

## Frequently Asked Questions

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## What is AgEvidence

### **What is AgEvidence?**

AgEvidence is a dataset and a visualization dashboard of the impact of regenerative agriculture on the environment and crop production in the US Midwest and Kenya. All of the data in AgEvidence come from peer-reviewed journal articles. The visualization dashboard allows anyone to learn from the data to assess the impact of regenerative agriculture practices in the US Midwest and Kenya.

### **Who created AgEvidence?**

AgEvidence is led and managed by the Food Systems Science team at The Nature Conservancy. The database was originally created as part of the Managing Soil Carbon working group at the Science for Nature and People Partnership. The visualization dashboard was built by Perisopic.

### **What is the purpose of AgEvidence?**

AgEvidence enables anyone—with or without a science background—to assess the impact of regenerative agriculture in the US Midwest and Kenya. This could help organizations prioritize which practices they promote and learn about alternative practices practiced in other geographies.

AgEvidence aims to help the applied science community come to agreement on the impact of often discussed practices. By compiling an exhaustive set of studies, AgEvidence avoids the problem of having different scientists drawing conclusions from different bodies of work. And, unlike many meta-analyses on these practices, the studies in AgEvidence are limited to specific geographies to ensure the greatest relevance.

### **Which practices are included?**

AgEvidence includes data on the following practices:

#### US Midwest

##### *Winter cover crop*

Fall-planted crops that overwinter in the field. For each paper, a control treatment of winter fallow (no winter cover crop) must be included. Papers that only report treatment differences in cover crop biomass and no other response variables were also excluded.

### *Reduced tillage*

Minimization of soil disturbance and retention of crop residue on soil surface. All tillage type comparisons were included as long as all other management practices were kept constant (e.g. preceding crops and nutrient additions). Tillage practices were later categorized into one of four groups (conventional tillage, conservation tillage, zonal tillage, and no-tillage).

### *Early season pest management*

Insecticides, nematicides, and/or fungicides applied to cropping systems when the cash crop is still in an early vegetative stage (seed-V6). Each paper must include comparisons to a no pesticide control treatment. Pesticides can be applied directly to seeds, soils, or leaves but pesticide application must occur before or while the crop is still in an early season vegetative growth state. Papers examining invertebrate sensitivity to specific pesticides and pesticide combinations were excluded.

### *Strategic nutrient management*

Fertilizers strategically placed, either spatially or temporally, to optimize crop nutrient uptake while minimizing nutrient loss. Spatially specific applications could include banding or variable rate application compared with uniform surface broadcasting. Temporally specific applications could include application during early vegetative growth compared with preplant application or Spring application compared with Fall application or split applications compared with single applications. Papers exploring the effect of varying rates or compositions of fertilizer were excluded.

## Kenya

### *Continuous Cover*

Diversified spatial or temporal planting arrangements including practices like intercropping, cover cropping, or alley cropping. Regenerative practices are compared with either bare soil, native fallow, or monocrops with most observations comparing intercrops (treatment) to monocrops (control). Intercropping is a practice where more than two crop species grow in close proximity. Alley cropping is a type of intercropping that includes at least one woody perennial species. These data can be filtered by Number of Species, Type of Species, Fertilization (to accommodate studies where fertilization differed

between the control and treatment plantings), and Management Intention (reason for the intervention).

### *Nutrient Amendment*

Types of nutrient amendments used to optimize crop nutrient uptake while minimizing nutrient loss. Amendment types include animal manure, biologics, foliar fertilizer, green manure, incinerated organics, insect frass, legume intercrops, micronutrient mineral fertilizer, nitrogen mineral fertilizer, phosphorus mineral fertilizer, and potassium mineral fertilizer. More than one amendment can be displayed at a time to allow for comparisons of NPK mixtures.

### *Reduced Tillage*

Minimization of soil disturbance and retention of crop residue on soil surface. All types of tillage were included as long as all other management practices were kept constant (e.g., preceding crops and nutrient additions). Tillage practices were later categorized into one of four groups (conventional tillage, conservation tillage, zonal tillage, and no-tillage). Most tillage practices included in the Kenya dataset were performed via hand-hoeing with only a few studies using plows pulled by tractors or oxen.

## **How were the studies selected?**

To be included in AgEvidence, studies had to meet the following criteria:

- a. Peer-reviewed publication (excludes conference proceedings) published since 1980.
- b. Field study conducted in the United States Midwest or Kenya (excludes laboratory experiments, agricultural models, review papers, social science studies, and methodological papers).
- c. Infield response variables only. Measurements collected beyond the field such as effluence from fields were excluded.
- d. Cash crops for the United States were either corn (including sweet corn), soybean, or both (excludes vegetable, forage, tree, and all other commodity crops). All cash crops were included for Kenya and were later grouped into Bean, Cereal, Coffee/Tea, Fodder, Tree, and Vegetable.
- e. Experimental treatments for the United States must include either winter cover crops, reduced tillage, early season pest management, or nutrient management. Experimental treatments for Kenya must include continuous cover, nutrient amendment, or reduced tillage.

- f. Publications were excluded if the treatment of interest was not isolated within the experimental design as these studies can suggest that a management practice could alter the measured outcomes, but they cannot provide direct evidence of a causal relationship between the practice and the observed effect (e.g. when corn-soybean crop rotations are compared to corn-soybean-wheat-winter rye rotations the causal effects of winter rye cannot be disentangled from the effects of wheat). An exception was made for Kenya – Continuous Cover when an experiment used different fertilization regimes for the planting arrangements because in some situations this is a more relevant comparison. Observations with differing fertilization regimes can be removed from the visualizations using the “Fertilization” filter.
- g. Quantitative results. Surveys and qualitative assessments of a treatment were excluded.

**Does AgEvidence include meta-analyses?**

No. We recognize the importance of meta-analyses, and that there are many widely cited papers on these topics that are meta-analyses. But we exclude meta-analyses to avoid double counting studies.

**Is there a more detailed description of the methods?**

Yes. More detail on the methods can be found by clicking [here](#).

## How Can AgEvidence Be Used

### Where can I get a tutorial for how to use AgEvidence?

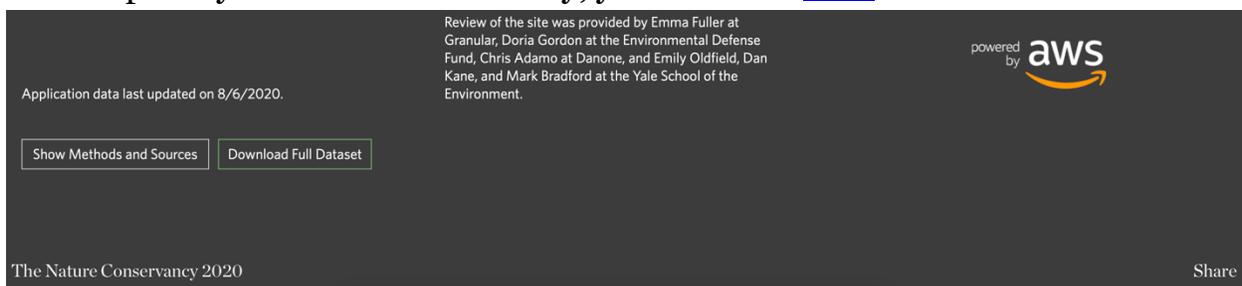
We created a video that walks you through the main features of AgEvidence. You can view that video [here](#).

### What should I do if there is a problem with the tool or the data?

If you have identified a problem with the tool, please contact [agevidence@tnc.org](mailto:agevidence@tnc.org).

### Can the raw data be used?

Yes. You can download either the full dataset or the data specific to a filtering of your choice. To download the raw data, scroll to the bottom of the site and click the button 'Download Full Dataset.' The link will take you to the Knowledge for Biocomplexity archive. Alternatively, you can click [here](#).



To download the data for a specific filtering, first choose the combination of practice and outcome you would like to select. On the panel at the top of the page, select the arrow to the far right to download the data.



### Can I use the charts from AgEvidence?

Yes. The charts were intended to be downloaded. To do this, follow the same steps as downloading filtered data, as above, but choose 'Download Chart Image' rather than 'Download Filtered Data.'

**Can I see the papers that were used and download them?**

Yes. To see the list of papers in the study, click the ‘View Citations List’ button below the map. This will open a list of papers in the current filtering of the data. Most papers in the list have links that you can follow to download the papers.

**How does the view by date timeline work?**

The timeline is the series of paper icons nested beneath the map. This shows what years the studies in the current filtering of the data come from. When the data filtering is updated, this list is updated.

**Can I add data to AgEvidence?**

There is currently not an option for users to contribute their own data. We recognize there is a lot of valuable data not represented in the published literature. To maintain roughly consistent quality standards, we only include published articles. If you have relevant data, we strongly encourage you to publish it—even if just as a data paper—and let us know.

**What do I do if I know about a relevant paper that isn’t in the database?**

We made our best effort to be exhaustive, but we recognize that we may have missed some papers. If you know of a paper that should be included, please email us at [agevidence@tnc.org](mailto:agevidence@tnc.org). If we reviewed that paper and chose not to include it, we will tell you why.

## How To Interpret the Data

### **Does AgEvidence tell me what will happen on a farm?**

No. AgEvidence provides an interface to access all of the scientific literature, but it does not use any models to estimate the impact of practices in places where there are no scientific studies. The map is included to help users interpret how relevant the studies are to a geography they may be interested in.

### **What is the right scale for using AgEvidence?**

This will depend on how specific you want to be with your query of the data. The more specific the filtering of the data, the fewer studies that are available, and the more limited the geographic scope. We set the search limits for AgEvidence to the US Midwest and Kenya, but for any specific filtering, the relevant geography may be smaller. We encourage you to use the map to determine the relevant scale of a particular filtering of the data.

### **Why does AgEvidence not show results in units that I'm interested in?**

To have enough data to visualize, AgEvidence groups together outcome variables that are measured in different units and slightly different ways. Because of this, we only visualize the percent change of the data in the bean plots. However, if you are interested in understanding change in specific units, you can click through the bean plots to the finest level of detail in the data where the tool shows the specific units and numeric values of change between treatment and control. If you are interested in analyzing these numbers further, you should download the raw data. If the raw data are still insufficient for your use, you can still download the list of papers and extract the data you need from those papers.

### **Why am I seeing a result that is different from a study that I've read?**

Some results in AgEvidence may be different from what you have seen before. This could be because AgEvidence excluded some papers under our inclusion criteria. This difference could be because of more narrow geographic focus. For instance, some widely cited meta-analyses on these topics include papers from outside of and inside of the United States and the Midwest, which may not be accurate to the Midwest.

**Why doesn't AgEvidence show data on an outcome I'm interested in?**

In developing AgEvidence we wanted to show as many of the impacts—and trade-offs—of regenerative agriculture practices as possible. Some outcomes that you may be interested in are not shown because of limitations in the peer-reviewed data. There were relatively few studies on topics such as biodiversity and economics. This does not mean that these practices can't be important for those outcomes.

## Future Developments

### **Will the data be updated?**

Yes. It is our intention to keep the data updated. At the bottom of the page, we list when the last update of the data was. Currently, the data include studies through 2020. We will be updating the studies through 2021 by the end of December 2022. We will also be expanding the Kenya dataset to include older data as it primarily includes literature published from 2015-2020.

### **Will AgEvidence include other geographies?**

It is our hope that AgEvidence will be expanded to include other geographies. Doing so will require a significant amount of work to search, review, and extract data from a new set of literature. New geographies will also likely have different sets of practices than the US Midwest and Kenya which will require planning on how to assemble a new database for new areas. We are actively seeking resources and collaboration to expand the tool.

### **Can I collaborate on AgEvidence?**

We would welcome partners who are interested in supporting AgEvidence. We are seeking resources and collaboration to expand AgEvidence to new geographies. If you are interested in collaborating, please contact [agevidence@tnc.org](mailto:agevidence@tnc.org)