

Final Project Slides with Description

Neha Gupta



About Me - Neha Gupta

Masters in Computer Science and Applications

Looking forward to joining a team with data analyst role where I can contribute my skills of problem solving and data analysis to use.

Past experience includes working in IT firms to deliver solutions to end clients.

Quick learner and hard worker with expertise in Coding and Analysis.



The Queen Bees
ENTITY ACADEMY

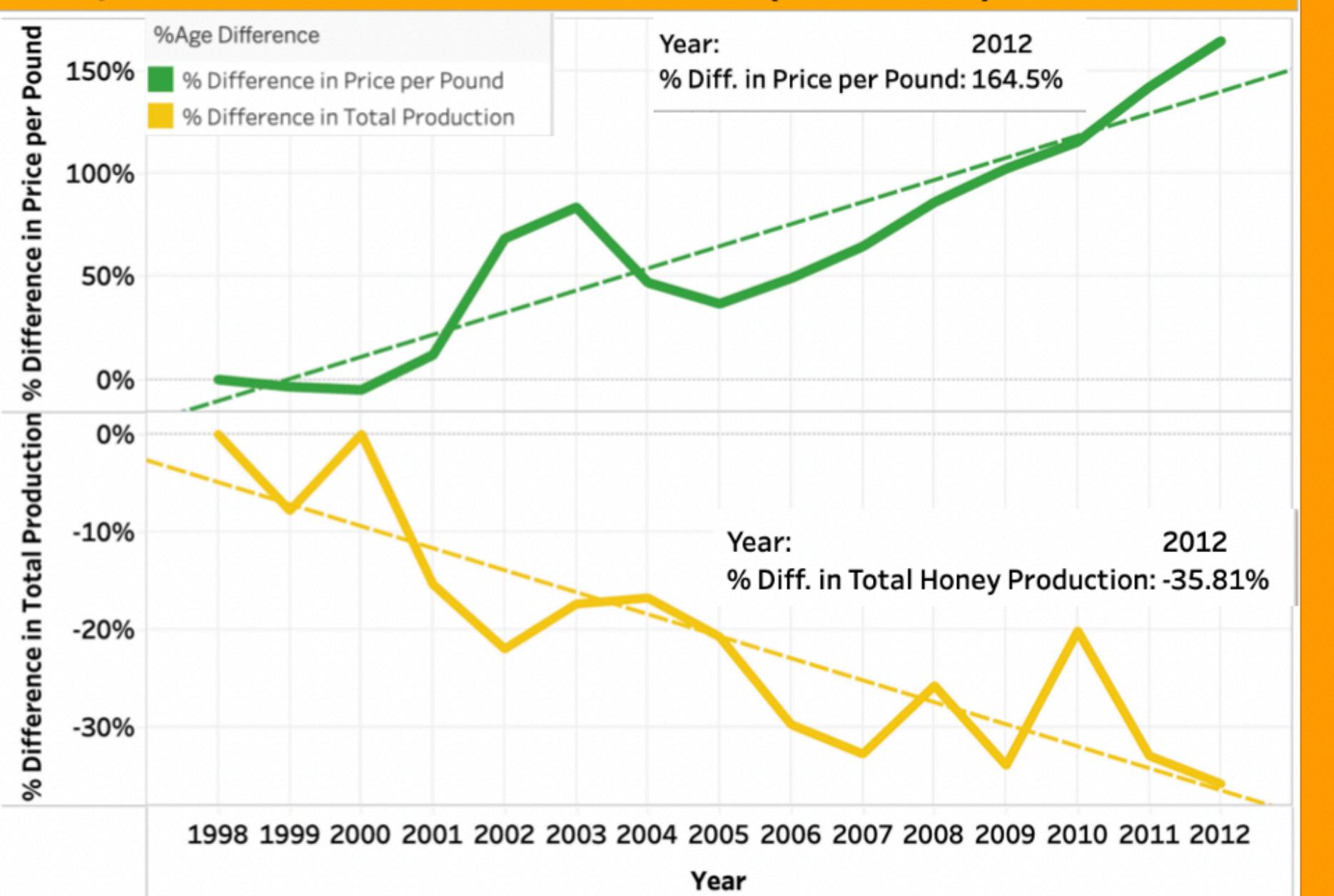
ABOUT ME : SLIDE - 8

Hello everyone! I am Neha.

- Currently, I am a stay at home mom and student at Entity Academy.
- I got my Bachelors and Masters degree in Computer Science and Applications.
- AND few years of IT experience as a Software Developer.
- I took work break for a while , and now I am ready and hoping
 - to start my career in the fast-growing Data Science industry.
- In my spare time(which is a luxury with kids),
 - I am always at look out for a good book
 - {thriller being my favorite genre}, and taking museum tours.
 - I love cooking for my family and friends,
 - which makes this topic , very close to my heart because
 - it's important that we ALWAYS have QUALITY food served
 - on our tables.

HOW HAS HONEY PRODUCTION CHANGED & IT'S EFFECT ON US AGRICULTURE

Honey Production Decline vs Prices Incline(1998 -2012)



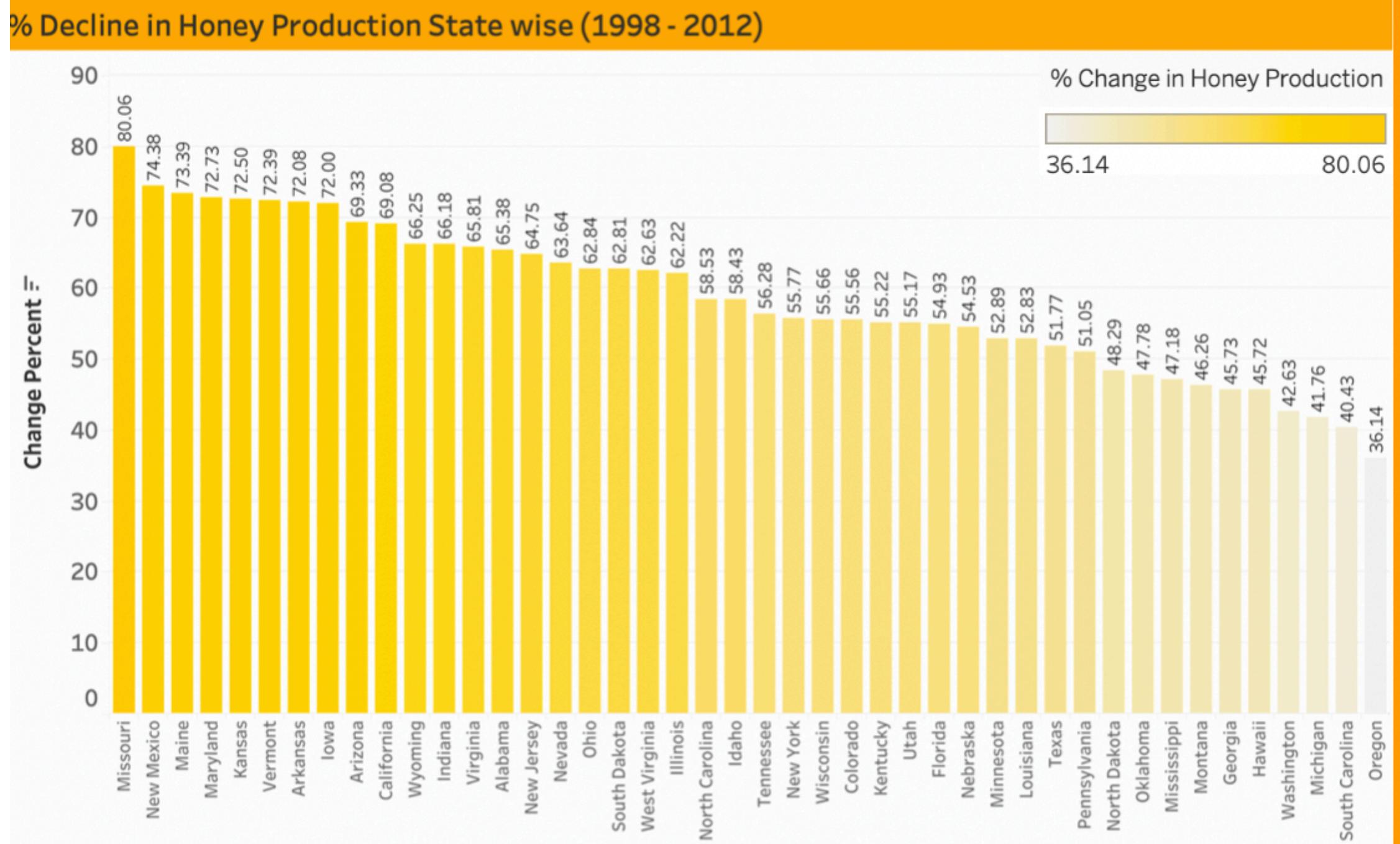
- 1/3 of our food relies on bee pollination.
- 90+ US crops rely on honey bee for pollination.
- No bees, no availability of fresh produce, and human nutrition would likely suffer.
- Beekeepers across the country lost 45.5% of their managed honey bee colonies from April 2020 to April 2021

As we can see in the graph,

- the production of honey has declined by about 35% while
- the prices have sky rocketed to about 164 %
- between 1998 and 2012 MEANING
- demand for honey is still high while the supply is depleting.
- Honey bees are clearly vital parts of our ecosystem,
 - acting as highly efficient pollinators of our food crops as well as for wild flora.
 - 1/3rd of our food and over 90 crops rely on honey bee f or pollination.
 - and they give rise to a lucrative honey industry as well.
- According to the latest data,
 - Beekeepers across the United States lost 45.5% of their managed honey bee colonies from April 2020 to April 2021 which is really sad and future of bees look perilous unless some solid steps are taken.
 - We need bees to keep our crops and Earth healthy.

SLIDE - 15

HONEY PRODUCTION DECLINE BY STATE

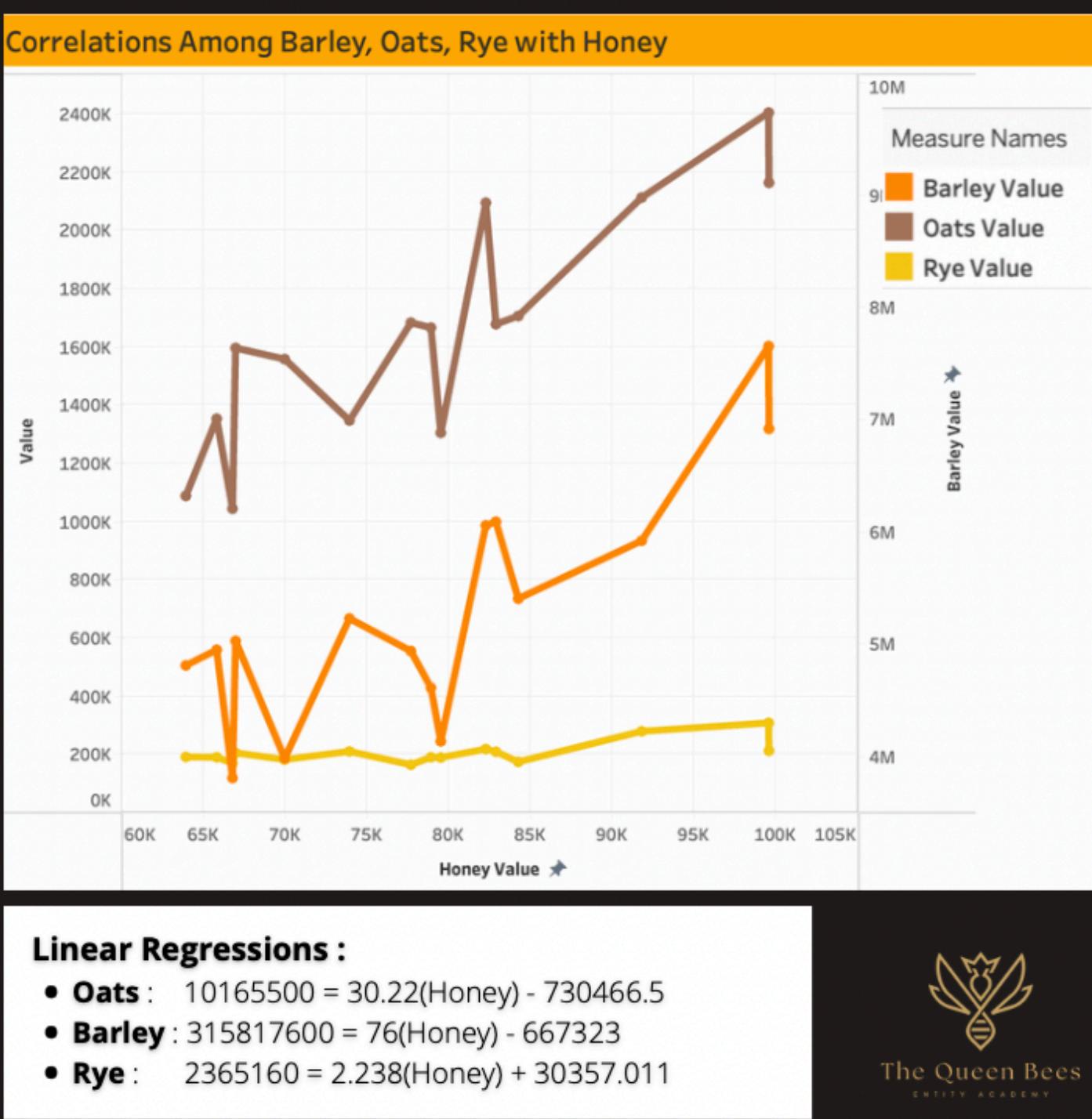
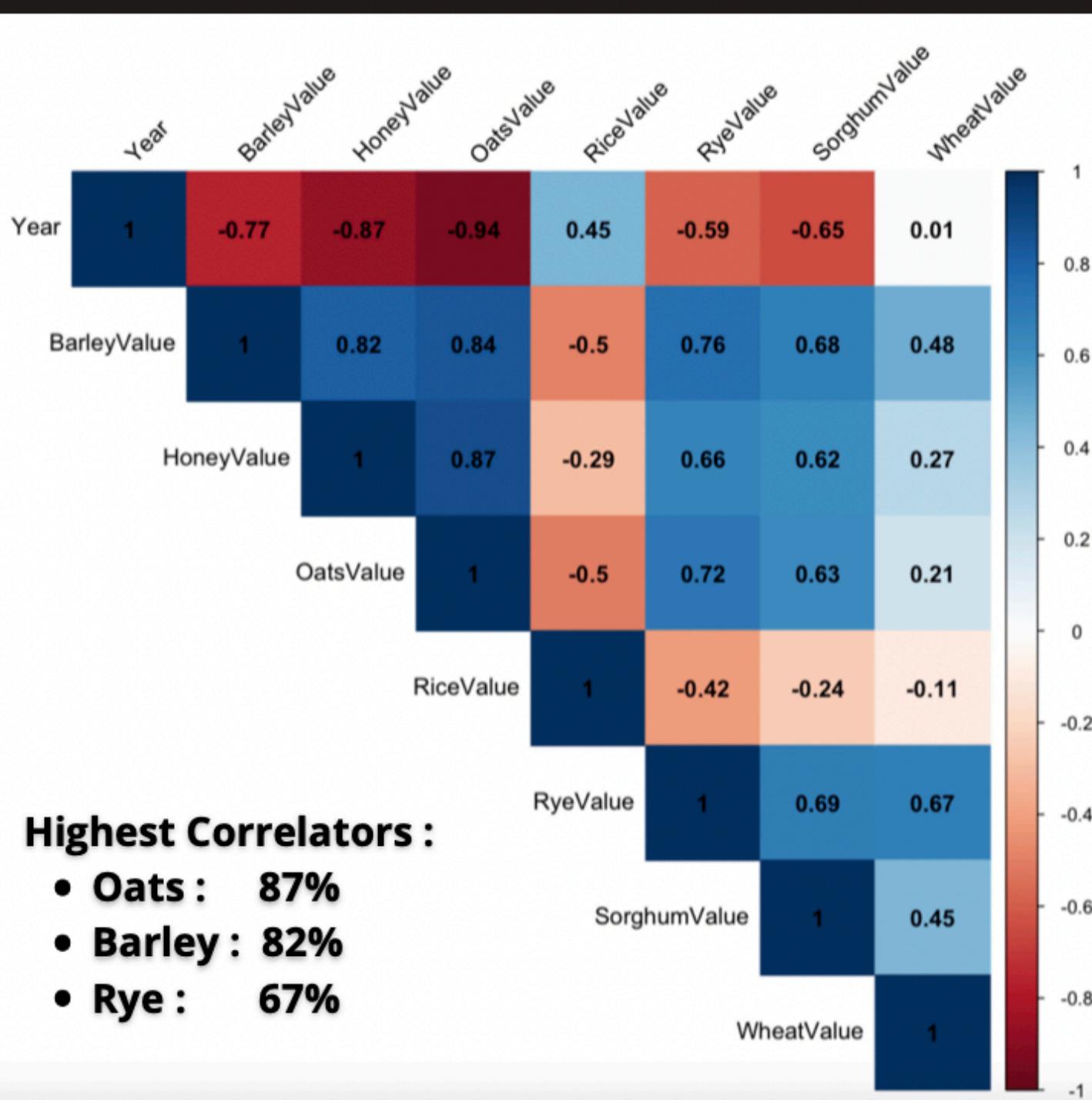


- Maximum Decline
 - Missouri - 80%
 - New Mexico - 74%
- Minimum Decline
 - Oregon - 36%
 - South Carolina - 40%
- Reasons for Decline
 - intensive agricultural practices
 - changes in land use
 - use of pesticides
 - pest and disease outbreaks by extreme weather

Here we see at what rate honey production declined in different US states.,

- between 1998 and 2012
- Missouri showed the most decline with production falling by 80% followed by New Mexico at 74%.
- Oregon saw the least decline with 36% and
- South Carolina by 40 %
- This worrying decline in the number of pollinators are largely brought about by
 - intensive agricultural practices
 - changes in land use
 - use of pesticides and
 - pest and disease outbreaks by extreme weather .

GRAINS & OATS



- We studied Barley, Oats, Rice, Rye, Sorghum and Wheat and their relationship with honey here.
- Out of all these grains ; Oats , Barley and Rye
 - are amongst the highest correlated grains.
- With Barley and Oats having over 80% while Rye over -65% of Correlation with honey.
- Looking at the line graph on the right, we can see they
 - are all showing a positive correlation with honey.
- Meaning, with every spike in honey production,
 - brings about the same fluctuation in Barley Rye and Oats.
- On the bottom right are the Linear Regression Equations
 - that we'll use later in our further calculations.
- Going through the analysis we found out

Honey accounts for roughly

- 74 % production of **Oats**.
- 64 % of **Barley**.
- and 40 % production of **Rye in any given year**

SLIDE - 22



Which begs the question...

WHAT DOES THIS MEAN FOR THE FUTURE OF HONEY?

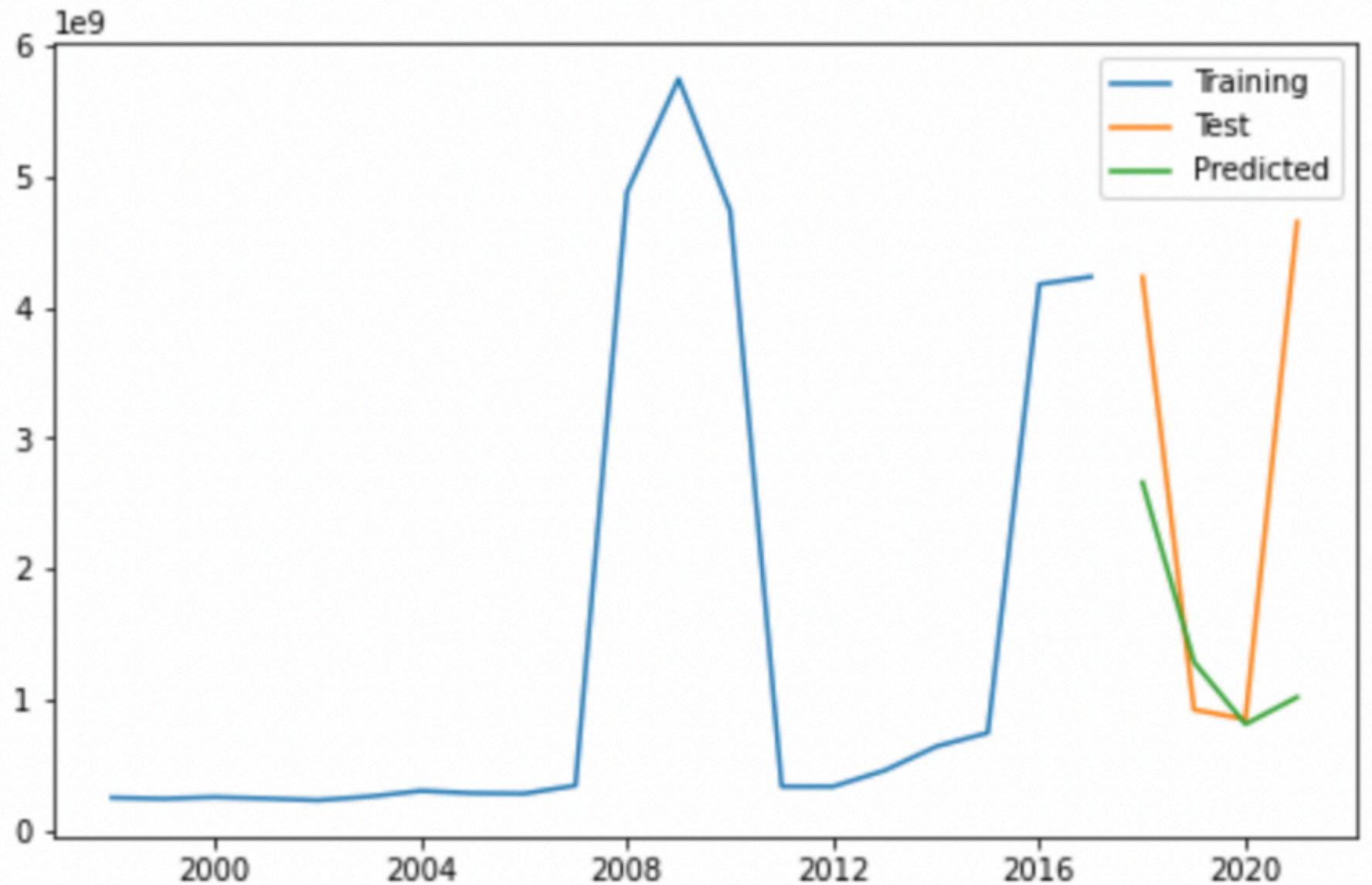
SLIDE - 25

- So looking at all the commodities and how most of them are tied up with honey bee pollination .. leads to the question, what is The future Of Honey, can we predict how the honey production be in the coming years?.
- To answer this question,
- We tried our hands at ARIMA to try some forecasting
 - We did our own research based on the materials provided by our mentors and instructors. And our best friend Google :),
- You ask what ARIMA is?
 - ARIMA is a method for forecasting or predicting future outcomes based on historical time series.
 - It is based on the statistical concept of serial correlation, where past data points influence future data points.
 - It is widely used in demand forecasting, such as in determining future demand in food manufacturing
 - Something similar to what we are doing here.
 - ARIMA models can also be used to predict the future price of your stocks based on the past prices.
 - Interesting isn't ? Well it just forecasts and not cover the losses :D
- Let's go through an example in the next slide.

Future Forecasting of Honey Production using ARIMA

OATS PREDICTION(2022 - 2025)

STEPS



Linear Regression Equation:
Oats: $10165500 = 30.22(\text{Honey}) - 730466.5$.

- Prediction for all highly correlated commodities.
- Pick the prediction value for each commodity for year 2023
- Feed them into the Linear Equations.
- Calculate the prediction for Honey for 2023
- Honey prediction based on Oats came to be 360,554.8 Metric Tons for 2023.

- The graph on the left shows the prediction and
 - forecasting for one of the highly correlated
 - commodities - **Oats**.
- We graphed this for each of our commodity which was highly correlated with honey.
- Not going too much in detail, I just want to mention that ARIMA model works with basic principle of dividing the data in test data and training data to predict the future data.
- Since we were trying to predict honey for year 2023, we picked the Commodity(Oats in this case) predictive value for 2023.
- And fed it into the linear equations we saw in the earlier slides, to get the value of honey production for 2023.
- And we did this for each of the highly correlated commodity in each Category/ groups.
- Based on off Oats, we predicted Honey production to be at 360,554.8 MT in 2023.

SLIDE - 26