Controlling Varroa Mites with Walnut Leaf Smoke

FNE03-485

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2. Restate the goals of your project.

This project aims to investigate walnut leaf smoke as a possible alternative to chemical treatment of varroa mites, a serious pest of honey bees worldwide.

3. Update the information on your farm.

O'Meara Family Farm has recently relocated to northern Maine. We moved to a larger farm with more cleared land and woodlot, which will allow us to expand several aspects of our operation. Our apiary will be getting bigger as it was in Massachusetts. In general we will need to put more energy into marketing because of our new location far from large markets. However, bees will stay at the center of our enterprise because of the increasing demand for honey and related products. We remain a highly diversified farm specializing in honey, eggs, vegetables, and heritage breeds of poultry, sheep, and cattle.

4. Describe your cooperators and their roles in the project.

For this project, I cooperated directly with several farmers who showed interest in the use of honeybees as pollinators. These farmers are also potentially interested in keeping bees for honey production. Dave Briand owns a small orchard in New Salem, Massachusetts. John Mickola operates a diversified farm, including blueberries, in Ashby, Massachusetts. Both locations offer good bee forage. Both farmers have assisted in observing the bees and relating their observations to me at various times during the year. Bob Pease, of Pease Orchard in Templeton, Massachusetts and Sterling Whiting of Whiting Farm in Phillipston, Massachusetts, have made similar contributions and have helped in moving bees.

Many beekeepers and potential beekeepers have expressed interest in the results of this project. I have produced a brochure outlining the goals and results of my project, which has been sent to individual beekeepers and various associations and clubs. In addition, I have made contact with beekeepers in and around my new farm. I have started working cooperatively with these local beekeepers on several issues related to beekeeping, including pest control. On April 3,2004, I presented the details of my project to the Massachusetts State Beekeepers Association. I am currently writing an article on this project for *American Bee Journal*. I am scheduled to present the details of this project to a local chapter of Future Farmers of America on November 3rd, 2004..

Craig Hollingsworth, an entomologist at the University of Massachusetts at Amherst, has worked as the technical advisor for this project, helping with initial fine-tuning of procedures, data collection, and analysis. Craig was very helpful in analyzing the final results of the experiment and in preparing the data for presentation to various organizations.

5. Tell us what you actually did on your project and what remains to be done.

This project involved fifteen hives started from packages in April of 2003. Russian hybrid stock was used. The hives were divided into five groups—each group consisting of one hive treated with apistan(a common chemical treatment), one untreated hive, and one hive treated with walnut leaf smoke.

Walnut leaf smoke was blown into five hives for one minute every three days for thirty days in the spring and in the fall. The hives treated with Apistan were treated for approximately fifty days in the spring and for fifty days in the fall, as indicated on the product directions.

Mites were collected from all hives on sticky traps placed underneath screened bottom boards and counted every week from the end of April through the beginning of November. Results were recorded for later analysis.

Sticky traps were again put beneath the hives in March of 2004 and mite counts were recorded. Hives were also evaluated for overall strength, ability to survive the winter, and for honey production.

6. Describe your results and accomplishments to date.

Collecting and counting mites from fifteen hives every week for such a long period of time was a major accomplishment. Being able to follow mite populations in these hives in such detail for such a length of time will be a valuable tool in considering mite control for the future.

Mite populations started out extremely low, but the data shows that they started to increase in general in late fall. In three of the five groups mite counts on the sticky traps were particularly high in the walnut leaf smoke treated hives during the thirty days of treatment in fall, indicating that the smoke knocks the mites off the bees. In the other two groups mite counts were at similar levels in the walnut leaf treated hives, the apistan treated hives, and in the control hives.

In March of 2004 mite counts were taken using sticky traps one more time. The traps remained on the hives for one week and mites were counted. One control hive and one walnut leaf hive, both in the same group, had relatively high numbers of mites (39 mites over a seven day period). One apistan treated hive and one walnut leaf treated hive, each in separate groups, showed low levels of mites( six mites each over a period of seven days). All the other surviving hives( one control, two apistan treated, and two walnut leaf treated) showed no mites in the spring of 2004.

Overall, the walnut leaf treated hives survived better than the other hives. Only one of the walnut leaf treated hives perished—in February of 2004. Of course other factors did come into play in regards to survivability, as one control hive was destroyed by a bear and a few hives had obviously inferior queens.

Interestingly, the hives treated with walnut leaf smoke produced twice as much honey as the untreated hives and three times as much honey as those treated with apistan. In general, honey production was low because of nearly incessant rain. On average, the walnut leaf treated hives produced twenty-one pounds of honey, the untreated hives produced ten, and the apistan treated hives produced seven.

Hive strength was also assessed—frames of bees were counted. Although there was some significant difference between hives, there was no clear trend that showed that one treatment or another led to more frames of bees. The strongest hive(ten frames of bees in early spring of 2004) had been treated with apistan. This hive had excelled from the start of the experiment and continues to do so as of this writing ( I have made several splits from this hive and hope to continue to breed from this queen.) One walnut leaf treated hive was fairly weak in the spring of 2004(5 frames) but grew quickly throughout the summer of 2004 and is still doing well. The other surviving hives consisted of from six to nine frames of bees in the early spring of 2004.

In general, the data collected in this experiment indicates that more research is needed into the effectiveness of walnut leaf smoke as a treatment for varroa mites. Importantly, walnut leaf smoke was certainly as effective as apistan within the somewhat limited number of hives included in this project. For me personally, this means that I will no longer being using chemical treatment for varroa mites.

7. Describe any site conditions or conditions specific to your farm and this growing season that might be affecting your results.

One untreated hive absconded in the end of June. One apistan treated hive and one untreated hive did not get off to a good start or did not have good queens and dwindled and died before the onset of winter. One control hive, otherwise healthy, was destroyed by a bear in the end of November. Bears also disturbed three other hives but the hives survived. Some of the hives in this project went into winter somewhat light of stores because of the rainy spring, summer, and fall. These conditions made it difficult to assess the effectiveness of walnut leaf smoke as a control of varroa mites.

There was some unusually cold weather in January of 2004 but the bees did have some breaks in the weather for cleaning flights. Overall, the bees wintered well. All of the hives that were alive in the fall survived through the winter—except one, which perished in February.

8. Describe your economic findings, if any.

Honey prices and demand remain high, ($5/pound at some farmer's markets) making beekeeping a potentially profitable enterprise in the northeast. Also, many beekeepers claim that chemical treatments of varroa mites, which are not inexpensive, are ineffective.

Mite counts, survivability, and production of hives in this project indicate that the walnut leaf smoke works as well as or better than chemical treatments. The availability and low cost of walnut leaves means that beekeepers should consider their use as a mite control.

The results of this project show that there is an opportunity for beekeepers to save some money on treatment of varroa mites and thus make their apiaries more economically viable.

| Treatment | Cost/hive annually | Hours/hive annually |
|---|---|---|
| **Fluvalinate (apistan)** | $12 | 0.5 |
| **Walnut leaves** | $0 | 1 |

Using walnut leaves as a treatment for varroa mites took approximately twice as long per hive per year. The cost, however, was nothing for walnut leaves, whereas apistan cost approximately $12 per hive.

The fifteen hives involved in this project produced the following amounts of money from honey. The cost of varroa treatment compared to dollars generated by honey was lowest in the hives treated with walnut leaf smoke.

| Treatment | Honey produced/hive | Income from honey | Cost of varroa treatment |
|---|---|---|---|
| **Fluvalinate** | 7 lbs. | $35 | $12 |
| **Walnut leaves** | 21 | $105 | $0 |
| **No treatment** | 10 | $50 | $0 |

In North America the average production of honey per hive is generally considered to be 50 lbs. per year. Given a retail honey price of $5.00 per pound(which is the current price in central Massachusetts, where the project was conducted), each hive would generate $250 in revenue.

Overall costs of production per hive vary widely from apiary to apiary. This study, however, does show that switching from fluvalinate to walnut leaf smoke as a control for varroa mites would eliminate approximately $12 per hive-- 5% of the average revenue generated by each hive annually.

If hives treated with walnut leaf smoke consistently produce more honey than those treated with chemicals, the economic impact of using walnut leaf smoke would be even greater.

In addition, survivability also impacts any economic analysis of using walnut leaf smoke as a control of varroa mites. With package bees often costing over $50, every hive that makes it through the winter means that an apiary is one step closer to economic viability. As with honey production, more research is need to determine the relationships between survivability and the use of walnut leaf smoke as a control of varroa mites.

9. Say whether the results from your project generated new ideas.

This project has been inspiring in many ways. This project has made me think that by combining various approaches to mite control, including screened bottom boards, varroa resistant queens, and other methods, beekeeping can be quite successful in the northeast.

Several intriguing questions have come up because of the results of this project. Would walnut-leaf smoke treated hives consistently produce more honey than hives treated with common chemical treatments? Is there a consistent trend for walnut-leaf treated hives to survive better than those treated with chemicals?

Survivability and production seemed to indicate that the walnut leaf smoke was knocking enough mites off of the bees without doing significant harm to the bees themselves—maybe walnut leaf smoke could be used with other controls to establish a sort of balance in the hive—relatively low levels of mites and relatively vibrant, healthy bees.

On the other hand, more work certainly needs to be done. This project has led me to believe that I would like to conduct a similar project on a larger number of hives so that the results might be more conclusive. At the very least, I plan on continuing to keep records of hives and mites while treating with walnut leaf smoke throughout my apiary.

John O'Meara