

Documented Research Done on

Leafcutter Bees in Maine



PROJECT # FNE94-53

By John Russell, Jr., R.F.D. Box 186-A, Little Deer Isle, ME 04650

FNE94-53

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The Northeast Region Sustainable Agriculture  
Research and Education Program (LISA)  
Hills Building, University of Vermont  
Burlington, Vermont 05405-0082

Dear Fred Magdoff:

Enclosed herewith is my report on my findings of the leafcutter  
bee project # FNE94-53.

My project was to determine whather this bee would be feasible,  
on a commercial basis, here in Maine. It was also to determine  
whether the leafcutter bee would pollinate blueberries, straw-  
berries, and cranberries in the state of Maine.

I have submitted my findings, together with my paid bills, see  
"Breakdown of Costs Related to REsearch on The Leafcutter Bee",  
and my paid separate bill for rental of a truck for \$60.00,  
according to the terms of the grant.

Respectfully submitted:

*John Russell, Jr.*

John Russell, Jr.'s Results on The Leafcutter Bees  
Project Number FNE94-55

This is my second year with hands-on experience with the leafcutter bee. My research on the leafcutter bee has been to develop this bee for the purpose of pollinating blueberries, strawberries, and cranberries on a commercial basis; and to determine whether this sort of operation would be feasible here in Maine.

Shelters:

Our first project was to design a leafcutter bee shelter with moveable nesting boxes. This shelter would serve as a mounting panel for the bees nests. It would also be used as a shelter against wind, rain, and sun rays. This shelter would need to be built inexpensively. It would need to be portable enough for one man to erect and dismantle by himself.

Our first two shelters were constructed of a 2"x4" framework. Corrugated plastic sheeting was placed over this framework. We found it to be too fragile, for it was too brittle and would break. Plastic sheeting, that comes in a four foot width and fifty feet long, called Filon was used as a covering for these shelters instead. Filon is a product, manufactured by B. P. Chemicals, Inc., Advanced Material Division Commercial Composites, Filon Products, 8500 C. W. Post Road, Jonesboro, AR 72401. These shelters were then provided with a guy wire and stake at its four corners; so as to prevent the shelter from being blown over or knocked down by an animal. Chicken wire was placed across the shelter's open face to keep birds from entering the shelter and eating leafcutter bees in and around the nests. To prevent direct sun's rays from entering bee nesting holes and possibly killing eggs or larvae, temporary canopies were placed across the openings. These nesting shelters were once more placed in a south easterly direction in the blueberry fields. The shelter, however small, worked well as long as the bees were alive. The Filon

plastic covering was the most satisfactory covering. it weathered well. It shows no sign of cracking or breaks, six months later.

#### Bee Nests:

Bee nesting boxes were made of 1/2 inch plywood on the top, bottom, two sides, and back. Large holes were drilled on the back of the box-like structure for ventilation. A wire mesh covered these holes; so as to keep out mice. A foam cushion like material, normally used under carpeting, was placed with aluminum foil covering between the nesting boards and the back of the nesting box, to seal the back of each nesting hole from parasites. A small piece of PVC plastic pipe served as an inexpensive spring to hold the nesting boards in place.

#### Incubator Design and Construction:

A home-made incubator was designed and constructed from 2'x8'x2" thick styrofoam panels. The base measured 2'x8' and was two inches thick. The four sides and top were also made of the same material. Inside this box was then constructed a wooden framework that would support electric light outlets near the bottom of the incubator for heat lamps. Near the top was placed a furnace fire-o-matic switch to shut down the system should the inside temperature go above 165 degrees Fahrenheit. A chicken incubator thermostat was also installed, as a means of controlling a temperature of 68 degrees Fahrenheit. Inside was then painted black; so that emerging leafcutter bees could be kept less active in a darkened area. Seven plastic trays of leafcutter bee cocoons, 40,000 in all, were placed near the top of this framework to be incubated.

#### Incubation:

Approximately 20,000 leafcutter bee larvae were removed from winter storage in my refrigerator. About another 20,000 leafcutter bee larvae were donated to me from Connie Stubbs, Entomology Department, University of Maine, Orono, Maine. These leafcutter bee larvae were combined and placed into seven plastic trays. On April 25th our incubator was started with

the use of three 75 watt incandescent light bulbs as a source of heat. The thermostat was set for 86 degrees Fahrenheit and a relative humidity of 66 percent.

As the number of days advanced, I found that the heat source was too much. By using lower wattage light bulbs, I came up with three forty-watt bulbs as the best source for heating incubator.

Relative humidity started rising above our designed 65 percent relative humidity. By opening the cover slightly, it was possible to control the humidity.

May 3rd, just eight days into operation of incubator, a fluorescent 20-watt black light trap was placed near the bottom of incubator. A pan of water was placed under the lamp. It was hoped calcid wasps would fly out of the trays of incubating leafcutter bees, and drown in pans of water beneath the black light lamps.

May 4th, I installed sticky boards to catch and kill leaf-cutter ~~cutter~~ bee parasites in another way. The sticky substance placed on cardboard was Tanglefoot. It is a sticky substance used around the base of trees to catch and kill harmful insects, that would crawl up the outside of trees to harm the bark and leaves.

May 6th. This is the eleventh day into incubation of the leaf-cutter bee. This was the first day I noticed calcid wasps dead in the light traps and on the sticky boards.

May 12. Seventeen days have elapsed into incubation of the leafcutter bee. A fungus-like substance is now found, on the outside surface of the cocoons being incubated. I reduced relative humidity to sixty percent and continued to incubate bees.

May 13th. Now the 19th day into our incubation project. Found five emerged male leafcutter bees. Males start emerging before females. Found less calcid wasps in trays; so covers were placed on plastic containers of leafcutter bees. Calcid wasp trap light was turned off and sticky boards were removed, for leafcutter bees were now emerging and needed to be confined to trays for further incubation and temporary storage.

May 21st placed incubation of the leafcutter bee on its twenty-sixth day. Seven trays of partially emerged leafcutter bees were transported to the two shelters in the blueberry field and allowed to enter the leafcutter nesting boards placed on the shelters in the field.

#### Field Management:

The winter of 1993-1994 was one of the coldest in recent years. May was no exception, for it was rainy and cold. I did not feel the cold, damp, and foggy weather this year was right for leaving these bees and emerging cocoons in the cold; so I brought in, what I could salvage, during the cold nights and continued to incubate them.

For the next seven days it was windy, rainy, and too cool for the leafcutter bees to fly. They were not even able to go into the fields to collect pollen and nectar to feed upon.

May 28th was a cool and windy day. The temperature plunged to 22 degrees Fahrenheit that night, thus killing what remained of my leafcutter bees in the field.

#### Estimated Cost per acre of Pollination:

The following prices have been compiled from data related to me, during my recent research on the leafcutter bee. It has been more or less established that 60,000 leafcutter bees are necessary to pollinate one acre of blueberries, strawberries, or cranberries. I will now list what equipment is necessary to fulfill this requirement.

A total of 2,100 nesting boards would be required at 26.22¢ each. 550.62

A total of forty-eight leafcutter bee nests would be required at #18.84 each. 791.28

Seven shelters would cost each \$115.46. 808.22

Incubator cost, in my case, was \$107.87. Five sheets of 2'x8'x2" styrofoam was donated by me at the cost of \$46.54. 156.41

60,000 leafcutter bee larvae, at 1/2 cent each per year, would be \$300.00. For a ten year period. 3,000.00

The total cost, on a basis of a ten year depreciation period, would be: \$5,306.53

I have found the equipment necessary to pollinate one acre of blueberries, strawberries, or cranberries would be \$530.65 per year. I might add that this cost does not include the cost of a refrigerator to store these leafcutter bee larvae during the winter.

Bills incurred during this leafcutter bee project:

Enclosed you will find "Breakdown of Costs Related to Research on The Leafcutter Bee". I have also submitted bills paid by me for this project. Please note, my costs of operation did not match that of a one acre pollinating operation, for my research was done on a smaller scale.

Summary of The Leafcutter Bee:

I have come to the conclusion that the weather is an iffy situation for this bee, during pollinating time for the blueberry blossoms. If one were to initiate this sort of bee for this climate, he would be required to provide a heating source for the bee shelter, to keep the leafcutter bee warm enough during inclement weather. The leafcutter bee is a solitary bee by

habit, and does not cluster together to keep warm during cold weather as a honey bee does. There would have to be some sort of feeding station, as well, within the shelter; so as to feed these alive leafcutter bees. I am sure that the leafcutter bees would do well on strawberries and cranberries during the warmer weather.

I have also demonstrated that, in my findings, the leafcutter bee exceeds the cost of pollinating by the honey bee at this time. One can rent a hive of honey bees for from \$35.00 to \$40.00 a season. Usually two hives of honey bees are adequate for pollination of one acre. The cost of pollinating by the leafcutter bee far exceeds that of the honey bee. For they would cost, from what I have learned, \$530.65 per acre each year, if one were to purchase his leafcutter bee larvae each year.

To all this I have one more outstanding bill that I have paid. Since it was not part of the equipment used for research done, I will now present this bill. Ninety dollars was allowed for the use of a truck to transport equipment to and from the blueberry field. Since my research did not continue beyond blueberry pollination, you will find a paid bill for \$60.00 to cover that cost also.

Thank you for the opportunity to allow me to do this research on the leafcutter bee. It has been a rewarding experience.

Date submitted 1/10/95

Respectfully submitted:

*John Russell, Jr.*