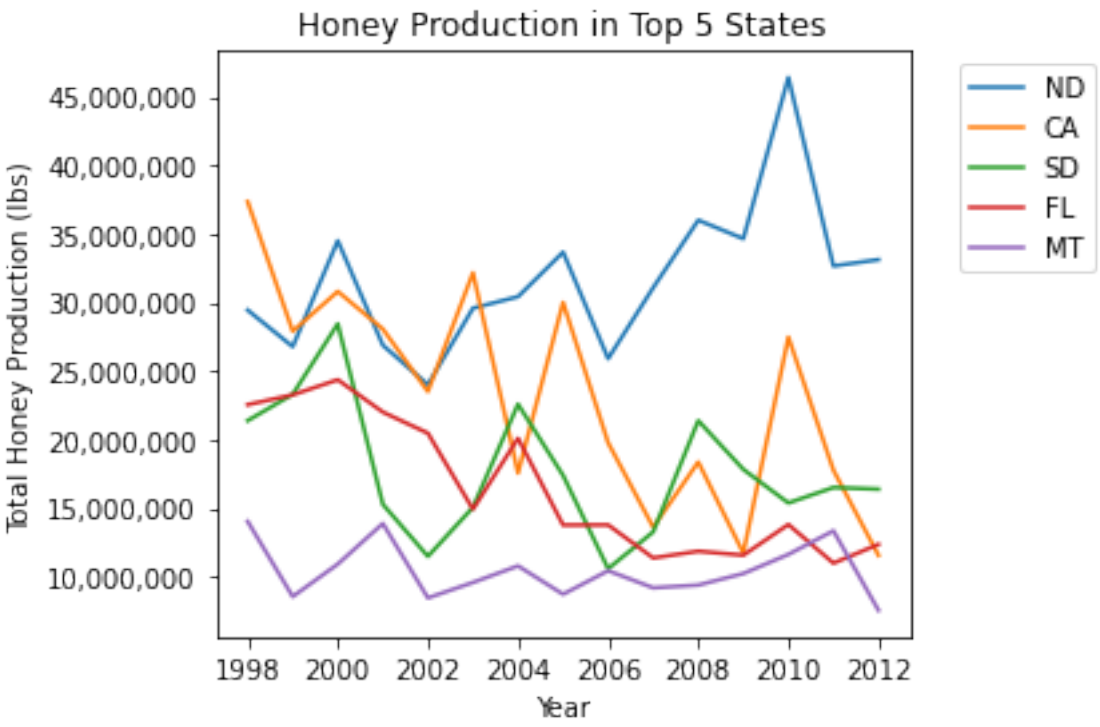
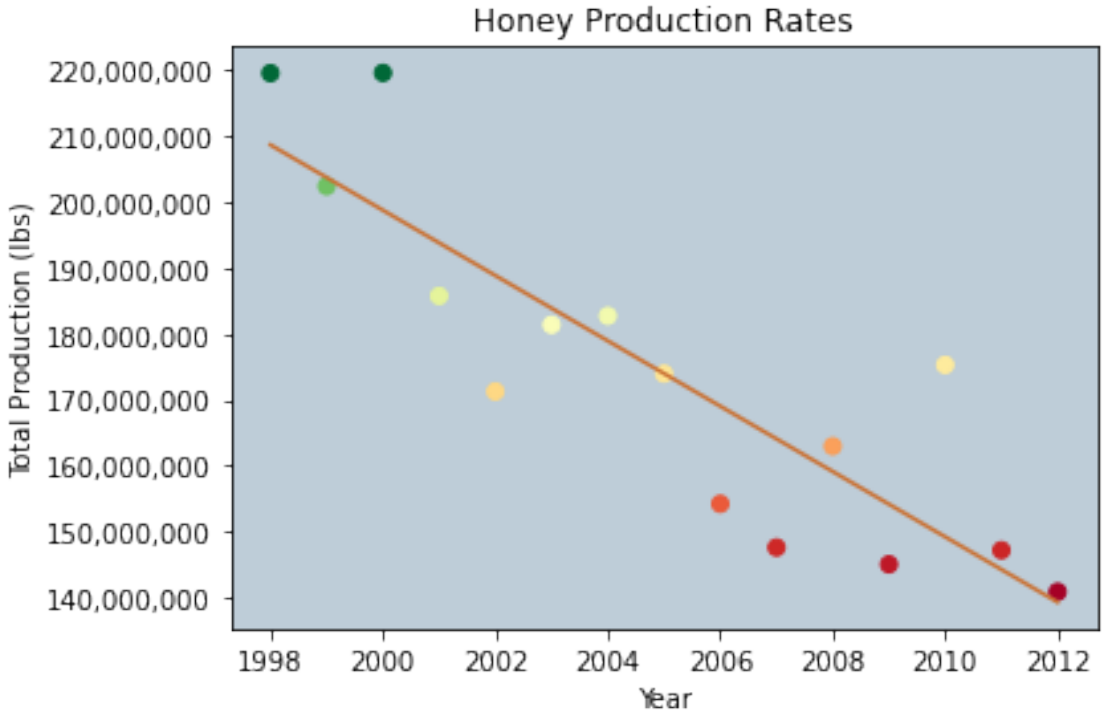
honeyproduction

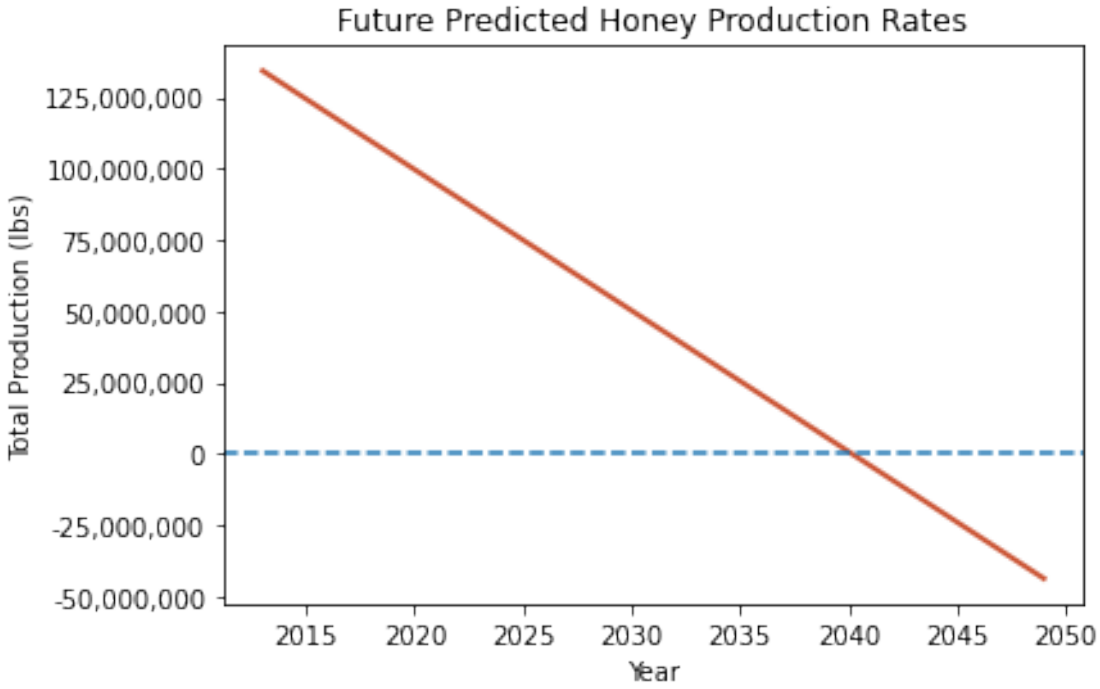
February 21, 2022

```
First 5 rows of data:
  state    numcol  yieldpercol   totalprod      stocks  priceperlb  \
0    AL   16000.0           71   1136000.0    159000.0        0.72
1    AZ   55000.0           60   3300000.0   1485000.0        0.64
2    AR   53000.0           65   3445000.0   1688000.0        0.59
3    CA  450000.0           83  37350000.0  12326000.0        0.62
4    CO   27000.0           72   1944000.0   1594000.0        0.70

    prodvalue  year
0    818000.0  1998
1   2112000.0  1998
2   2033000.0  1998
3  23157000.0  1998
4   1361000.0  1998

Descriptive stats of columns:
              numcol  yieldpercol     totalprod        stocks  priceperlb  \
count     626.000000   626.000000  6.260000e+02  6.260000e+02  626.000000
mean    60284.345048    62.009585  4.169086e+06  1.318859e+06    1.409569
std     91077.087231    19.458754  6.883847e+06  2.272964e+06    0.638599
min      2000.000000    19.000000  8.400000e+04  8.000000e+03    0.490000
25%      9000.000000    48.000000  4.750000e+05  1.430000e+05    0.932500
50%     26000.000000    60.000000  1.533000e+06  4.395000e+05    1.360000
75%     63750.000000    74.000000  4.175250e+06  1.489500e+06    1.680000
max    510000.000000   136.000000  4.641000e+07  1.380000e+07    4.150000

          prodvalue         year
count  6.260000e+02   626.000000
mean   4.715741e+06  2004.864217
std    7.976110e+06     4.317306
min    1.620000e+05  1998.000000
25%    7.592500e+05  2001.000000
50%    1.841500e+06  2005.000000
75%    4.703250e+06  2009.000000
max    6.961500e+07  2012.000000
['ND', 'CA', 'SD', 'FL', 'MT']
```


Honey Production in Top 5 States
Total Honey Production (lbs)
45,000,000
40,000,000
35,000,000
30,000,000
25,000,000
20,000,000
15,000,000
10,000,000
1998
2000
2002
2004
2006
2008
2010
2012
Year
ND
CA
SD
FL
MT

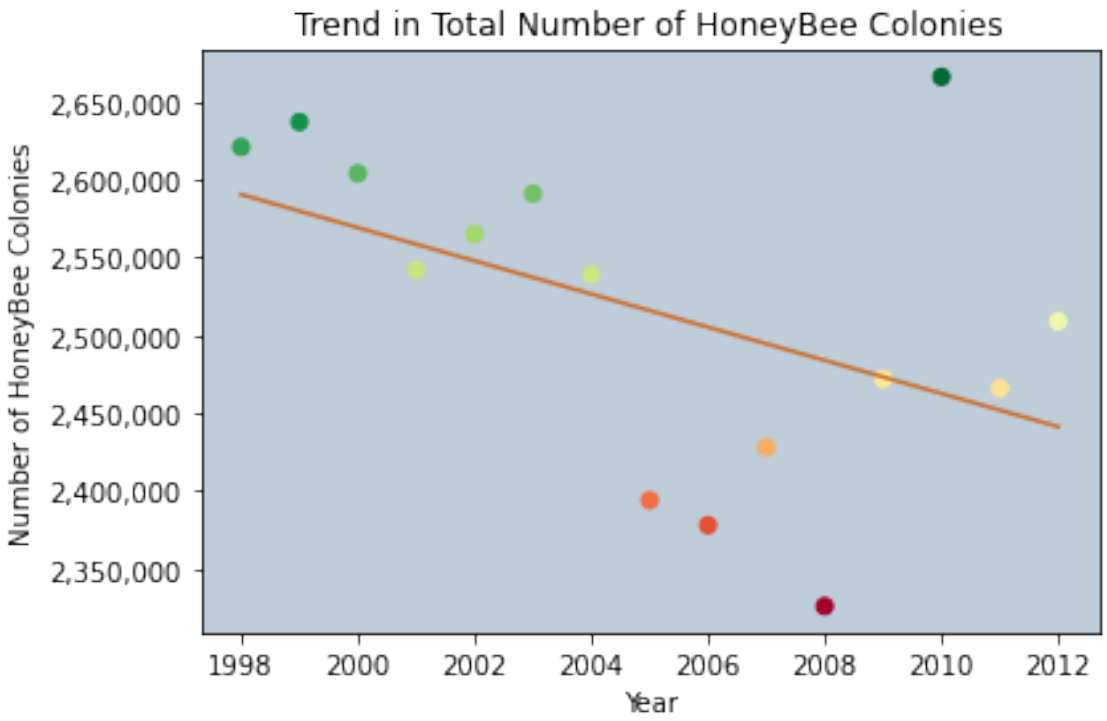

Honey Production Rates
Total Production (lbs)
220,000,000
210,000,000
200,000,000
190,000,000
180,000,000
170,000,000
160,000,000
150,000,000
140,000,000
1998
2000
2002
2004
2006
2008
2010
2012
Year

<Figure size 432x288 with 0 Axes>

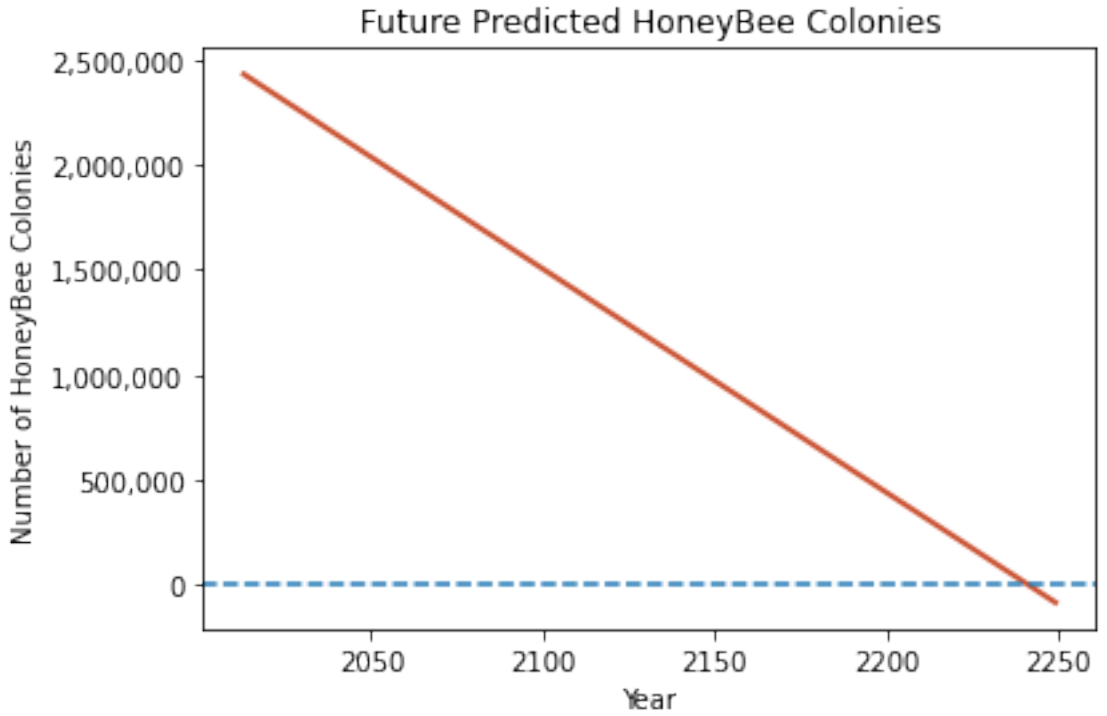


The predicted honey production in 2023 is 84869809.5 pounds.
The predicted honey production in 2035 is 25456438.1 pounds.
This model predicts that honey production will reach 0 in the year 2040 if this trend continues.

<Figure size 432x288 with 0 Axes>

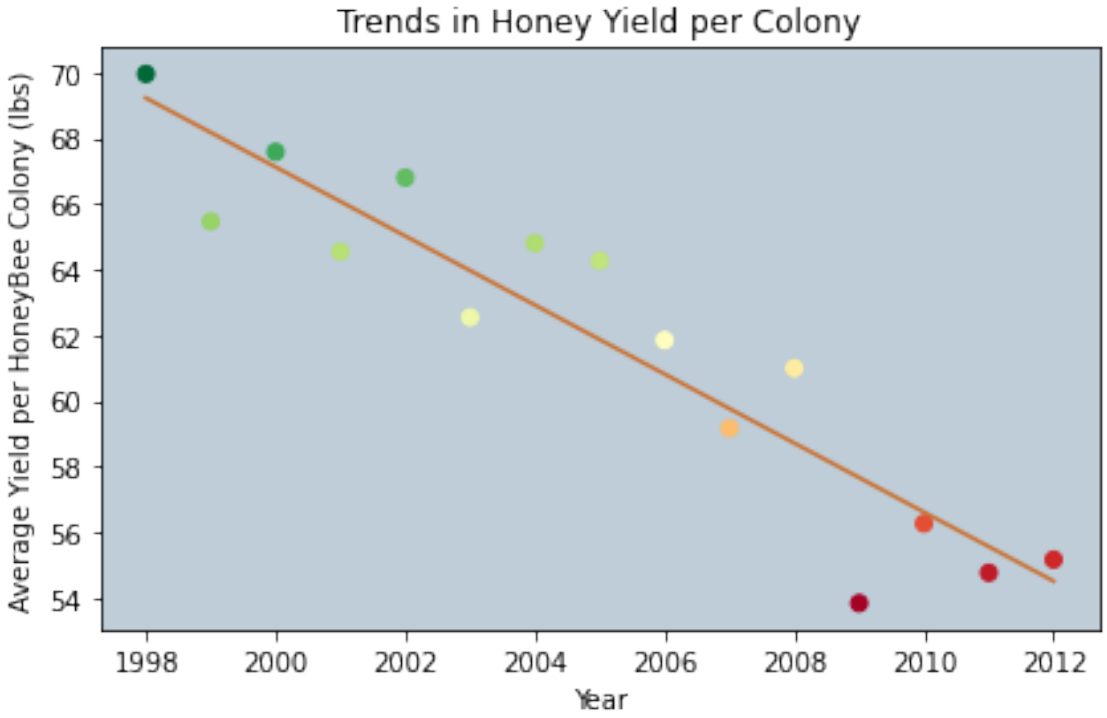


<Figure size 432x288 with 0 Axes>

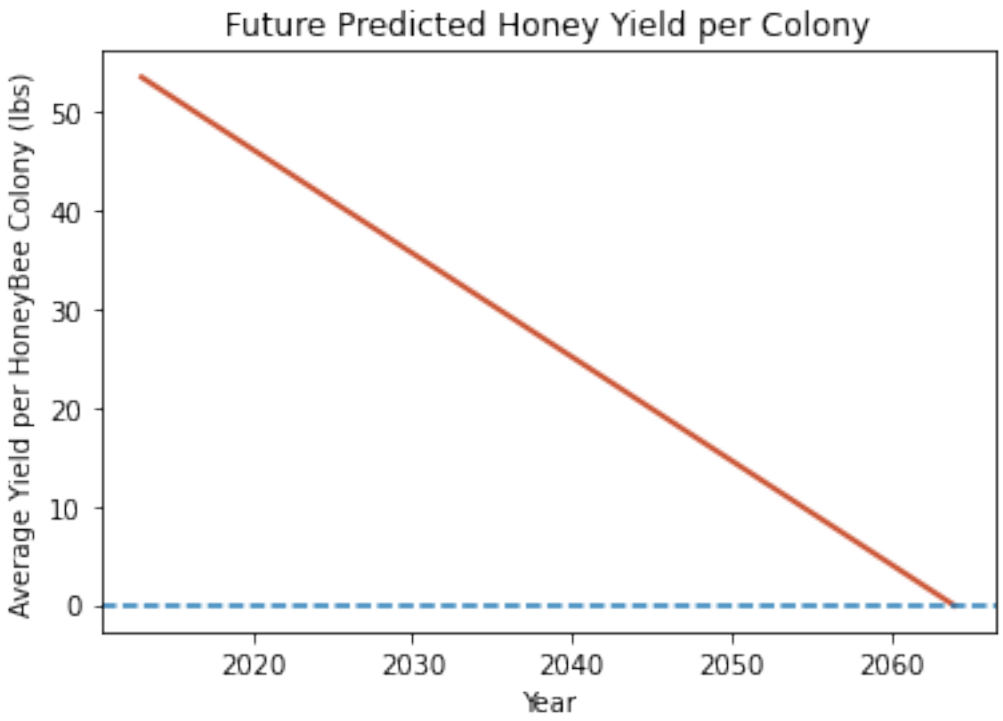


```
The predicted number of HoneyBee colonies in 2023 is 2324038.1 colonies.
The predicted number of HoneyBee colonies in 2050 is 2036295.2 colonies.
The predicted number of HoneyBee colonies in 2100 is 1503438.1 colonies.
The predicted number of HoneyBee colonies in 2200 is 437723.8 colonies.
This model predicts that the number of colonies will reach 0 in the year 2241 if
this trend continues.
```

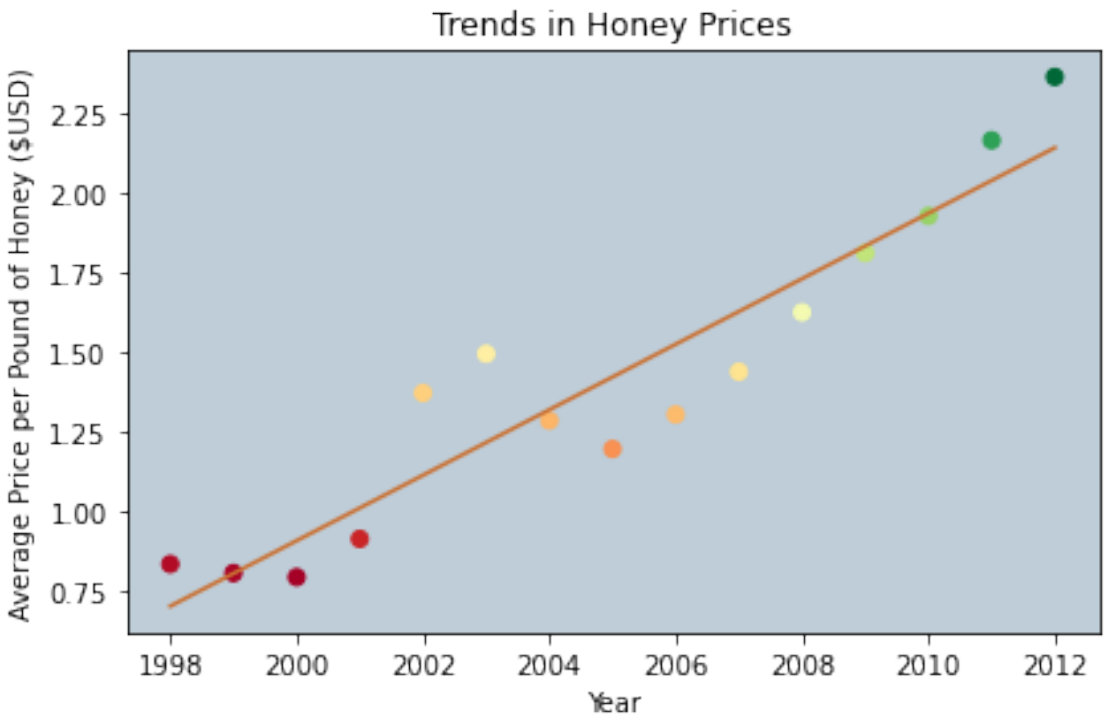
```
<Figure size 432x288 with 0 Axes>
```



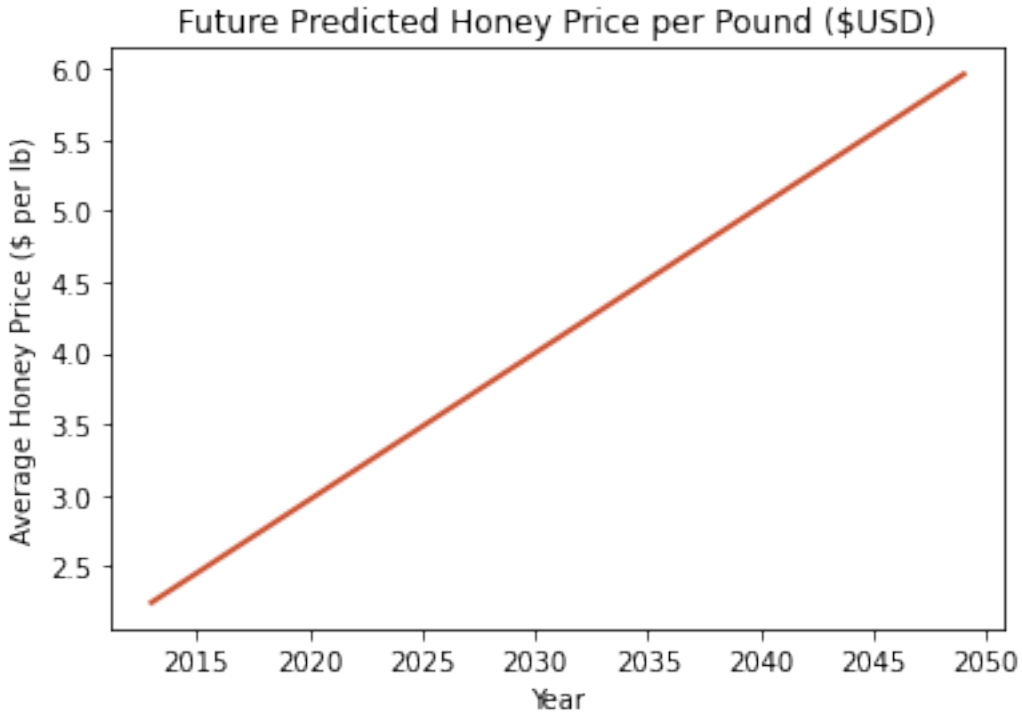

```
<Figure size 432x288 with 0 Axes>
```



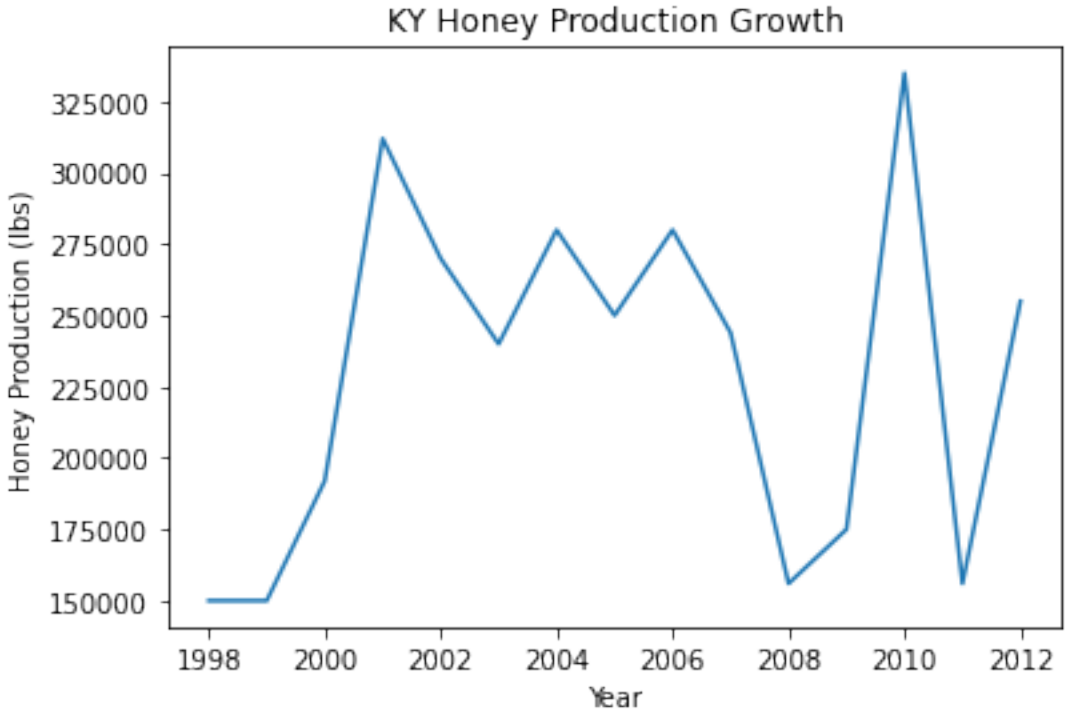

```
The predicted yield per colony in 2023 is 43. pounds.
The predicted yield per colony in 2050 is 14.6 pounds.
The predicted yield per colony in 2060 is 4.1 pounds.
This model predicts that the average yield per honeybee colony will reach 0 in
the year 2063 if this trend continues.

<Figure size 432x288 with 0 Axes>
```

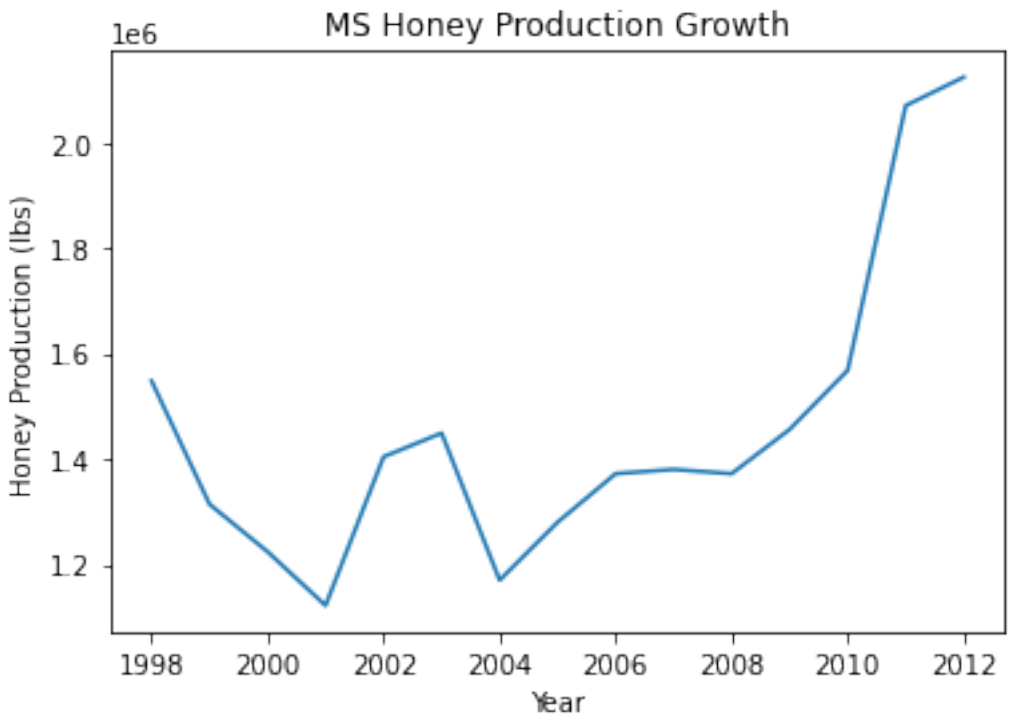


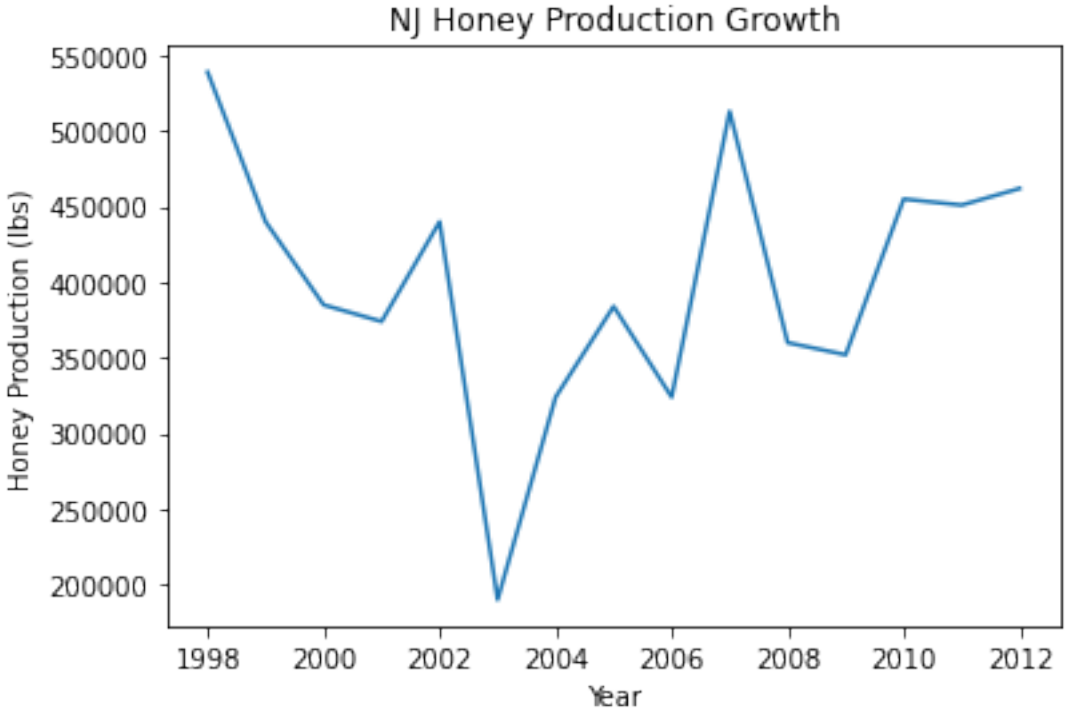
<Figure size 432x288 with 0 Axes>

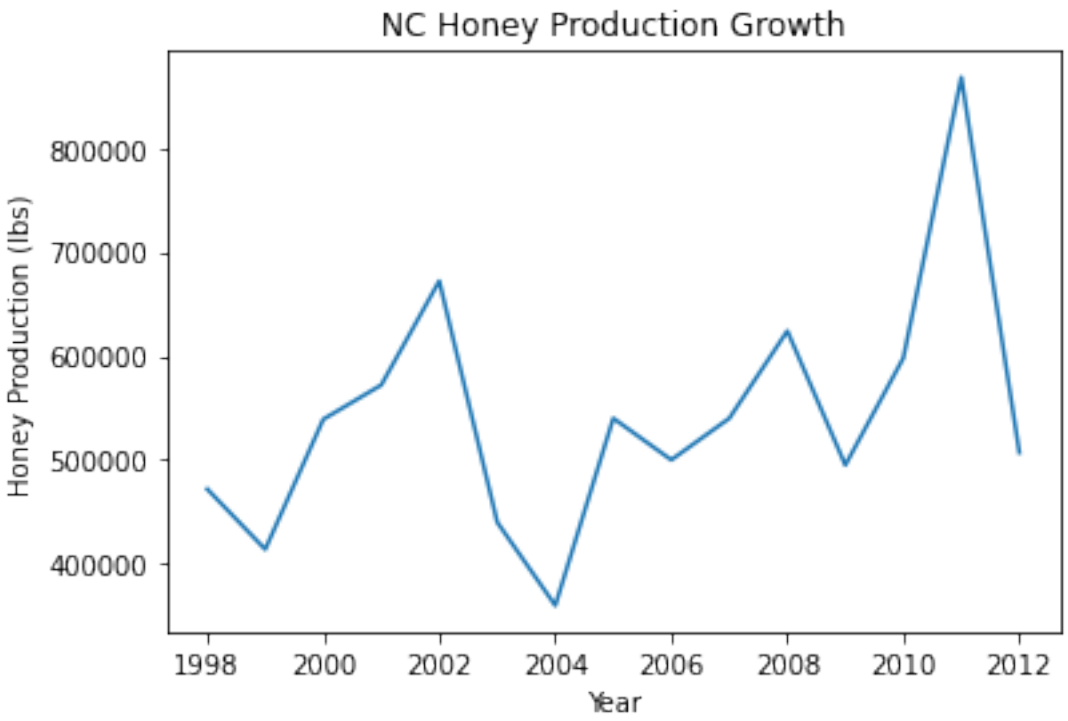


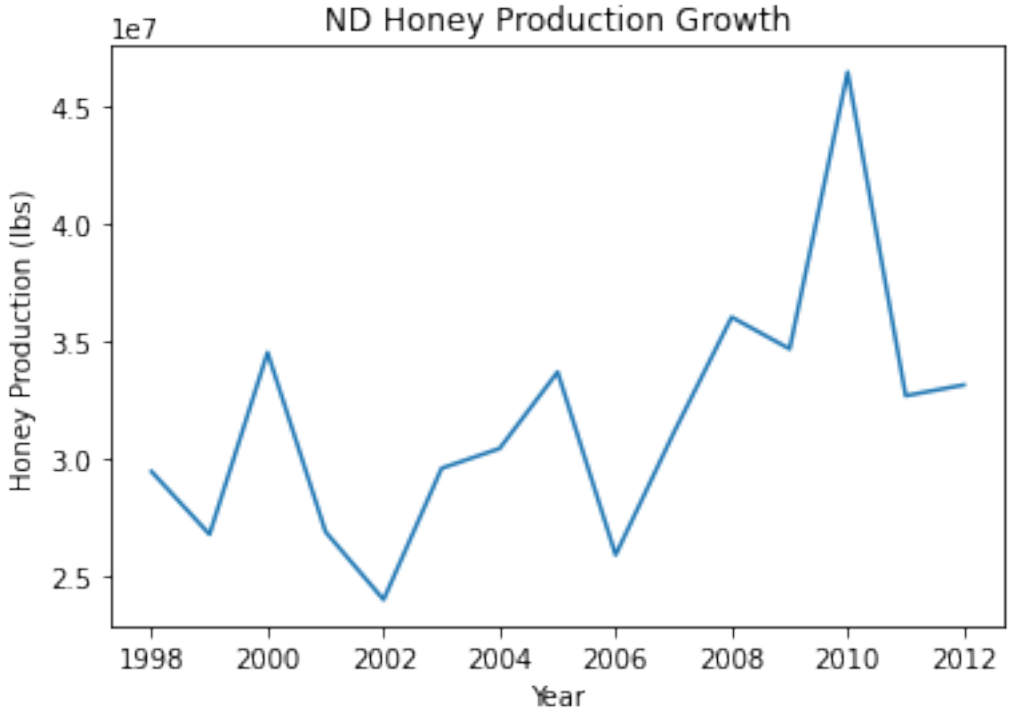
```
The predicted average price for honey in 2022 is $3.18 per pound.

 array([3.18])

<Figure size 432x288 with 0 Axes>
```

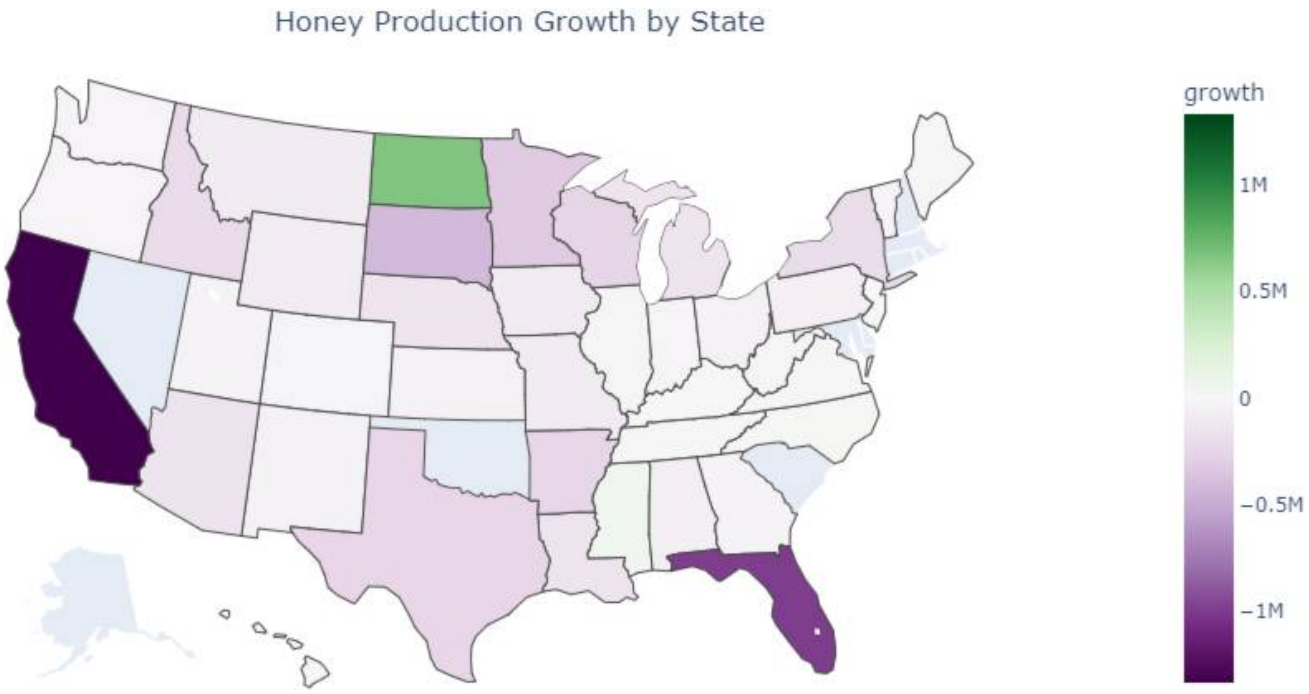



MS Honey Production Growth
1e6
2.0
1.8
1.6
1.4
1.2
Honey Production (lbs)
1998
2000
2002
2004
2006
2008
2010
2012
Year

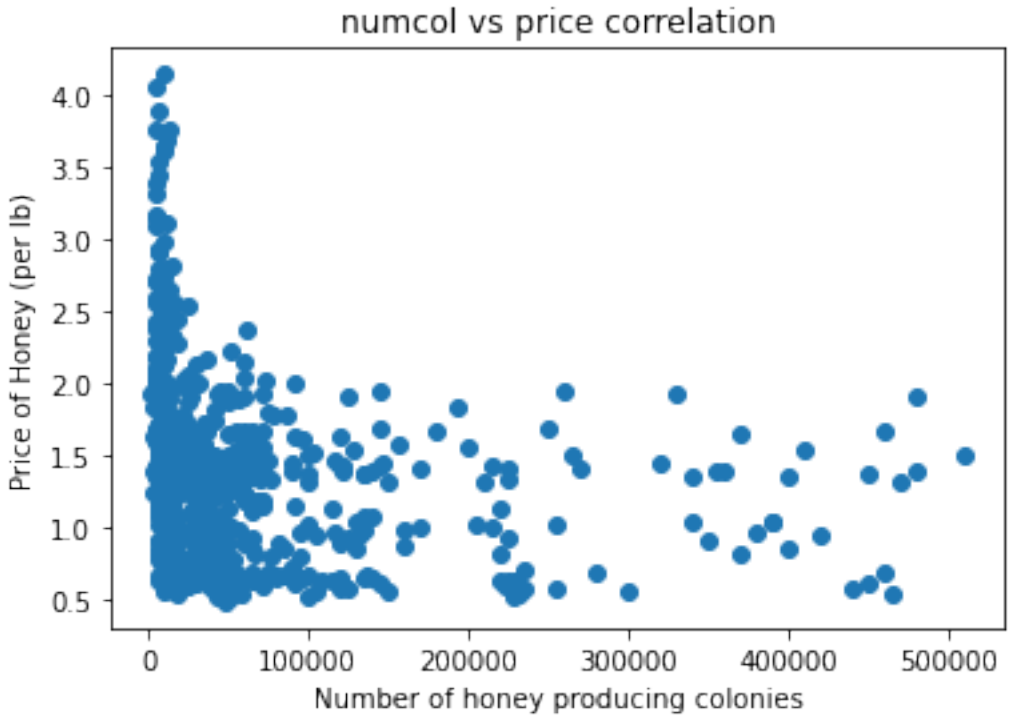

NJ Honey Production Growth
550000
500000
450000
400000
350000
300000
250000
200000
Honey Production (lbs)
1998
2000
2002
2004
2006
2008
2010
2012
Year

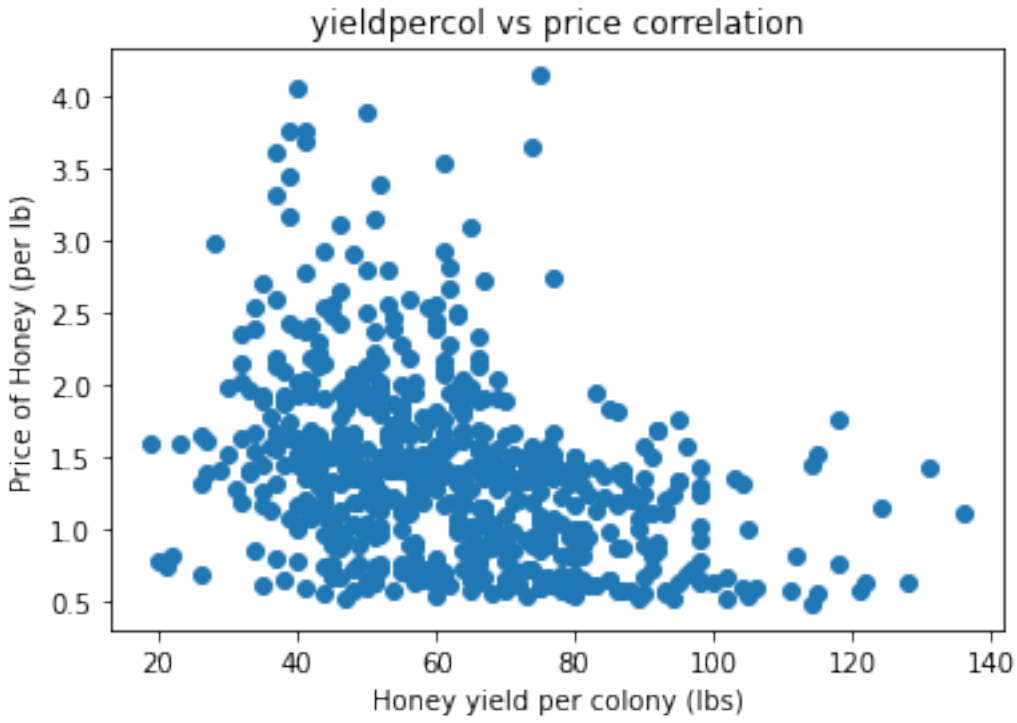

NC Honey Production Growth
Honey Production (lbs)
800000
700000
600000
500000
400000
1998
2000
2002
2004
2006
2008
2010
2012
Year

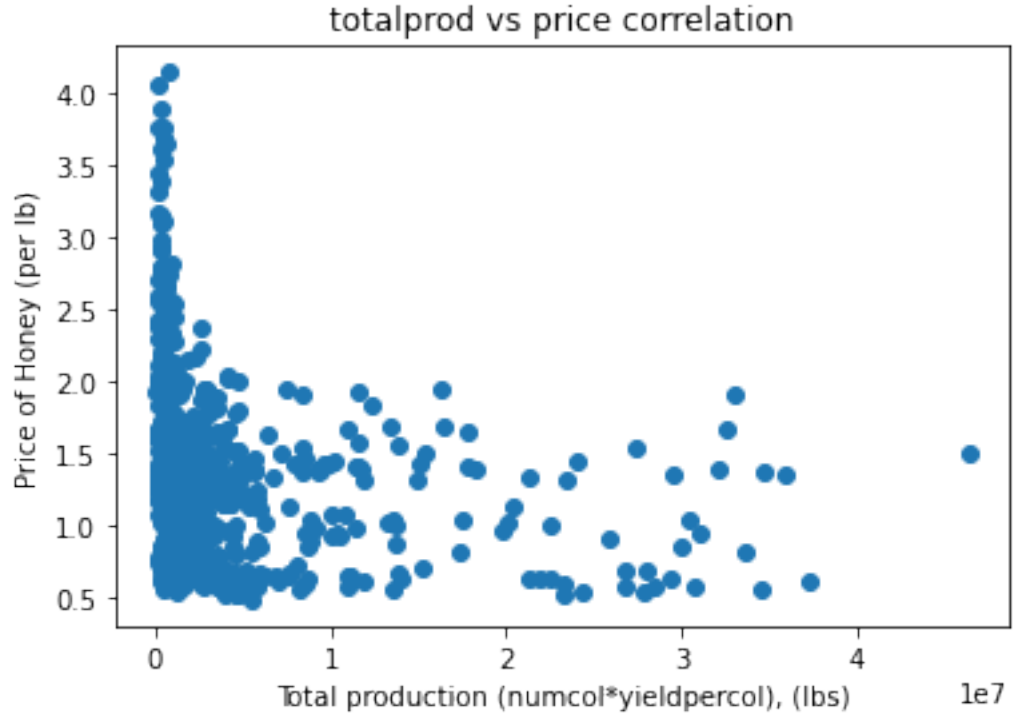

ND Honey Production Growth
1e7
Honey Production (lbs)
4.5
4.0
3.5
3.0
2.5
1998
2000
2002
2004
2006
2008
2010
2012
Year

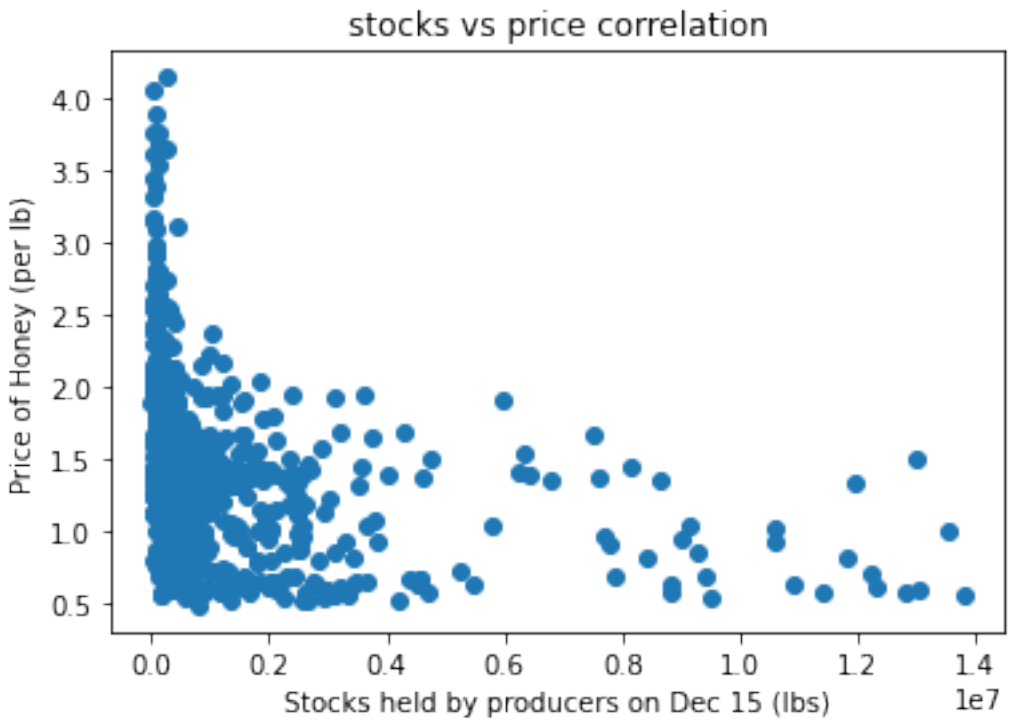

Honey Production Growth by State
growth
1M
0.5M
0
−0.5M
−1M

```
5 States with the best growth in Honey Production (average increase in lbs per
year):
   state         growth
26    ND  664928.571429
18    MS   41400.000000
25    NC   11257.142857
13    KY    2157.142857
22    NJ     696.428571
5 States with the worst decline in Honey Production (average decrease in lbs per
year):
   state        growth
38    WI -2.618464e+05
17    MN -3.167679e+05
30    SD -4.170214e+05
5     FL -9.956500e+05
3     CA -1.335000e+06
```




yieldpercol vs price correlation
Price of Honey (per lb)
Honey yield per colony (lbs)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
20
40
60
80
100
120
140


totalprod vs price correlation
Price of Honey (per lb)
Total production (numcol*yieldpercol), (lbs)
1e7
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0
1
2
3
4




```
Residual analysis score of training set: 0.17115038901114776
Residual analysis score of test set: 0.1683830758880378
(Not very strong correlation)

Feature coefficients:
['numcol', 'yieldpercol', 'totalprod', 'stocks']
[[-2.09986215e-06 -1.12511905e-02  3.59700608e-08 -7.49081507e-08]]
```