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Control of European and American Foul Brood and Wintering of Bees

Published and distributed in furtherance of the Act of May 8, 1914, by the State College of Washington, Extension Service, S. B. Nelson Director, and U. S. Department of Agriculture cooperating.

EXTENSION SERVICE
STATE COLLEGE OF WASHINGTON
Pullman, Washington

Bulletin No. 75 November 1921

Control of European and American Foul Brood and Wintering of Bees

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The disease situation in apiaries of western Washington has become a very serious problem. To illustrate, the writer found that 64.8% of the apiaries in Whatcom County, 80% of those in Cowlitz County (if the vicinity around Oak Point is an index) and 90% on Vashon Island, King County, were diseased. This is generally the condition in all coast counties. The situation has resolved itself into two alternatives. The beekeepers must co-operate and fight disease or beekeeping, as an industry, will cease to exist. The two diseases which are largely responsible for this condition along the coast and, to a smaller extent, east of the mountains, are European Foul Brood and American Foul Brood.

European Foul Brood

European Foul Brood is caused by a non-spore bearing bacterium called Bacillus pluton. There is a difference of opinion as to the way in which this germ is carried, that is, the way the disease spreads. Some believe the germ is carried in the honey for a short period of time and spread by robbing or by careless beekeepers; others claim the nurse and house cleaning bees spread the disease. Whether or not these are the agencies, we do know that the disease spreads very rapidly, at times exterminating entire apiaries. A damp, cold spring which prevents the bees working is ideal for the conception of this disease.

European Foul Brood attacks very young brood, about four day old larvae, which die as a rule, before the cells are capped over. The larvae, when attacked, first change from a natural creamy color to a watery white, then to yellow, brown, and lastly, coffee brown color, finally resulting in a scale which may lie in almost any position in

the cell, but is usually curled up in the bottom. During this process of transformation from larva to scale, the breathing tubes of the bee become prominent, forming white demarcations which give the larva a segmented appearance. This segmented appearance is distinctive of European Foul Brood.

Treatment of European Foul Brood

Beekeepers seldom encounter this disease if their bees are strong and are Italians. Italian bees seem to be more resistant than the common black bee because they are better housekeepers. However, they are not immune. If they should become diseased, dequeen for a period of ten days and at the end of that period introduce a new queen.

American Foul Brood

This disease is caused by a spore forming bacterium called Bacillus larvae. The germ is carried in the honey or any material with which it may come in contact, and is spread by robbing or by careless beekeepers, who leave any such contaminated material exposed. As the germ is spore bearing, it is very resistant and hard to combat. Combs have been kept forty years and still carry the disease germs. Only 50% of the germs are killed after being boiled for ten minutes. They are unharmed by such strong chemicals as corrosive sublimate or carbolic acid. This being the case, it behooves every beekeeper to be extremely careful in handling this disease and to see that no honey, combs or other material which have become contaminated are placed where the bees have access to them.

American Foul Brood attacks the larvae about two days before the cells are capped over and they generally die after the cells are capped. The larva melts down and changes from a healthy color to a yellow and then a dark brown, finally resulting in a black scale which lies full length of the cell. While this transformation is taking place (usually about two days), the larva becomes a sticky mass which may be stretched out by means of a toothpick. This is known as the rope test. This rope may be stretched to about three inches before breaking and when it parts, it snaps back into the cell. This snapping characteristic distinguishes the rope of the American from that produced in European Foul Brood by the Bacillus alvei. The rope caused by the Bacillus alvei may be stretched out, but instead of snap-

ping back, it falls over the cell and is more thick and lumpish than that produced by the American Foul Brood germ. There is one distinctive characteristic which designates American Foul Brood and that is the scale of the pupa which has a thin thread, its tongue, projecting toward the roof of the cell and at times adhering to it. The scales and the diseased larvae adhere to the cell, making it difficult to remove them. The adhering, diseased larva as it melts down, pulls down the capping of the cell, thus giving the cappings of the comb a sunken appearance. The bees seem to be inquisitive and gnaw holes in these sunken cappings and as these perforated, sunken capped cells are scattered over the comb, they give it a pepper-box like appearance.

Treatment of American Foul Brood

In this disease the germ is in the honey so it becomes necessary to transfer the bees to a clean hive which has frames of full sheets of foundation. The reason for having sheets of foundation is so the bees will use the diseased honey in their honey stomachs in building out the wax. There are several methods of transferring. Some of these methods may be used in transferring bees from a box hive to a modern hive with movable frames.

The Shake Method: For this method the paraphernalia required is a receptacle, usually an old hive, for the diseased combs, a hive with frames which have starter foundations, a top and bottom board and several sheets of newspaper. Place the receptacle within easy reach to your right and the hive to be treated to your left. Place the hive to which you are transferring on the hive stand of the old hive so that the field bees will return to it. It is better to do this transferring late in the afternoon after the bees have ceased flying, in order to prevent any chance of robbing. Lay the newspaper in front of the clean hive and you are then ready to begin transferring. Take a frame out of the diseased hive and shake onto the newspaper, brushing off the clinging bees, and then place in the receptacle. Repeat this process until all the bees have been transferred to the new hive. Gather and burn the newspaper and take the diseased hive and combs away to some place where the bees can not get to them. To be absolutely sure of this treatment, it is advisable to shake again after the combs have been drawn out.

Smoke Method: Place the hive, which has starter foundation, in front of the new hive with the entrances facing and as close together as possible so their bottom boards will form a runway for the bees. Shove the cover of the diseased hive forward slightly and blow smoke into this opening. Pound on the sides of the hive with a hammer or stick while you are smoking and the bees will pass from one hive into the other. Continue this process until you are sure the queen has been driven across with the bees to the other hive. Remove the diseased hives to a place where the bees can not get at them and place the clean hive on the stand of the old one.

Tube Method: Set the diseased hive off to one side of its former position and place a clean hive in its place. See that all holes in the diseased hive are plugged up, with the exception of the one in which tube is placed. The tube may be made of tin and should lead from diseased hive to a position in front of the entrance of the new hive and should have a bee escape placed in the end of it. Just prior to this, the queen should be found and caged until there are enough bees in the new hive to take care of her. The bees will come out through the bee escape and as they can't get back, will go into the new hive. The diseased hive may be left until the brood hatches, but it should then be taken away.

In each of the above methods, the diseased combs, as they contain germs, should be rendered so the wax may be saved. The frames and hives should be thoroughly burned with a blow torch, being sure of striking every crack and corner before using again.

Characteristics of Both Diseases Contrasted

So that the reader may note more clearly the outstanding differences between the two brood diseases given above, they are contrasted below:

American Foul Brood	European Foul Brood
Caused by a bacterium, Bacillus larvae; is spore forming and very resistant to chemicals.	Caused by a bacterium, Bacillus pluton; is non-spore forming and thus not so resistant.
Spread thru diseased honey and careless beekeepers.	Thought to be spread by nurse bees and house cleaning bees.
Attacks larvae two days before	Attacks four or five day-old

American Foul Brood Contd.	European Foul Brood Contd.
pupation.	larvae.
Dead larvae usually capped over.	Dead larvae usually uncapped.
Capping starts to sink and perforations appear in cap. Larvae turn yellow, brown, and finally black.	Larvae turn yellow, then brown
Bee cannot handle this disease without assistance.	If colony is strong it can usually handle this disease alone.
All species of bees attacked.	Italians are more resistant than the black bee.
Larvae are ropy and easily drawn out into a string.	Larvae do not rope unless Bacillus alvei, another bacterium, enters.
Scale is black and almost impossible to take from the cell.	Scale is very dark brown and more easily taken from the cell.
No markings on scale.	Tracheal or breathing tubes appear when the larvae dry up.
Scale lie along the bottom of the cell.	Scale in almost any position, but usually curled up in the end of the cell.
Scale of pupa has a fine thread or tongue attached to or pointing toward the roof of the cell.	Larva attacked before approaching pupa stage, thus there is no such thread pointing toward the roof of the cell.
Spreads slowly.	Spreads rapidly.
Adults not affected.	Adults not affected.
Very foul odor.	No odor to speak of.

WINTERING OF BEES

The important considerations in wintering are plenty of young bees, a good, fairly young queen, plenty of stores of good quality and proper protection from cold and dampness.

One should have about six pounds of bees (30,000) to go into winter quarters. If there are less, the number of bees which act as insulators for the rest of the cluster may become insufficient to con-

serve the heat of the cluster. It is desirable to have the greater majority of these bees young ones. A bee may be compared to a dry battery: When it emerges, it has a definite amount of vital energy and as it has not the power of producing more, when this is expended the bee dies. Whenever the temperature of the hive falls below 57 degrees Fahrenheit, the bees cluster and those on the inner portion of the cluster expend this vital energy in an effort to raise the temperature by muscular activity. Thus it may readily be seen how important it is to have young bees, for older ones, not having so much energy to expend, would die before spring. The more bees you have to act as insulators the greater is the amount of heat conserved and consequently, the less work the bees on the inside of the cluster have to do, the greater is the amount of energy saved to work with in the spring.

A good, young queen, as a rule, will produce more young bees for winter than an old one. A colony which has a young queen will generally recover more rapidly in the spring.

If, as cold weather approaches, the bees do not have stores enough they must be fed. Every colony should have from thirty-five to fifty pounds of honey, depending on the length of the winter and the methods of wintering. Feeding should be done at the end of the fall brood rearing and should be in the form of a heavy sirup, two and one half parts of sugar to one part of water, to which a level teaspoonful of tartaric acid to twenty pounds of sugar is added to prevent granulation. There are a number of very good feeders on the market, but the cheapest method is to take a friction top pail. Punch a few small holes in the cover, fill it with sirup and place bottom side up over the brood nest—an empty super should be placed over the pail and the cover upon this super. It is advisable to pack gunny sacks about the pail to prevent the escape of heat from the cluster. Some beekeepers place a super of honey beneath the brood nest and leave it there all winter, which is considered a very good plan. The bees will carry this honey up and place it about the brood nest where it is very desirable to have it. When wintering in two hive bodies, it is considered a better plan to place this super above the brood chamber after the bees have filled the brood nest. Otherwise there is danger of dead bees filling the spaces between the frames and causing the suffocation of the remaining bees.

If, for any reason, sufficient stores are not left with the bees in the fall and it becomes necessary to feed during the winter, the beekeeper should feed either a fondant or honey and sugar candy.

Fondant

12 lbs. granulated sugar	1¼ qts. water
1½ lbs. liquid glucose	¼ teaspoonful cream of tartar

In making the above, use only good sugar. The water should be heated and the sugar added only as fast as it will dissolve, so that it will not scorch. The glucose may be added before or after the sugar. When the sirup begins to boil, add the cream of tartar. As soon as it is boiling briskly, remove and stir until thick enough to pour into molds. To make the molds, take a standard Hoffman frame (wired) and nail a thin board on one side. This board may be removed when the candy is cold and you then have a frame of candy which may be slipped down next to the cluster on a warm afternoon. The above recipe will fill two frames.

Honey and sugar candy: Make a stiff dough with a first quality extracted honey and powdered sugar (the kind which contains no starch). Heat the honey to 140 degrees Fahrenheit, add sugar until the mixture becomes too stiff to stir, then place on board, sprinkled with sugar, and knead in enough more sugar to make it of the right consistency—which should be neither too stiff nor too soft and moist.

Another important consideration is proper protection from cold and dampness. There is a variance of opinion among beekeepers regarding this point of protection by packing, but the writer believes packing of some sort pays. Bees that do not have the additional protection of packing expend more energy and consume more stores in order to keep warm than do packed bees. It is the personal opinion of the writer that the amount of stores consumed and the loss of vitality of the bees, which means weaker colonies in the spring and thus colonies which are not so strong as possible at the time of the honey flow, would about pay for the time and materials required for packing.

Suggestions for methods of packing best suited to your locality will be furnished upon application to the Extension Service, State College of Washington, Pullman.