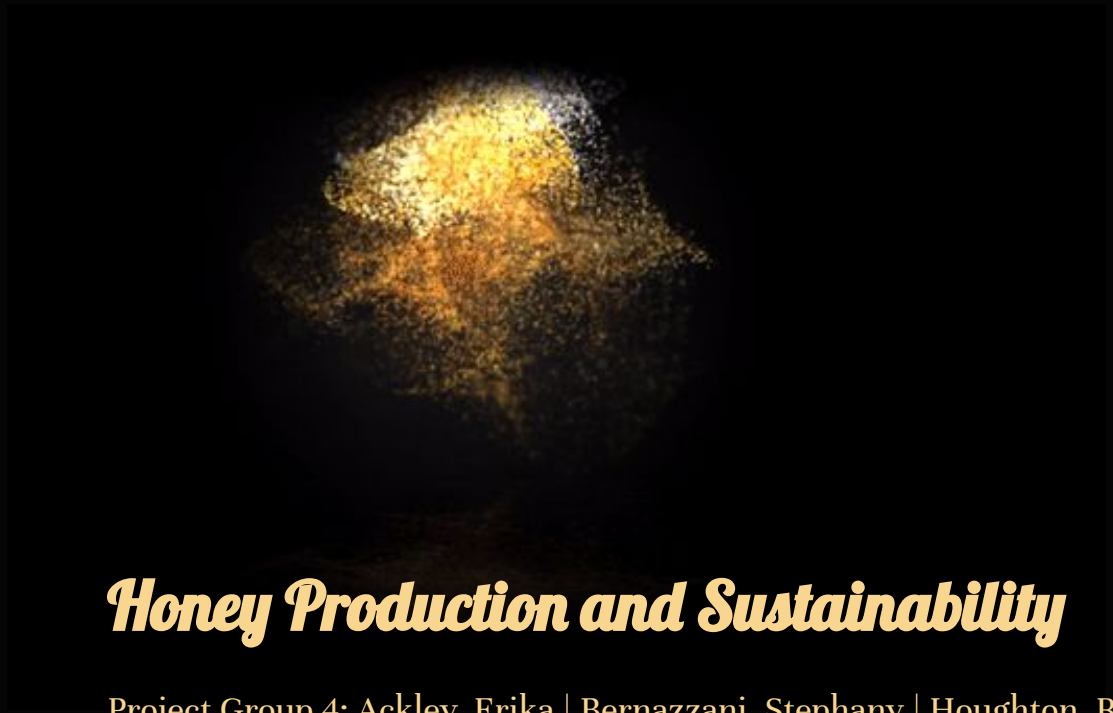

Honey Production and Sustainability

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Northeastern University

Outline

1. Introduction
2. Datasets
3. Analysis
4. Insights
5. Future Explorations
6. Questions

Why is this important?

Bees are key players in our ecosystem

70%

Bees pollinate 70 of the top 100 human food crops

300 million

Number of flowers a colony can pollinate in a bee

1/3

Of our food supply relies on bees for pollinisation

$19 billions

Added dollar value to the agricultural industry by bees

85%

Of plants and trees themselves need bees to reproduce

60% reduction

In number of colonies from 1947 to 2008

Source: Greenpeace & WorldBeeDay

The use of neonics is linked to honey-bee colony collapse disorder (CCD)

CCD is a condition affecting natural and domesticated honey bee colonies that causes the bees to leave the hive.

Some possible contributing factors include:


Climate Change


Pesticide Use


Loss of Natural Habitat


Parasites


Viruses

Source: Greenpeace & WorldBeeDay

How do pesticides affect bees?

Neonics are water-soluble and applied directly to the soil, or sprayed directly on seeds and plants.

Plants and seeds soak up neonics from the soil.

Neonics stay in the plant throughout its life.
As the plant matures, the neonic is present in every cell.

When a honeybee arrives at a blossom to collect pollen, contact with the flower exposes much of the bee's body to neonics

DISEASE & DEATH

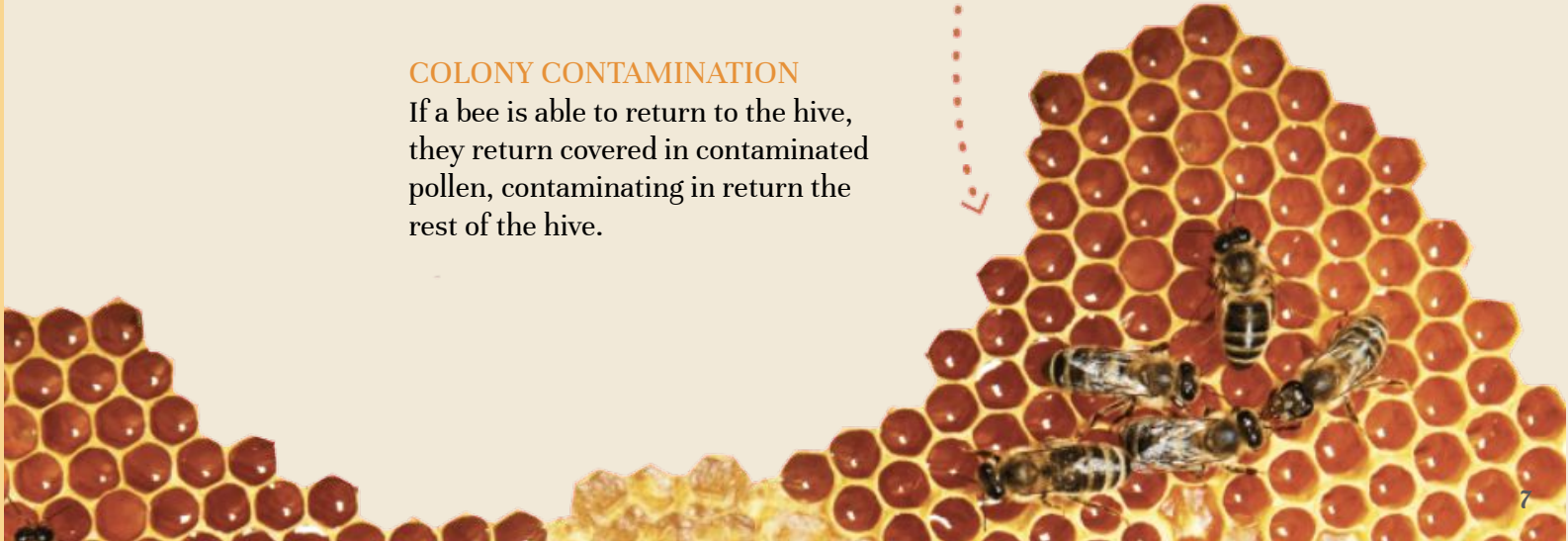
Neonics make it hard for bees to groom themselves and makes them more susceptible to disease and mites and weakening their immune systems.

LOST & CONFUSED

Neonic affects bees' ability to navigate back to the hive. Disoriented and alone, they die. Worker bees supply the colony's food and if they don't come back the entire colony can starve.

COLONY CONTAMINATION

If a bee is able to return to the hive, they return covered in contaminated pollen, contaminating in return the rest of the hive.



Investigation

What is the effect on the number of colonies, yield per colony, and total production of honey, as pesticide use goes up?

Datasets

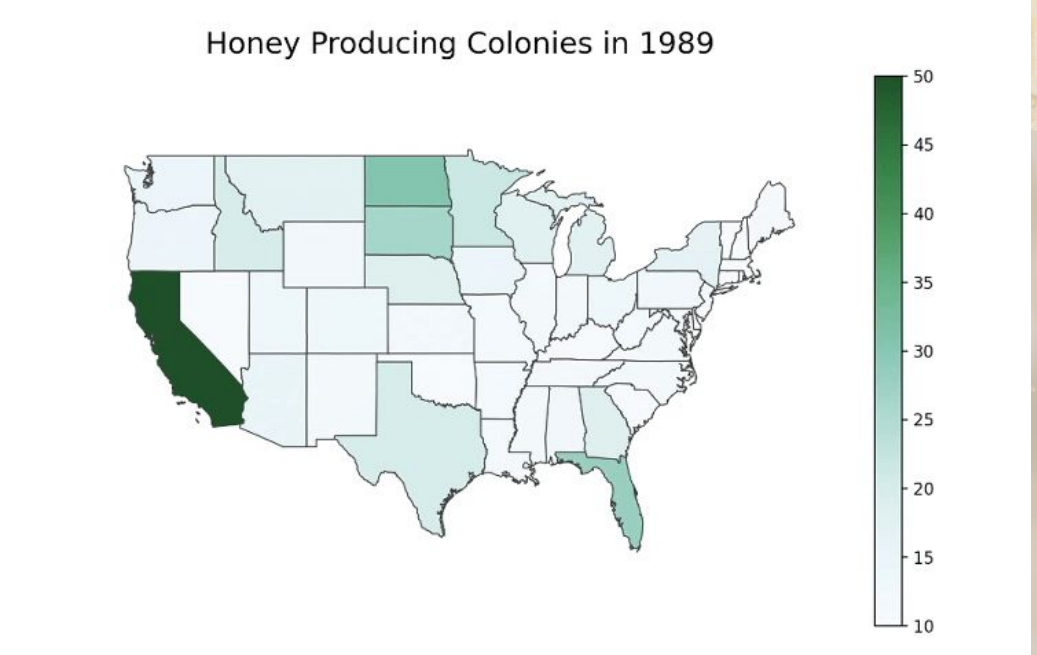
NASS Bee Colony and Honey

Provides context for honey production and bee colony data in the U.S. between 1974 and 2020 as well as data on various stressors.

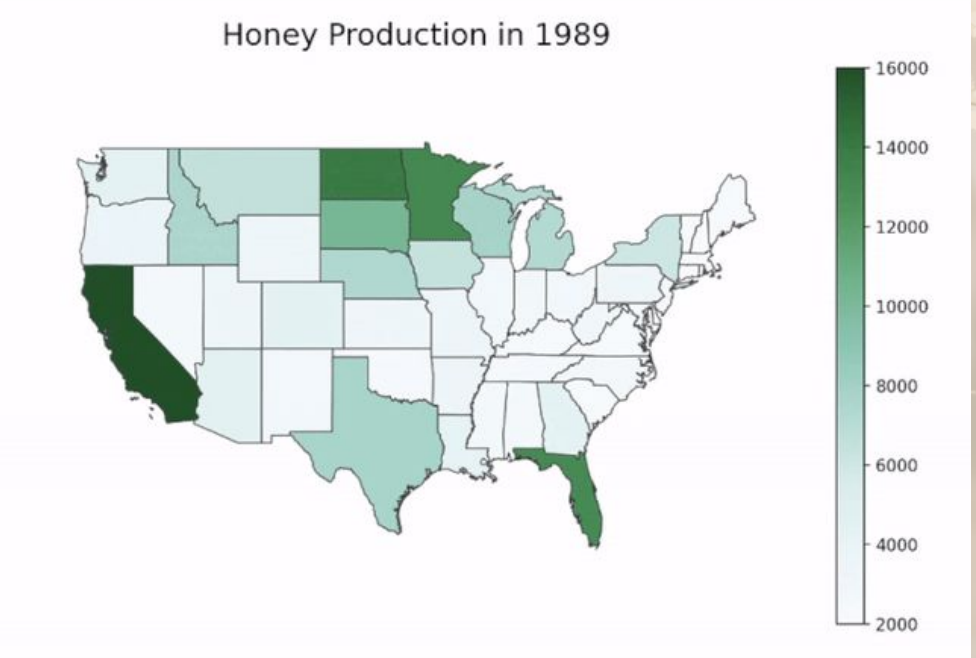
Honeybees and Neonic Pesticides

Contains data on levels of neonic pesticides by state, this data will be helpful in analyzing a relationship between pesticides and the decline of honeybee colonies by state.

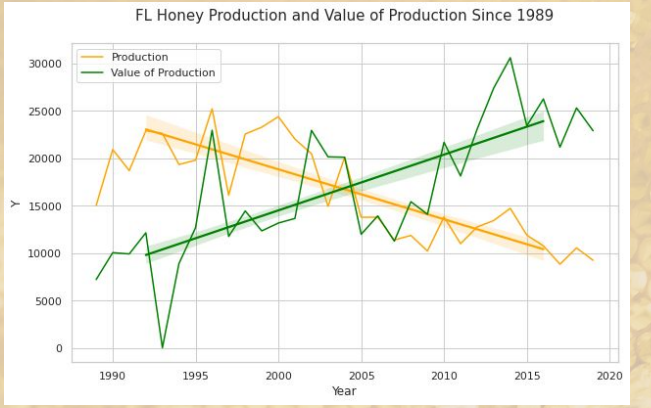
Overview of Honey Producing Colonies in America

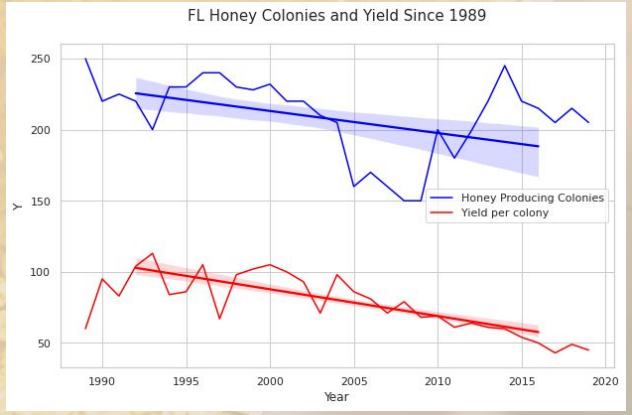


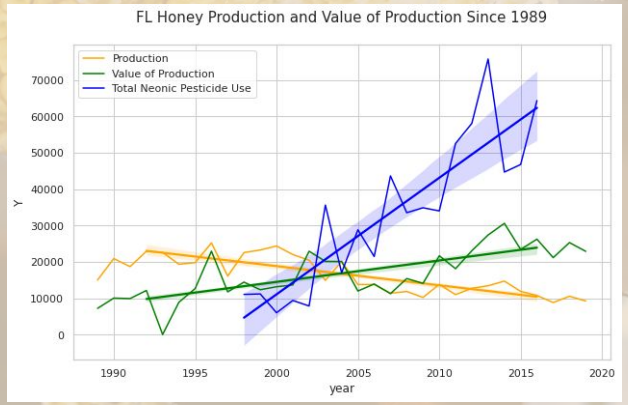
Overview of Honey Production States in America



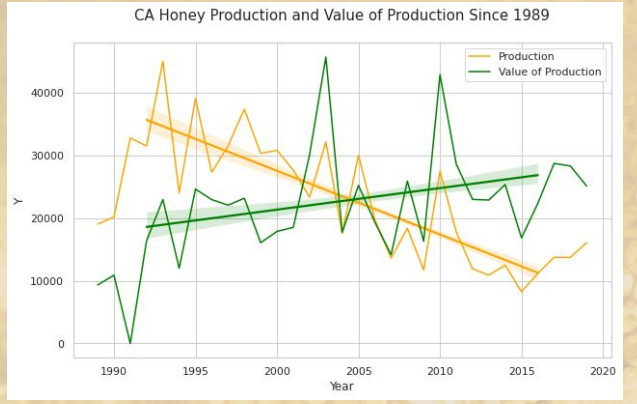
Changes in Production, Value, and Pesticide Use Since 1989: Florida

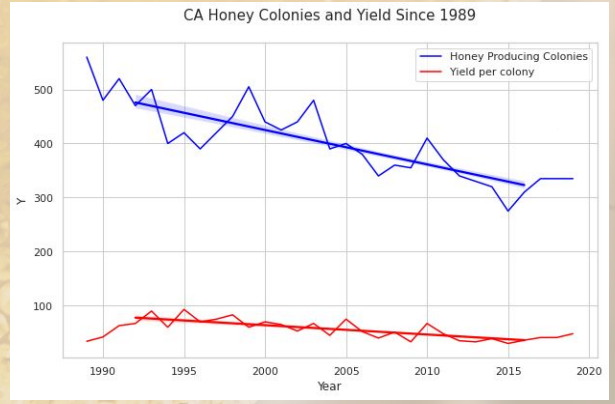


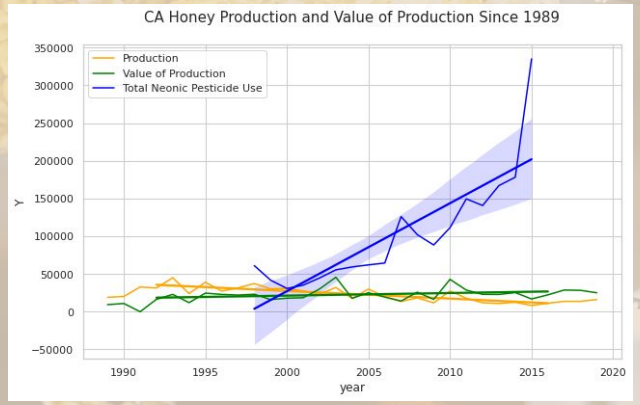




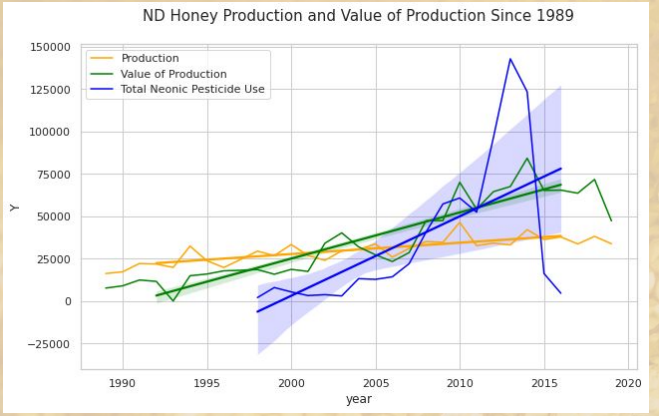
Changes in Production, Value, and Pesticide Use Since 1989: Californi

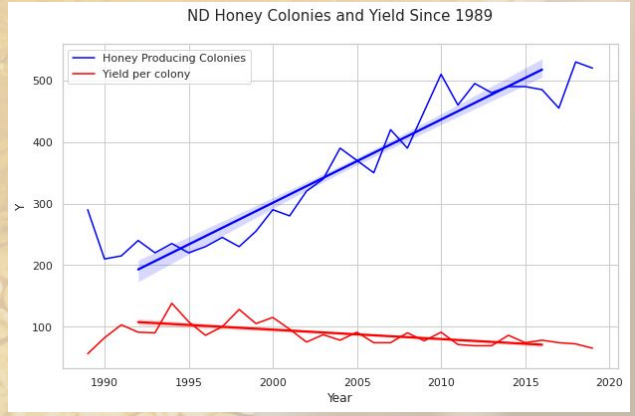


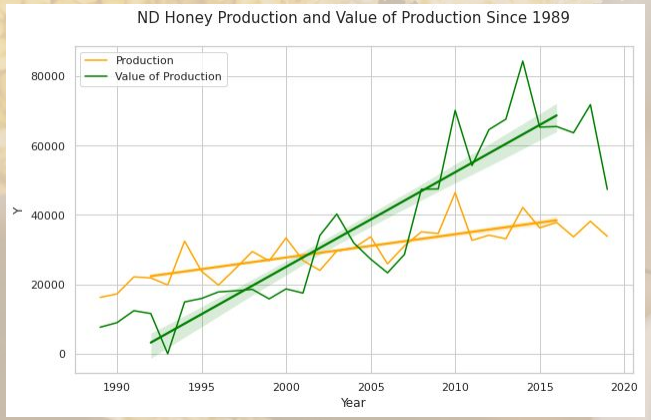




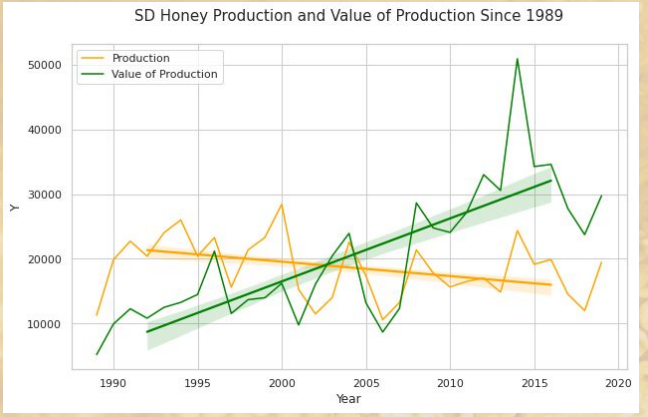
Changes in Production, Value, and Pesticide Use Since 1989: North Dakota

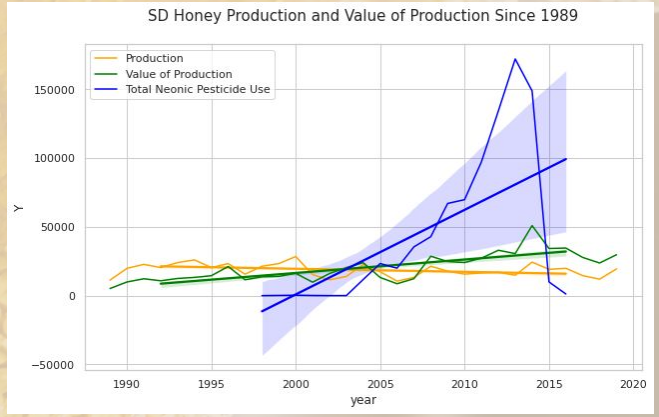


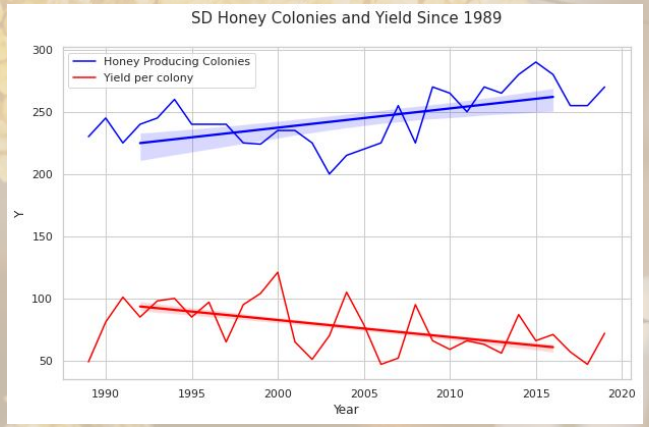




Changes in Production, Value, and Pesticide Use Since 1989: South Dakota

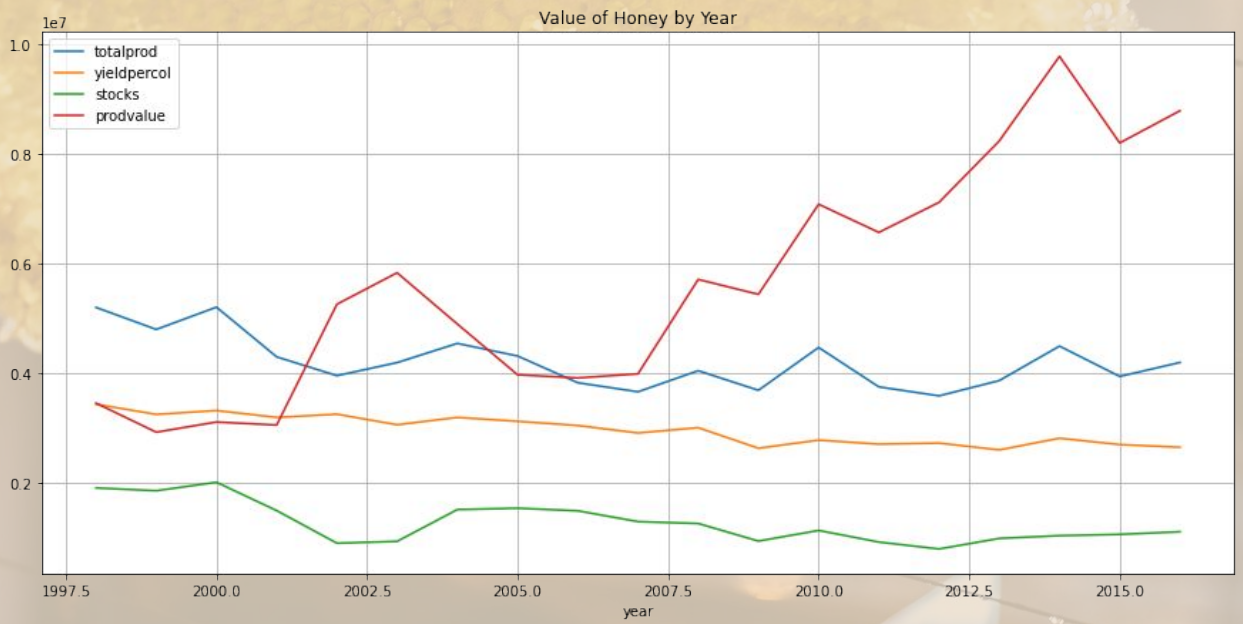






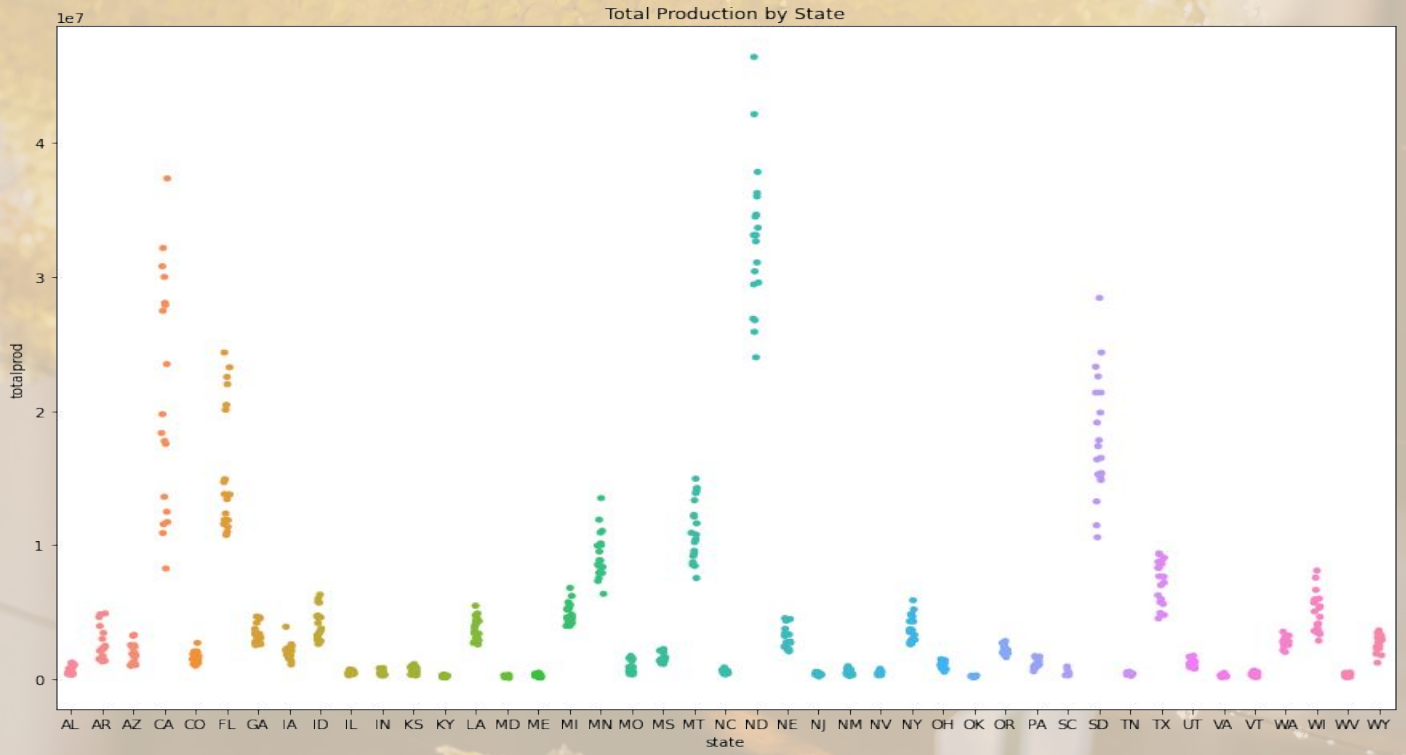
General Insights

- Production value has increased substantially while total production and yield from colonies has declined over the years

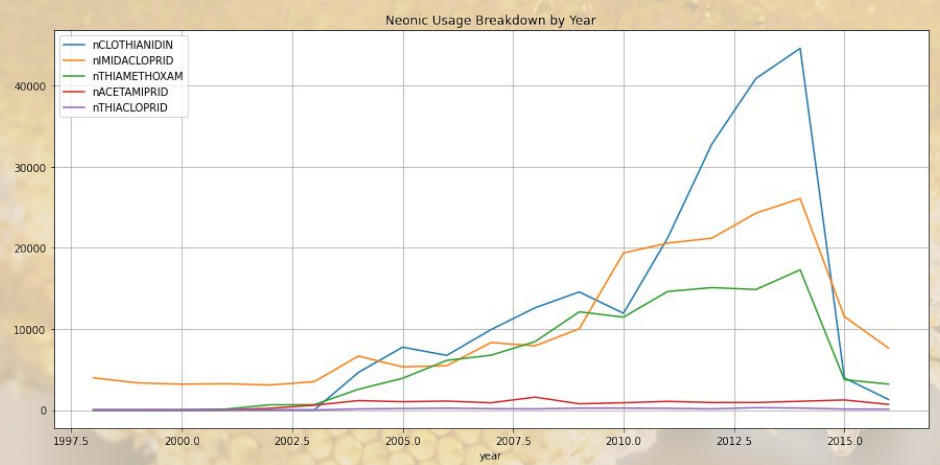


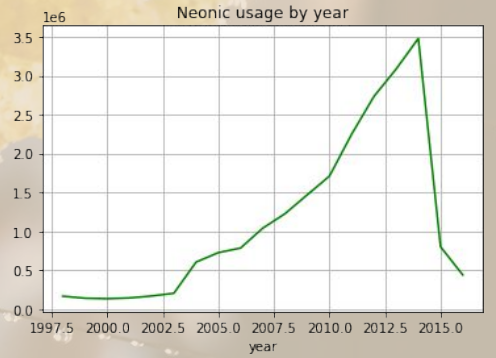
General Insights: Production by State

- Top four honey producing states include California, Florida, North Dakota, and South Dakota



General Insights: Pesticides



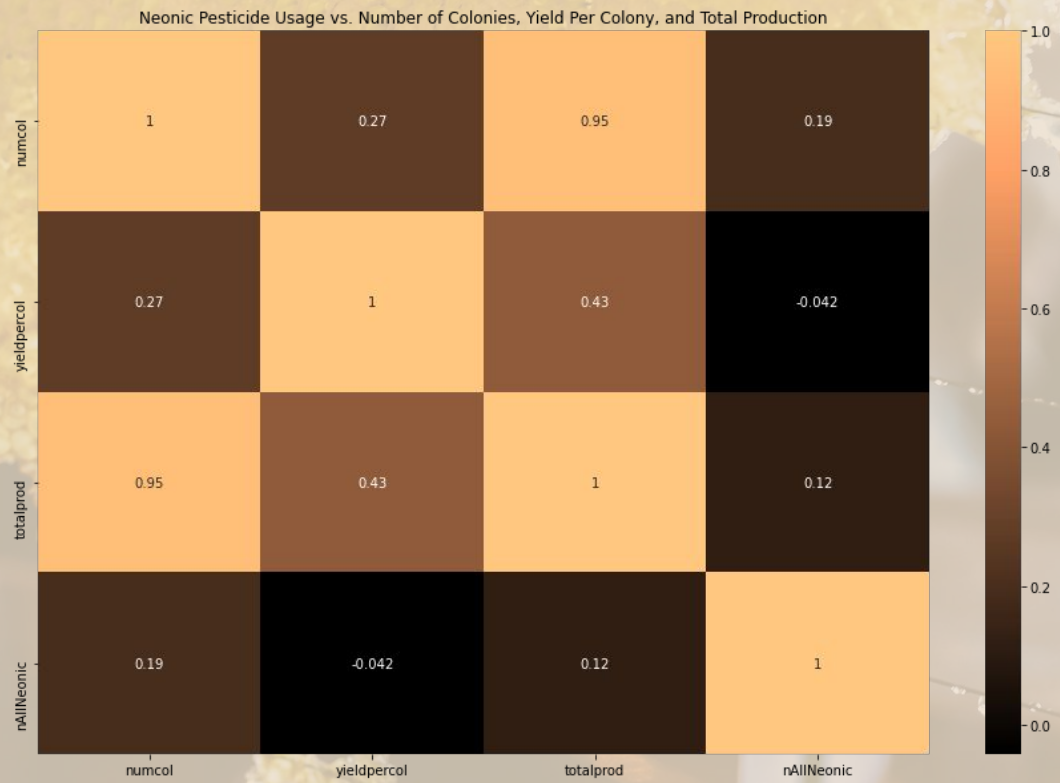


- Neonic (pesticide) usage has increased tremendously
  - Peak in 2014
- Breakdown of pesticide usage revealed Clothianidin and Imidacloprid as most commonly used

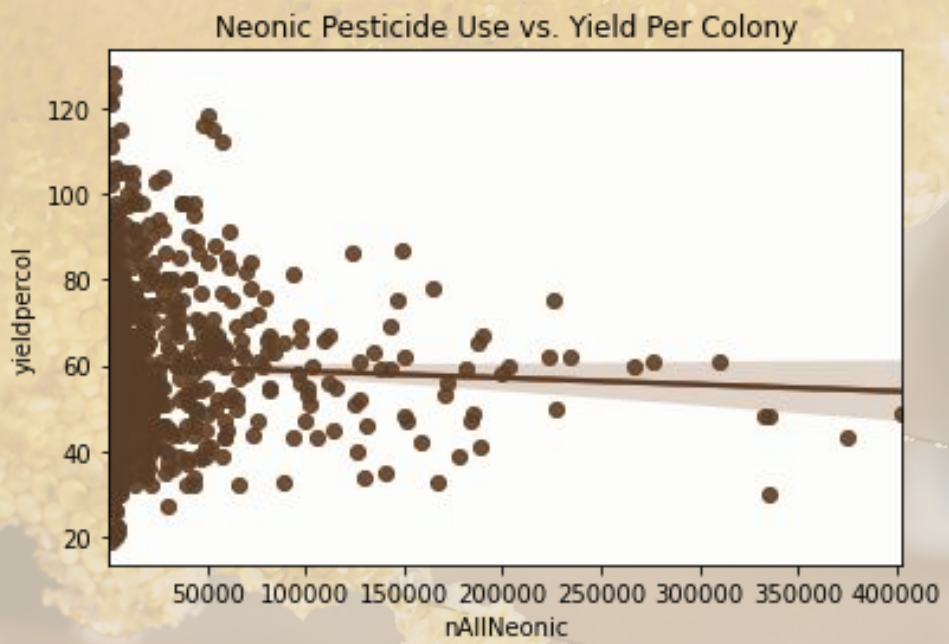
Regression Analysis: The effects of Neonic Pesticides

Hypothesis:

As neonic pesticide use goes up, the number of colonies, yield per colony, and total production of honey will go down.



Regression Analysis: The effects of Neonic Pesticides



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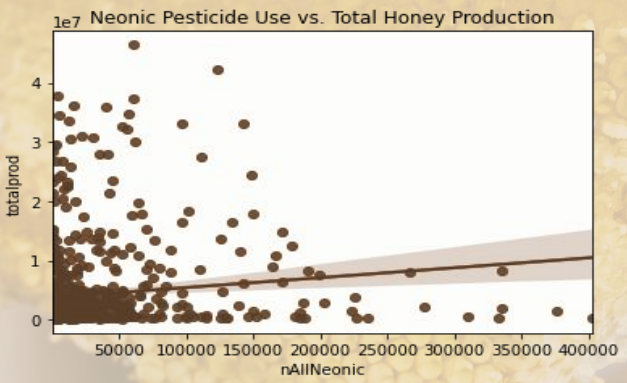
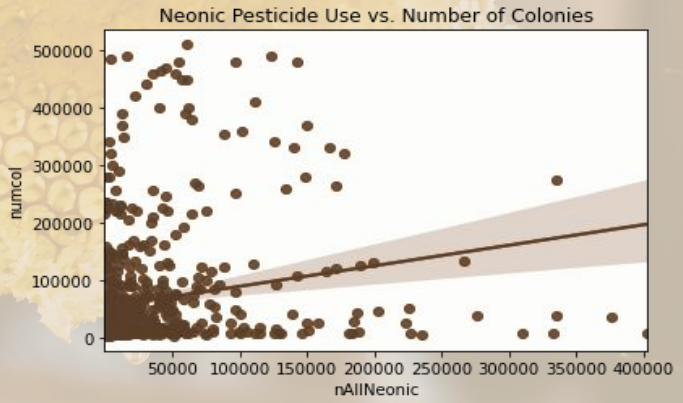
Regression Analysis: The effects of Neonic Pesticides





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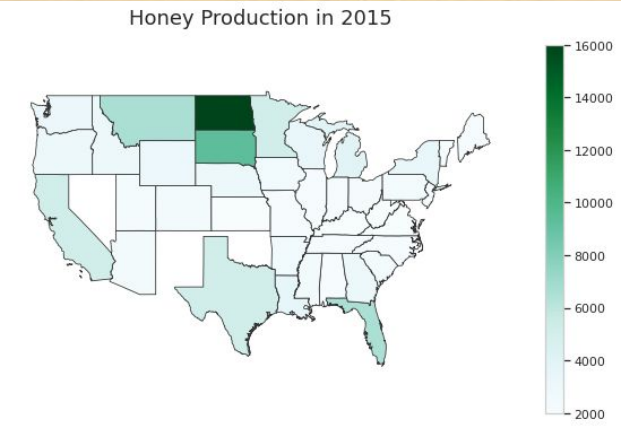
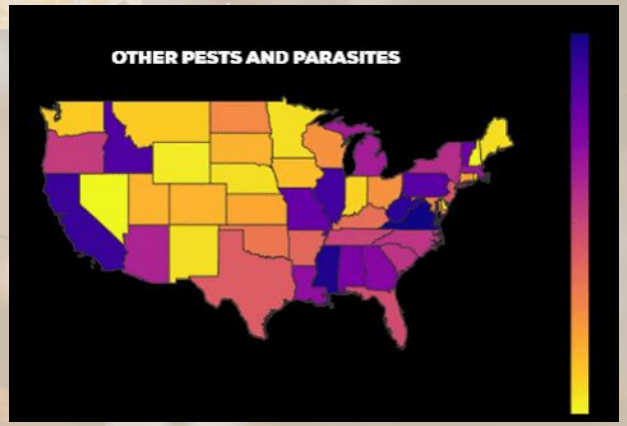
Future Exploration

- Consider the effect of diseases and pests. Also insights into environmental changes





Thank you!

Questions?