



# Technology Transfer Program

BC Honey Producers' Association

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## Blueberries and Pollination Services

During the Education Days at the recent BCHPA AGM, we had a section dedicated to blueberries and pollination services. It came as no surprise to offer presentations and a panel discussion on this topic since it's well understood that both industries are interconnected. There were two main objectives during the Education Days: a) to connect with the blueberry industry, and b) to support the economic analysis of blueberry pollination services led by Dr. Miriam Bixby.



Bee hives in highbush blueberries. *Photo Nuria Morfin*

## Connecting with Agricultural Partners

The beekeeping industry is not isolated, we depend on many factors to be successful; this is very evident for beekeepers that provide pollination services. However, understanding how crop production and beekeeping works is key for a healthy and profitable collaboration between industries, including blueberry production. The BCHPA has a long history of connecting with agricultural partners, and now with the BC-TTP operating, we'll aim at working on a strategy to make these connections meaningful.

## Blueberry Production

Highbush blueberries are an important food source, and their production has rapidly expanded on a global scale due to their high demand, palatability and nutritional value (USDA, 2021). Highbush blueberry production has an estimated value of CAD \$364 million in Canada, with an export value of CAD \$533 million, and British Columbia is one of the largest producers of highbush blueberries in the world, contributing to food security (Agriculture and Agri-Food Canada, 2023). Highbush blueberry varieties depend on insect pollination to reach optimal yields; crop yield can decrease 30 to 50% without pollination and berry weight is positively correlated with pollinator abundance (Isaac and Kirk, 2010; Morandin and Law, 2021).

However, there is an estimated unfulfilled demand of 30,000 honey bee colonies for blueberry pollination in BC, which presents an opportunity for commercial beekeeping (AF, 2022). Blueberry pollination seems to cause detrimental effects on honey bee colonies used for this service. For example, beekeepers report signs of European foulbrood (EFB) and weak colonies coming out of pollination, which is reflected in economic losses, as these colonies will not manifest their full potential of honey and/or nuc production (Dufour et al., 2020; Thebeau et al., 2023).

During the AGM Education Days, we learned many things about the blueberry industry in BC and some of its challenges, with some similarities to those faced by beekeepers such as labour availability, climatic challenges, pests and diseases, rapid urban growth and high land prices. It should be noted that pollination was highlighted as one of their challenges, which is linked to fruit quality problems. Interestingly, 99% of blueberry production happens in the Lower Mainland, where there are approximately 1,271 beekeepers managing ~50% of the total colonies registered in BC.

Thus, it appears that we have a great potential for collaboration to strengthen both industries but it's not an easy task, as some of the problems faced by beekeepers are linked to environmental stressors like humid and cold springs that prevent colonies from growing early in the season when blueberry pollination is needed. Also, beekeepers face difficulties linked to logistics and crop management practices, for instance around placement of the hives within blueberry fields. In addition, to their detriment, not all blueberry growers rent bees for pollination services, indicating a need for education amongst the growers regarding the benefits of increased pollination.

## What can we do?

### 1. Economic analysis of blueberry pollination services

The BCHPA, with help from stakeholders and the BC Ministry of Agriculture and Food, is looking at strategies to connect with blueberry growers, to overcome the difficulties around pollination services. The first step is to conduct an economic assessment of blueberry pollination. This study is currently being led by Dr. Miriam Bixby with the support of the BC-TTP and with the financial aid of Project Apis m.

There have been two focus groups in 2023, one at the Western Apicultural Society (Calgary, AB) and the second at the BCHPA Education Days (Abbotsford, BC). These focus groups shed light on the main issues faced by growers and beekeepers; it allowed us to hear from stakeholders, government representatives and extensionists. Based on the responses of the focus group, a survey will be designed and sent to beekeepers across North America to investigate the economics behind pollination services.

In addition to this study, there are a number of research initiatives to support bee health in stock used for pollination services. For more information visit: <https://ttp-bchpa.ca/> and <https://www.bcblueberry.com/bc-blueberry-council>

## 2. Revising of the proposed pollination model

A revision of the blueberry and beekeeping industries was done in 2021, and a pollination contract was drafted. A signed agreement could provide legal protection to beekeepers

and growers with written expectations from both sides. To resume the efforts of designing a pollination contract, we ask beekeepers and growers to help revise the Blueberry Pollination Model. This document provides an overview of both industries and summarizes possible practical solutions based on other pollination models, like hybrid canola and almond pollination services.

Please read the Proposed Pollination Model and share your thoughts.

## BC Blueberry Pollination Model Proposal

This document offers an outline of a proposed crop pollination model for BC's blueberry industry and commercial beekeepers that provide pollination services. The model is similar to the pollination model adopted by the Hybrid-Canola Industry of Alberta.

The purpose of the proposed crop pollination model is to increase security of available honey bee colonies during spring flowering, and to create greater stability of the operating conditions and payment schedule of pollination services.

## Proposed BC Blueberry Pollination Model

### A. Parties and Conditions

- The blueberry growers and commercial beekeepers establish a Blueberry Grower Pollination Committee and Beekeeper Pollination Committee respectively. All participating growers and beekeepers commit to meet all the conditions of the negotiated contract between the Blueberry Grower Pollination group and the Beekeeper Pollinator Group.
- The two industry groups should meet in late fall or early spring to establish the parameters of the contract including:
  - The fee paid for a standard blueberry pollination unit, and the premium paid for the average of all colonies of a beekeeper that exceed the standard unit,
  - The total number of pollination units under contract (per grower),
  - Conditions of supplying additional colonies when the average of delivered colonies fail to meet the pollination unit standard,
  - Approximate dates of delivery and colony removal (per grower),
  - Conditions related to pesticide applications during the pollination service,
  - Colony placement, access and management,
  - Payment schedule and conditions.

### B. Pollination Unit Standards

- Blueberry is the earliest major flowering crop of the season. The long-established standard of a blueberry pollination unit meets the "8-4-1" formula:
  - 8 (eight) frames covered with bees on both sides, of which,
  - 4 (four) frames contain all stages of brood development (i.e. eggs, larvae and capped brood) and,
  - one (1) egg-laying queen.

- Some variability of colony strength among colonies is normal. The average colony strength of all colonies of a beekeeper under contract must meet the standard pollination unit.

- When the overall average colony strength exceeds the standard pollination unit up to a maximum of 10 frames, a premium may be added to the pollination fee.

The beekeeper must replace or strengthen colonies that fall below the standard pollination unit during the pollination period, to meet the original contract conditions.

### C. Colony Verification

The Blueberry Growers Pollination group should contract one or more experienced beekeepers (without direct blueberry pollination involvement) on a short-term contract to verify colony strength and condition.

Blueberry growers are also encouraged to familiarize themselves by inspecting a standard pollination unit with the beekeeper.

### D. Placement, Management & Pesticide Notification

- The number of colonies under contract should be based on the recommended placement of 2 – 3 colonies per acre. Placement density varies according to bush maturity, crop varietal, total acreage, and nearby riparian zones / undisturbed habitat.
  - The standard pollination unit should be used in negotiations with the Beekeeper Pollination Group.
  - Colony placement and distribution in / near the blueberry planting must be agreed upon prior to delivery.

Use of pesticides:

- No insecticides can be applied during the pollination service.
- Minimal use of pesticides other than insecticides should be applied.
- Beekeeper must be notified at least 24 (~48?) hours prior to spraying of any pesticide,
- Subject to the pesticide formulation, colonies may be temporarily closed or completely removed to prevent bee poisoning at the discretion of the beekeeper without financial penalty.

### E. Payment Schedule

- The pollination contract must include a payment schedule that involves an initial deposit, partial payment upon colony delivery, and a final payment on the date of pollination contract completion.

In addition to this, we plan to continue conversations with our agricultural partners, so please:

*Join our conferences  
Participate in focus groups and discussions  
Share your suggestions and concerns*

If you have any questions or suggestions, please send us an email at [info@ttp-bchpa.ca](mailto:info@ttp-bchpa.ca). Your comments would be very valuable to design action plans to strengthen collaborations and look for commercial opportunities for beekeepers in BC.

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Tatyana Sopka (UofS volunteer), Julia Common and Sarah Wood conducting research in blueberries.

*Photo Nuria Morfin*

sustainable blueberry pollination in North America.' Also, thank you to Heather Higo for the valuable suggestions for this note.

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Incidence of disease in colonies doing blueberry pollination. *Photo Sarah Wood*

## Other Strategies to Mitigate Colony Shortages in Blueberry Pollination

from *Blueberry Pollination*, a document put together in 2021 by Paul van Westendorp

### Access to US Bees

Canada restricts the import of US honey bee colonies in hives. This is the so-called “No Comb” Law which was put into place in the early 1900s to prevent US beekeepers of accessing Canadian floral resources and returning to the US with a honey crop. In recent decades the primary purpose of the No Comb Law is to protect against the introduction and spread of bee diseases and pests. A proposal to import US colonies on comb for BC blueberry pollination is a non-starter.

Presently, Canadian beekeepers can only import bee packages under (federal) CFIA permit from Australia, New Zealand, Ukraine and Chile. Transportation costs and other handling fees have made these packages very expensive. Since the bees from the southern hemisphere are in the opposite season (~early fall), additional problems have often been encountered in productivity and queen survival.

A standard bee package consists of a ventilated box container with 2 lbs (~1kg) of bees with a caged queen. After delivery, the imported bees are “shaken” into empty bee hives and provided supplemental feed to stimulate brood rearing.

Normally, bee packages are delivered in April. A 2 lb bee package contains approximately 8,000 bees which is not sufficient to meet the population size of a standard pollination unit. Earlier delivery may be possible.

US bee packages would be cheaper and their delivery more secure than from overseas sources. While the import of US packages will not directly solve the blueberry growers’ challenge of securing sufficient colony numbers, it could benefit growers indirectly as US bee packages are expected to stabilize BC beekeeping operations through winter loss replacements and strengthening weak colonies.

### Native Pollinator Enhancement

Blueberry and cranberry evolved in the cold and wet bog environments of the northern hemisphere. Various bumblebee species co-evolved and became highly efficient pollinators of these plants.

To overcome the challenges of accessing nectar at the bottom of the blueberry’s tubular corolla and dislodge its sticky pollen, bumblebees developed a long proboscis (~tongue) and the ability to “buzz” pollinate. (Buzzing happens after the bumblebee has landed on the flower and rapidly contracts and relaxes its flight muscles without moving its wings). Bumblebees also became tolerant to forage during cool and wet conditions.

Even though bumblebees are highly efficient pollinators in blueberries, there are never enough bumblebees to meet all the pollination requirements of commercial plantings. It has been estimated that a mature stand of highbush blueberry produces 4.5 - 5.0 million flowers per acre. Also, flowers require multiple pollinator visitations to optimize fruit set and fruit uniformity. Only honey bee colonies can meet those requirements.

Studies have shown that a diversity of pollinator species in a crop setting results in higher crop yields and quality compared to a crop with only one or few pollinator species.



Blueberry Flowers.

Photo Nuria Morfin

In the early 2000s, BC commissioned a study to enhance bumblebee populations in and near blueberry plantings. The study quickly concluded that planting bee forage along the edges of fields and the preservation of riparian zones were key factors in sustaining and increasing native pollinator populations.

While blueberries are a valuable food source for wild pollinators during flowering, the non-availability of forage sources afterwards has often led to the collapse of bumblebee nests. Continued availability of bee forage through the spring and summer seasons will lead to greater pollinator diversity in the local environment. It will also reduce grower dependency on honey bee colonies.

A selection of forage bee forage plants can be found at [www.gov.bc.ca/foodforbees](http://www.gov.bc.ca/foodforbees). ☼

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