Sustainable Agriculture Research and Education Program
Producer Grant Final Report

FNE96-138
Sustainable Pollination of Wild Blueberry and Cranberry

1. Restate the goals of your project.

Project Goals were to make pollination of wild blueberry and cranberry more sustainable and less costly through building-up populations of native bumble bees and leafcutting bees. These goals were to be accomplished by providing additional nesting sites (wooden nesting boxes, wooden nesting blocks, and bales of straw) for them.

2. Update the information on your farm since you received a producer grant. include acres farmed, crops, livestock.

The blueberry farm operation is full time and is approximately 50 acres of wild blueberries split in 6 small lots. The cranberry operation is part-time with approximately 3 acres in cultivation.

3. Who were your cooperators and what were their roles in the project?

Dr. Connie Stubbs, pollination ecologist at the University of Maine, provided technical support and advice in all phases of the project, including providing bee house designs, recommendations for conservation bee house placement, demonstrating bee sampling, identifying bees, supervising student assistants, summarizing and interpreting the data collected, and helping to circulate information.

Mr. Del Emerson, Farm Manager at the University of Maine Blueberry Hill Experiment Station Research Farm, assisted in the construction of leafcutting bee houses and in circulating information on the project.

Mr. Jerry Herger, Mt. Desert Island High School wood-working instructor, provided technical advice on bumble bee house construction and supervised his students in the building of the bumble bee houses.

4. Tell us what you actually did in your project and how it was done.

Four farm study sites were used: two blueberry and two cranberry. In 1996, the conservation bee houses and bales of straw were set out in the early spring. One hundred one conservation bee nests blocks were set out, either nailed to 3.3 ft. stakes or to tree trunks at 5 ft. above the ground for native leafcutting bees (40 blocks in blueberry and 61 in cranberry). Also, 32 bumble

bee houses, 16 per crop were set out at ground level or buried below ground. At one blueberry site and one cranberry site, 18 bales of straw (per site) were set out in three mounds for bumble bees to either nest in or to use for hibernation.

To get base-line measures of native bumble bee and leafcutting bee abundance during bloom, their presence was measured in the fields by taking one minute counts of bees in one meter^2 (1.2 sq. yds) plots in the blueberry fields and cranberry bogs.

Throughout the summer and into the fall, the nesting blocks for leafcutting bees and houses for bumble bees were examined to assess nesting success. In the fall, the bumble bee houses were opened and examined for evidence of bumble bee nesting. Also, the bales of hay were periodically checked for evidence of bumble bee activity.

Leafcutting bee blocks were left in the fields over winter; bumble bee houses were brought in for storage and then set out again, along with flowering hyacinths and crocus in the spring of 1997. We will be continuing to monitor bee abundance and nesting success in 1997 (received SARE Farmer Grant funding for 1997 to continue this conservation work.)

5. What are your findings and accomplishments? Did you have any unexpected results? If so, what were they?

Base-line bee abundance measures per one meter^2 (1.2 sq. yd.) ranged from 0 leafcutting bees to 0.79 bumble bees per square meter. The averages are shown in Table 1.

Table 1. Average number of bees observed per square meter (1.2 sq. yds) $n = 45$

Site	Leafcutting Bees	Bumble Bees
S. Kelley Bog (blueberry)	0	0.44
S. Kelley Cromwell (blueberry)	0	0.04
Hammond (cranberry)	0.03	0.79
Hammond (cranberry/blueberry)	0.02	0.02

Four species of bumble bees and two genera of leafcutting bees were found: *Megachile* and *Osmia*. Even though base-line measures of leafcutting bee abundance were 0 per sq. meter in two fields, all fields had some leafcutting bees present because nest occupation by leafcutting bees was observed for both blueberry and cranberry fields. In fact, cranberry had higher nesting success for both the percentage of blocks occupied* (mean 31.9% for cranberry versus 14.45% for blueberry) and for the percentage of nests completed* 5.3 % for cranberry versus 2.35% for blueberry), which makes sense given more bees were observed in the cranberry one m^2 plots during bloom. It is expected that leafcutting bee abundance will increase over time as

* wig by leafcutter bee

the benefits of the nest blocks take effect. Table 2 shows the percentages for leafcutting bee nesting success.

Table 2. Percentage of nesting blocks occupied and nests completed by leafcutting bees.

Site	% Blocks occupied	% Nests completed
S. Kelley Bog (blueberry)	20.0	3.3
S. Kelley Cromwell (blueberry)	8.9	1.4
Hammond (cranberry)	37.8	5.2
Hammond (cranberry/blueberry)	36.0	5.4

No bumble bee houses showed any evidence of occupation by bumble bees, but 3 contained nests made by ants. Also, no bumble bees established nesting in the bales of straw. However, it is possible that the bales of straw were used as hibernacula (overwintering sites for the Queens). This possibility will be checked on further this season.

We had hoped that bumble bees would establish nesting the first year, but they are supposedly attracted to abandoned mice nests. No mice nests were made in the houses in 1996. However, already this spring four houses have had mice nests built in them, which encourages us to anticipate bumble bees establishing residence in them early next spring (1998).

6. Is there any specific site information relevant to your project or the results.

One of the blueberry fields (S. Kelley Bog) has a fair amount of leather leaf, that may provide forage (nectar and pollen) for the bumble bees before blueberry bloom.

7. What were your economic findings (if relevant to your project).

It appears that the use of the wooden nesting blocks for the wild leafcutting bees is an inexpensive way to build-up leafcutting bee populations and thereby reduce the cost of pollination. Continuing this project will definitively answer this, as well as, whether the use of wooden houses for bumble bees is a worthwhile endeavor.

8. Have the results from your project generated new ideas about what is needed to solve the problem you are working on? What would the next step be?

Yes. We are this season checking to see if setting out flowering plants near the bumble bee houses will encourage the bumble bees to use the houses. Also, since we found that several of the underground bumble bee houses were very wet inside, we have decided to put all the bumble bee houses above ground.

9. Will you continue to use the practice you investigated? Why or why not?

Yes, at the very least, given the good nesting success, the use of wooden blocks for conservation of leafcutting bees will be continued. This coming year will let us know whether the use of wooden houses as nest sites for bumble bees is worth continuing.

10. What do you tell other producers about your project and the results?

Basically we have told others about being awarded a SARE Farmer grant, explained what SARE farmer grants are, and shared with them the same information that we have provided in this report.

11. Explain what you did in your outreach program. Please send a copy of any articles written about your project.

Outreach included telling approximately 150 growers/farmers about the project at the annual Farm Field Day, Jonesboro, ME, July 17, 1996 and at a monthly Downeast RC&D Council Meeting, Cherryfield, ME, Jan. 23, 1997. Also, included with this report is a copy of an article that appeared on the project, focusing especially on the participation by the Mt. Desert Island High School students who made the bumble bee houses, in *The Bar Harbor Times*, May 2, 1996.

12. Enclosed are two slides. Slide #1 shows University of Maine student, Axel Larson putting nesting straws into the leafcutting bee conservation blocks. Slide #2 shows a truck load of bumble bee conservation houses ready to be set out in blueberry and cranberry.