

FNE10-681 Final Report  
Honey Bee Hive Equipment Sterilization  
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Goal: My goal with this project was to prove if honeybees will be more productive when packages are installed in equipment that was sterilized by Gamma Irradiation compared to a control group installed on equipment from dead outs last winter.

Farm Profile: We have a small farm of about 100 acres located in a high valley with limestone soil near the center of Pa. We raise hay and pasture along with produce but our honeybees are the main interest. We also have planted 2000 locust trees, 900 sumac trees and many acres of different kinds of clovers. Since the late 80's it has become more difficult to make a profit with the honeybees with 2008 and 2009 resulting in \$12,000 losses each year. However, that all changed this year.

Participants: Maryann Frazier from PSU was my technical advisor starting with advice from the beginning. My other cooperators would install free package bees into their equipment just as if they had bought bees for their dead out hives. They didn't do any work other than what they normally would to produce a honey crop. We all did the same basic beekeeping work with sterilized equipment being the only difference. The apiaries were spread from Canton in the North to Hershey in the South and Danville on the East to beyond Clarion on the West.

Project Activities: The project was very simple to do. First I contacted 15 other beekeepers that had a problem similar to mine last year and asked if they would like to participate. 75 packages would be divided between 15 beekeepers with the actual number determined by the size of the operation. Next all my hives had to be depopulated and placed on pallets in a specific manner. Then the pallets were placed on a large truck and hauled to Salem, N. J. to be sterilized by Gamma Irradiation. My equipment was set up to receive the new packages and the other beekeepers did the same. Everyone was told to do the installation the same as they would any other time. During the winter I thought about the possibility of receiving bees that were infected with high levels of virus. (PSU told me they see a lot of this). In the early part of June I found four hives that appeared to have high infection rates (determined by empty cells on a brood comb) so I marked them and that night I burned them. There is no cure for a virus and if you leave it go it will spread through your operation. They were the only hives that developed a problem. Everything else went well as planned except for one thing. Maryann suggested that I have samples tested for virus problems by a person in Montana. I contacted him and was planning on doing it in Aug. at a cost of \$880.00. However in Dec. a beekeeper asked if I would look at his bees and help him. He had 500 hives in Aug, 156 the 4<sup>th</sup> of Dec. and 100 on the 7<sup>th</sup>. They were all dead by Dec. 31. I collected three samples and mailed them

out to Montana the way he (the tester) said to. Seven days later he cashed my \$120.00 check and to this day (Oct. 18) I have not received any information on them. I went through this with another laboratory several years ago and I can't help but feel I would be throwing my money away so I didn't send any more samples. As far as I can find out, he is the only person doing this testing for private operations. I then went to each beekeeper and went through their hives, removing a typical brood frame – not the best – not the worst – and marked off 400 cells (20 x 20) and counted how many empty cells were in the block. This is an indication of how many sick, developing bees have been removed through the 21 day incubation period. It could also indicate a queen problem but if you have eggs in every cell you do not have a queen problem unless perhaps she is infected. I also took pictures of these frames for future reference. I did the same counting and picture taking with my hives. We also had an open house at our farm on August 22 to explain my findings and the results and also to look at my hives.

Results: This was by far the most rewarding project I have done – both in having good healthy bees and making honey. My bees on the sterilized equipment had just one half the infections (empty cells) that the other beekeepers had. I really expected to see more of a difference but for some reason their bees were much better than last season, perhaps because of a good nectar flow. It does seem to make a difference. One person did what he wasn't supposed to do and power-washed his equipment with a 3000PSI washer and then washed them with a soap they use in a hospital. Not exactly a dirty dead out hive. His brother on the other hand did what I wanted and installed them on dead outs not over 800 feet away, just across the field. The first brother had the best bees of all in the project – 15 empty cells while his brother had 125, 126, and 131 empty cells. Same flowers, same weather and, same terrain.

I found this very interesting. Another eye opener came about up North. The beekeeper, his helper and I were doing the count and picture job with old black comb when his helper said “look at this”. It was a new comb with enough sealed brood to get my 20 x 20 cell count which I did. The number in the old black comb and the new were the same. So what you have in one part of a hive is all through it. Today a lot of people are saying to replace 1/3 of your frames each year to which I reply isn't that like disinfecting ¾ of the chicken house? I feel these are two very important observations. The other happy part of this project was looking at my hives that made honey. With farming there are so many variables that you can not draw a line and say this is the divide but it appears when a hive has 50 or less empty cells (out of 400) it will be productive. As that number increased to 75 it seems to produce less and when you see 125 empty cells in a hive it probably will not make any surplus honey. At least this is what I am finding.

Beekeepers that served as the control group

William Krasinski – Morrisdale, Pa. 16858  
Mike Cantolina – Hawk Run, Pa. 16840  
Rick Schimmel – Wallacetown, Pa. 16876  
John Novinger – Lykene, Pa. 17048  
Trevor Stauffer – Bellefonte, Pa. 16823  
Glenn Crimbring – Canton, Pa. 17724  
David Peterson – Clearfield, Pa. 15856  
Jeff Kriner – Dubois, Pa. 15801  
Lloyd Knouse – Richfield, Pa. 17086  
Warren Miller – Mingoville, Pa. 16856  
Milton Hershey School – Hershey, Pa. 17004  
Melvin Peachy – Bellville, Pa. 17004  
Vernon Harbach – Jersey Shore, Pa. 17740  
Marty McCormick – Jersey Shore, Pa. 17740  
Clinton County Extension Office – 4-H – Lock Haven, Pa. 17745

Total 75 – 3 lb. packages installed

Treatment group – Craig Cella, Loganton, Pa. 17747

Total 75 – 3 lb. packages installed

Table 1: Empty cell comparisons between control and treatment (Gamma Irradiation)

Beekeeper	Number of packages April 1	Number of hives alive in Aug.	Total number of empty cells out of 400 per hive – Aug.	Average number of empty cells per hive	Percentage of empty cells per hive
1	10	4 (bear damage)	290	72	18%
2	9	8	537	67	17%
3	4	3	343	114	29%
4	4	3	371	124	31%
5	8	7	539	77	19%
6	4	2	168	84	21%
7	8	5 (bear damage)	539	108	27%
8	2	2	223	111	28%
9	2	2	266	133	33%
10	2	2	164	82	21%
11	7	4	100	50	13%
12	2	Beekeeper	Was out of	State for	Summer
13	9	8	814	102	26%
14	2	2	110	55	14%
15	2	1	100	100	25%
Total	75	53	4,6564	1,279	21.5% average
		Treatment	Group		
Treatment Group – Gamma Irradiation equipment	75	68	2,995	44	11%

Conditions: It takes three things to make honey – good weather, good flowers and good bees. I had all three this year. My bees are spread out over 185 miles along Rt. 80 with over eight locations and they did well with over an 80 pound average while the other beekeepers were in the thirty to forty pound range.

Economics: It is simple – no honey = no money. This is the best year by far that I have had since the early eighties. I was going to quit last year but now I see hope out there and plan to keep producing honey.

For several years it would take one day to extract my honey and one day to clean up. However, this year it took 5 days to extract my honey. In 2008 and 2009 I lost \$12,000 each year but this year is different, I will be using the black ink instead of the red. I am looking forward to next year and perhaps even improving more.

Assessment: This project proved the difference between clean (sterilized) and dirty (contaminated) equipment and how spending a little money can make a larger difference in the profit margin. I also learned that even if you replace a few combs the infection will quickly spread to those new frames. You can compare that practice to cleaning out 1/3 of the chicken house because the other 2/3 didn't look too bad. Another important observation took place between two brother's bees separated by six hundred feet. One sterilized his equipment and the other didn't. The sterilized equipment looked wonderful and the other brother's was terrible with infection. Even a few hundred feet can help control the spread of disease. This can be very important when setting up new hives.

Adoption: I will not use gamma irradiation in the future because of the high cost – minimum order is \$900.00 plus eight hundred miles of driving even though it proved effective. Instead I will use new equipment each spring in the brood box. This is where the problem is stored in honey and pollen. I will install a 3 lb. package and queen on ten new frames and foundation each spring for a cost of \$30.00 and sell them each fall for \$60.00. That will pay for the equipment and leave some towards the new package next year. I did not treat with any chemicals this year and will not in the future. My honey is free of chemicals and the beeswax I produce does not have any residues left in it. Every piece of foundation wax that PSU tested had residues of mite treatment chemicals in them but mine doesn't. I would much sooner spend a little money and make a lot of honey than not spend any and make a very small amount of honey.

Outreach: On August 22 we had an open house at our apiary with 200 people attending to explain the project and the results. Some beekeepers were quite new and others had fifty and sixty years experience. We also had some from the research side of beekeeping. We had hot sliced pork on homemade rolls, corn on the cob, dessert and drinks for everyone. Then we went out to the bee yard and they were able to see the results. No control hives were present for fear of contamination from them into the sterile hives.

I spoke at three beekeeping meetings so far about this project and I am on the Pa. State Beekeepers annual program for Nov. I am also scheduled to speak at the Western Beekeepers annual meeting in Feb. near Pittsburg, Pa. I am still doing field work outside but after I am done I will write an article for the American Bee Journal.

Summary: Does sterilized hive equipment make a difference in the health of a colony compared to non sterilized – Yes. You can do it with Gamma Irradiation or use new equipment in the brood box. My honey production was increased from a 10 lb. average last year to an 80 pound average this year.

This has been my most important lesson in beekeeping over the last 53 years by far. The beekeepers that were present at the two meetings I spoke at recently averaged 30 lbs. and I was at 80 lbs. It is very simple – Sick bees don't make honey.

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