

# UNITED STATES BEEKEEPING INDUSTRY RESOURCE



MONSANTO







# BEEKEEPING INDUSTRY

The United States beekeeping industry has a varied and dynamic value chain. Commercial beekeepers have been around for quite some time, initially as honey collectors. However, the need for agriculture to utilize honey bee colonies for pollination, especially in the U.S., has increased dramatically.

In the United States, one-third of all agricultural output depends on pollinators.<sup>1</sup> Pollinators contribute more than \$24 billion to the United States economy, of which honey bees account for more than \$15 billion.<sup>2</sup> U.S. commercial beekeepers have shifted their business model to use their honey bees – the best domesticated pollinator – to support pollination events around the country.

Beekeepers in the U.S. are divided into three categories:

- **Hobbyist beekeepers:** These beekeepers have one to several hives and typically engage in keeping bees for recreation and noncommercial honey production.
- **Sideliner beekeepers:** These beekeepers have colony numbers ranging from less than 50 up to 500 hives and may be involved on an informal commercial basis.
- **Commercial beekeepers:** Commercial beekeepers may manage thousands to tens of thousands of colonies in pollinator dependent agriculture and may offer fee-based migratory pollination services.

Commercial beekeeping is logistically intensive and critical to several crops, particularly California almonds. Each of the 1,100,000 acres currently in almond production in California<sup>3</sup> is dependent on bee pollination, and the honey bee is the best and most widely-used domesticated bee pollinator. Essentially, there would be no U.S. almond crop without the honey bee.

<sup>1</sup> [https://www.nrcs.usda.gov/wps/portal/nrcs/detail/pa/plantsanimals/?cid=nrcs142p2\\_018171](https://www.nrcs.usda.gov/wps/portal/nrcs/detail/pa/plantsanimals/?cid=nrcs142p2_018171) Retrieved March 13, 2017.

<sup>2</sup> <https://obamawhitehouse.archives.gov/the-press-office/2014/06/20/fact-sheet-economic-challenge-posed-declining-pollinator-populations> Retrieved March 13, 2017.

<sup>3</sup> [https://www.nass.usda.gov/Statistics\\_by\\_State/California/Publications/Fruits\\_and\\_Nuts/2016/201605almac.pdf](https://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/2016/201605almac.pdf) Retrieved March 13, 2017.

Other crops – such as apples, berries, alfalfa seeds, and melons – also depend on pollination services to varying degrees for propagation and increased yield. For example, alfalfa requires bee pollination to produce a seed, whereas almonds and apples require bee pollination to produce a fruit.

Protecting the health of honey bees is now more important than ever. The *Varroa* mite is a parasite that is tiny to the human eye, but massive in proportion to the body of a honey bee. It spreads disease, causes disfigurement in honey bee larvae, and contributes to deaths in colonies – all of which have caused devastating losses for beekeepers. Other impacts to bee health include unintentional pesticide exposure, inadequate nutrition, and challenging weather conditions.



Monsanto works with farmers and beekeepers to find sound, evidence-based and long-term solutions for improving honey bee health. As a founding member of the Honey Bee Health Coalition, Monsanto is invested in working with others to find solutions to some of the challenges facing honey bees. Two areas of focus for Monsanto are to foster better communication between farmers and beekeepers, and establish best management practices and training for farmers planting treated seed.

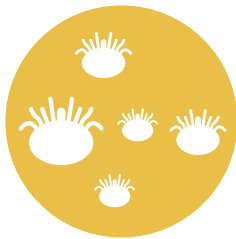


# COMPROMISED HONEY BEE HEALTH

Honey bees are impacted negatively by many different pests, predators, diseases, and other stressors. The issues of honey bee health are very complex; no single company or corporation has all of the answers.

## STRESS FACTORS

Impacts on bee health have been linked to a variety of factors, including those influenced by the activities associated with both **beekeeping and crop production**.



Pests and Disease



Lack of Genetic Diversity in Breeding



Lack of Forage and Nutrition



Incidental Pesticide Exposure

*Graphic elements provided by the Honey Bee Health Coalition.*

There are many factors that affect the health of honey bees. What people can do differently is one of them. Watch **Bee Understanding**, the story of four people who swapped jobs to learn more about protecting bees: <https://www.youtube.com/watch?v=KBsrvJ2-7xY>

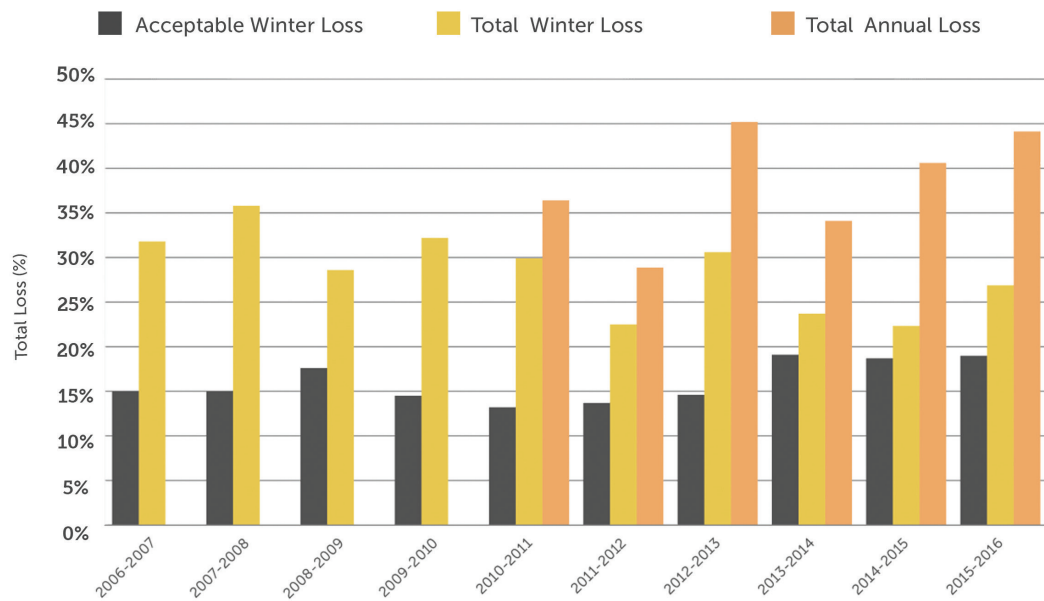




# MANAGED COLONY LOSSES

The winter loss survey is a nationwide survey that has been available to beekeepers since 2006. The survey, conducted by the Bee Informed Partnership in collaboration with the Apiary Inspectors of America, began including summer loss rates within the survey after 2010.<sup>1</sup> The managed loss survey was created to help researchers understand factors affecting honey bee health and determine what could be done to mitigate losses.

Total U.S. Managed Honey Bee Colonies Loss Estimates<sup>1</sup>



"For the 2015-2016 winter season, a preliminary 5,756 beekeepers in the United States provided validated survey responses. Collectively, these beekeepers managed 389,083 colonies in October 2015, representing about 15% of the country's estimated 2.66 million managed honey producing colonies... Beekeepers not only lose colonies in the winter but also throughout the summer. In 2015, summer losses, at 28.1%, were the same as winter losses. When all results were combined, beekeepers lost 44.1% of their colonies between April 2015 and March 2016. This high rate of loss is close to the highest annual loss rate in the [past] 6 years."<sup>1</sup> Some clear factors contributing to the colony losses are *Varroa* mite, pesticides, weather, and disease.

<sup>1</sup> <https://beeinformed.org/results/colony-loss-2015-2016-preliminary-results/> Retrieved March 13, 2017.

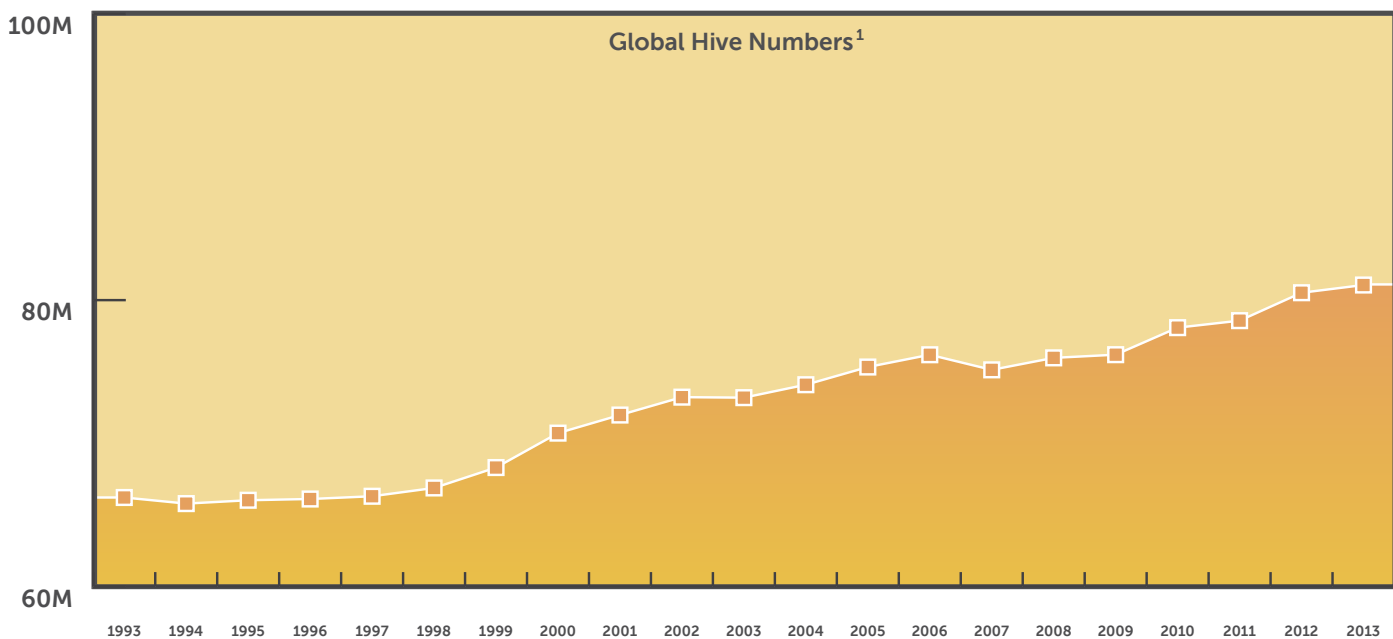
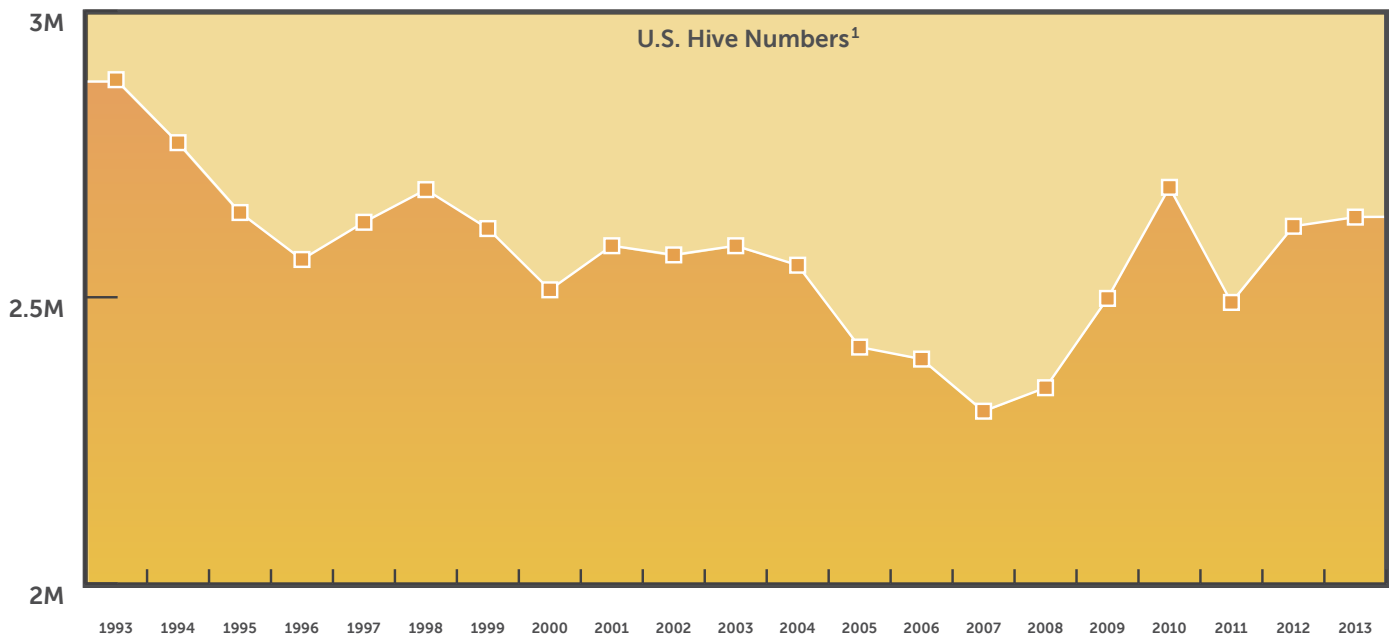




# U.S./ GLOBAL HIVE NUMBERS

Global hive numbers have increased steadily over the past decade, while numbers in the United States have been essentially flat.

As the standard of living rises in developing nations, so does the demand for honey and the bees that produce it. The U.S. represents a little more than 3.2 percent of the global honey bee supply.<sup>1</sup> Although challenged with increased colony deaths or colony mortality, U.S. beekeepers have responded well and maintained an adequate supply of honey bee hives.



<sup>1</sup> Food and Agriculture Organization of the United Nations. (2017). FAOSTAT Database. Retrieved January 10, 2017 from <http://faostat3.fao.org/home/E>



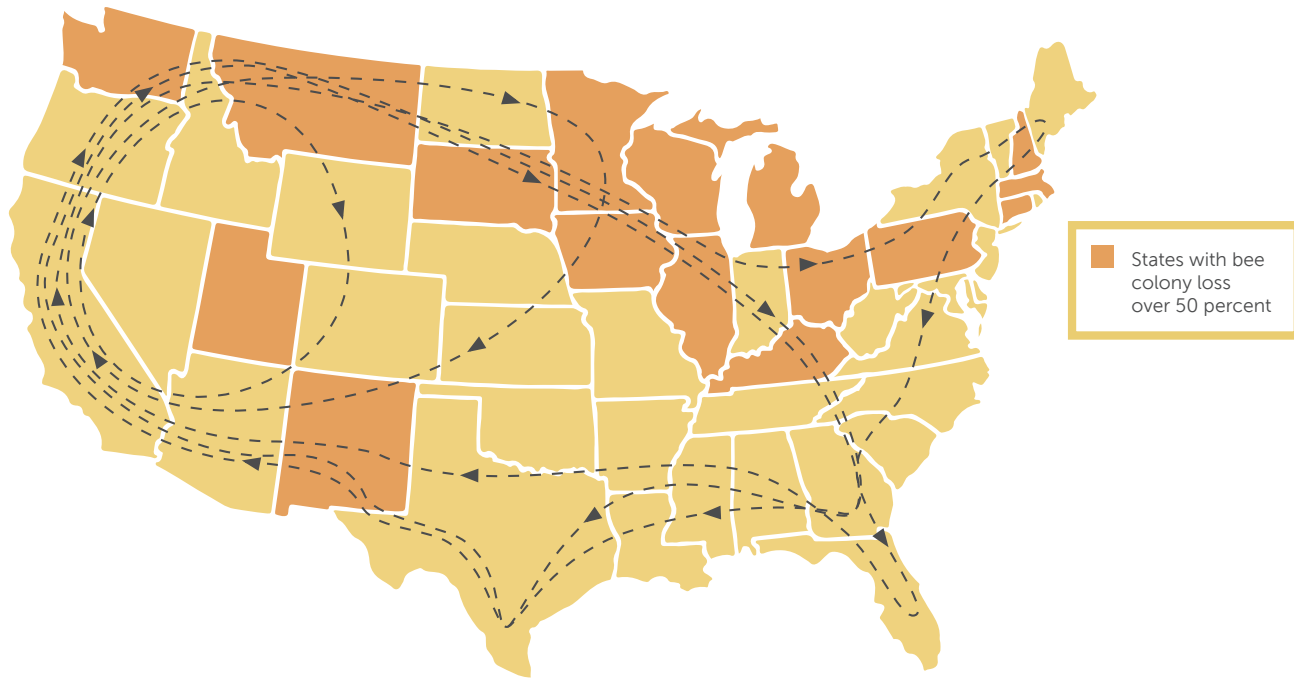




# U.S. COMMERCIAL BEEKEEPING:

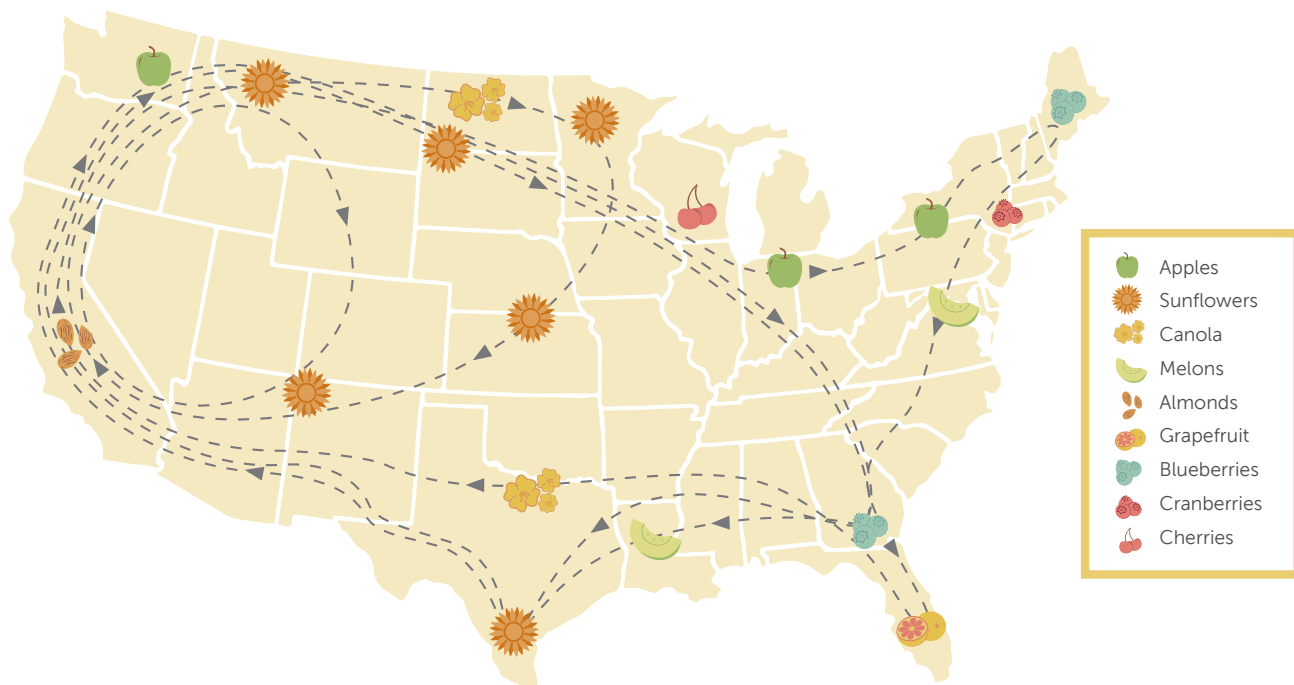
## MIGRATION & RECUPERATION<sup>1</sup>

This map shows that the majority of U.S. migratory paths are concentrated in southern states, California, and the northern mountain states, which are popular summer recuperation locations for commercial beekeepers. Nearly 80 percent of U.S. hives are moved north by early summer.



## POLLINATION<sup>1</sup>

This map shows that commercial beekeepers transport the insects thousands of miles around the country every year to pollinate crops when they are in bloom. According to the Department of Agriculture, one-third of the food in the U.S. diet relies on bees and other pollinators.



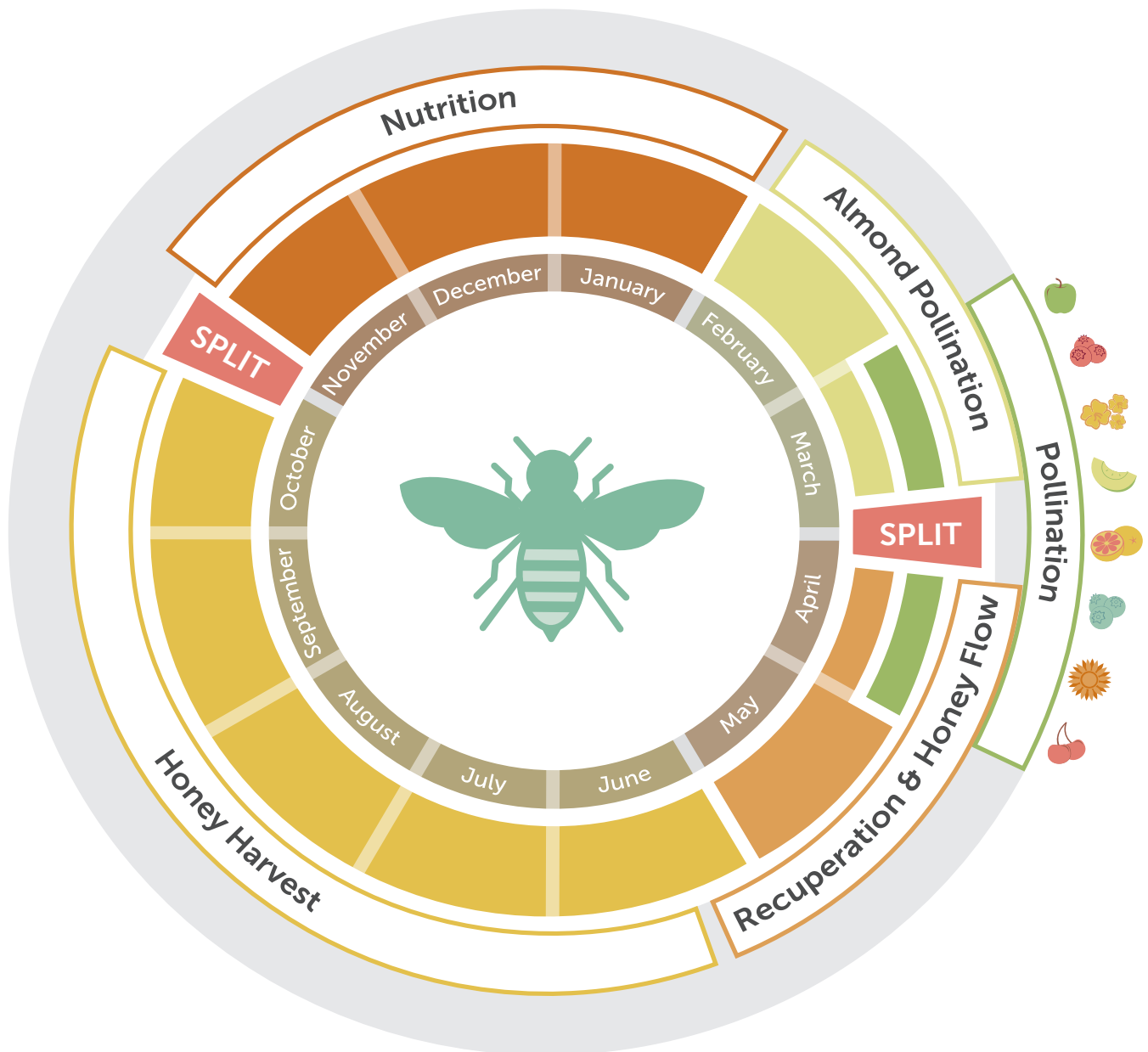
<sup>1</sup> <http://ngm.nationalgeographic.com/2015/05/building-bees/transport-map> Retrieved January 20, 2017.



# U.S. COMMERCIAL BEEKEEPING ANNUAL CYCLE

As with most agriculturally focused businesses, beekeeping operates on an annual cycle. Beekeepers focus on nutrition in the winter months. Spring rains and blooms help to increase colony populations and nectar gathering. Splitting colonies is the practice of taking a healthy colony, dividing the population and augmenting the nutrition of the two new (albeit weaker) colonies. This is a cost-effective way for beekeepers to replace colonies.

Replacement by splits is not sustainable if mortality rates increase annually. Depending on the location of honey production, called "honey flow", the cycle can begin as early as April and run late into the summer. Although many commercial beekeepers "follow the bloom" up and down the East or West Coasts, the most important annual event for them is almond pollination in California in late February and early March.







# U.S. BEEKEEPING INDUSTRY

Although there are many components, the beekeeping industry has not historically seen much technological advancement. However, recent increased demand for pollinators is changing the landscape. Today's commercial beekeepers employ a host of modern management practices, including supplemental feeding, antibiotic use and pallet management systems. Most commercial beekeepers now recognize that they are primarily in the pollination business. Accordingly, bee brokers, pollination contract services, logistics, and farmers and growers are becoming an increasingly important part of this value chain.

## HOBBYIST BEEKEEPERS

Have one to several hives and typically keep bees for recreation and non-commercial honey production.

## SIDELINER BEEKEEPERS

Have a looser commercial focus with colony numbers ranging from less than 50, up to 500 hives.

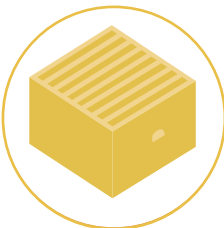
## COMMERCIAL BEEKEEPERS

May have thousands of colonies and offer migratory pollination services. In 2015, there were an estimated **2.66 million hives** in the U.S., from which honey was harvested.<sup>1</sup>

<sup>1</sup><http://usda.mannlib.cornell.edu/usda/current/Hone/Hone-03-22-2016.pdf> Retrieved January 30, 2017.



# BEEKEEPING: FARM TO TABLE



## Beekeeper Supplies

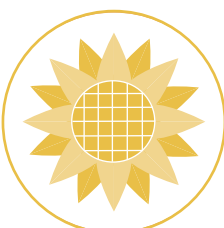
**Beekeeper Suppliers:** Dadant • Brushy Mountain • Walter T. Kelley • Betterbee • Glory Bee • Mann Lake Ltd. • Miller Bee Supply • Smaller regional and local suppliers and distributors

**Bees & Queens:** Individual and integrated suppliers



## Beekeepers

**Beekeepers:** Estimated 115,000-125,000 beekeepers in the U.S.<sup>1</sup> • 2.66 million hives in the U.S. produced honey in 2014<sup>2</sup> • Commercial beekeepers have 300 or more hives<sup>3</sup> • Most hobbyist beekeepers have less than 25 hives<sup>1</sup>



## Pollination Services

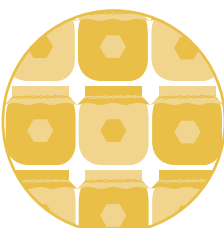
**Growers:** At least \$15 billion of U.S. agricultural production is supported by honey bee pollination • More than 90 crops are pollinated by commercial honey bees<sup>4</sup> • Approximately 33% of our world's crops are dependent on some form of insect pollination<sup>5</sup> • More than 1 million hives are placed in California almond orchards for pollination<sup>6</sup>

**Almond Board of California:** 1.1 million almond acres in California<sup>7</sup>



## Honey

**Production:** 157 million pounds in March 2016<sup>2</sup> • Average retail price per pound was \$2.09 in 2016<sup>8</sup> • More than 80% of honey consumed in the U.S. in 2015 was imported<sup>9</sup>



## Packers

**Honey Color Designation:** Water White • Extra White • White • Extra Light Amber • Light Amber • Amber • Dark Amber<sup>10</sup>

**Determining Grade Factors:** Flavor and aroma • Absence of defects • Clarity<sup>10</sup>

**Distribution:** Roughly half of U.S. honey is sold through retail channels, and half is sold for use in the food service industry<sup>1</sup>



## Retailer

**Packaged Honey:** Bottled

**Honey Foods:** Breads, sauces, cereals, and sweeteners

**Cosmetics and Household Goods:** • Lip balm, candles, and over-the-counter remedies (cough suppressants)

<sup>1</sup> <http://www.honey.com/newsroom/press-kits/honey-industry-facts> Retrieved March 13, 2017.

<sup>2</sup> <http://usda.mannlib.cornell.edu/usda/current/Hone/Hone-03-22-2016.pdf> Retrieved March 13, 2017.

<sup>3</sup> <http://govinfo.library.unt.edu/npr/library/reports/ag02.html> Retrieved March 13, 2017.

<sup>4</sup> <https://obamawhitehouse.archives.gov/the-press-office/2014/06/20/fact-sheet-economic-challenge-posed-declining-pollinator-populations> Retrieved March 13, 2017.

<sup>5</sup> <http://www.fao.org/biodiversity/components/pollinators/en/> Retrieved March 13, 2017.

<sup>6</sup> <http://www.abfnet.org/?page=14> Retrieved March 13, 2017.

<sup>7</sup> [https://www.nass.usda.gov/Statistics\\_by\\_State/California/Publications/Fruits\\_and\\_Nuts/2016/201605almac.pdf](https://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/2016/201605almac.pdf) Retrieved March 13, 2017.

<sup>8</sup> <https://www.honey.com/honey-industry/honey-industry-statistics/unit-honey-prices-by-month-retail/> Retrieved March 13, 2017.

<sup>9</sup> <http://www.beeeculture.com/u-s-honey-industry-report-2015-2/> Retrieved March 13, 2017.

<sup>10</sup> <http://www.honeytraveler.com/types-of-honey/grading-honey/> Retrieved March 13,

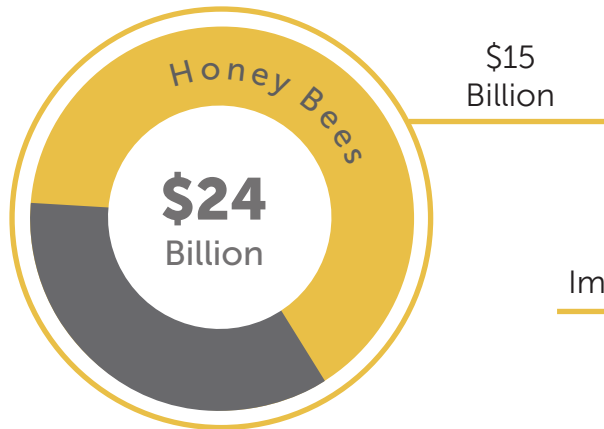






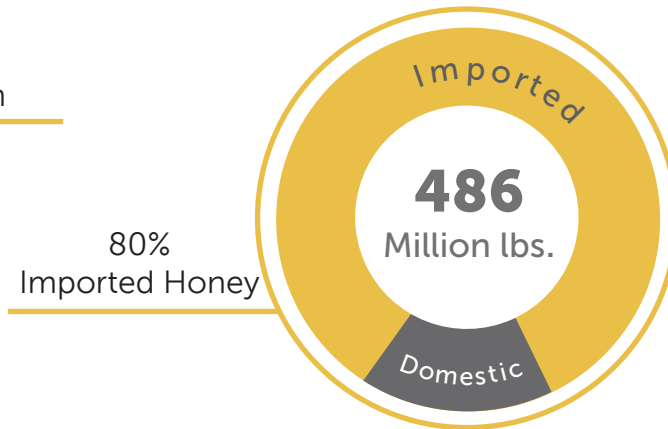
# BEE ECONOMICS & CONSUMPTION

## Annual Pollinator Contribution to the U.S. Economy<sup>1</sup>



While pollinators contribute more than \$24 billion annually, over 62% of that contribution comes exclusively from honeybees.<sup>1</sup>

## U.S. Honey Consumption - 2015<sup>2</sup>



Out of all of honey consumed in the U.S., nearly 80% is brought in from other countries, with India and Vietnam being the largest importers.<sup>2</sup>

# HONEY BEE IMPACT ON ALMONDS

In February and March of each year, Central California is home to nearly two million honey bee colonies, and it's not because of the sunny, wonderful weather.

Commercial beekeepers and bees are descending on the almond farms of Central California to have honey bees help with pollinating almond trees during the bloom period. This time is basically when the crop is made, as pollination will literally set the seed for the 2 billion-pound (billion!) California almond crop.<sup>3</sup>

"We call these 'pollinator events' in the beekeeping community," said Jerry Hayes, the honey bee health expert at Monsanto. "Commercial beekeepers drive from all over the country to have their honey bees pollinate the almond crop. The honey bee's impact on food production shouldn't be taken lightly."

Some crops, such as almonds, are almost exclusively pollinated by honey bees.<sup>1</sup> It's amazing how much impact such a small creature has on our food system. The honey bees will also travel around the country to pollinate watermelons, blueberries, pumpkins, and dozens of other crops throughout the growing season.



<sup>1</sup> <https://obamawhitehouse.archives.gov/the-press-office/2014/06/20/fact-sheet-economic-challenge-posed-declining-pollinator-populations> Retrieved January 20, 2017.

<sup>2</sup> <http://www.beeculture.com/u-s-honey-industry-report-2015-2/> Retrieved January 20, 2017.

<sup>3</sup> [https://www.nass.usda.gov/Statistics\\_by\\_State/California/Publications/Fruits\\_and\\_Nuts/2016/201605almpd.pdf](https://www.nass.usda.gov/Statistics_by_State/California/Publications/Fruits_and_Nuts/2016/201605almpd.pdf) Retrieved January 20, 2017.



# WORKING TOGETHER TO IMPROVE HONEY BEE HEALTH

It is now generally understood that many factors interacting in complex ways can impact bee health. Some of the identified factors are pests and pathogens, such as *Varroa*, bee viruses, Nosema, beekeeping practices, hive nutrition, extreme weather, and other environmental conditions. **The Honey Bee Health Coalition** — facilitated by The Keystone Center — is composed of diverse organizations (including Monsanto) who are committed to finding solutions to these challenges. The Coalition's mission is to collaboratively implement solutions that will help to achieve a healthy honey bee population in the context of productive agricultural systems and thriving ecosystems. The Coalition's four areas of focus are: forage and nutrition, hive management, crop pest management, and outreach and education.

To learn more about the Honey Bee Health Coalition and its ongoing work in improving honey bee health, visit: [www.honeybeehealthcoalition.org](http://www.honeybeehealthcoalition.org)

## POLLINATING YOUR PLATE

This breakfast photos below tell a compelling story. Without bees, most of the foods below would either not exist or would experience reduced yields: there would be no honey or almond butter, limited fruit and avocado, no grapefruit juice, less coffee, and no cream produced by alfalfa and clover munching cows.





# THE GROWER'S ROLE

Proactive communication between growers, applicators, and beekeepers is essential to protect honey bees from unintended pesticide exposure. Beekeeper and landowner cooperation is based on mutual interests and is important to mitigate risks of pesticide exposure to pollinators.



## WHEN BEES ARE PLACED FOR CROP POLLINATION

**Growers contracting honey bees and the commercial beekeeper should:**

- Discuss grower's pest management program before agreement is made and apiary is placed.
- Identify any risks of pesticides being used and discuss best management practices to protect pollinators.
- Develop an agreement, preferably written, outlining the following steps:
  1. Timing of crop bloom and desired pest treatments;
  2. Beekeeper's responsibility to provide strong effective colonies;
  3. Landowner's responsibility to safeguard bees from off-target exposure;
  4. Location for apiary placement on the land for access to pollinated crop, water, and buffer areas.

## WHEN BEES ARE PLACED ON PUBLIC OR PRIVATE LANDS, NOT FOR POLLINATION

**Grower/Landowner Responsibilities:**

- Always refer to the pesticide label for application requirements.
- Review the managed pollinator protection plan (MP3) or other bee health plans for the state or province if available.
- Abide by the agreement — verbal or written. Protect water sources from contamination by pesticides of concern.
- Inform applicators of apiary locations, agreements, and pollinator friendly practices.
- Notify the beekeeper as soon as possible before an application is planned.



Monsanto is proud to collaborate with the following partnerships:

**HBAC**  
HONEY BEE ADVISORY COUNSEL



**HONEY BEE  
HEALTH  
COALITION**

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