

# The Status and Future of Washington Apiculture (Beekeeping)

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## Introduction:

The apiculture industry in Washington is experiencing many and diverse difficulties in the management of honey bee colonies. Honey bees are required to pollinate tree fruit, tree nuts, berries and seed crops. If bees become unavailable for pollination the quality and abundance of these will be reduced. Beekeepers are facing the challenges of Varroa and Tracheal mites, two species of Nosema disease, genetic deficiencies, and the unknown cause of the recently reported Colony Collapse Disorder (CCD). These issues are causing 15 to 75 percent losses for beekeepers, some in the fall and some year round. These losses are putting beekeepers out of business and decreasing the number of colonies available to pollinate agriculture in Washington. In addition, the high cost of fuel makes the intra- and interstate transport of hives used for pollinating almonds in California, fruits and berries in the Northwest, and transport to the Dakotas for a honey crop prohibitively costly. The availability of capable and English-speaking employees is of increasing concern.

However, there are bright spots in the future. The Washington State Beekeepers Association is establishing a Colony Health Research Project at Washington State University to determine the baseline colony health of our bee colonies. The project is looking at the nutrition, diseases and maladies of bees to determine why colony losses are so prevalent and how we might remedy these issues.

## Honey bee pollinated agriculture:

All tree fruit in Washington consisted of 217,750 acres in 2007 located in four western and eight eastern counties of the state. The utilized value of tree fruit is \$2,128,811,000 according to USDA's National Agricultural Statistics Service (NASS). Apples, cherries and pears account for 213,550 acres, mostly in eastern Washington, and their utilized value is \$2,102,698,000. In addition, there are many individual trees and small acreages located throughout western Washington in urban and rural residential areas.

Blueberries, cranberries and raspberries consist of 14,900 acres mostly in Whatcom, Skagit, Snohomish, Pacific and Grays Harbor counties, but are also scattered through other counties in urban and rural areas. The utilized value of these berries is \$84,786,000.

NASS also provided the total value of fruit, tree nuts and berries requiring pollination consisting of 232,650 acres at a value of \$2,213,597,000.

Other crops foraged and pollinated by bees include canola, alfalfa seed, vegetable seeds, red clover, corn and mint. Honey bees enhance the quality of the seeds and fruits of these crops as well as that of wild plants, trees and legumes.

Washington State University has recommended the use of at least one colony per acre for ideal pollination of tree fruit, depending somewhat on the size of tree and amount of bloom per acre. That means we should be using about 200,000 colonies of bees for pollination in Washington (some are used twice, once for tree fruit and once for seed or berry pollination).

### **Honey Bee Hives:**

In 2007, 283 beekeepers registered a total of 74,820 hives with WSDA. It is thought that fewer than half of the hives in Washington are registered with WSDA. If so, then there are approximately 150,000 resident hives. There may be 25,000 non-resident hives here during pollination. Several thousands of hives are brokered into the state for pollination by beekeepers and others.

Relatively new hives and those kept in good repair may be saleable at \$150.00 each. The 74,820 (2-story) hives are therefore worth approximately \$11,223,000. A recent national survey revealed that beekeepers lost about 32 percent of their bees during the fall and winter of 2007-2008. Loss reports ranged from 10% to 100%.

If 200,000 colonies of bees pollinate \$2,213,597,000 worth of tree fruit, nuts and berries, one colony insures the production of \$11,068 worth of these fruits. In addition, honey bees are required for pollination of seed crops that are utilized by man and animals, for which NASS does not collect data.

Honey bees also produce about 2.5 million pounds of honey in Washington worth approximately \$2,500,000. Honey bees therefore have a total value to the state of Washington of approximately \$2.2 billion.

### **Current challenges facing beekeepers:**

- Colony management costs are approximately \$150.00 to \$170.00 per colony per year in inputs, travel, mileage and labor. Income per colony is approximately \$230 per year (for example, \$125 for California almond pollination, \$45 for Washington tree fruit pollination, and \$60 for honey). The average colony loss of 32% means a significantly reduced return on investment for the remainder of the colonies, or else a net loss for the year if replacement colonies are purchased.
- The average age of commercial beekeepers is about 55 years. Due to the pests and diseases in honey bees most beekeepers can't depend on retirement income from the sale of their business.
- With the continuing annual colony losses from known and unknown causes and the current economic reality, a beekeeper can't plan on having a viable apiculture business in the next five years.
- Beekeeper offspring generally don't want to "take over" the bee business because they are well aware of the hazards, poor family income and long hours of hard work without any guarantee that they will be successful.

- Bankers are not inclined to lend operating capital to beekeepers because of the known hazards in bee management. There is no guarantee that they can recoup their investment.
- Younger beekeepers do not have the capital to invest in a commercial beekeeping business, nor the skills necessary for the management of large numbers of colonies and the necessary business administration.
- Income per colony is not sufficient to pay the mortgage on the hives, to raise a family, and to put aside funds for their children's college education.
- Beekeepers have great difficulty finding qualified persons for employment. Bee colony management includes repetitive lifting of boxes weighing 60 to 80 lbs. Employees must observe colony performance, recognize variable bee behavior depending on queen quality, identify problems in early stages, and accurately relate their observations. Employees generally are paid \$8.00 to \$12.00 per hour while working and sometimes less when they are riding along over long distances between work sites.

Fuel costs: The owner of one large commercial operation reports that his interstate and intrastate fuel costs per thousand hives is \$16,335 (on 13,000 hives).

- Colony health: In spite of the many years of study by federal and state honey bee scientists, the definition and parameters of colony health have never been developed. It is not known what level of proteins and lipids are necessary to produce a surviving bee, whether bees are able to acquire these necessities in their normal diets as they are transported within Washington or to other states, or the relative nutritional value of the pollens of various species and cultivars of plants.
- Also, beekeepers are experiencing high numbers of queen bee losses after their introduction to a colony, three to six weeks later and sometimes over the winter. When the queen dies, worker bees often do not replace her, resulting in the colony being off the production line until the beekeeper returns to solve the problem.
- Beekeepers are experiencing increasing losses caused by poor queens. These aberrant behaviors may result in an insufficient or absent queen retinue. Without these attendants to groom and feed the queen and spread her pheromones around the hive, there is a loss of colony cohesion and reduced egg viability and larvae survival. These combined issues result in poor performing colonies and fall and winter losses. In the 1990s annual losses were about 5%, now it is common to experience 15 to 50% loss.
- Agricultural pesticide damage to honey bees still occurs. Commercial beekeepers have been transporting their bees to other states for a honey crop instead of operating them in eastern WA and receiving continuing pesticide kills. Newer pesticides are less toxic to bees but there are serious questions

### **Current research solutions:**

The Washington State Beekeepers Association (WSBA) and the WSDA Apiary Advisory Committee (AAC) have adopted a Colony Health Research Project document that describes the research needs of Washington beekeepers, as well as those of other northwest states. This Project document has been given to WSU with the insistence that it defines the research needs and that the WSU - P.F. "Roy" Thurber Endowed Chair accomplishes this research over a five year period.

The current Project activity consists of 144 hives receiving six different nutritional and management treatments and an additional 200 colonies being tested by WSU for Honey Bee Tracheal and Varroa mites and *Nosema apis* and *ceranae* diseases. All colonies are being monitored monthly to document variations in colony performance, nutrition and diseases in an effort to be able to quickly react to any significant changes in colony health and survival. Brood survival and pollen species and their nutritional characteristics are also being monitored.

Eric Olson, Vice President of WSBA, Jerry Tate, President and others are working to ensure that WSU research efforts accomplish industry defined goals. Mr. Olson has taken the lead in generating contributions from beekeepers in the northwest, beekeeper registration fees located in a WSDA account, funds from WSBA research accounts, fruit growers and others to support the research Project activity.

Eric and Sue Olson have met with the Governor's staff and requested \$40,000 from the emergency fund to help jump-start the research Project at WSU. To date their efforts have been able to acquire \$4,540 from 36 pollination customers and \$86,500 from 11 commercial beekeepers and several pollination user groups for a total of \$131,040.00.

### **Short and long term outlook for apiculture:**

1. If the number of honey bee colonies in Washington continue to decline at current rates, agriculture and native fauna will suffer from lack of pollination. Fruit and seed quality and quantity will decline. The economy of apiculture will not allow beekeepers to rebuild failing or dead colonies and make increases in numbers if these losses continue even in the short term. Beekeepers can't sustain their operations if these losses occur more than two years in a row. More beekeepers will leave the business because of the colony losses and their inability to overcome the economic impact.

Commercial beekeepers manage several thousand (1,000 to 13,000 in WA) colonies and if they go out of business their customers and the crops they grow will lack pollination. There are no colonies available for import from other states to pollinate the specialty crops. Beekeepers in other states are experiencing the same

losses. Crops in western Washington will not be pollinated because there aren't any commercial beekeepers able to meet the needs of agriculture. The logistics of pollination activities and high fuel prices make it difficult for beekeepers to move colonies long distances without substantial increases in pollination service fees.

2. Beekeepers in the 60 to 65 age bracket will sell their operations and retire in the next five years because they can't maintain their colony numbers due to economics, stock quality, and bee pests and diseases.
3. Decision-makers should consider prioritizing to build a credible, responsive and efficient honey bee research effort within the parameters of the WSBA / AAC Colony Health Research Project. The effort must be solution based and responsive to the economics and function of apiculture in the northwest. The effort should not duplicate the research psychology of the past that had a shotgun approach to resolving problems instead of first investigating baseline colony health and then doing research to resolve those issues that affect colony health and survival. Research as conducted in the past produced knowledge but the science did not resolve the problems facing beekeepers. In some cases the results can't be trusted because the scientist didn't consider queen and bee behavior and other factors that could explain their results. Beekeepers used the research and experienced only varied or no benefit. Research must be performed within the parameters of the Colony Health Research Project to achieve useful results.
4. Research must continue over the next ten to 20 years to determine if agricultural crops are capable of providing for the nutritional needs of honey bees. We do not know if the cultivars being propagated in modern tree fruit nurseries, in row crops and seed varieties are capable of satisfying the nutritional needs of honey bees or if these cultivars are a part of the so-called CCD problem.
5. Washington apiculture must calculate its costs and needs in a manner that will justify higher pollination service fees across pollinated crops to better reflect the contribution of honey bees to each of these crops in the northwest. Interaction with grower groups and the research community will be necessary to acquire a valid understanding of their interests, economies, needs and potential outcomes. Communications and outreach are key to this objective.
6. With higher pollination service fees beekeepers will be better able to adapt to the changing needs of their colonies, promote better nutrition management and colony health, and react to research results that will enhance colony survival.
7. When the business of apiculture is on a more sound economic footing, younger beekeepers will be encouraged to grow their operations to commercial numbers and the pollination of Washington agriculture will be ensured. Older beekeepers will be able to retire and leave their operations in capable hands to meet the changing needs of agriculture in the state.