or a dead air space between nesting material and outside walls of the domicile receiving direct sunlight.
5. Move portable domiciles out of fields which are about to be sprayed with pesticides and other chemicals harmful to bees.
6. Place domiciles in different locations each year to prevent a buildup of dead larvae and fungal spores in the immediate nesting area.
7. Phase out **all** nesting material each year, even those containing newly purchased or wild trapped bees, into new or sterilized nest materials. This one practice, if used consistently, has reduced chalkbrood disease significantly.



8. Phased-out nesting materials should be treated as follows before being reused:
  - a. Drilled bee boards and soda straws — heat-treat at 225° F for 4 hours minimum. Allow air space for free circulation of heat between each unit.
  - b. Wood laminates — either heat-treat, as above, or dip in a 1% hypochlorite solution for 3 minutes and allow to dry (follow label directions).
  - c. Other nest materials that cannot be dipped or heat-treated must be discarded and replaced with new materials.
9. Spray field shelters with a 1% hypochlorite solution before bees are placed in them in the spring. Thoroughly wet the inside, outside and surrounding ground where bees may warm themselves in the mornings and evenings.
10. Use only domiciles that have a floor and sweep or vacuum litter off the floors at least 3 times a week during the season. Spray the floor with 1% hypochlorite solution each time it is cleaned, either before or after bees are active, but do not spray the face of nests or bees.
11. When practical, separate bees obtained from Canada, Montana, the Midwest and other areas that are relatively free of chalkbrood. Since they may be more susceptible to chalkbrood, keep them at least ¼ mile from local bees.
12. Plan all pesticide applications carefully. Check fields for beneficial as well as pest insects before deciding that a pesticide application is needed. Then incorporate the advice given in University of Idaho Current Information Series 458, Prevent Insecticide Poisoning of Pollinators, into your plan before deciding which specific pesticide to use.
 

Avoid: (a) spray drift, (b) pesticide application when temperatures are low, (c) potential chemical residues during seed set, (d) moving bees into fields too soon after application of a pesticide and (e) killing or damaging your neighbors' bees — they may also be working in your fields.
13. In the loose-cell system (i.e. bee cells extracted from laminated wood and styrofoam boards, punched-out drilled holes and various plastic and

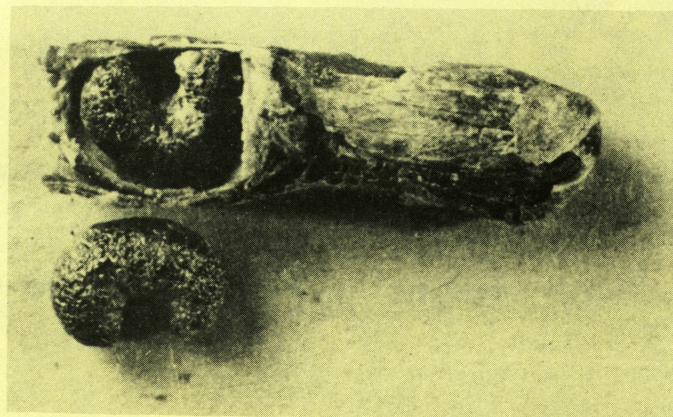


Fig. 1. Alfalfa leafcutting bee cadaver exhibiting typical late-stage chalkbrood disease.

cardboard nest materials), extracted cells can be dipped in a 1% hypochlorite solution for 3 minutes. **CAUTION: Do not dry dipped bee cells in sunlight or with excessive heat.**

Loose-cell management techniques require more time, money and equipment than other management systems and even a little mistake can be disastrous. Consult your County Extension Agricultural Agent or Area Extension Entomologist before committing resources to this management scheme.

14. Decontaminate adult bees as they emerge from overwintering nesting material. The female bee can contaminate the larval food supply with chalkbrood spores while preparing cells for egg deposition. Surface-decontaminate these adults as they first emerge, using a bathing apparatus where adults wade or tumble through a hypochlorite solution. Bathing systems have been developed as additions to or extensions of existing phase-out traps. These systems assure that all emerging bees and their parasites and predators passing through the traps are decontaminated or eliminated. The systems require absolute compliance with labels and instructions in both the mixing and use of hypochlorite solutions on adult bees. Contact your County Extension Agricultural Agent for more information about bee bathing technology.

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