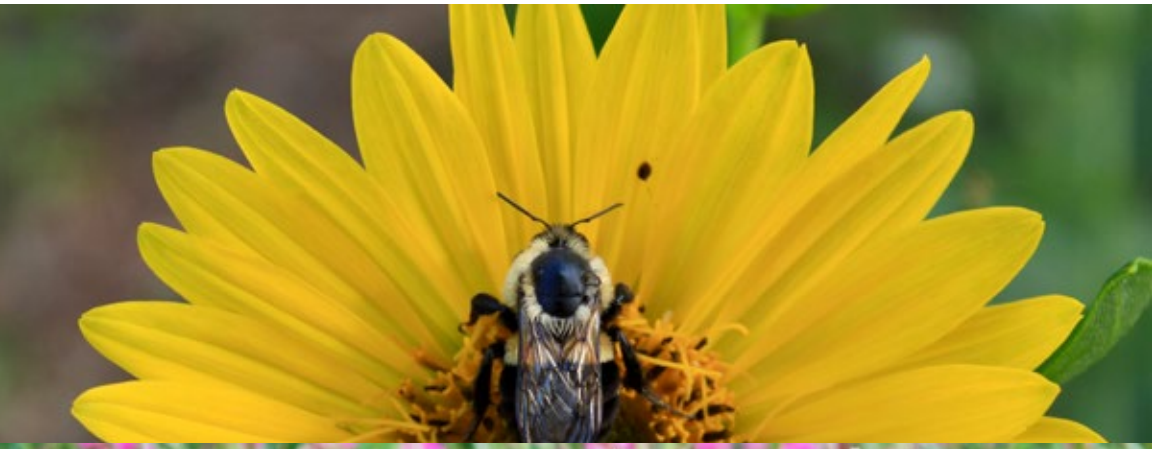
THE LAND INSTITUTE

2024-2026

Perennial Atlas

Civic Science Field Guide



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Welcome

Welcome to civic science!

From roots in local landscapes across the country, researchers and civic scientists come together in community to engage in agricultural science that helps build knowledge and stories for a more just, sustainable food future.

Perennial Atlas is a three-year, hands-on civic science project to grow and study future perennial grain crops and their current annual counterparts in a wide range of geographies. We call the project Perennial Atlas because the data you gather in your civic science plots will help create a set of digital maps.

We're motivated by a long-term vision, the possibility of scientific discovery, and the need to help farmers keep and build healthy soil as they grow food to feed people in the face of climate change and unpredictable weather events. We are also inspired by the various experiences civic scientists and researchers bring to this project, and we will work to test and improve civic science as a research method.

We designed this field guide to help you understand and navigate the Perennial Atlas civic science project. Inside, you'll find an introduction to research concepts, information about the plants and people involved in the project, and an overview of the project purpose and process.

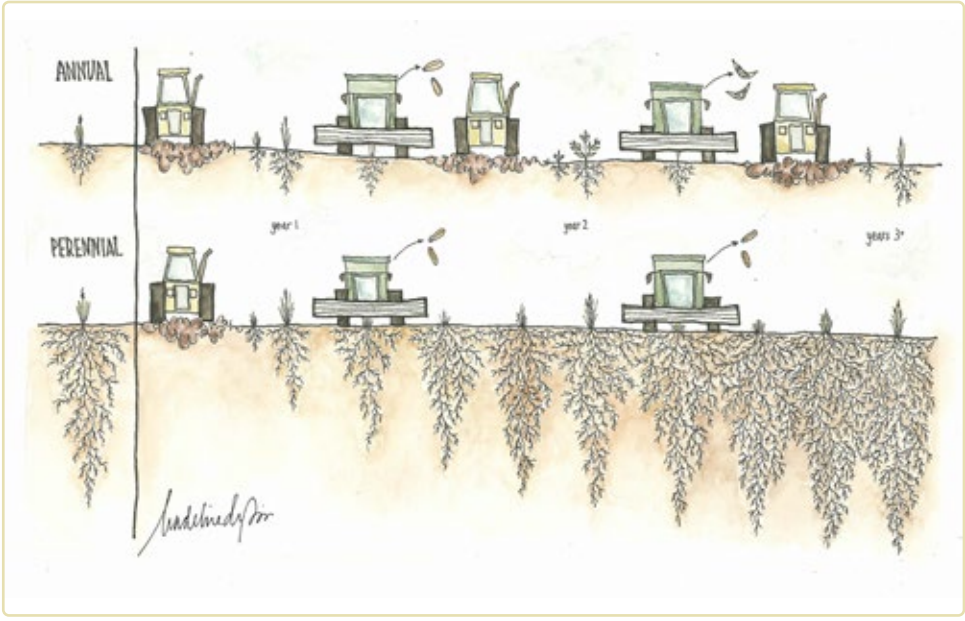
You are welcome to use and share this field guide with family, friends, or neighbors.

Thank you for your collaboration, care, and curiosity. We are excited to learn together!

— Aubrey, David, and Reece, with The Land Institute's Civic Science research team and collaborators

Research Concepts

The Land Institute's research is rooted in some basic concepts.



Annuals: plants that complete their life cycle in just one growing season

Perennials: plants that grow for multiple years

Why do we work with perennials?

Perennials support ecological processes that are essential to life on Earth. Thanks to their persistent root systems, perennial plants protect soil from washing or blowing away and improve soil structure. They help cycle water and key nutrients through ecosystems. They can help address climate change by capturing and storing carbon. Unlike annual plants, perennial plants don't need to be replanted every year. Perennials can reduce the need for farmers to spend time and money tilling, planting, and weeding their fields.

Grains: small, hard, dry, edible, and nutritious seeds of plants

Cereals: grains that provide carbohydrates

Oilseeds: grains that provide dietary oils

Pulses: grains that provide proteins

Why do we work with grains?

People depend on grains as staple foods with nutritional and cultural importance. Grains provide more than half of modern society's food calories. Grains are less perishable and more easily handled, transported, and stored than most fruits, vegetables, and tubers. Hundreds of plants produce edible seeds, but only a few dozen have become important food sources grown across large amounts of land. The world's major grains all currently come from annual plants.

Crops: plants that are grown as food, fiber, forage, fuel, and medicine

Domestication: process through which humans learn to grow and depend on plants as crops and through which plants change to feature characteristics that are important to humans and to rely on humans to help them grow

Why do we work on domesticating perennial grain crops?

Grapes, asparagus, olives, berries, and fruit and nut trees are just some of the perennial crops that human communities have grown for thousands of years. These perennial crops help ensure food and water security over the long term by supporting essential ecological processes. The Land Institute is adding perennial grains to the list. Perennial grain crops can become staple foods that are valued nutritionally and culturally. Annual grain crops require tilling, replanting, weeding, and other costly inputs, which can have negative ecological impacts. Perennial grain crops can help regenerate the soil, water, and air on which life depends.

Monoculture: when just one kind of crop is grown in a field

Polyculture: when multiple kinds of crops are grown in a field

Cropping System: the way crops are arranged and grown over time in a field

Diversity: a mix of different things, a variety

Why do we work on diverse cropping systems with perennial grains?

Natural ecosystems feature diverse perennial plants and diversity in other life forms, like microorganisms in soils. Cropping systems can also feature a variety of crops and different ways to arrange and grow those crops over time. These diverse cropping systems can also incorporate the benefits of diversity in natural ecosystems. Combining perenniality and diversity in grain cropping systems can lead to better ecological outcomes, reduce the need for fertilizers and pesticides, and help address problems like severe pest outbreaks, soil erosion, and nutrient loss.

Research: process of searching for, investigating, and building knowledge that uses systems and methods

Data: information collected, organized, and analyzed for research

Civic Science: a way for people who aren't professional scientists to participate in and advance research

Why do we work with civic science?

Civic science might be an effective and efficient approach to building trustworthy knowledge. A broader, more diverse network of people studying and caring for future perennial grain crops could build more data, knowledge, and relationships. By partnering with civic scientists, The Land Institute's researchers are testing how people can work together to advance perennial grain crop domestication.

Plants & People

Get to know the plants and people involved in the Perennial Atlas project. Participating in this project allows you to join a long line of people who have grown and observed plants in their home spaces.

Future Perennial Grains

Silphium

Researchers at The Land Institute are collaboratively developing *Silphium integrifolium*, a plant in the sunflower family native to the Great Plains and other parts of North America, as a perennial grain oilseed. Silphium is a drought-tolerant perennial prairie plant being domesticated as a crop because of its deep, persistent root system and large seeds. Plants in the Silphium genus are known and used by Native American tribal nations for multiple purposes. However, evidence has not been found of the seeds being eaten by people.

Silphium's taproot grows several meters deep, penetrating heavy clay soils that challenge other species. Silphium can access groundwater at depths of 4-6 feet, eliminating frequent irrigation and providing resilience in short-term droughts. Silphium is a strong candidate for polyculture cropping systems because it stays in row formation and uses water and nutrients at different depths. It is expected to provide soil protection and carbon sequestration. Finally, silphium and its bright yellow blooms provide a good habitat for earthworms, hoverflies, native bees, Monarch butterflies, and honeybees.

The long-term goal is for perennial silphium to provide an alternative to annual oilseed crops such as sunflower, canola, and soy. Because silphium is still nearly wild and adapted to life in the prairie, we are using selective breeding to adapt it to the farm environment, for compatibility with farm planting and harvesting equipment, and to increase grain quality and quantity. We have found that silphium can grow outside its native prairie region but we don't know where it does best or what factors (soil, climate, management) are needed for it to thrive. You will be helping us figure that out.

> **The silphium grown in the Perennial Atlas project came from our breeding program.** A few years ago most of our plants were hit hard by one or more diseases. We searched for rare plants that were resistant or less symptomatic and we crossed them with each other. The offspring of those crosses were grown out and our longtime collaborator Alejandra Vilela, a scientist from Argentina, identified several plants in this plot that were both somewhat resistant and also appeared crop-like and productive. We pooled the seeds from Ale's favorite plants for this project. Silphium seeds have strong dormancy and require some tricks to break this dormancy, which is why we are sending you seedlings, not seeds.

Sainfoin

Researchers at The Land Institute are collaboratively developing *Onobrychis viciifolia*, a perennial plant used for hundreds of years in Eurasia as a forage to feed livestock, as a potential perennial grain pulse crop for human consumption under the trade name perennial Baki™ bean. Sainfoin seeds are high in protein and essential amino acids. They can be enjoyed in preparations similar to lentils and chickpeas. Sainfoin has a deep tap root and thrives in low-fertility soils and semi-arid climates.

Sainfoin is a legume: a member of the plant family Fabaceae, along with other common crops like peas, soybeans, alfalfa, and clovers. Many legumes form symbiotic relationships with bacteria in nodules on their roots, allowing them to convert nitrogen from the atmosphere to a form that plants can use.

Using sainfoin as a dual-purpose forage and pulse crop–to feed livestock and people–could diversify both farmers' fields and economic returns. Because sainfoin is a legume that obtains much of the nitrogen it needs via biological nitrogen fixation, it could also reduce a farmer's reliance on synthetic nitrogen fertilizer. Honeybees, used as pollinators amid sainfoin's striking pink blossoms, help supply a third potential revenue stream for sainfoin growers. Preliminary food science research suggests that sainfoin seeds might be nutritious for

humans, and archaeological evidence suggests humans were collecting and eating seeds from wild sainfoin plants thousands of years ago. However, more investigation is needed to confirm the seeds are safe for people to consume before they become a widely adopted pulse crop.

Sainfoin seeds are larger than other potential perennial grain pulses, which makes harvesting the seeds easier. As an open-pollinated plant species, increased seed yields can be obtained by adding honeybees (*Apis mellifera*) or alfalfa leafcutter bees (*Megachile rotundata*). The long-term goal is to design multifunctional sainfoin cropping systems that produce high-quality forage for livestock and nutritious seeds and honey for humans while sequestering carbon and reducing soil erosion and fossil fuel inputs. The near-term goal is cultivating a network of researchers, farmers, and stakeholders to identify target environments suitable for sainfoin grain production, develop best management practices, and explore sainfoin seeds' nutritional value and use as human food.

> **The sainfoin cultivar "Shoshone" was selected for the Perennial Atlas project.** The cultivar was named "Shoshone" as to honor Chief Washakie of the Eastern Shoshone Tribe. The Shoshone tribe is of the Great Basin region, in which this cultivar was developed. This cultivar exhibits forage yield and quality characteristics similar to other cultivars in adapted regions, and it can tolerate the northern root-knot nematode, a serious root pest of sainfoin. "Shoshone" is adapted to chalky calcareous soils containing calcium carbonate (pH of 7.0-8.0) in regions with rainfall totals of as little as 13 inches per year with cool summers and can be planted on dryland or under irrigation. "Shoshone" was jointly released in 2004 by The University of Wyoming, Montana State University, and the United States Department of Agriculture.

Perennial Flax

Researchers at the United States Department of Agriculture and the University of Colorado are collaboratively investigating *Linum lewisii* as a potential perennial oilseed crop. Lewis flax is a perennial plant native to North America, west of the Mississippi River and north into Alaska. It has traditionally been used for forage, fiber, and medicinal purposes. Domesticated annual flax crops, native to Europe and around the Mediterranean Sea, are used for linseed oil, edible flaxseed and flax oil, and fiber. There is hope that perennial Lewis flax could be domesticated in a similar manner. Lewis flax's nutritional value has yet to be fully assessed; however, Lewis flax's oil composition has been analyzed. Lewis flax has oil composition that is similar to annual flax (50-60% alpha-linolenic acid — an omega-3 fatty acid), and oil content slightly less than annual flax at around 33% of the total seed weight.

Perennial Lewis flax has a long taproot, making it drought-tolerant. It is also cold winter tolerant, making it suitable for shifting climates. It grows well in well-drained, infertile, and disturbed soils; it does not do well in areas with flooding or high water tables. The long flowering period of Lewis flax, featuring profuse light blue flowers, makes it an early to midsummer food source for pollinators, including honeybees. Lewis flax has also been cultivated for use in prairie restoration and makes good forage for wildlife and livestock. It can

tolerate some competition when growing, however it does not do well in a dense canopy. Its tolerance for some competition potentially makes Lewis flax a good candidate for intercropping with other species. However, Lewis flax can survive well in infertile and disturbed environments where other species may have difficulties.

The perennial Lewis flax grown in the Perennial Atlas project is Maple Grove germplasm from a collection made near Maple Grove, Utah, in 1988. According to the USDA, Maple Grove was selected "for outstanding vigor, beauty, and competitiveness with grasses prevalent on sites where it was collected" and "based on superior drought tolerance, plant longevity, seedling vigor, seed production, and rust resistance" compared to other collections. Maple Grove germplasm was released in 2003 by the Natural Resources Conservation Service, the University of Idaho and Utah Agricultural Experiment Stations, the Utah Division of Wildlife Resources, and the Forest Service Rocky Mountain Research Station.

Current Annual Grains

Sunflower

©Salix/Wikimedia Commons https://commons.wikimedia.org/wiki/File:2008-07-Pont_l%27Abb%C3%A9-Tournesols.JPG

Sunflower, *Helianthus annuus*, is a tasty oilseed crop native to North America, with wild sunflower relatives widely distributed across diverse landscapes. Native American communities domesticated sunflower about 4,000-5,000 years ago in the east-central part of the continent. From there, sunflower crops spread, with sunflower now grown worldwide.

> **The sunflower grown in the Perennial Atlas project is called Mandan 2.** It is a variety historically cultivated by the Mandan tribe, who have primarily lived in what is currently called North Dakota. This is an open-pollinated variety, meaning its a distinct population that reproduces primarily through outcrossing via pollinators. Outcrossing references the reproduction between genetically different individuals. In addition to Mandan 2, two modern sunflower varieties with noticeable differences from Mandan 2 will be used for this project. One variety will be short in stature and will mature early. The other variety will have a moderate maturity and be full in stature.

Lentil

ChriKo, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

Lentil, *Lens culinaris*, or *Viciia lens*, is a staple grain pulse crop eaten by people across the globe as a valuable source of protein. Along with wheat and barley, lentil is one of the earliest crops domesticated by humans in the Fertile Crescent, 10,000 or more years ago. Like sainfoin and alfalfa, lentils are legumes with symbiotic relationships with bacteria via root nodules that convert atmospheric nitrogen to plant-available nitrogen (NH_3).

> **The lentil grown in the Perennial Atlas project is an heirloom red lentil with excellent culinary characteristics.** It is a cool-season legume requiring only 80-110 days of growth from planting to harvest. The seeds are certified organic and produced by Sustainable Seed Co.

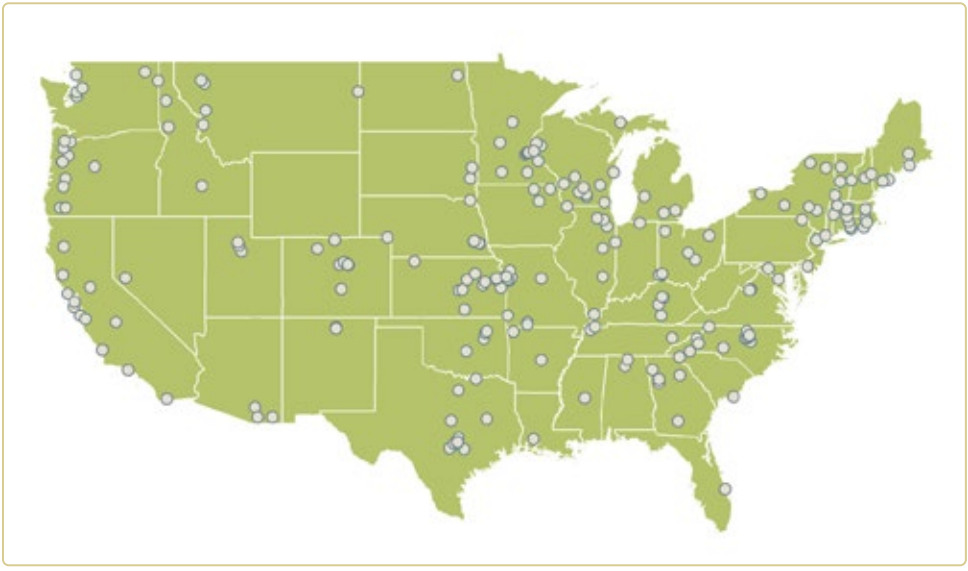
Annual Flax

H. Zell, CC BY-SA 3.0 <https://creativecommons.org/licenses/by-sa/3.0>, via Wikimedia Commons

Annual flax, *Linum usitatissimum*, is an important oilseed and fiber crop with origins in Eurasia. You might eat flax seeds, use linseed oil, or sleep on linen bedsheets. Humans have used the fibers of flax for tens of thousands of years. People in the Fertile Crescent first domesticated flax as an oilseed crop about 9,000 years ago. In North America, flax is primarily grown in the Northern Great Plains and Western Canada.

> **The annual flax grown in the Perennial Atlas project is 'Carter' flax, which has high yield, yellow seeds, resistance to flax rust, and tolerance to flax wilt.** Carter flax is a flax grown for its oilseeds, not a fiber flax grown for its fibrous stems, as it has large seeds and good yield potential. Carter flax was released by the North Dakota Agricultural Experiment Station in 2004. Despite Carter flax having a similar common name as the Florida native, Carter's small-flowered flax (*Linum carteri var. carteri*), these are different species.

Civic Scientists



The Perennial Atlas project launches with the collaboration of 224 civic scientists across 46 US states, including the District of Columbia.

Researchers

The research team to design, facilitate, and scientifically engage with Perennial Atlas spans six institutions.

The Land Institute Researchers

Aubrey Streit Krug
Perennial Cultures, Civic Science

Reece Knapic
Perennial Cultures, Civic Science

David Van Tassel
Perennial Oilseeds, Silphium

Betsy Trana
Perennial Oilseeds, Silphium

Brandon Schlautman
Perennial Legumes, Sainfoin

Spencer Barriball
Perennial Legumes, Sainfoin

Evan Craine
Crop Stewardship, Sainfoin

Laura van der Pol
Soil Ecology

Madeline DuBois
Soil Ecology

Claire Wineman
Soil Ecology

Kathryn Turner
Crop Protection Genetics

Yvonne Thompson
Crop Protection Genetics

Ebony Murrell
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Perennial Atlas

Perennial grain civic scientists grow small plots of plants in their local places, collect and share data, and come together in a digital learning community. **The 2024-2026 Perennial Atlas civic science project will result in new knowledge, stories, and maps.**

Building an Atlas

An atlas is a set of maps. The research team has envisioned the Perennial Atlas to be a set of maps of large data sets that can help scientists analyze perennial grain performance. The data shared by civic scientists and analyzed by researchers can be converted into geographic visualizations and thematic layers for the broader research community to interact with and study. Potential layers may related to:

- Plant developmental stages
- Plant vigor and biomass
- Seed performance and quality
- Disease and pathogen interactions
- Insect and pollinator interactions
- Soil quality, chemistry, and microbiome
- Water relations and soil moisture

These maps and data can provide insights into the adaptability of future perennial grain crops across different environments by revealing boundaries and patterns and by building an evidence base and ideas for domestication research.

The Perennial Atlas project and set of maps are being developed on the CitSci.org digital platform. As part of this project, The Land Institute researchers collaborate with CitSci to develop expanded features and improve accessibility.

Engaging in Civic Science

The civic science research team widely shared information about the Perennial Atlas project to invite interested people to learn more and indicate their interest. We looked for civic scientists who could grow plants in a range of places and environmental conditions across the United States, like a backyard, community garden, neighborhood center, or schoolyard. We selected the final group of civic scientists for the project primarily based on geographic diversity across the country.

The research team organizes and provides educational materials, seeds and seedlings, and other resources, including harvest bags, pre-paid shipping labels, and a small stipend. As civic scientists, you receive these materials, establish plots, and collect data. Civic scientists make a range of different observations, measurements, and samples. You share your experiences with us on the research team, with your local communities, on social media, and with fellow project members. The stories, feedback, and shared ideas help improve the Perennial Atlas project and grow knowledge as the project progresses.

The research questions for the Perennial Atlas civic science project relate to the natural and social sciences, the arts and humanities, and what is called transdisciplinary research that goes beyond academic disciplines to engage communities.

As Perennial Atlas civic scientists, you are invited to participate in the scientific study of future perennial grain crops and their current annual grain crop counterparts. The scientific data requested relates to plant biology and productivity, agroecology, and soil and crop ecology. The scientific datasets form the atlas maps described above to build knowledge and advance perennial agriculture research and new crop domestication.

Additionally, as Perennial Atlas civic scientists, you are invited to participate in a social science study of engagement. The sociocultural data requested through opportunities like surveys and guided tours relates to your sense of place, motivations, values, quality of experiences, demographic identities, and experiences as a civic scientist. By studying your engagement, we as researchers can improve this project and better design future perennial agriculture civic science projects that are effective and inclusive.

Returning Results

Throughout each growing season, the research team and civic scientists communicate digitally and meet on webinars and community calls. After harvest, everyone gathers to discuss the year's research results, learn from challenges, celebrate successes, and identify plans and opportunities for next year. The research team analyzes data and converts data into maps for you as civic scientists to view and interact with, along with our colleagues in the research community.

The Perennial Atlas project rests during the winter. It resumes in the spring once the perennials re-emerge above ground and the annuals are replanted. The project will continue for three years of learning and result in an atlas with new knowledge, stories, and maps.

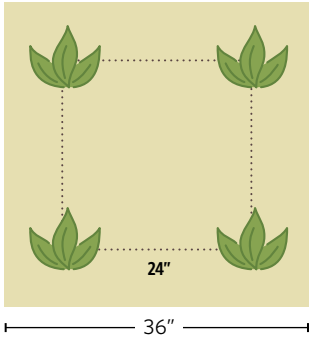
In the Field

Caring for Your Plot

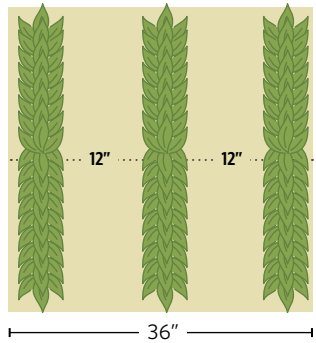
Individual Plot Layout

These 36″ x 36″ squares show how your individual plots should be planted.

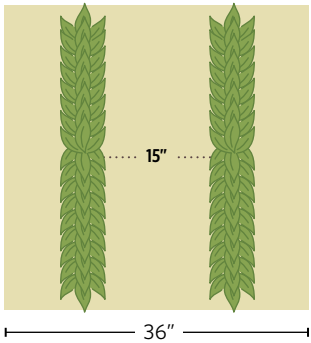
Silfower & Sunflowers



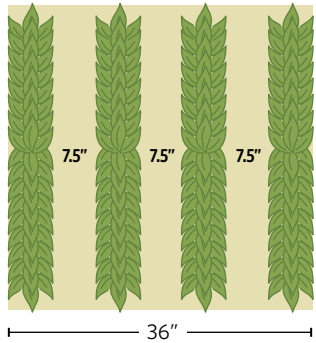
Sainfoin



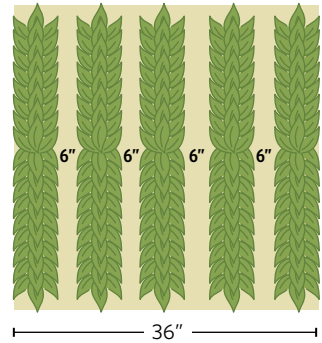
Lewis Flax



Annual Flax



Lentils



Plot Layout

At right is an *example* of a layout, you should orient and alter as needed.

Please randomize the placement of the plots within your chosen orientation.

1: Sunflower VARIETY 1

2: Sunflower VARIETY 2

3: Sunflower VARIETY 3

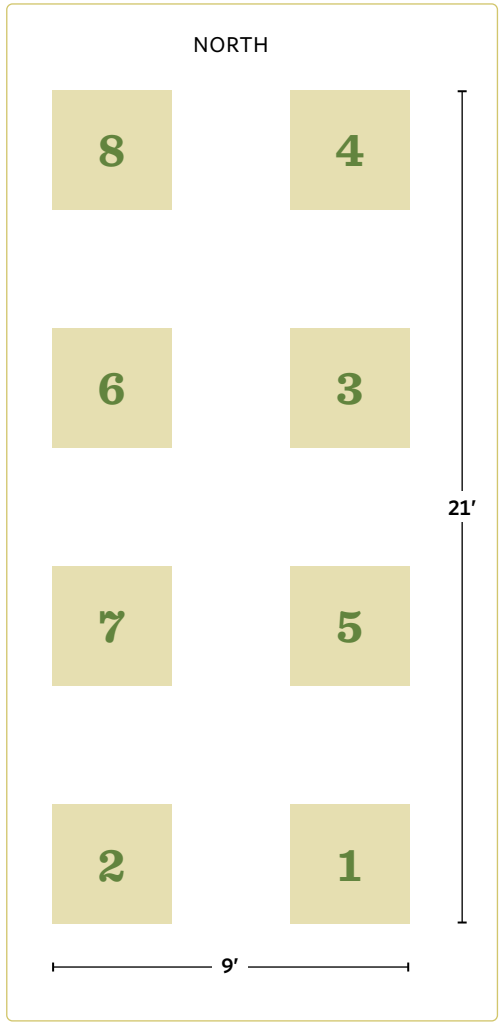
4: Lentil

5: Annual flax

6: Silflower

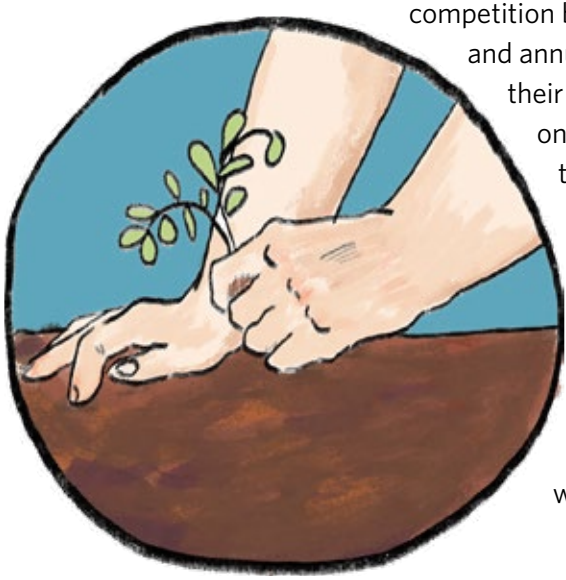
7: Sainfoin

8: Lewis flax



Weeding

Weeding is the central part of maintaining the plot. Weeding aims to avoid any competition between weeds and the perennial and annual crop plants that could affect their survival rate. Weeding at least once every two weeks throughout the growing season is essential to keep the weeds in check. You can use a tool like a hoe to remove weeds from the perennial and annual crop plants. For weeds near the crop plants, it is safer to remove those by hand so as not to accidentally harm them, especially when they are small.



Watering

After the plants in your plot get established, regular watering is not recommended for most places, as natural precipitation is usually enough. When you notice that it hasn't rained recently and the crop plants look stressed, you should water them. You don't want to water regularly, but you also don't want the crop plants to die because of a lack of water.

Plant Markers

To help support data collection and plot management, it's useful for the plant identification markers to stay in place next to the corresponding blocks of crop plants. If your plant markers and plot signage get lost or degraded, contact the civic science research team so we can provide new ones.

Interacting with Plants

Please regularly observe your plants. Your close proximity to them means that you are best suited to notice what seems surprising or interesting and have the chance to use all your senses to get to know them.

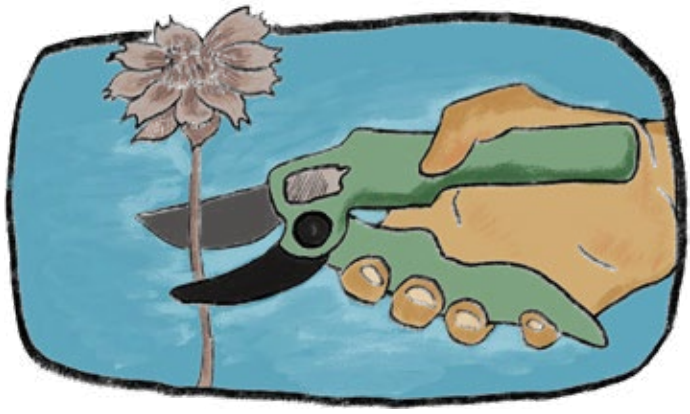
As researchers, we hope you find creative inspiration through your interactions with plants based on your practical interests and what you find culturally significant. Civic scientists might investigate the aroma of plants or grains, novel methods for harvesting or cleaning seeds, using by-products for papermaking, or creating artwork based on your plants and plots.

Please contact the research team if you have ideas for additional experiments and want to ensure they don't compromise the project's scientific data collection and research goals. Culinary research is not the main focus of our research, and seeds harvested in your plots will mostly need to be shared back so researchers can study the quantity and quality of seed harvest. However, over the project's life, we hope to provide some fun and optional opportunities for you as civic scientists to eat, cook, or bake with perennial grains.

Collecting Data

The Perennial Atlas project data includes observations, photographs, numbers, locations, dates, stories, samples, harvested materials, and more. Civic scientists collect data, and the research team organizes and analyzes this data.

Data Collection Protocols



Please visit the "Resources" tab in the Perennial Atlas project on CitSci.org to access all data collection protocols, which will give you step-by-step instructions for when and how to collect data. These steps help ensure the data collected meets scientific standards. Along with educational materials that help explain how data are used and why they are important, repeated practice can help build skills to gather high-quality data. So follow the steps as best you can, reach out to the research team with questions and feedback so we can help, and know that you (like us!) are growing your skills now and for the next season in the lifelong practice of learning.

Data Governance, Management & Privacy

Data collection is voluntary but encouraged. For more information about how data and results will be of benefit and be used, about the systems we use as researchers to manage data, and about confidentiality and privacy concerning your identities and locations as civic scientists, please look in the Perennial Atlas project resources on CitSci.org and reach out to the research team.

Submitting Data

CitSci.org

To submit your civic science data on a desktop or tablet, visit the Perennial Atlas project on CitSci.org. Here, you can access all datasheets, data collection protocols, instructions, and educational resources. Find and click the "Add Data" button at the top right corner of the project page, then look for the datasheet that matches the protocol name for the data you want to submit.

TLI Civic Science App

To access datasheets and submit photos using your phone, use the TLI Civic Science App. This mobile app is connected to our project on CitSci.org and will upload your data. You can download the free app on your phone's app store by searching for "TLI Civic Science."

If you need help logging into the project at CitSci.org, accessing your account, or receiving error messages on data submissions, contact webmaster@citsci.org.

Shipping Materials to The Land Institute

You will be asked to send samples and harvests to the research team at The Land Institute. We will provide you with materials like envelopes and prepaid shipping labels. If you lose your label or need another one sent, contact the research team at civicscience@landinstitute.org. If you need to send anything else to us, our mailing address is 2440 E Water Well Rd., Salina, KS, 67401.

Sharing Stories & Feedback

Stories

Stories help us as researchers get a richer picture of your experience as a civic scientist. Your story might be a moment that stands out to you, an interesting conversation you had with a friend, a reflection or insight, a photo that encapsulates a memory, or something you were inspired to create, like a poem, video, or drawing. We invite you to share your stories in many places across the project, including emails, phone calls, forums, community calls, datasheets, surveys, newsletters, and social media.

Feedback

Please share honest feedback with the research team to help us improve this project and to design future projects. When you share what works well, we can learn what to sustain and grow. When you share challenges, questions, and ideas, we can learn how and why to change. Feedback is most helpful when we can understand what's going on, and if we aren't sure we understand, we may wish to reach out to you to gain clarity or context. We look for patterns across feedback in the group. We also look for infrequent but important responses highlighting where to improve. We have an open line through our feedback form available in the online project, email at civicscience@landinstitute.org, and phone at 785-823-5376.

Navigating Joys & Challenges

We invite you to join us as researchers and participate in the process of scientific inquiry and discovery, which may involve both rewarding and disappointing moments. Seedlings may take root; plants may bloom and produce seed. Or seeds may not germinate; plants may not survive. Negative results are not a failure on your part as civic scientists. Instead, they provide critical, valuable information for agricultural civic science research. Please share your experiences and results, both positive and negative, so we have ample information to learn as a community.

Engaging with Data

Visit the Perennial Atlas project on CitSci.org to see scientific measurements and observations as they come in. Researchers analyze and convert this data into maps, also available on CitSci.org. Our research team aims to support civic scientists in viewing and interacting with the maps of the Perennial Atlas as well as other kinds of data visualizations as we regularly return and share back the results of the project with you. We welcome your questions and ideas about engaging with agricultural, ecological, and scientific data.

Engaging with the Civic Science Community

CitSci.org

The project's online platform includes a forum for connecting civic scientists and researchers. Civic scientists can share stories and support peer-to-peer learning, and researchers can answer questions and help troubleshoot challenges.

Community Calls

During each growing season, our research team facilitates regular digital meetings for civic scientists to talk with and learn from each other. Community calls are also a chance for our research team to hear feedback, share civic science project results, and provide updates about the broader context of perennial grain agriculture into which this Perennial Atlas project fits.

Site Visits

In the Perennial Atlas project's second and third growing seasons, our research team will ask civic scientists if we can visit your plots digitally or in person. These visits can be a chance to get to know you, your plants, and your place.

Engaging with Your Community

In the Perennial Atlas project, our research team seeks to grow the community of people across the country who are engaged in learning with perennial grain crops. We aim to support interested civic scientists in making local and regional connections. We encourage you to use your civic science plot to engage with your neighbors, family, friends, and fellow community members. You could develop informational signage, offer public tours, speak at local events, work with a school or community garden on educational programming, or do something different. Please let us know how we can help.

Citations & Gratitude

The material in this field guide is adapted from The Land Institute's website, and the 2012 entry on grains by David Van Tassel and Duane Schrag published in the *Berkshire Encyclopedia of Sustainability*. Unless otherwise credited, all photos and images in the guide are from The Land Institute.

For more information and relevant peer-reviewed publications, please check out the resources posted in our project at CitSci.org and The Land Institute's website at landinstitute.org, along with our Civic Science webpage at landinstitute.org/civic-science.

This Perennial Atlas field guide was developed in 2024 through a collaborative effort led by The Land Institute's Civic Science Program. We drew from and built on the format and content of past field guides for silphium and perennial wheat civic science, which were conceptually designed and written by Anna Andersson, Aubrey Streit Krug, and colleagues (see past publications for a complete list of contributors). We then developed new content and an updated approach to serve the Perennial Atlas project better.

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Our Civic Science program continues to grow and learn. In addition to the contributors above, many more people deserve credit and thanks for their knowledge and support:

- Colleagues across The Land Institute, ranging across research, administration, and leadership, including visiting scholars and temporary staff, and especially past and current members of the Perennial Cultures Lab
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- Many researchers whom we have never met, whose books and articles inform our understanding and challenge and inspire us in fields including citizen science, participatory research, agroecology, ethnobotany, data science, agricultural extension, feminist studies, and Indigenous studies
- Finally, the most essential acknowledgment goes to the people who join us as civic scientists. Those who invite perennial grains into their homes, backyards, farms, and gardens, try new tasks and give us feedback, and do the work of caring and learning together for varying lengths of time, but perennially in relationship with plants and places. Thank you!

The Land Institute is a non-profit agricultural research organization. With our partners, we advocate worldwide to realize perennial, diverse agriculture that regenerates the soil, water, and air on which all life depends. We develop perennial grain crops as staple foods to be grown in diverse cropping systems known as perennial polycultures. We engage the people and systems needed to care for, value, and create more just perennial agricultural communities.

The Land Institute was co-founded in 1976 by Wes Jackson and Dana Jackson. Our headquarters is located on Mollisol soils of grassland ecosystems near the Smoky Hill River outside of Salina, Kansas, United States, in the ancestral homelands of the Kaw, Pawnee, Osage, and other Indigenous nations. We are committed to creatively repairing harm and building mutually beneficial relationships with members of the land community here in Salina and across the planet.

Learn more at landinstitute.org

Share Your Story and Stay in Touch!

- Join the Perennial Atlas project and share and interact with data at CitSci.org.
- Download The Land Institute's "TLI Civic Science App" on your mobile device to submit photos and data in the field.
- Participate in community calls to talk with fellow civic scientists and researchers.
- Contact the research team at civicscience@landinstitute.org or 785-823-5376

Use #PERENNIALATLAS to make and find public social media posts. Tag The Land Institute:

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