

## Data Review:

|    | A        | B    | C          | D          | E         | F         | G          | H           | I        | J             | K             | L           | M            | N         | O              | P             | Q           | R              | S            | T           | U         | V                | W              | X          | Y             | Z           | AA               | AB                  | AC                |      |      |
|----|----------|------|------------|------------|-----------|-----------|------------|-------------|----------|---------------|---------------|-------------|--------------|-----------|----------------|---------------|-------------|----------------|--------------|-------------|-----------|------------------|----------------|------------|---------------|-------------|------------------|---------------------|-------------------|------|------|
|    | Doc Code | Year | State Code | State Name | Dist Name | RICE AREA | WHEAT AREA | BARLEY AREA | RYE AREA | CLUB RYE AREA | WHEAT PRODUCE | WHEAT YIELD | BARLEY YIELD | RYE YIELD | CLUB RYE YIELD | WHEAT HARVEST | WHEAT YIELD | BARLEY HARVEST | BARLEY YIELD | RYE HARVEST | RYE YIELD | CLUB RYE HARVEST | CLUB RYE YIELD | MAIZE AREA | MAIZE PRODUCE | MAIZE YIELD | FINGER MILK AREA | FINGER MILK PRODUCE | FINGER MILK YIELD |      |      |
| 1  | 1966     | 1    | MI         | Ohio       | Seneca    | 540       | 195        | 337.59      | 0        | 20            | 454.55        | 0.4         | 0.6          | 666.67    | 0              | 0             | 0           | 0.6            | 0.4          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 2  | 1967     | 1    | MI         | Ohio       | Seneca    | 547       | 409        | 747.71      | 50       | 26            | 520           | 11          | 0.9          | 818.18    | 0              | 0             | 0           | 11             | 0.9          | 818.18      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 3  | 1968     | 1    | MI         | Ohio       | Seneca    | 556.3     | 460        | 841.27      | 53.7     | 30            | 556.66        | 0.5         | 0.4          | 800       | 0              | 0             | 0           | 0.5            | 0.4          | 800         | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 4  | 1969     | 1    | MI         | Ohio       | Seneca    | 550.4     | 400.8      | 714         | 454      | 26.5          | 536.44        | 0.8         | 0.6          | 750       | 0              | 0             | 0           | 0.8            | 0.6          | 750         | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 5  | 1970     | 1    | MI         | Ohio       | Seneca    | 4716      | 4276       | 820.95      | 144.2    | 29            | 4516          | 0.8         | 0.8          | 666.67    | 0              | 0             | 0           | 0.8            | 0.8          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 6  | 1971     | 1    | MI         | Ohio       | Seneca    | 5618      | 4258       | 720.93      | 444      | 26            | 536.44        | 0.3         | 0.2          | 666.67    | 0              | 0             | 0           | 0.3            | 0.2          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 7  | 1972     | 1    | MI         | Ohio       | Seneca    | 5622      | 381        | 654.41      | 386      | 20.6          | 520.2         | 0.3         | 0.3          | 1000      | 0              | 0             | 0           | 0.3            | 0.3          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 8  | 1973     | 1    | MI         | Ohio       | Seneca    | 600       | 4716       | 786.5       | 37.3     | 16            | 496.66        | 0.2         | 0.2          | 1000      | 0              | 0             | 0           | 0.2            | 0.2          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 9  | 1974     | 1    | MI         | Ohio       | Seneca    | 5074      | 289        | 372.83      | 36.5     | 224           | 613.7         | 0.5         | 0.4          | 800       | 0              | 0             | 0           | 0.5            | 0.4          | 800         | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 10 | 1975     | 1    | MI         | Ohio       | Seneca    | 518.3     | 454        | 758.62      | 49.2     | 27.8          | 505.04        | 0.2         | 0.2          | 1000      | 0              | 0             | 0           | 0.2            | 0.2          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 11 | 1976     | 1    | MI         | Ohio       | Seneca    | 630.6     | 3271       | 5910.4      | 46.9     | 9             | 212.22        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 12 | 1977     | 1    | MI         | Ohio       | Seneca    | 601.7     | 5724       | 4623.9      | 53.1     | 27.1          | 496.36        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 13 | 1978     | 1    | MI         | Ohio       | Seneca    | 612.5     | 362.2      | 661.35      | 49.7     | 26.4          | 525.67        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 14 | 1979     | 1    | MI         | Ohio       | Seneca    | 638       | 330.6      | 535.99      | 44.6     | 17.6          | 398.1         | 0.5         | 0.5          | 1000      | 0              | 0             | 0           | 0.5            | 0.5          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 15 | 1980     | 1    | MI         | Ohio       | Seneca    | 634.9     | 58.6       | 821         | 441      | 31.6          | 761.9         | 0.2         | 0.2          | 1000      | 0              | 0             | 0           | 0.2            | 0.2          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 16 | 1981     | 1    | MI         | Ohio       | Seneca    | 630       | 506.9      | 834.66      | 41.5     | 21.8          | 568.67        | 0.2         | 0.2          | 1000      | 0              | 0             | 0           | 0.2            | 0.2          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 17 | 1982     | 1    | MI         | Ohio       | Seneca    | 627.9     | 513        | 877.49      | 41.1     | 23.9          | 569.51        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 18 | 1983     | 1    | MI         | Ohio       | Seneca    | 626.7     | 76         | 104.51      | 26.9     | 26.6          | 496.28        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 19 | 1984     | 1    | MI         | Ohio       | Seneca    | 632.2     | 563.8      | 891.61      | 40.5     | 16.9          | 493.06        | 0.3         | 0.3          | 1000      | 0              | 0             | 0           | 0.3            | 0.3          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 20 | 1985     | 1    | MI         | Ohio       | Seneca    | 638.8     | 698.8      | 1093.38     | 34.4     | 21            | 532.39        | 0.2         | 0.2          | 666.67    | 0              | 0             | 0           | 0.2            | 0.2          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 21 | 1986     | 1    | MI         | Ohio       | Seneca    | 642       | 525        | 894.49      | 37       | 24            | 446.85        | 0.2         | 0.1          | 800       | 0              | 0             | 0           | 0.2            | 0.1          | 800         | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 22 | 1987     | 1    | MI         | Ohio       | Seneca    | 640       | 523        | 807.1       | 43       | 23            | 534.89        | 0.2         | 0.2          | 666.67    | 0              | 0             | 0           | 0.2            | 0.2          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 23 | 1988     | 1    | MI         | Ohio       | Seneca    | 652.7     | 547        | 942.19      | 43.7     | 20.2          | 462.24        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 24 | 1989     | 1    | MI         | Ohio       | Seneca    | 660.2     | 457.3      | 832.87      | 43.6     | 22.7          | 596.26        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 25 | 1990     | 1    | MI         | Ohio       | Seneca    | 652.9     | 668.8      | 1014.3      | 36.2     | 24.8          | 658.68        | 0.5         | 0.4          | 800       | 0              | 0             | 0           | 0.5            | 0.4          | 800         | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 26 | 1991     | 1    | MI         | Ohio       | Seneca    | 668.8     | 773.6      | 1156.31     | 34.8     | 21.6          | 620.69        | 0.3         | 0.3          | 1000      | 0              | 0             | 0           | 0.3            | 0.3          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 27 | 1992     | 1    | MI         | Ohio       | Seneca    | 668       | 777.3      | 1293        | 56.1     | 21.5          | 305.42        | 0.1         | 1            | 309.99    | 0              | 0             | 0           | 0.1            | 1            | 309.99      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 28 | 1993     | 1    | MI         | Ohio       | Seneca    | 670.6     | 726.7      | 1246.6      | 33.8     | 23.8          | 614.14        | 0.2         | 0.2          | 666.67    | 0              | 0             | 0           | 0.2            | 0.2          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 29 | 1994     | 1    | MI         | Ohio       | Seneca    | 726.8     | 967.9      | 1337.7      | 36.5     | 24            | 606.48        | 0.3         | 0.3          | 666.67    | 0              | 0             | 0           | 0.3            | 0.3          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 30 | 1995     | 1    | MI         | Ohio       | Seneca    | 723.3     | 1052       | 1464.44     | 37.1     | 26.5          | 794.29        | 0.1         | 0.1          | 1000      | 0              | 0             | 0           | 0.1            | 0.1          | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 31 | 1996     | 1    | MI         | Ohio       | Seneca    | 706.1     | 901.2      | 1290.2      | 36.2     | 29.1          | 603.87        | 0.2         | 0.2          | 666.67    | 0              | 0             | 0           | 0.2            | 0.2          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 32 | 1997     | 1    | MI         | Ohio       | Seneca    | 726.7     | 875        | 1038.37     | 35.6     | 18.3          | 594.04        | 0.1         | 0.1          | 824.4     | 0              | 0             | 0           | 0.1            | 0.1          | 824.4       | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 33 | 1998     | 1    | MI         | Ohio       | Seneca    | 746.5     | 884.62     | 1370.45     | 39.96    | 24.84         | 621.62        | 0.27        | 0.27         | 1000      | 0              | 0             | 0           | 0.27           | 0.27         | 1000        | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 34 | 1999     | 1    | MI         | Ohio       | Seneca    | 726.7     | 901.2      | 1290.2      | 36.2     | 29.1          | 603.87        | 0.2         | 0.2          | 666.67    | 0              | 0             | 0           | 0.2            | 0.2          | 666.67      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    | 0    |
| 35 | 2000     | 1    | MI         | Ohio       | Seneca    | 768.1     | 867.9      | 1249.09     | 29.9     | 17.59         | 588.19        | 0.42        | 0.23         | 556.46    | 0.03           | 0.02          | 631.34      | 0.02           | 0.03         | 631.34      | 0.02      | 0.03             | 631.34         | 0.02       | 0.03          | 631.34      | 0.02             | 0.03                | 631.34            | 0.02 | 0.03 |
| 36 | 2001     | 1    | MI         | Ohio       | Seneca    | 756.26    | 978.89     | 1294.13     | 34.23    | 24.1          | 702.43        | 0.28        | 0.25         | 902.45    | 0.02           | 0             | 0           | 0.28           | 0.25         | 902.45      | 0.02      | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 37 | 2002     | 1    | MI         | Ohio       | Seneca    | 753.41    | 469.3      | 843.5       | 32.25    | 25.09         | 754.44        | 0.22        | 0.22         | 941.81    | 0              | 0             | 0           | 0.22           | 0.22         | 941.81      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 38 | 2003     | 1    | MI         | Ohio       | Seneca    | 763.59    | 1065.62    | 1449.73     | 29.59    | 23.59         | 719.78        | 0.17        | 0.15         | 872.07    | 0              | 0             | 0           | 0.17           | 0.15         | 872.07      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 39 | 2004     | 1    | MI         | Ohio       | Seneca    | 775.99    | 984.31     | 1268.46     | 36.43    | 23.9          | 636.48        | 0.16        | 0.1          | 678.46    | 0              | 0             | 0           | 0.16           | 0.1          | 678.46      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 40 | 2005     | 1    | MI         | Ohio       | Seneca    | 779.38    | 1031.3     | 1330.46     | 36.43    | 23.9          | 636.48        | 0.16        | 0.1          | 678.46    | 0              | 0             | 0           | 0.16           | 0.1          | 678.46      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 41 | 2006     | 1    | MI         | Ohio       | Seneca    | 791.7     | 1077.1     | 1395.61     | 36.43    | 23.9          | 636.48        | 0.16        | 0.1          | 678.46    | 0              | 0             | 0           | 0.16           | 0.1          | 678.46      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 42 | 2007     | 1    | MI         | Ohio       | Seneca    | 789.39    | 1054.94    | 1363.92     | 37.22    | 24.38         | 521.03        | 0.17        | 0.03         | 177.1     | 0              | 0             | 0           | 0.17           | 0.03         | 177.1       | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 43 | 2008     | 1    | MI         | Ohio       | Seneca    | 783.77    | 704.09     | 1048.42     | 36.46    | 21.9          | 695.47        | 0.27        | 0.27         | 134.29    | 0              | 0             | 0           | 0.27           | 0.27         | 134.29      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 44 | 2009     | 1    | MI         | Ohio       | Seneca    | 789.44    | 622.05     | 769.77      | 42.44    | 18.2          | 622.05        | 0.18        | 0.18         | 360.69    | 0              | 0             | 0           | 0.18           | 0.18         | 360.69      | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 45 | 2010     | 1    | MI         | Ohio       | Seneca    | 779.32    | 1218       | 160         | 46.12    | 45.96         | 99.69         | 0.22        | 0.32         | 1393.34   | 0.06           | 0             | 0           | 0.22           | 0.32         | 1393.34     | 0.06      | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 46 | 2011     | 1    | MI         | Ohio       | Seneca    | 608.55    | 106.68     | 1756.23     | 43.89    | 50.19         | 106.68        | 0.25        | 0.2          | 774.6     | 0              | 0             | 0           | 0.25           | 0.2          | 774.6       | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 47 | 2012     | 1    | MI         | Ohio       | Seneca    | 654.22    | 1000.87    | 1400.87     | 43.87    | 47.59         | 1000.87       | 0.17        | 0.17         | 705.4     | 0              | 0             | 0           | 0.17           | 0.17         | 705.4       | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    |      |
| 48 | 2013     | 1    | MI         | Ohio       | Seneca    | 694.44    | 126.24     | 1561.86     | 41.54    | 43.32         | 1041.06       | 0           | 0            | 0         | 0              | 0             | 0           | 0.22           | 0.17         | 636.36      | 0.08      | 0.07             | 309.99         | 0.04       | 0.04          | 174.2       | 0.17             | 0.04                | 0                 | 0    |      |
| 49 | 2014     | 1    | MI         | Ohio       | Seneca    | 634.87    | 144.24     | 1728.89     | 42.25    | 60.96         | 144.24        | 0           | 0            | 0         | 0              | 0             | 0           | 0.22           | 0.17         | 636.36      | 0.08      | 0.04             | 750            | 0.02       | 0.02          | 185.68      | 0.13             | 0.03                | 0                 | 0    |      |
| 50 | 2015     | 1    | MI         | Ohio       | Seneca    | 655.99    | 1070.95    | 1422.74     | 54.2     | 50.74         | 1070.95       | 0.16        | 0.16         | 1070.95   | 0              | 0             | 0           | 0.16           | 0.16         | 1070.95     | 0         | 0                | 0              | 0          | 0             | 0           | 0                | 0                   | 0                 | 0    | 0    |
| 51 | 2016     | 1    | MI         | Ohio       | Seneca    | 655.99    | 178.69     | 1005.96     | 46.94    |               |               |             |              |           |                |               |             |                |              |             |           |                  |                |            |               |             |                  |                     |                   |      |      |

The screenshot displays the Microsoft Power Query Editor interface. The main area shows a table with columns for 'Valid', 'Error', and 'Empty' status, and a summary table on the right. The summary table has columns for 'Valid', 'Error', and 'Empty' status, and a 'Total' column. The data is as follows:

|    | Valid    | Error | Empty   | Total       |
|----|----------|-------|---------|-------------|
| 1  | 6757.85  | 257   | 931.59  | 31.05633333 |
| 2  | 8670.3   | 507.2 | 1216.43 | 22.06521739 |
| 3  | 8546.52  | 576.9 | 1272.72 | 25.10434783 |
| 4  | 9365.17  | 611.2 | 1260.82 | 26.59130435 |
| 5  | 11216.6  | 767.8 | 1330.26 | 33.4        |
| 6  | 9362.08  | 705.6 | 1341.81 | 30.69565217 |
| 7  | 10586.08 | 632.3 | 1317.84 | 27.52173913 |
| 8  | 14154.32 | 716.4 | 1369.48 | 31.17826087 |
| 9  | 9780.72  | 433.7 | 1089.23 | 36.31433333 |
| 10 | 10077.73 | 725.5 | 1354.59 | 31.5826087  |
| 11 | 7452.44  | 413.2 | 1213.11 | 17.96956522 |
| 12 | 10719.76 | 787.3 | 1335.26 | 44.512      |
| 13 | 10419.75 | 532.7 | 1350.44 | 23.1826087  |
| 14 | 8591.69  | 433.1 | 1197.68 | 39.92933333 |
| 15 | 11077.1  | 732.8 | 1327.32 | 44.25066667 |
| 16 | 9869.16  | 681.1 | 1336.55 | 44.55833333 |
| 17 | 11398.54 | 700.5 | 1336.37 | 40.48695652 |
| 18 | 10656.64 | 934.8 | 1374.49 | 45.81966667 |

## Python Code:

```
In [1]: import numpy as np
import pandas as pd
```

```
In [2]: df = pd.read_csv('ICRISAT_District_Level_Data.csv')
#df.info()
```

```
In [3]: crop = []
dist_code = []
year = []
state_code = []
state_name = []
dist_name = []
area = []
production = []
yields = []
cols_to_rows = ['RICE', 'WHEAT', 'KHARIF SORGHUM', 'RABI SORGHUM', 'SORGHUM', 'PEARL MILLET', 'MAIZE', 'FINGER MILLET',
                'BARLEY', 'CHICKPEA', 'PIGEONPEA', 'MINOR PULSES', 'GROUNDNUT', 'SESAMUM', 'RAPESEED AND MUSTARD',
                'SAFFLOWER', 'CASTOR', 'LINSEED', 'SUNFLOWER', 'SOYABEAN', 'OILSEEDS', 'SUGARCANE', 'COTTON']

extra_cols = ['FRUITS', 'VEGETABLES', 'FRUITS AND VEGETABLES', 'POTATOES', 'ONION', 'FODDER']
```

```
In [4]: for i in range(len(cols_to_rows)):
        for j in range(len(df)):
            crop.append(cols_to_rows[i])
            dist_code.append(df['Dist Code'][j])
            year.append(df['Year'][j])
            state_code.append(df['State Code'][j])
            state_name.append(df['State Name'][j])
            dist_name.append(df['Dist Name'][j])
            area.append(df[cols_to_rows[i]+' AREA (1000 ha)'][j])
            production.append(df[cols_to_rows[i]+' PRODUCTION (1000 tons)'][j])
            yields.append(df[cols_to_rows[i]+' YIELD (Kg per ha)'][j])

        for i in range(len(extra_cols)):
            for j in range(len(df)):
                crop.append(extra_cols[i])
                dist_code.append(df['Dist Code'][j])
                year.append(df['Year'][j])
                state_code.append(df['State Code'][j])
                state_name.append(df['State Name'][j])
                dist_name.append(df['Dist Name'][j])
                area.append(df[extra_cols[i]+' AREA (1000 ha)'][j])
                production.append('')
                yields.append('')
```

```
In [5]: df2 = pd.DataFrame({'Plant':crop, 'Dist Code':dist_code, 'Year':year, 'State Code':state_code, 'State Name':state_name,
                           'Dist Name':dist_name, 'Area (1000 ha)':area, 'Production (1000 tons)':production, 'Yield (Kg per ha)':yields})
```

```
In [5]: df2 = pd.DataFrame({'Plant':crop, 'Dist Code':dist_code, 'Year':year, 'State Code':state_code, 'State Name':state_name,
                           'Dist Name':dist_name, 'Area (1000 ha)':area, 'Production (1000 tons)':production, 'Yield (Kg per ha)':yields})
```

```
In [6]: crop_production = ['RICE', 'WHEAT']

coarse_grains = ['KHARIF SORGHUM', 'RABI SORGHUM', 'SORGHUM', 'PEARL MILLET', 'MAIZE', 'FINGER MILLET']

pulses = ['CHICKPEA', 'PIGEONPEA', 'MINOR PULSES']

oilseeds = ['GROUNDNUT', 'SESAMUM', 'RAPESEED AND MUSTARD', 'SAFFLOWER', 'CASTOR', 'LINSEED', 'SUNFLOWER', 'SOYABEAN', 'OILSEEDS']

other_crops = ['SUGARCANE', 'COTTON', 'FRUITS', 'VEGETABLES', 'FRUITS AND VEGETABLES', 'POTATOES', 'ONION', 'FODDER']
```

```
In [8]: category = []
for i in range(len(df2)):
    if df2['Plant'][i] in crop_production:
        category.append('crop production')
    elif df2['Plant'][i] in coarse_grains:
        category.append('coarse grains')
    elif df2['Plant'][i] in pulses:
        category.append('pulses')
    elif df2['Plant'][i] in oilseeds:
        category.append('oilseeds')
    else:
        category.append('other crops')
```

```
In [11]: df2['category'] = category

In [12]: df2.tail()

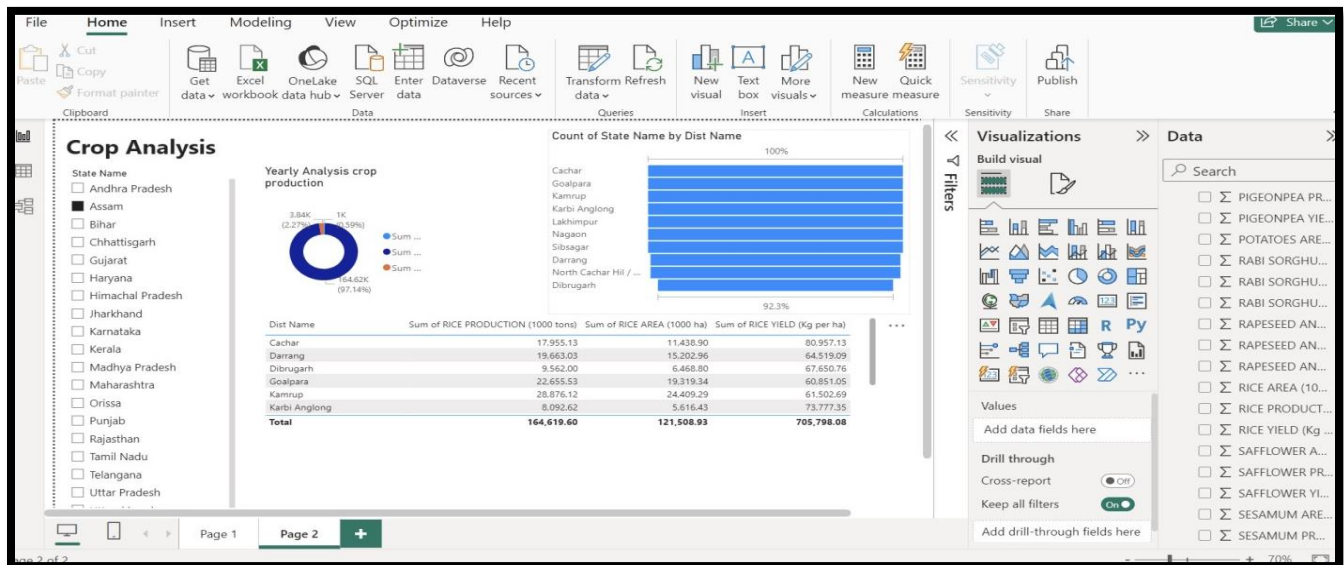
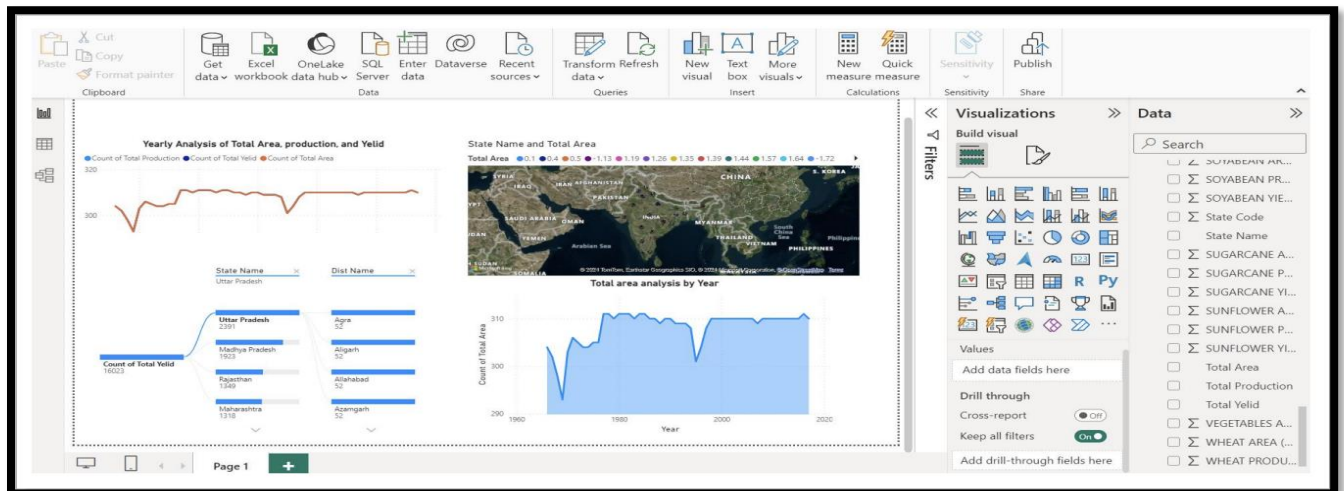
Out[12]:
```

|        | Plant  | Dist Code | Year | State Code | State Name | Dist Name | Area (1000 ha) | Production (1000 tons) | Yield (Kg per ha) | category    |
|--------|--------|-----------|------|------------|------------|-----------|----------------|------------------------|-------------------|-------------|
| 468229 | FODDER | 917       | 2013 | 15         | Jharkhand  | Singhbhum | 0.0            |                        |                   | other crops |
| 468230 | FODDER | 917       | 2014 | 15         | Jharkhand  | Singhbhum | 0.0            |                        |                   | other crops |
| 468231 | FODDER | 917       | 2015 | 15         | Jharkhand  | Singhbhum | 0.0            |                        |                   | other crops |
| 468232 | FODDER | 917       | 2016 | 15         | Jharkhand  | Singhbhum | 0.0            |                        |                   | other crops |
| 468233 | FODDER | 917       | 2017 | 15         | Jharkhand  | Singhbhum | 0.0            |                        |                   | other crops |

```
In [13]: df2.to_csv('ICRISAT_data.csv', index = False)

In [ ]:
```

## Agriculture Overview:



Final Agriculture Analysis Output:

