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Research Proposal: Projecting Organic Land Use Metrics for North America

Abstract

Organic agriculture has seen a rise in popularity within the United States over the past few decades and has had steady growth over this same time period. Healthy and sustainable growth of organic agricultural practices is important to achieve due to their noted positive ecological effects. Data exists on the growth of organic agricultural land use from 2000 to 2017 and will be analyzed to create an equation that can be used to project the growth for future years. Further data on the distribution of this land use by typology for 2017 will be analyzed to project their individual growth rates as well. These future metrics will be used as a baseline for a healthy growth trend of organic agricultural land use for future years.

Background

Countries in North America have traditionally been agriculturally intensive due to vast swaths of arable land. Over the past century and a half, industrialization has heightened and intensified agricultural practices to produce large amounts of crops and livestock in excess. Many of these industrial practices have had noticeably and scientifically verifiable detrimental impacts to the overall environment and ecosystems within which they take place, and health detriments have been hotly contested as well. Over the last half a century, the organic agriculture movement has seen a rise in popularity and adoption on some systemic levels, but mostly in individual consumption patterns.[1] In the United States, for example, the US Department of Agriculture has an organic certification that an agricultural entity can attain after strict scrutiny based on a multitude of guidelines. Some examples of these guidelines include living accommodations and no antibiotic use for livestock, and refusal to use most synthetic fertilizers and pesticides, among many others. While there has been a noted trend in rising levels of organic agricultural practice, it is worth exploring this trend to map out ideal future levels and distribution of organic agriculture.

Broader Impacts

The importance of this research is to project a healthy baseline of growth for organic agricultural practices within North America. Growth and increased adoption of agricultural practices is always beneficial, but providing specific metrics to be measured against allow for a determination of the health of organic agricultural practices. Further, organic agricultural practices are noted as having positive impacts on the biodiversity of the ecosystem in which they occur.[2] Providing healthy growth metrics for organic agricultural practices then help provide a timetable and framework for increasing biodiversity throughout the environment. By ensuring

[1] Bialik and Walker, “Organic Farming Is on the Rise in the U.S.”

[2] Birthisel, “Multi-Tactic Ecological Weed Management in a Changing Climate.”

healthy, spread out growth, it can help mitigate the detrimental impacts of large-scale industrialized agribusiness. It can also help provide an easily digestible datapoint for those curious about organic agriculture, and could help provide the push for them to be adopters of these practices by wanting to help see these predictive metrics hit or exceeded.

Analysis + Research Question

The primary research question will simply be: Can future organic agricultural growth, including individual subsets of organic agriculture, be projected based on current data?

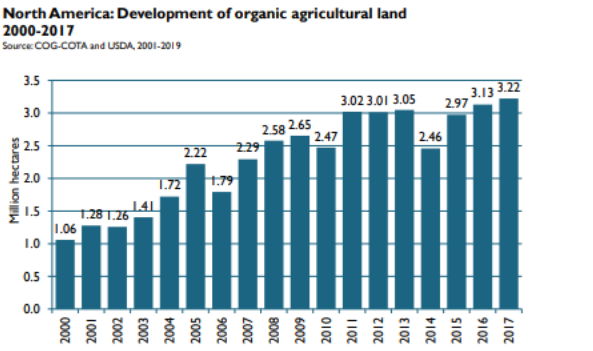

Figure 99: North America: Development of organic agricultural land 2000-2017

Source: Canada Organic Trade Association and United States Department of Agriculture[1]

The figure to the left represents the growth metrics that will be analyzed.[3] The data represents land used for organic agriculture per million hectares. This data will be plotted out again with the creation or calculation of a trendline, whichever is possible within the confines of matplotlib. The equation of the trendline will be used to project metrics for future years. These metrics will then be appended to the current data set where standard statistical measures will be calculated, such as standard deviation and confidence intervals. Once confidence in these metrics has been attained by the researcher, the second stage of the statistical analysis will be conducted. Unfortunately, as viewable above, the data only stretches to 2017 and no data for 2018 to 2020 could be found.

The second stage will involve analysis and growth projections of each subset of organic agricultural production. These will be based on the distribution metrics found within the same document that the figure/data above was taken from. Specifically, the distribution data relates to 2017, the final year of available data, and thus provides a good springboard for this analysis. These subsets will be defined as Land Use Types and will consist of four categories: Arable land crops, Permanent grasslands, Permanent crops, and Other/No details.

Timeline

The timeline with specific deliverable dates for each step:

1. Creation of dataframes for analysis within Python – DUE: 4/9
2. Plotting and trendline calculation/creation – DUE 4/13
3. Calculation of projections on base data – DUE 4/18
4. Plotting and calculation of projections on distribution data – DUE 4/22
5. Writing of methods, data and analysis sections of final paper – DUE 4/26
6. Writing of introduction, discussion/conclusion, and abstract of final paper – DUE 4/28
7. Finalize editing of paper – DUE 4/30

[3] Willer and Lernoud, "The World of Organic Agriculture Statistics and Emerging Trends 2019," 219.

8. Creation of PowerPoint for final project – DUE 5/2

References

Bialik, Kristen, and Kristi Walker. “Organic Farming Is on the Rise in the U.S.” *Pew Research Center* (blog). Accessed April 4, 2021. https://www.pewresearch.org/fact-tank/2019/01/10/organic-farming-is-on-the-rise-in-the-u-s/.

Birthisel, Sonja K. “Multi-Tactic Ecological Weed Management in a Changing Climate.” The University of Maine, 2018. https://digitalcommons.library.umaine.edu/etd/2928.

Willer, Edited Helga, and Julia Lernoud. “The World of Organic Agriculture Statistics and Emerging Trends 2019,” 2019, 351.