

Pacific Northwest Honey Bee Pollination Economics Survey 2007

by

Michael Burgett

Professor Emeritus

Department of Horticulture

Oregon State University

Corvallis, OR 97331

burgettm@hort.oregonstate.edu

Since 1986 the Honey Bee Laboratory at Oregon State University has conducted an annual survey of pollination economics in the Pacific Northwest (PNW). The information from each year of the survey has been made available both regionally and nationally. The information has proved to be most useful to individual beekeepers who generate income from pollination rental, which is the primary source of income for the majority of commercial beekeepers in the PNW.

The use of managed honey bee colonies for commercial crop pollination remains the most important function of the PNW beekeeping industry. The vast and diverse agriculture of the region relies on a healthy and strong beekeeping industry to maintain optimum production. An enhanced knowledge of pollination economics is crucial to every beekeeper that enters into the world of commercial crop pollination. It is also important for those growers who contract honey bee colonies for managed pollination to understand the current economic conditions of the beekeeping industry.

The pollination requirement for commercial agriculture in the PNW is enormous. In the tri-state region of Washington, Oregon and Idaho there are *ca.* 355,000 acres of crops grown that require or benefit from managed honey bee pollination. The "farm-gate" value of those combined crops is approximately \$1,750,000,000! Nearly half of those acres and 60% of the dollar value is in one crop – apples.

The USDA National Agriculture Statistical Service estimates that there are 200,000 production honey bee colonies in the PNW. And with these numbers there are some interesting hypothetical calculations that can be made. If all growers were to rent 2 colonies for each acre of blooming crop (355,000 acres), the resulting pollination requirement would utilize 710,000 colony rentals. If we multiple this by the 2007 average colony rental fee (\$70.65) it results in a potential pollination rental income of more than 50 million dollars. If we add to that the 2007 estimated California almond pollination income available to all PNW commercial beekeepers (\$25 million), we end up with a potential gross pollination income of 75 million dollars. Another way to look at this is, 'how much pollination income, under optimized conditions, should have been produced from one commercial honey bee colony in the year 2007?' For the PNW that figure is approximately \$375 per hive.

Comparing the hypothetical PNW rental income (\$50 million) to the farm-gate value of the crops pollinated in the PNW (\$1.75 billion) shows that the money spent by growers to optimize pollination is less than 3% of the total crop value.

This is another impressive illustration of what a remarkable bargain pollination rental is to the commercial agricultural industry of the PNW.

This year's survey continues to show a number of trends, one of which is the continued dependence of PNW commercial beekeepers on the income generated from colony rentals. For 2007 the average commercial beekeeper reported receiving 68% of his or her annual operating gross from pollination rentals. This percentage is slightly higher than the previous year 2006 and continues to show the dominance of pollination rental income to a commercial beekeeper's financial "health".

Recent increases in the average pollination rental fee have been strongly influenced by a dramatic rise in the pollination rental fees paid by California almond growers. In 2005 almond growers responded to a perceived shortage of colonies by dramatically increasing the price they were willing to pay for pollination; this has obviously continued for the 2007 pollination season. The average almond pollination fee for 2007 was \$137.35. This is a 73% increase from the 2005 average (\$79.40) and a 6% increase from the average almond pollination fee in 2006 (\$129.30). Almond pollination is a target crop for nearly all commercial beekeepers in the Pacific Northwest and represents the beginning of the annual pollination season by nature of their early flowering period.

For 2007 the average pollination rental fee, computed from commercial colony rentals on all crops reported (including almonds), was \$70.65. This is a 4% decrease from the average pollination fee of 2006 (\$73.85) (see Tables 1 and 2). This slight decrease is in spite of a nominal rise in the average almond pollination rental fee. Table 2 illustrates the average fees paid by crop and a comparison to the average fee received in 2006.

During the past ten years the average rental fee has increased from \$31.05 (1997) to \$70.65 (2007), an increase of 127%. It needs to be stressed that honey bee colony rental has for many decades, been an underpaid service to the agricultural industry at-large. It is really only within the past decade that rental fees have begun to more accurately reflect the enormous value-added service of managed pollination. This is shown by the 380% increase in the average pollination fee during the last eighteen years; 1990 = \$18.40 to 2007 = \$70.65.

Within the PNW, tree fruits are the dominant crop type for pollination income. In 2007 the combination of pears, sweet cherries and apples accounted for 39% of all reported rentals and 23% of all reported pollination income. Paradoxically, the single most important crop for PNW beekeepers is grown in California, *i.e.*, almonds.

Almonds were responsible for 30% of all rentals and 58% of all rental income in the 2007 survey (see Table 4).

Almonds consistently have produced a high average pollination fee and for the past two years have displayed remarkable fee increases (for 2005 the average fee was \$79.40; for 2006, \$129.20 and for 2007, \$137.35).

In 2007 the combination of California almonds and PNW tree fruit accounted for 69% of all rentals and 81% of all pollination income, which illustrates the dominance and importance of these crops for a commercial PNW beekeeper (see Table 4). All other PNW cropping systems utilizing honey bee pollination contributed 19% of a beekeeper's gross pollination income in 2007.

In terms of acreage, apples are the largest crop grown in the PNW and this is reflected by the large number of reported rentals (21% of all rentals and 12.5% of the total reported rental income).

Berry crops (blackberries, Marion berries, Logan berries, raspberries), are late spring to early summer bloomers and most often copious nectar producers. The 2007 average pollination fee for combined berry crops was \$34.35, a lower price than the average fee because beekeepers have an expectation that a honey crop will also be produced. The rental of colonies for blueberry pollination has been increasing in recent years due to more acreage in production. The average fee for blueberries in 2007 was \$35.70, somewhat higher than other berry crops due to the fact that there is little to no expectation of a surplus honey crop.

The average PNW commercial honey bee colony was rented 2.5 times in 2007 and this includes California almonds. This is an increase from 2006 (2.1). This statistic had been dropping since 1999 when the average number of rentals per colony was 2.8. Does this actually reflect the real world situation? Are commercial beekeepers concentrating on almonds and PNW tree fruit (which historically provide the major sources of pollination income) and reducing the number of colonies involved in minor crop pollination? At this time our data are not able to provide a reasonable answer to this question.

For the 2007 pollination season, an average rental fee of \$70.65, combined with an average of 2.5 pollination rentals per colony, results in an annual per colony pollination income of \$176.60, which is up significantly from past years. With the "average" commercial operation running 3,091 colonies, a hypothetical 2007 gross pollination income for the "average" commercial beekeeper was \$545,950.

The combined colony numbers from those commercial beekeepers who responded to the 2007 survey, (37,095 hives), represent about 18.5% of the USDA's estimate of colony numbers in Oregon and Washington.

Therefore, if we multiply the total reported pollination income (\$6,649,913) by a factor of 5.4, we have a ball park estimate of the pollination income generated by commercial beekeeping in the PNW, *i.e.*, a regional pollination income of approximately \$35,910,000. This is far more than the “estimates” assigned to the bee industry by agricultural economists, who, for reasons unexplained, usually do not even include pollination rental income in their estimates of the beekeeping industry economics. Pollination income in the PNW far exceeds the value of honey and wax sales for our regional beekeeping industry. Pollination rental income is frequently three to four times greater than honey and wax sales in any given year. This disparity between pollination income and combined honey/wax income has increased dramatically, especially in the past few years, concurrent with the dramatic rise in pollination rental fees

The 2007 survey asked commercial beekeepers to report the total number of full-time or full-time equivalent employees working for their operations. The figure for the “average” commercial beekeeping operation in 2004 was 2.9 full-time employees; for 2005 it was 3.4 employees; for 2006 it is 4.8, and for 2007 the figure is 3 employees. Another interesting way to look at this is to ask the question “what is the ‘colony equivalent’”, meaning, what is the number of colonies necessary to hire one full-time employee? That figure was very close to 1,500 colonies/employee in 2004 and 2005. In 2007 the “colony equivalent” is 1,125 hives per full-time employee.

While colony income from pollination rental is a critical statistic, so therefore is the annual cost to maintain a healthy hive of honey bees. Numerous commercial beekeepers, who have over the years maintained good cost accounting records, have responded with numbers that are very reasonable relative to today’s economy. The average annual hive maintenance cost was \$135.20 per colony for the year 2007. The range in responses was a high of \$250/hive to a low of \$75/hive. This wide range suggests that beekeepers should try to be more precise in calculating their operational costs. If you can’t answer the question of your operating cost on a ***per colony basis***, you need to re-adjust your operational accounting.

For 2007 the average colony maintenance cost is lower than the average per colony pollination income.

From the 2007 survey data pollination income was \$176.60/colony and the colony maintenance cost was \$135.20; a difference of \$41.40 per colony. This a change from recent years when the average operational cost was somewhat higher than the average pollination income on a per colony basis. This still illustrates that the majority of net operational profit is generated by sources of income outside of pollination rental, most importantly, Money production.

In interpreting the average pollination fee for an individual crop, it is important to recognize that the reliability of the “average” is strongly influenced by the number of reported rentals. The “average” for almonds should be considered

very realistic because of the large number of beekeepers and rentals reported for this crop, and such is also the case for tree fruit in the PNW. However, when looking at the "average" rental fee for cucumbers in 2007 (\$27.40) as an example, this number is down dramatically from 2006 but it is based on only 124 colony rentals. This variation for cucumbers is due largely in part because of the few number of beekeepers who participated in cucumber pollination and the low number of reported rentals in the 2007 survey.

Remember that the data presented here represent the pollination rental situation of a hypothetical "average" commercial beekeeper in the Pacific Northwest. For individual beekeepers the survey results are most useful as benchmarks against which they should compare their individual operations.

Please let me stress again that all of these "projections" are only as accurate as the data provided by responding beekeepers. The projections also assume that the participating beekeepers collectively represent the mainstream of commercial beekeeping in the Pacific Northwest. The 2007 survey is produced from a significantly fewer number of commercial beekeepers than 2006 and hence the number of colonies and reported rentals are lower than 2006.

I wish to again thank all those beekeepers in Oregon and Washington who took the time to participate in the survey, which over the past 22 years, has generated the most accurate assessment of commercial pollination known in the U.S. I also offer sincere thanks to the Washington State Beekeepers' Association for the funding support to continue this annual survey of PNW regional beekeeping economics.

Table 1.-
Average Pollination Fee 1996- 2007

1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
31.55	31.05	29.65	32.25	32.85	33.65	36.40	36.45	38.65	51.30	73.85	70.65

Table 2.
Average pollination fees by crop as reported by 12 commercial and 5 semi- comercial beekeeping operations.

Crop	No. Rentals	Avg. Fee	Fee +/-1
Pears	6,864	\$40.75	+7.8%
Cherries	10,347	\$42.30	+7.0%
Apples	19,652	\$42.90	+7.2%
Blueberries	7,790	\$35.70	+10.2%
Cranberries	1,652	\$44.40	0%
Vegetable seed	5,666	\$56.95	+30.0%

Clover seed 3	2,300	\$44.15	+48.0%
Radish seed	372	\$35.85	-23.4%
Cucumbers	124	\$27.40	-60.0%
Sq. & Pump. seed	1,403	\$60.10	+36.5%
Watermelon	1,424	\$36.80	+5.1%
Meadowfoam	3,526	\$43.75	+3.0%
Misc. 4	1,324	\$23.20	+7.2%
Almonds	28,050	\$137.35	+6.3%

SUM = 94,100 rentals generating \$6,649,913 in pollination income

Average Pollination Fee = \$70.65

1 % change from 2006

2 Includes blackberries, raspberries, Marion berries, & Logan berries.

3 Includes red & white clover as grown for seed.

4 canola and sunflowers

Table 3.

Average colony numbers, average rental fee per hive, and average annual rental income per hive for a hypothetical commercial beekeeping operation in the Pacific Northwest 1992-2007)

Year	Average No. Colonies	Average Rental Fee	Average Annual Rental Income per Colony
1992	765	\$19.25	\$49.70
1993	990	\$22.50	\$62.25
1994	1,225	\$28.10	\$78.70
1995	1,348	\$29.60	\$78.15
1996	1,350	\$31.55	\$97.50
1997	1,504	\$31.05	\$92.20
1998	1,153	\$29.65	\$83.00
1999	2,058	\$32.25	\$89.30
2000	2,055	\$32.85	\$77.40
2001	3,168	\$33.65	\$64.60
2002	4,255	\$36.40	\$63.75
2003	2,612	\$36.45	\$86.40
2004	3,555	\$38.65	\$74.60
2005	2,055	\$51.30	\$112.85
2006	3,855	\$73.85	\$151.10
2007	3,091	\$70.65	\$176.60

Table 4.

Pollination rentals and income by crop type from 12 PNW commercial and 5 semi-commercial beekeepers in 2007.

Crop	# Rentals	% of total rentals	Rental Income	% of total rental income
Tree Fruit	36,863	39%	\$1,559,506	23%
Almonds	28,050	30%	\$3,852,544	58%
All other crops	29,187	31%	\$1,237,863	19%
Total	94,100	100%	\$6,649,913	100%

Summary Information - 2007

Number of participating commercial beekeepers
= **12**

Number of participating semi-commercial beekeepers
= **5**

Number of colonies in the survey
= **37,095**

Total colony rentals
= **94,100**

The average colony pollination rental fee (for all beekeepers, for all crops including California almonds) was:
\$70.65

The average commercial colony was placed in
2.5 pollination sets in 2007,
for an average per hive rental income of
\$176.60

The average commercial bee operation maintained
3,091 colonies and grossed
\$545,870 in pollination rental income for 2007.