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Photo: Dan Wyns, © Michigan State University
A bee pollinates crimson clover in the Willamette Valley.

Introduction

Pollination services and honey production are the primary revenue sources for a beekeeping business based in the Pacific Northwest. Other potential revenue sources include bee stock (nucleus, package and queen production, for example) and wax sales. Diversified revenue streams buffer sudden changes in any single revenue source. We recommend those starting a beekeeping operation focus on two to three revenue sources initially and diversify after gaining experience. This publication provides information for formulating a production plan and estimating sales for a PNW-based beekeeping business.

Pollination services

The Pacific Northwest agricultural industry produces diverse crops that require insect pollination. The PNW beekeeping industry is vital to fruit trees, berries, cucurbits, seed crops and oilseed crops, which occupy more than 245,000 paid pollination acres in Idaho, Oregon and Washington.

For many PNW beekeepers, revenue from pollination services makes up a significant portion of their annual income. PNW beekeepers have a variety of pollination contracts, with an average of four different crop rentals per colony each year. Bloom timing for each crop depends on environmental and cultural conditions, but generally tree fruits and nuts bloom from February to May, and berries, cucurbits, melons, oilseed and seed crops bloom from April to September (Figure 1, page 2).

Nearly all commercial PNW beekeepers send colonies to the almond bloom in California, which is the earliest and largest pollination event in the United States. California almond pollination requires about 2 million honey bee colonies every year. Colony rental rates for almonds during 2017–2019 averaged \$195 per colony, which is substantially higher than any other pollination crop fee (Table 1, page 2). Many contracts for almond pollination include a colony strength requirement

Budgeting for a Commercial Beekeeping Operation in the Pacific Northwest

FACT SHEET #1

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and offer an average of 5.7% premium in rental rates for colonies that exceed the standard eight frames of bees.

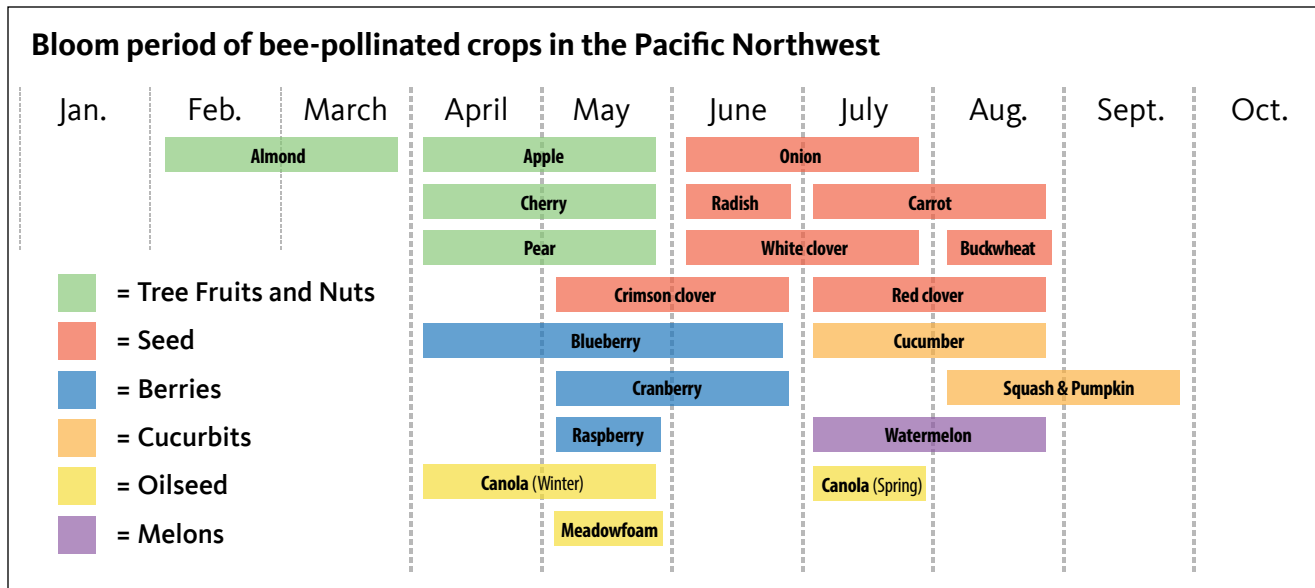


Illustration: Iris Kormann © Oregon State University
 Figure 1. Bloom period of common bee-pollinated crops in the PNW.

Table 1. Prices and colony stocking rates for major crops pollinated by PNW beekeepers

| Crop | Average rental fee (\$/colony) | Rental fee range (\$/colony) | Stocking rate (colony/acre) |
|----------------------|---|------------------------------|---|
| Almonds | \$195 \$216 (if graded above 8 frames of bees) | \$170–\$234 | 2.0 1.0 (self-pollinating varieties) |
| Apple | \$44.35 | \$33–\$60 | 1.5 |
| Blueberry | \$42.35 | \$28–\$55 | 3.0 |
| Canola | \$59.00 | | 2.0 |
| Cherry | \$46.70 | \$28–\$60 | 1.7 (sweet) 1.0 (sour) |
| Pear | \$53.65 | \$28–\$60 | 1.5 |
| Clover | \$33.45 | \$10–\$45 | 2.0 (alsike) 2.3 (crimson) 3.0 (red) 1.5 (white) |
| Cranberry | \$53.75 | \$40–\$60 | 3.0 |
| Meadowfoam | \$43.15 | \$40–\$48 | 2.0 |
| Raspberry | \$33.40 | | 0.8 |
| Other vegetable seed | \$35.90 | \$32–\$75* | 3.0 (carrot) 2.0 (crucifers)** 6.7 (onion) |
| Cucumber | \$67.20 | \$35–\$75 | 2.2 |
| Watermelon | \$50.00 | | 1.8 |
| Squash/pumpkins | \$44.65 | \$20–\$75 | 1.5 |

*We have anecdotal evidence that PNW colonies receive \$110 per colony for hybrid carrot seed.

**Arugula, cabbage, kale, mustards, radish and turnip are cruciferous vegetables grown for seed production in the PNW.



Photo: Ellen Topitzhofer © Oregon State University
 Figure 2: Palletized colonies placed in an onion seed field for pollination.

Pollination rental prices fluctuate each year according to supply, demand, fuel costs and colony management inputs. Excluding almonds, average pollination crop rental prices range from \$30.40 to \$67.20 per colony (Table 1, page 2). Each crop has a recommended stocking rate based on bloom duration, floral density and relative attractiveness of the target crop to honey bees. PNW pollination crops have average stocking rates ranging from 0.8 to 6.7 colonies per acre (Table 1). Colonies spend from two to eight weeks in each crop.

Colony management inputs vary based on the target crop. Beekeepers should account for these expenses when calculating profit. Many almond pollination contracts require beekeepers to have unseasonably large colony populations. Beekeepers may need higher amounts of supplemental feed, and they may need to consolidate weaker colonies to meet this requirement. Because overwintering losses vary and should be expected, some beekeepers may overwinter up to 50% more colonies than needed to pollinate almonds. Bees need supplemental feed in other crops when the surrounding environment does not meet a colony’s nutritional needs. Many hybrid seed crops produce lower amounts of pollen and nectar and have higher colony stocking rates than open-pollinated varieties. Beekeepers may need to provide supplemental feed for colonies placed in crops that provide little nutrition to bees, such as hybrid carrot seed, blueberry and cranberry.

Honey production

Honey production depends on such factors as colony health, local flora and environmental conditions. Honey bee foragers prefer traveling within a half-mile of their colony for nectar, so nearby floral diversity and abundance, climate and soil conditions affect honey yields. To increase honey yield, beekeepers maximize the forager population to coincide with major nectar flows. Beekeepers can increase production by moving their colonies to large nectar flows or reducing stocking rate in apiary locations.

In the last decade, the average nationwide annual honey yield ranged from 55–70 pounds per colony, whereas PNW colonies produced only 32–46 pounds per colony (see Figure 3, page 4 and the “Supplemental material” section). From 2008 to 2018, each PNW state reported similar yield ranges:

- Idaho: 27–46 pounds per colony
- Oregon: 32–43 pounds per colony
- Washington: 35–45 pounds per colony



Tip for beginning or growing beekeeping operations:

- *Honey bees must build wax comb before they can store honey in the colony. A limited supply of wax will lead to lower honey yields in a beekeeping operation. Beekeepers can expedite this process by routinely mixing frames with foundation into brood boxes and honey supers.*

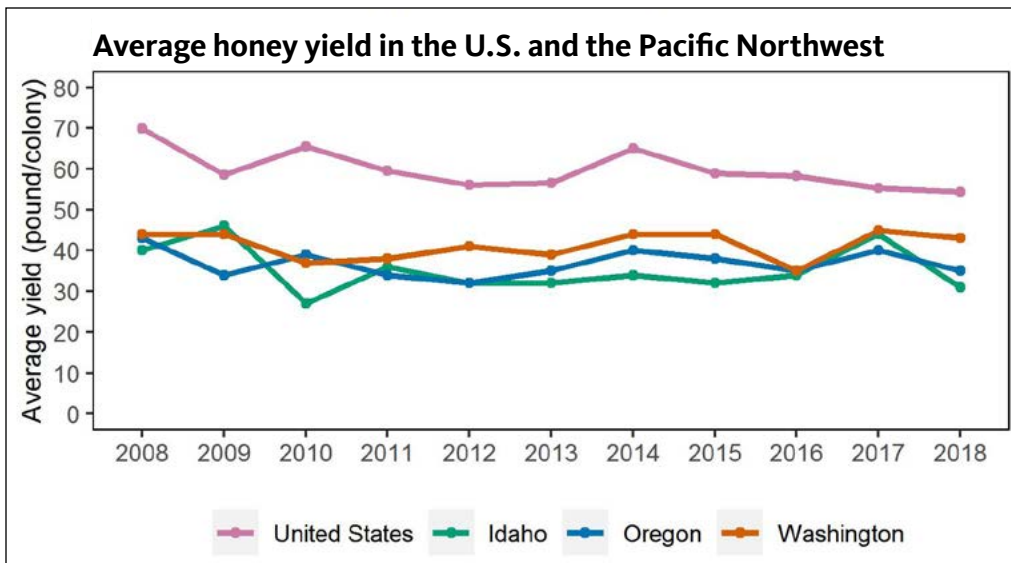


Figure 3. Average honey yield for beekeepers in Idaho, Oregon, Washington and the United States from 2008 to 2018. Source: 2010-2019 NASS Honey Reports.

Beekeepers sell honey as a wholesale (bulk) or retail product. Bulk honey prices are influenced by overall production, color grade and market factors, such as international demand, trade agreements and global economic conditions. Some beekeepers separate honey of a certain primary floral source or color grade — such as meadowfoam, sweet clover and buckwheat — because they can often sell it at a premium price. Retail honey sells at a substantially higher price than wholesale honey (Table 2), but there is more labor and equipment required for retail sales than bulk sales. Retail sales also require additional insurance, food handling and state inspection of extracting and packing facilities.

Table 2. Average wholesale and retail prices reported from California, Idaho, Nevada, Oregon and Washington compared to total U.S. prices (\$/pound)

| Color grade, market type | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|--------|--------|--------|--------|--------|
| California, Idaho, Nevada, Oregon and Washington | | | | | |
| Light, wholesale | \$2.38 | \$2.57 | \$2.56 | \$2.80 | \$2.88 |
| Amber, wholesale | \$2.32 | \$2.58 | \$2.57 | \$2.57 | \$2.73 |
| Light, retail | \$4.30 | \$4.29 | \$3.82 | \$3.56 | \$3.64 |
| Amber, retail | \$4.19 | \$4.25 | \$3.87 | \$3.70 | \$3.68 |
| U.S. total | | | | | |
| Light, wholesale | \$2.26 | \$2.22 | \$2.23 | \$2.27 | \$2.21 |
| Amber, wholesale | \$2.17 | \$2.11 | \$2.13 | \$2.15 | \$2.11 |
| Light, retail | \$3.33 | \$3.41 | \$3.40 | \$3.35 | \$3.42 |
| Amber, retail | \$3.27 | \$3.38 | \$3.38 | \$3.35 | \$3.41 |

Sources: *Bee Culture* monthly honey reports from 2015 to 2019.

Bee stock (nucleus, package and queen production)

Healthy colonies outgrow the colony space in the spring. Beekeepers can divide large colonies by removing a portion of worker bees, brood or both and using that portion to expand their operation or sell to other beekeepers. The surplus bees can be sold as established colonies, packages, nucleus colonies, bulk bees or brood.

Many beekeepers produce bee stock for sale during or shortly after almond pollination. Table 3 is a comprehensive price list for different types of bee stock. A beekeeper may sell an established colony, which consists of a full colony unit and hive equipment (such as frames, boxes and lid). Most beekeepers sell established colonies after almond pollination. Double-story colonies sell for \$275 to \$320. After almond pollination, single-story colonies sell for \$100 to \$215 and double-story (or 1.5-story) colonies go for \$140 to \$300.

Alternatively, a beekeeper may sell surplus bees as packages or bulk bees in early spring during or immediately after almond pollination if there is a demand. A package of bees consists of a mesh box containing three to four pounds of worker bees with a mated queen. Package bees can sell for \$88–\$128. Bulk bees do not come with a queen and are purchased in large cages or queenless packages. Bulk bees are sold at \$16–\$18 per pound.

Similarly, a beekeeper can pull frames of brood from a colony to sell in bulk at \$15–\$18 per frame or as part of a nucleus colony. A nucleus colony is a complete, yet small colony consisting of a laying queen and enough worker bees to cover four or five frames containing brood and food stores. Nucleus colonies are typically produced by PNW beekeepers in late April and May, with prices ranging from \$90–\$150.

Some beekeepers produce queens for their own operation, to sell to other beekeepers, or both. This takes time, planning and skill, but the demand and potential revenue are high. Mated queens sell for \$24–\$38 per queen. Specialty queens, such as Varroa Sensitive Hygiene stock, sell at substantially higher rates (\$41–\$75). Beekeepers also sell mature queen cells at \$5–\$8 per cell to other beekeepers for introduction into newly divided colonies (Table 3).

Table 3. Average and range of purchase cost for packages, nucleus colonies, established colonies, bulk bees, bulk brood and queens

| | Unit | Average cost (\$/unit) | Cost range (\$/unit) |
|---|--------------------------------|------------------------|----------------------|
| Other stock | | | |
| Double-story (before almond pollination) | 2 deeps | \$302 | \$275–\$320 |
| Single-story (after almond pollination) | 1 deep | \$162 | \$100–\$215 |
| Double-story or 1½ story (after almond pollination) | 2 deeps or 1 deep and 1 medium | \$186 | \$140–\$300 |
| Other | | | |
| Package | 3 pounds | \$105 | \$88–\$128 |
| Nucleus colony | 4–5 frames | \$122 | \$90–\$150 |
| Bulk bees | Pound | | \$16–\$18 |
| Bulk brood | Frame | | \$15–\$18 |
| Queens | | | |
| Mated queen | Queen | \$28 | \$24–\$38 |
| Mated queen (specialty stock) | Queen | \$55 | \$41–\$75 |
| Queen cell | Cell | \$6 | \$5–\$8 |

Sources: Information gathered from PNW beekeepers and *American Bee Journal* Marketplace advertisements.

Wax production

Wax is a byproduct of honey extraction. Beekeepers produce a sellable product after they clean and refine the wax.

There are two main color grades for wax: light and dark. Light-grade wax is more refined and filtered. Dark-grade wax has more particulate matter and often requires further processing from the buyer. Average dark-grade wax prices ranged from \$4.55 to \$8.68 per pound in the last five years (Table 4).

Table 4. Average wholesale wax prices reported from California, Idaho, Nevada, Oregon and Washington (\$/pound)

| Color grade | 2015 | 2016 | 2017 | 2018 | 2019 |
|-------------|--------|--------|--------|--------|--------|
| Light | \$4.96 | \$5.80 | \$6.65 | \$8.46 | \$8.46 |
| Dark | \$4.55 | \$5.66 | \$5.38 | \$7.11 | \$8.68 |

Sources: *Bee Culture* monthly honey reports from 2015-2019.

Further reading

Pollination

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Supplemental material

Table 5. Average honey yield for beekeepers in the US and PNW from 2008 to 2018 (pound/colony)*

| | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---------------|------|------|------|------|------|------|------|------|------|------|------|
| United States | 69.9 | 58.6 | 65.5 | 59.6 | 56.1 | 56.6 | 65.1 | 58.9 | 58.3 | 55.3 | 54.4 |
| Idaho | 40 | 46 | 27 | 36 | 32 | 32 | 34 | 32 | 34 | 44 | 31 |
| Oregon | 43 | 34 | 39 | 34 | 32 | 35 | 40 | 38 | 35 | 40 | 35 |
| Washington | 44 | 44 | 37 | 38 | 41 | 39 | 44 | 44 | 35 | 45 | 43 |

*Sources: 2010–2019 NASS Honey Reports

About this series

About this series

In this series, *Budgeting for a Commercial Beekeeping Operation in the Pacific Northwest*, we describe potential revenue streams and expenditures associated with a commercial beekeeping operation. This publication does not discuss depreciation, interest, taxes, insurance costs or enterprise budgets. Refer to the “Further reading” section for detailed beekeeping business plan guides.

Included in this series:

- [Fact Sheet 1: Revenue Sources for a Commercial Beekeeping Operation in the Pacific Northwest](#)
- [Fact Sheet 2: Operational Equipment Expenses for a Commercial Beekeeping Operation in the Pacific Northwest](#)
- [Fact Sheet 3: Beekeeping Equipment Expenses: Woodenware and Other Components](#)
- [Fact Sheet 4: Honey Bee Colony Maintenance Expenses: Supplemental Feed, Requeening and Medication](#)

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