ecdysis

Individual Grower Report 2025

This report is provided as part of the ongoing *1000 Farms Initiative*, by Ecdysis Foundation.

INTRODUCTION & BACKGROUND

Ecdysis Foundation is all about grower-focused research to transform agriculture with regenerative principles. Agricultural science is typically conducted and communicated to other scientists, rather than the farming community. At Ecdysis, we flip those priorities. Ecdysis has a strong emphasis on farmer-, rancher-, and beekeeper-driven research questions, and empowers growers by involving them in the actual research projects themselves. Funded by grants and donations, all of our research is provided back to farmers at no cost, with no strings attached. We host field days around the country to help others understand our findings, connect growers with each other, and make friends along the way.

To make this mission a reality, we started the largest agricultural research project North America has ever seen, the *1000 Farms Initiative*. This report is an important part of this ongoing effort.

Blue Dasher is the regenerative farm where Ecdysis' headquarters is located. We believe that if we're going to be researchers for farmers and ranchers, we better be farmers and ranchers ourselves. On any given day, staff can be found moving sheep, mucking barns, starting seeds, or checking on bees. Blue Dasher roots us and gives us a place to connect with the communities and people around us. It allows us to connect with many of the obstacles that farmers face. Bettering our food system and engaging our communities go hand-in-hand, and we want to be a part of that.

And if you're getting this report, then we've already met and we've begun to work together to find better solutions. We look forward to continuing this collaboration.

CONTENTS

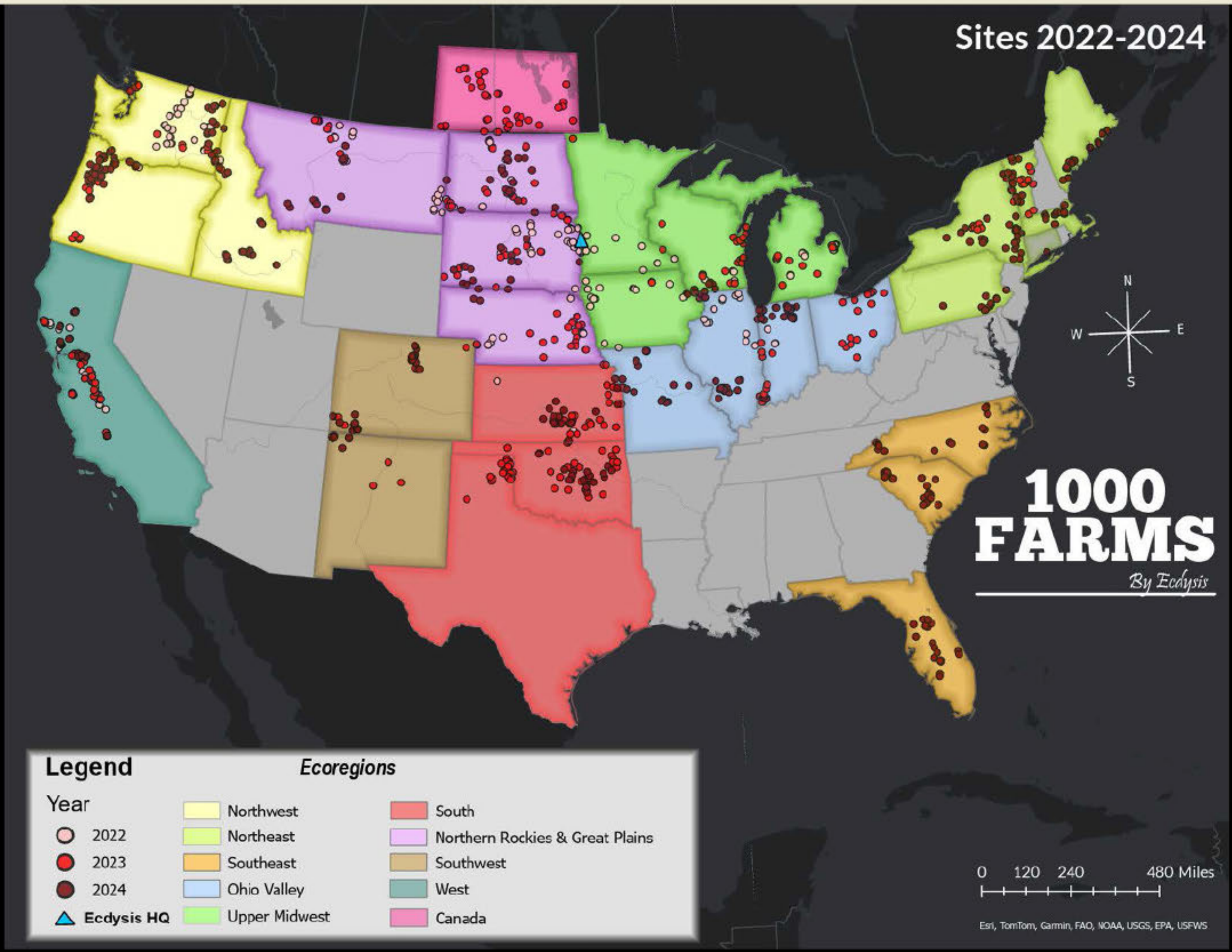
1000 FARMS INITIATIVE SUMMARY

In 2022, the 1000 Farms initiative was launched, designed to answer the **biggest and most complex questions** that can be asked about our food system:

- **How can we grow food in a way that restores our hurting world to health?**
- **How can our food production benefit our farmers, our bodies, our natural environment, and our communities?**

In search of answers, Ecdysis deploys teams to farms across North America to measure everything from **biodiversity, soil carbon, food nutrient content, and economic and sociological effects** of various styles of land management.

In 2024, we visited **547 farms** alone and surpassed the 1000-farm milestone with **full-system assessments on 1,284 farms across North America!** Information in this report comes directly from these visits. Read on for data on your site.

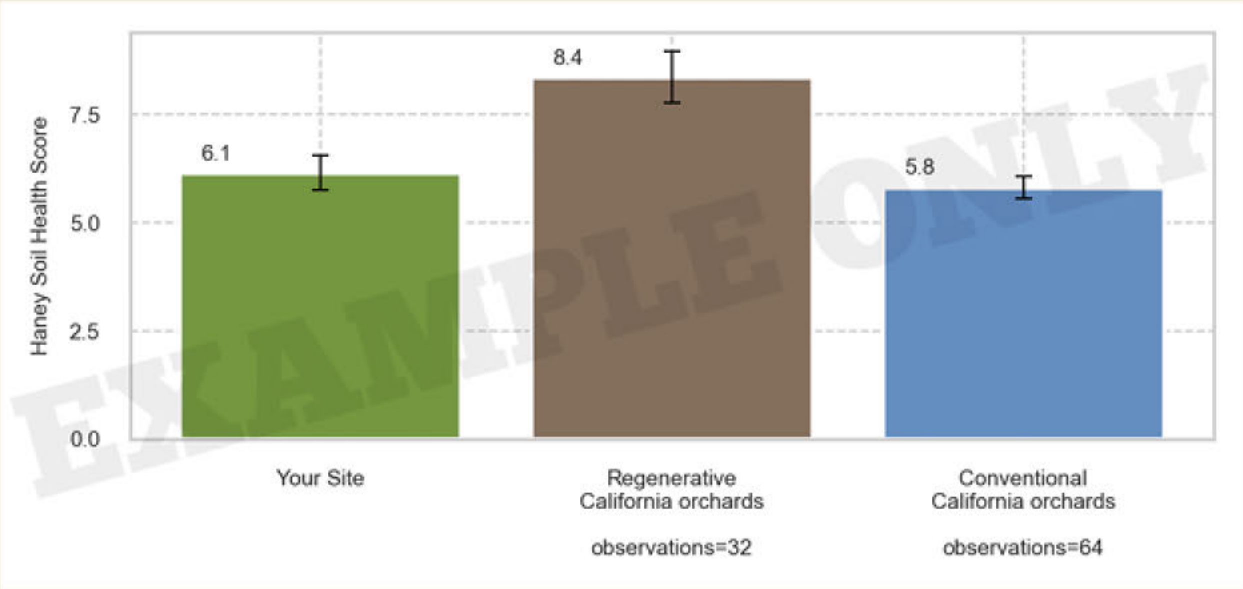


HOW TO INTERPRET THIS REPORT

Included in this report, you will find the results for your field, as well as comparative values for similar crops and other farms in your region.

One important thing to remember is that these numbers are only a part of the story. They are not always what we expect to see, and often the reasons lie under the surface. Biological systems, including farms, are incredibly complex in their functioning. If you see a result you don't expect, we encourage you to consider outlying variables and reach out to the trip leader that was in contact with you for your site visit, or send an email to ecdysis.admin@ecdysis.bio so we can help you look into it.

Here is an example of a bar chart that you will see in each topic of research:



The first bar will depict your farm's data. The second, will show the combined average of regenerative farms growing similar crops in your region (or rangelands in your region). The third bar will show the combined average of the conventional farms growing similar crops in your region (or rangelands).

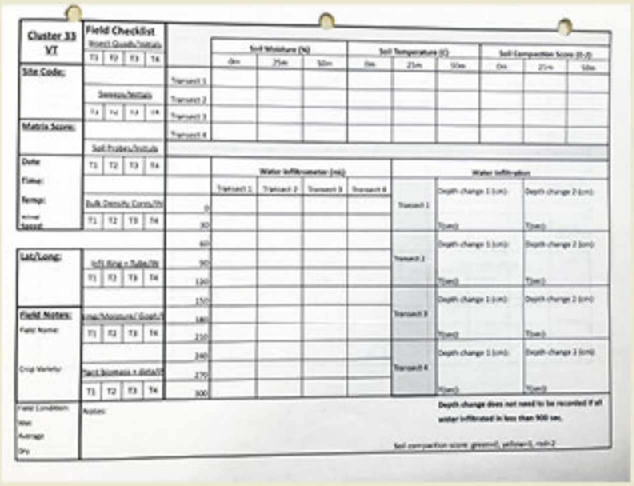
For purposes of this chart, a farm is determined to be conventional or regenerative based on their number score in the regenerative matrix questionnaire that you have participated in prior to sampling your farm. If you have further questions about this matrix questionnaire, please reach out to your contact from our site visit or email ecdysis.admin@ecdysis.bio

OUR METHODOLOGY

When arriving at your site, we enjoy the opportunity to meet you and learn the management info or notable field conditions you'd like us to know. Our team enters the field and lays down 4 measuring tapes that we call our "transects". These transects are each 50 meters long, at least 25 meters apart from each other, and at least 25-50 meters from the edge of your field, depending on its size. This will help to minimize any "edge effects" (effects of roads, neighboring fields, etc).

Our team drops a GPS (latitude and longitude) pin at the first transect and measures climatic conditions (temperature and wind speed), as well as if the field condition is dry, average or wet. If there are any notable other conditions this is also included.

Here is a an example of our data sheet:



We begin to break into several teams to collect a full systems assessment of your field, collecting samples and data on several metrics of soils, water infiltration, plants, birds, insects, and microbes. We utilize several methods to do this, which we will describe further in each relative topic of your report beginning on the next page.

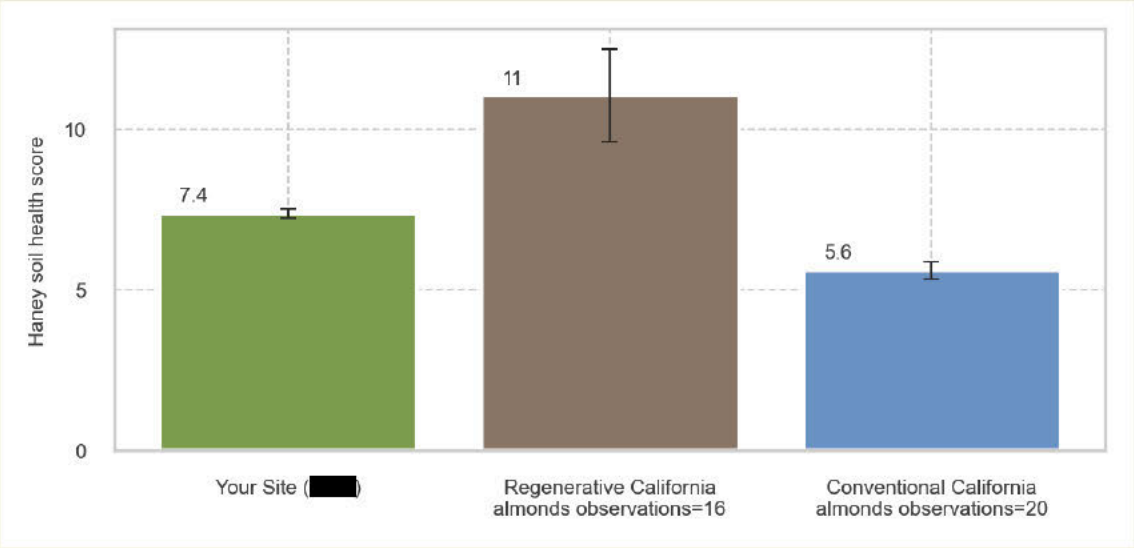
YOUR RESULTS START HERE

The following pages contain data from your individual site. These pages also explain aspects of the data collection process like *how it was measured, what was learned, and why it's important*. This document is part of the ongoing discussion and effort around the *1000 Farms Initiative*.

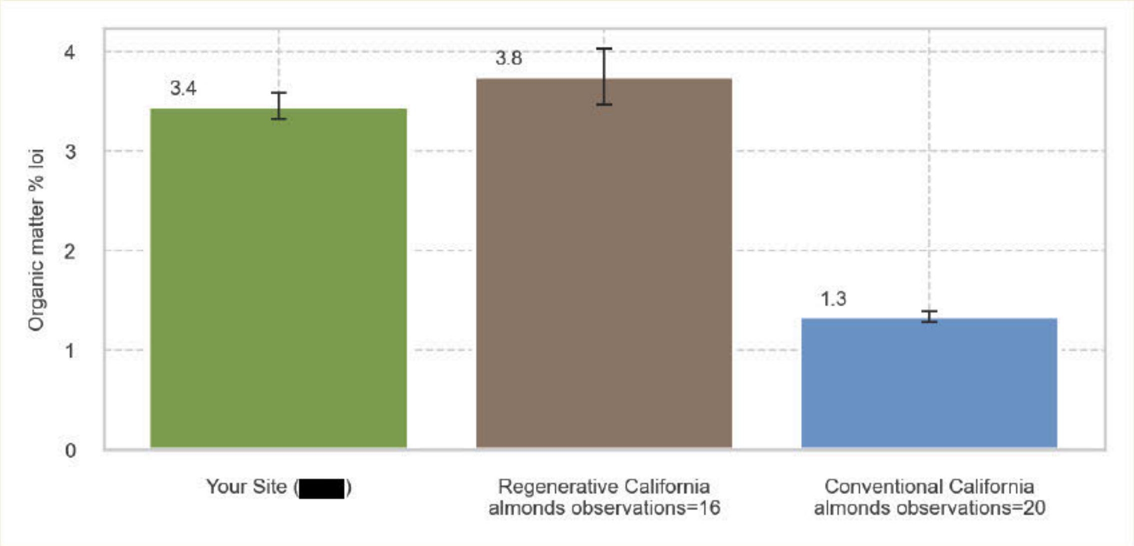
If you have any specific questions, please reach out to us at ecdysis.admin@ecdysis.bio

SOILS

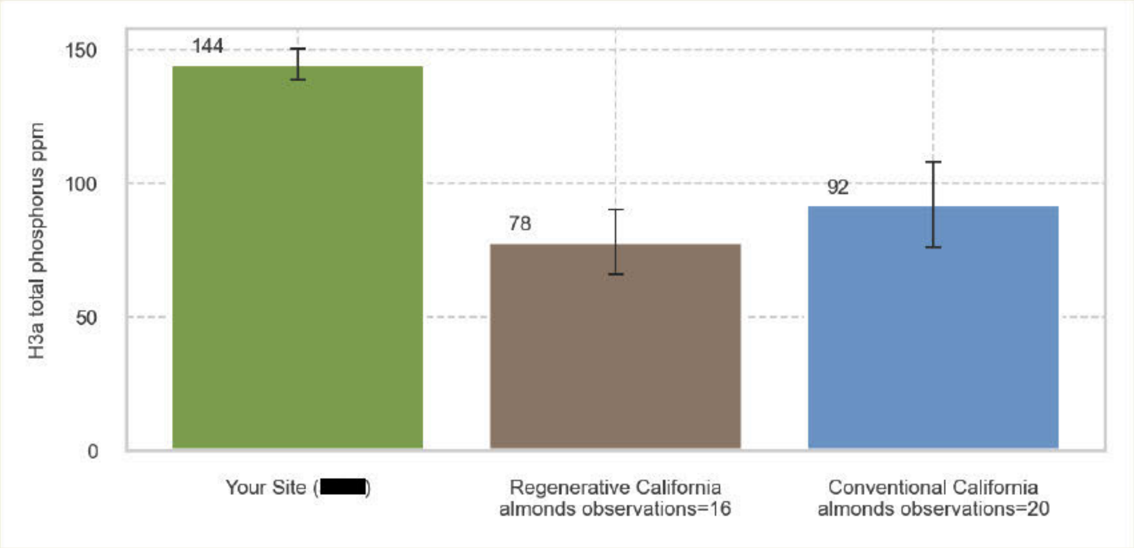
Haney soil health score



Organic matter



Phosphorus



Measure	Your Site ([redacted])	Regenerative regional	Conventional regional
Bulk density g/ml	1.3 ±0.09	1.2 ±0.06	1.5 ±0.09
Soil ph	7.4 ±0.09	7.5 ±0.04	7.6 ±0.04
1:1 conductivity mmho/cm	0.2 ±0.02	0.11 ±0.02	0.33 ±0.1
Sulfur (ppm)	37 ±12	12 ±4.6	82 ±38
Potassium ppm	140 ±6.5	118 ±9.9	139 ±15
Calcium ppm	844 ±14	656 ±38	1314 ±223
Magnesium ppm	161 ±5.7	203 ±8.2	156 ±21
Sodium ppm	23 ±2.3	34 ±2.8	52 ±7.9

Why Do We Care About Soils?

The physical and chemical properties of soil support the life on a farm; practices that promote organic matter, micronutrient levels and enhance aggregation increase the profitability and resilience of a farm. But even more importantly, the soil is a pivotal tool for stabilizing global climates, reversing desertification, increasing biodiversity, and restoring the rural fabric of our society.

How Did We Measure For Soils?

From your farm, soil was analyzed for a wide range of properties related to soil health. This section highlights 16 components of soil's chemical and physical properties. On your field/rangeland, we measured soil characteristics along four lines, or transects. On each of these transects, we collected four deep cores (60 cm deep), and 13 shallow cores (15 cm deep). The deep cores were partitioned into five depths, 0-5, 5-10, 10-15, 15-30, and 30-60 cm, and a battery of chemistries were estimated at each level. The shallow cores had soil chemical and health assessments done on them (including microbial analysis, which is presented later). Most of the data we are presenting in this report are from the top 15 cm of the soil; values from deeper in the soil column and more comprehensive sets of nutrients are available upon request. The categories presented here are bulk density, pH, organic matter, total carbon, total organic carbon, total organic nitrogen, nitrogen, phosphorus, electrical conductivity, cation exchange capacity, sulfur, potassium, calcium, magnesium, sodium, and the Haney soil health test.

o Bulk density:

Bulk density reflects the amount of soil and air within a uniform volume, and lower bulk densities are preferred. For your farm, we present the bulk density of the top 15 cm of the soil. Soil compaction measured as bulk density simultaneously indicates multiple soil characteristics and functions, such as structural support, soil aeration, as well as water and nutrient movement. Bulk density is measured as g/cm^3. Recommended measurements vary depending on land use history, climate, geographic position, the soil texture and mineral composition; Common values for sandy soil, 1.6-1.8 g/cm^3, for silty soil 1.4-1.65 g/cm^3, for clay soil 1.1-1.47 g/cm^3 (1).

o pH:

Soil pH is measured on a scale that shows the acidity or basicity of the soil. This scale ranges from 0-14, with 7 being neutral. Values below 7 become more acidic and above 7 become more alkaline (basic) (3). According to the NRCS, a general optimal range for most soil is 6-7.

o Organic matter

Organic matter (OM) is material that is, or has been a part of an organism and is at any stage of decomposition. This includes worms, crop residues, insects, compost tea, and all the bacteria and fungi within soil. Once organic material enters the soil profile, it weaves itself into the soil's structure. Adding organic matter for soil development provides a multitude of benefits such as a high capacity for nutrient absorption and retention, increased water holding capacity, improved soil structure and erosion resistance (5). Increasing soil organic matter can be done by reducing or eliminating tillage, using cover crops, adding compost and/or manure.

o TOP - Phosphorus

Phosphorus is a structural component of DNA and RNA, which are both essential for plant growth. Phosphorus deficient plants have stunted growth, limited roots systems, and thin stems (10).

One way to increase phosphorus is through adding cover crops, manure, and compost. While these methods do not alway produce the most phosphorus, they are the most available for plants to take up and are a key to building long term soil health (11, 12).

o Electrical Conductivity

Electrical conductivity measures the capacity of water in the soil to carry electrical current. High electrical conductivity can indicate high salinity in soil, which hinders microbial activity and plants ability to uptake water (13). While adding organic matter will help fix electrical conductivity, the most important is to avoid excessive irrigation which increases salinity of soil (14).

o Sulfur

Sulfur is essential for protein producing enzymes and metabolic relations. Crops are able to uptake sulfur through organic matter and also background elements, such as weathering from minerals and dust. Organic matter is a better source of sulfur compared to background elements because it is easier for plants to uptake and process (16 and 17).

o Potassium

Potassium is essential to a plant's water uptake from soil and water retention. Other benefits of potassium are thicker cell walls which improves crops resistance to pests, disease, and mechanical wear (18). One way to ensure that plants are uptaking the potassium is to add manure or compost. By adding manure or compost, cation exchange capacity, or nutrient absorption, is greatly increased, therefore the plant is able to absorb more potassium.

o Calcium

Calcium is a nutrient taken up through young roots of the plant and plays a crucial role in cell health and growth by defending a plant and its cells against toxic elements (18). Microbes and soil structure are also supported by calcium (19).

Improving calcium uptake can be done by having covered soil and adding organic matter such as compost or manure.

o Magnesium

Magnesium largely is sourced from weathered minerals present in the soil and from clay. Connecting ATP molecules for energy and metabolism are other vital roles that magnesium plays. Too much magnesium can prevent plants from uptaking calcium (9). Adding compost can increase magnesium, gypsum can decrease magnesium, but the right cover crops can do both and also add organic matter and protect soil from erosion.

o Sodium

Sodium is an abundant element that can support growth and water uptake, but is non-essential for most plants. High levels of sodium lead to salinization of soils, this is often attributed to high amounts of sodium in irrigated water (9). Soils with high amounts of sodium are one of the world's leading barriers to agricultural production because high amounts of sodium decrease a plant's ability to uptake water and nutrients and this leads to plant death (9).

o Haney Soil Health Test

The Haney Soil Health test provides a score (0-50) to estimate soil health. The score is based on more than a dozen individual tests of soil inorganic nutrients (both macro- and micronutrients), nutrients that are plant-available, and microbial activity in the top six inches of soil. In general, a higher Haney test score represents healthier soil.

Importantly, the score represents only a snapshot in time and can respond to certain treatments quickly and for a short duration (such as applications of nitrogen and synthetic fertilizers).

Increasing soil organic matter is a long-term, sustainable approach to improving Haney test scores. Increase soil organic matter by leaving terminated cover crops and crop residues in fields, introducing livestock, composts and compost teas, and using organic fertilizers, like fish emulsions and blood meal.

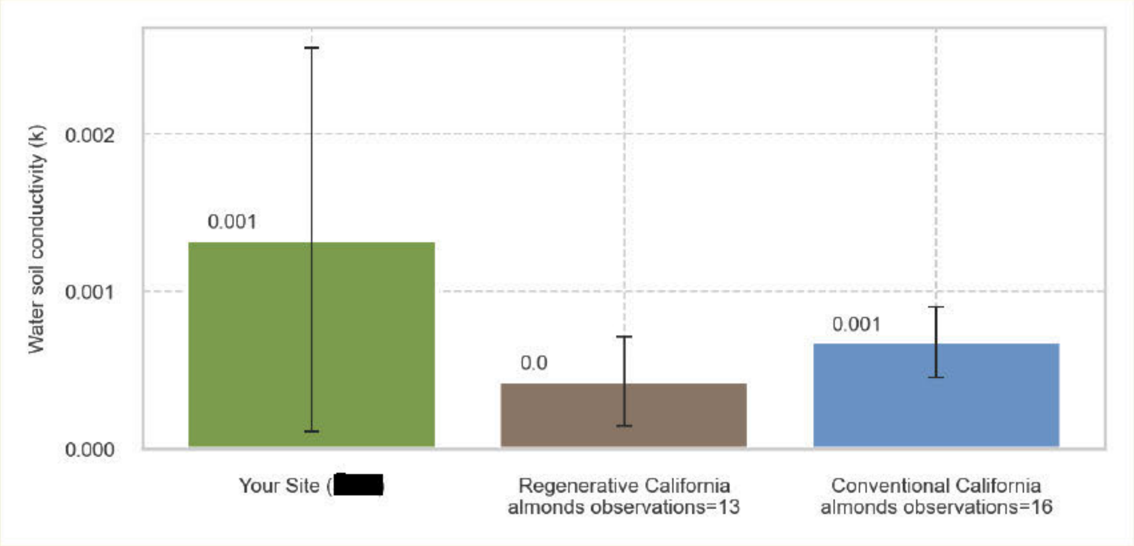
How Are Farmers Improving For Soils?

Things that negatively impact bulk density are consistent plowing or tilling, having little crop rotation or variability, having little variability in root depth or structure, and repeated use of heavy equipment on soil (2). Practices to improve bulk density, support soil structure, and water movement are: Using a variety of cover crops, reducing or eliminating tillage, minimizing soil disturbance, increasing organic matter, and integrating livestock into cropping operations.

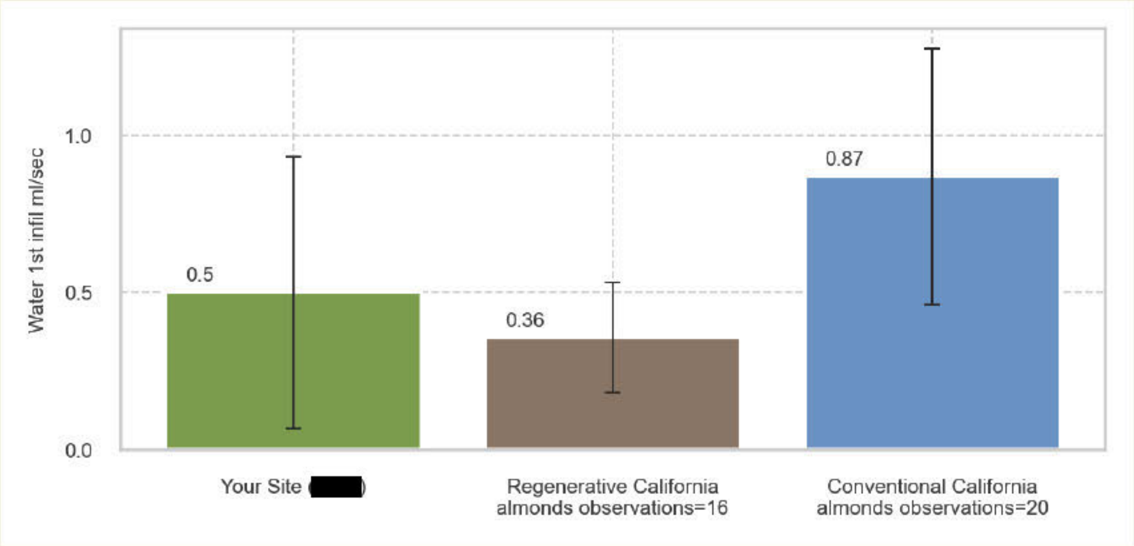
Factors such as crop type and soil mineral composition play a role in optimizing the pH for each operation. Additionally, adding synthetic or organic fertilizer, organic matter and leaving crop residues will modify soil pH. One way to lower the pH of soil is to add natural soil acidifiers such as compost or manure. To raise pH, lime is most commonly used. Another option is to adjust crop rotations based on soil nutrient needs (4).

WATER

Soil conductivity



Water infiltration



Why Do We Care About Water?

Water and life go hand in hand, and a farm's productivity is tied to how it interacts with water. We're starting to see lots of water stress around the country, and many farmers won't be able to handle too little or too much water with current management approaches. Regardless of their rainfall averages, farmers should focus on improving soil structure to absorb more water. In dry conditions, better water infiltration and absorption means you catch and hold more precious rainfall, especially as you build long-term soil health. In wet conditions, more water enters deeper in your soil profile, which can improve mucky spring planting conditions and improve wet spots in fields over time.

How Did We Measure For Water?

We use several methods to measure water relationships on your farm, two of which are presented below: a 6-inch infiltration ring and a mini-disk infiltrometer. We also examined water holding capacity of your soil, gravimetric water content of your soil, and water use. The 6-inch ring is a standard NRCS infiltration test, where one pours 444 mL of water to simulate an inch of rainfall(22). We measure how long the first pour takes, and if that goes in within 15 minutes and saturates the soil, we do another pour. This tells us how well your soil can receive and absorb rainfall. The mini-disk infiltrometer measures the "hydraulic conductivity" of soil, which reflects how the physical and chemical properties of soil, such as particle size and micropore space, pull in water, as opposed to gravity simply pulling water downwards (23 and 24).

What Did We Learn About Water?

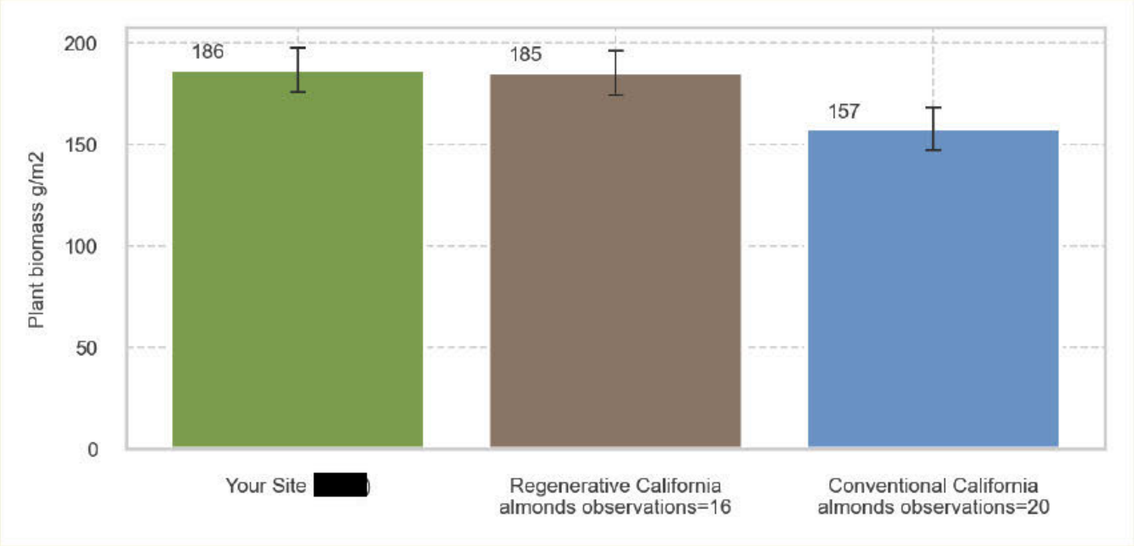
Hydraulic conductivity is a good measure of other soil health parameters; the ring test may be as well, but is harder to interpret. In general, higher hydraulic conductivity is better. Likewise, higher infiltration rates are good, but slow infiltration rates are not necessarily bad. Water infiltration is highly dependent on soil structure and existing moisture, so comparing your farm to another gets tricky. The best use of this test might be to run them periodically as a bell-weather of how your management practices affect your water infiltration. Without conducting an infiltration test yourself, you can often tell whether you have infiltration problems if you have puddles or prolonged wet areas after a rainfall, or if any water that flows off your field is muddy or brown.

How Are Farmers Improving For Water?

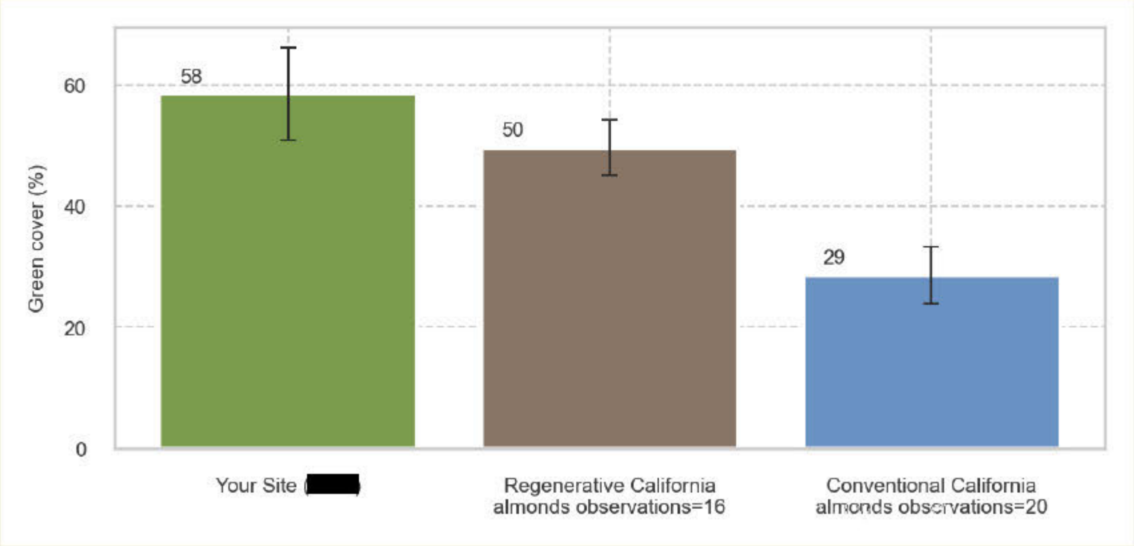
Short-term tactics such as draining low areas and irrigating high or dry areas might improve the short-term productivity of the land, but they reduce a farm's long term ability to support production and do not address underlying soil-water dynamics. Farmers are teaching us that we can influence how water acts on our farms, and improve long-term productivity, by shifting our focus to the life on our farm and in our soils. Diverse plant communities, often achieved by planting cover crops or leaving endemic ground cover intact, are the best way to prepare a farm for water stress. In perennial systems, living cover crops improve overall water use efficiency(25). In annual cropping systems, cover crops do not necessarily compete with primary crops for water, even in dry environments(26 and 27). When cover crops are terminated appropriately and paired with minimal tillage, the plant residues provide ground cover and improve water efficiency(28, 29,30 and 31). Plants absorb the impact of rainfall and reduce water erosion and rainfall compaction and evapotranspiration (32 and 33). Their roots create pores and channels in the ground and exude sugars to feed microbial communities, and it's these living soils that create the organic matter and healthy soil structures that absorb more water (34, 35, and 36).

PLANTS

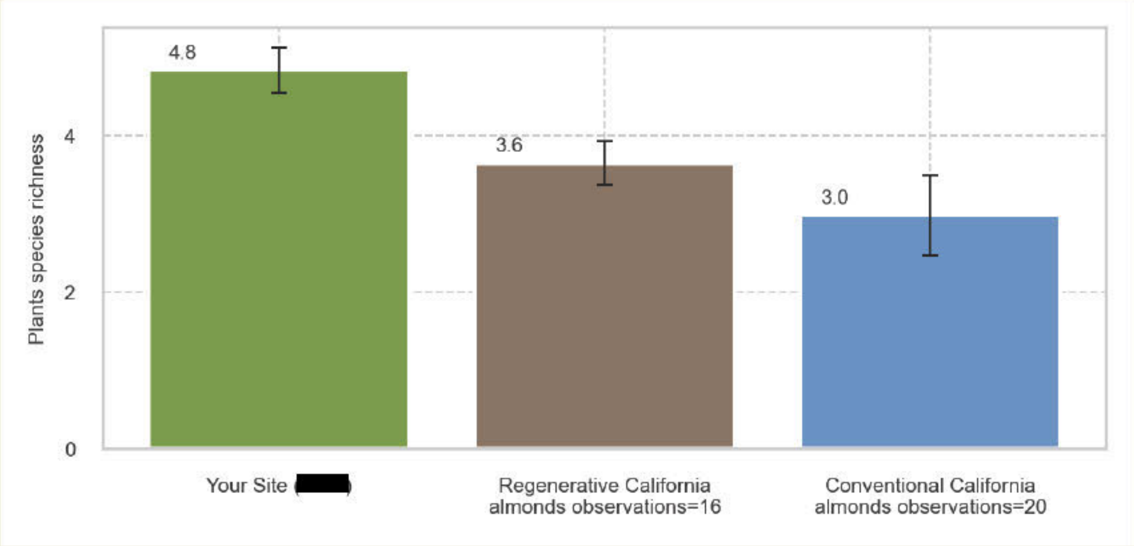
Plant biomass



Green cover on the soil surface



The number of plant species (species richness)



Why Do We Care About Plants?

Plants play a key role in capturing energy from the sun, using it to support the productivity of a farm. Most life depends on plants and the energy they bring to the system- so the diversity and abundance of most other organisms scale with the diversity and biomass of plants in a habitat. Plants also are important in moving nutrients and changing the soil composition for better water infiltration/porosity and more soil organic matter and micronutrient status (37).

How Did We Measure For Plants?

We measured several parameters of plant communities, including % ground cover, % green cover, plant biomass, and plant species richness. In most systems except row crop agriculture, we also measured the plant biomass. At 25 locations per transect (four transects per field/pasture), we dropped a compression plate (38), whose height equates to the amount of plant biomass beneath it. At three locations per transect, we laid a square qaudrat (0.33 × 0.33 m), and the number of plant species was counted and % of the soil surface that was covered by green material were calculated for these quadrats.

What Did We Learn About Plants?

The more that the ground is covered with roots and green cover, and the more plant species there are in a habitat, the healthier the soil, the more water it infiltrates, the more life it supports, and the greater the profitability of the operation. More ground cover creates a better habitat for microorganisms and protects soil life from the heat of the sun (39). It also reduces evapotranspiration. The diversity of plants within an agroecosystem can have multiple benefits, functioning as substitutes for fertilizers, pesticides, pollinators, and irrigation.

Plants, even “weeds”, are a great indicator of soil health and specific soil compositions. Learning to read these plant species can help a farmer understand patterns on their farm, especially pertaining to soil characteristics. This also includes plants that are favorable for grazing animals. In addition, the more plant species there are in a rangeland, the greater its forage yield and quality (40).

More biomass is generally a good thing if it doesn’t come at the expense of plant diversity; plant communities with only a few species that are large plants are undesirable in most agricultural lands. Biomass is important because it is directly related to how much other life you find on your farm.

How Are Farmers Improving For Plants?

The first step in promoting plant life on farms is to stop killing plants (or at least don't kill as many plants). Tillage and herbicides are tools that reduce plant diversity and % cover, having downstream impacts on life and farm productivity. When done correctly, planned burning, grazing (including winter grazing), and planting cover crops can all function as useful alternatives to tillage and herbicides. The most advanced regenerative farmers are finding that overthinking plant mixes that are adapted for a particular field is less productive than simply planting as diverse seed mixes as possible and letting things sort themselves out. Complex, multi-year crop rotations that have a perennial phase (e.g., alfalfa) build soil health and reduce pest pressure. Also, intercropping is a simple way to double plant diversity that works well with most cropping systems. Perenniality of plants also lends to stability in your farm that supports the natural resource base of your operation. Finally, animal integration into cropland can help to improve the productivity of your croplands. In the case of rangelands, the answer to promoting plant health is simple. Graze high densities of animals, move them frequently, and let the land rest following the graze to allow for the plant community to resurge.

MICROBES

Measure	Your Site [redacted]	Regenerative regional	Conventional regional
Total microbial biomass ng/g	6497 ±651	4591 ±500	1238 ±105
Total bacteria ng/g	3016 ±220	2055 ±247	418 ±37
Gram positive others ng/g	1125 ±88	786 ±90	210 ±17
Actinomycetes ng/g	408 ±44	312 ±40	57 ±5.1
Gram negative others ng/g	1483 ±92	957 ±123	151 ±23
Total fungi ng/g	769 ±64	488 ±71	54 ±9.9
Arbuscular mycorrhizal ng/g	309 ±18	175 ±28	23 ±4.1
Saprophytic fungi ng/g	460 ±47	313 ±44	30 ±6.2
Protozoa ng/g	36 ±12	18 ±4.5	0.7 ±0.44
Fungi:bacteria ratio	0.25 ±0.003	0.22 ±0.01	0.12 ±0.01

Why Do We Care About Microbes?

Healthy soil is rich in minerals and nutrients, but it is also rich in microorganisms. Here, we present some of the data on your bacterial and fungal communities. These are the tiny, invisible superheroes that are vital to the productivity of your farm. Bacteria and fungi do a lot of jobs, including nutrient release from minerals, cycling of organic matter, carbon sequestration, nitrogen fixation, soil aggregation, disease suppression, pest management, and nutrient uptake (41). In the end, bacteria and fungi touch nearly every aspect of a farm, influencing its ability to produce food in ways that science is only beginning to understand.

How Did We Measure For Microbes?

We used three different approaches to measure microbial life on the farms in the 1000 Farms Initiative. Soil respiration is a general measure of soil microbial activity, measuring how much CO_2 is released by the microbes in a sample. More descriptive approaches are Phospholipid Fatty Acid Analysis (PLFA) and genetic characterization of microbial communities. Living microbial cell membranes have PLFAs in their cell membranes. These fatty acids work like our fingerprints and are unique to each species and thus can be used as a tool to gain insights into soil microbial diversity (42). Another fingerprinting approach examines the DNA sequence of each bacterial and fungal species. Specifically, we look at the DNA of a small structure called the ribosome (16S subunit) of each microbe. Microbiologists have described thousands of bacterial and fungal species based on this segment DNA. Both PLFA and DNA-based approaches have strengths and weaknesses, so complement each other when describing microbial communities. Soil is a complex microbial ecosystem and understanding this complex ecosystem has the potential to unwind a ton of agricultural hurdles(43).

What Did We Learn About Microbes?

Different farming practices dramatically influence the relative abundance of microbes, as well as their ability to do their jobs. Bacterial abundance is higher in soil that is drier neutral to slightly acidic and rich in simple organic matter(44). Fungi prefer moist soil with high, more complex organic matter (e.g. lignin). So different crop residues that are either high in N or C can influence which microbes one finds in their soil. Fungi form a spider web of hyphae that connect plants and other organisms in the soil; one such group of these fungi is called Arbuscular Mycorrhizal Fungi (AMF). Tillage is devastating to microbial life in a farm's soil; it leads to bacterially dominated soils that experience a "hot flash" of high short-term productivity, sacrificing its long-term ability to support plant communities/crops. Pesticides and fertilizers also disrupt microbial communities and their normal functions, leading to a dependence on these agrochemicals.

Microbial communities are very complex (we find 800-2000 species in a single 1 × 4" column of soil), and to help us to understand this complexity, we group microbes into different functional groups. Some microbes fix nitrogen, others solubilize phosphorus, or suppress pests. By categorizing different species into these different functional groups, it provides a window into how your soil is working.

The ratio of fungi to bacteria is an important metric for the productivity of a farm. When soils have too many bacteria relative to fungi, their ability to support plant growth over time tends to be more volatile. It is hard to determine a good fungal: bacterial ratio as it depends on crop type, soil type, vegetation, and management practices. All of this said, even ratios or higher ratios (e.g. more fungi per bacteria) are an important metric of healthy agricultural soils, particularly in perennial crops like vineyards and orchards. Likewise, soil with complex organic matter benefits more from higher fungal to bacterial ratios because of the abilities of fungi to enhance nutrient absorption and decomposition of complex organic molecules.

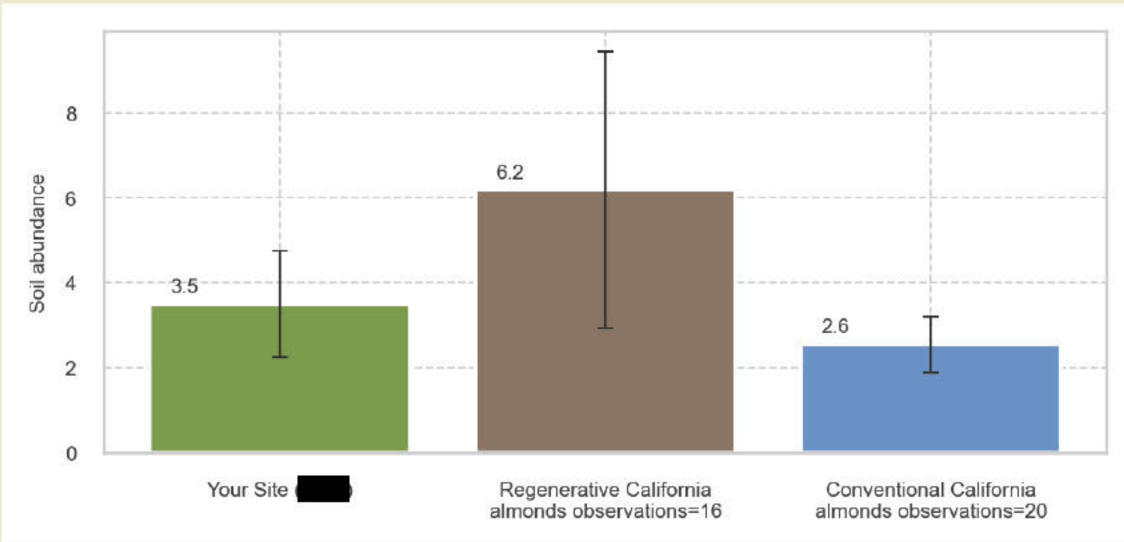
While there isn't an ideal fungal: bacterial ratio, it does give farmers a good indicator of their farm's health. Farmers can correlate the ratio with visible characteristics of their farm. A dark and rich soil with an earthy smell and visible mycelium networks, crumbly texture with increased soil aggregation, and an increased resistance to erosion, indicate a fungal dominated biomass. Higher bacterial biomass is often correlated with more oxygen and increased biological activity like the presence of more earthworms, arthropods and many bacteria as they need oxygen to breathe. Not all crops desire higher fungal biomass. Perennial crops and trees, brassicas, legumes, shrubs, and flowers prefer high fungal biomass whereas grasses, root vegetables, annual crops, and nitrogen demanding crops (e.g. corn) prefer high bacterial biomass. Thus, farmers can look at their fungal: bacterial ratio, their crop type and make management decisions accordingly.

How Are Farmers Improving For Microbes?

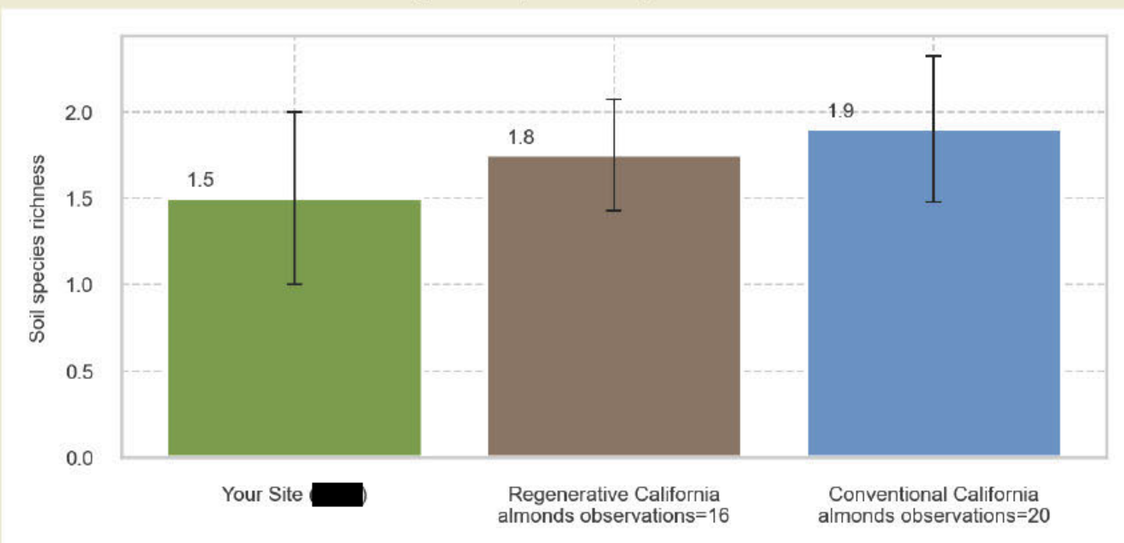
Regenerative practices like no till, cover crops, no synthetic fertilizers, no pesticides, rotational grazing, and animal integration help in developing a healthy microbial community and interactive ecosystem between plants and microbes. These regenerative practices have been scientifically proven to be effective in enriching soil microbial communities, soil organic carbon levels, nutrient levels, and overall soil health which ultimately correlates to farm productivity(45). Studies have shown how tillage disrupts soil aggregation and microbial composition(46). On the contrary, farmers adopting no-till/minimal till have achieved higher populations of beneficial microbes, improved soil nutrient content, and greater resistance to plant pathogens(47). Additionally, adoption of intercropping is linked to increased nitrogen fixation by microbes, higher nitrogen availability to plants thus, increased productivity and crop health(48). While it's true that regenerative practices improve your microbial population, it is important to understand your soil type, climate conditions and geography, and apply appropriate practices that will yield best results.

INSECTS & INVERTEBRATES

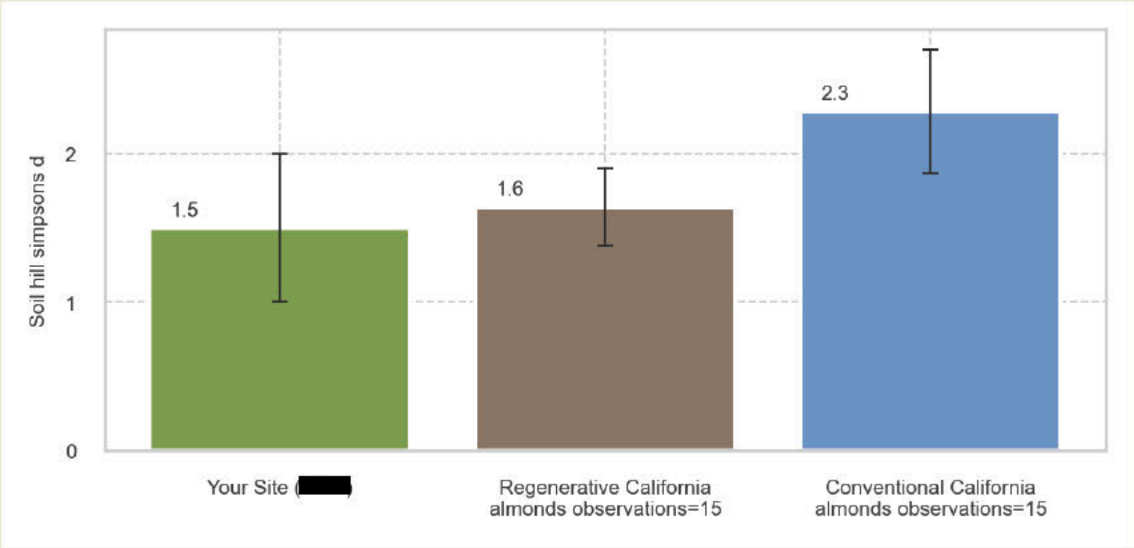
Soil invertebrate abundance



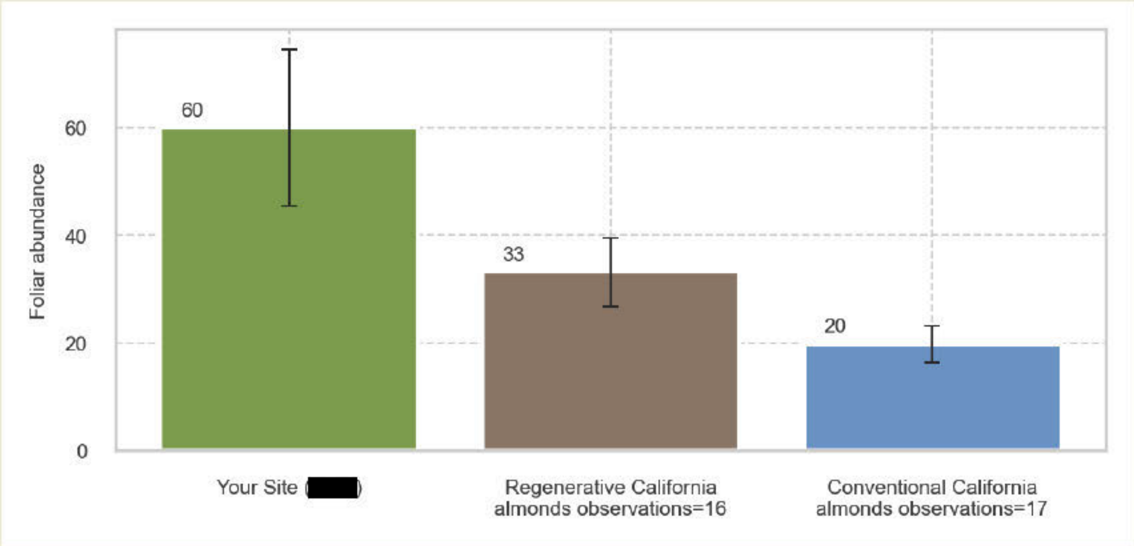
Number of soil invertebrate species (richness)



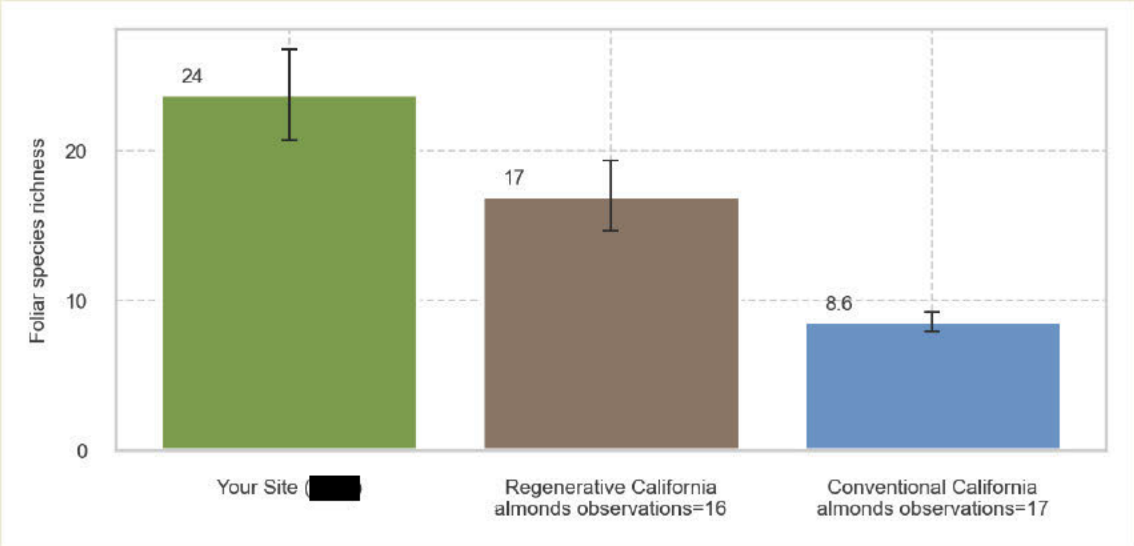
Soil invertebrate species diversity (hill simpsons index)



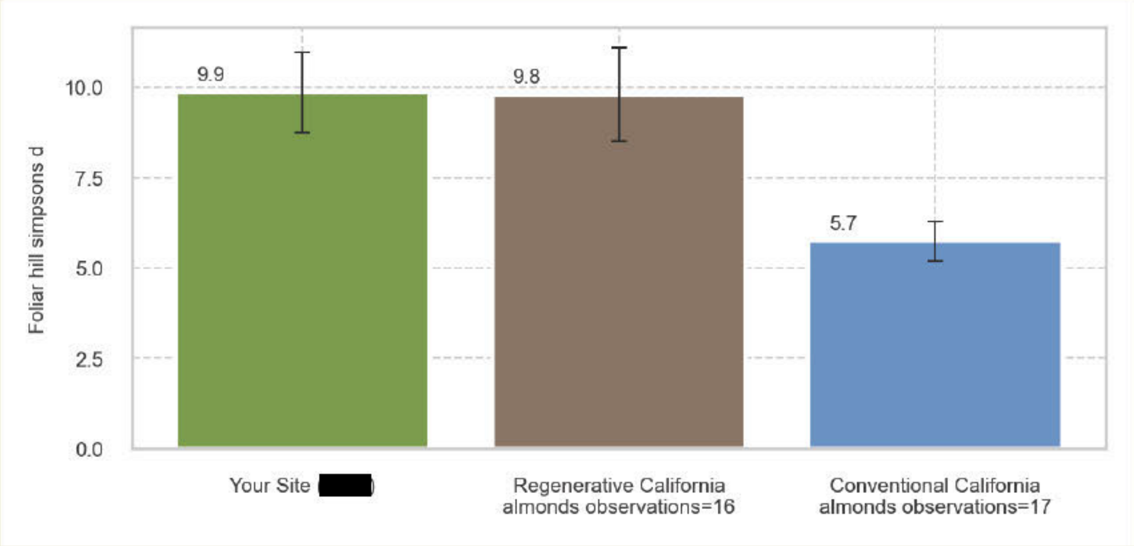
Foliar invertebrate abundance



Number of foliar species (richness)



Foliar invertebrate species diversity (hill simpsons index)



Why Do We Care About Insects?

Insects play an important role for our agroecosystems by balancing pest populations, pollinating crops, increasing nutrient cycling, and performing other ecosystem services. These services provide at least billions of dollars annually in just the U.S. (49). One common misconception is that most insects are harmful when in reality, the majority of insects are actually beneficial for their ecosystem. Studies have also shown that more insect diversity can equal a decrease in pest populations (50). More diversity in a population means more beneficial insects and increased sustainability of the ecosystem. We use “insects” as a familiar word, but we’re also considering spiders and other “bugs” here too.

How Did We Measure For Insects?

We sampled both the foliar and soil insects on your farm. Foliar insects are those that dwell on the leaves and canopy of the plants, which are sampled with sweep nets. Our field specialists walk four 50 m lines (transects) of your farm, collecting 50 sweep samples of the plants for any insects at each location. For the soil insects, our field specialists place a 0.5 × 0.5 m metal “quadrat” on the surface of the soil, and all insects in the square are sucked up with aspirators.

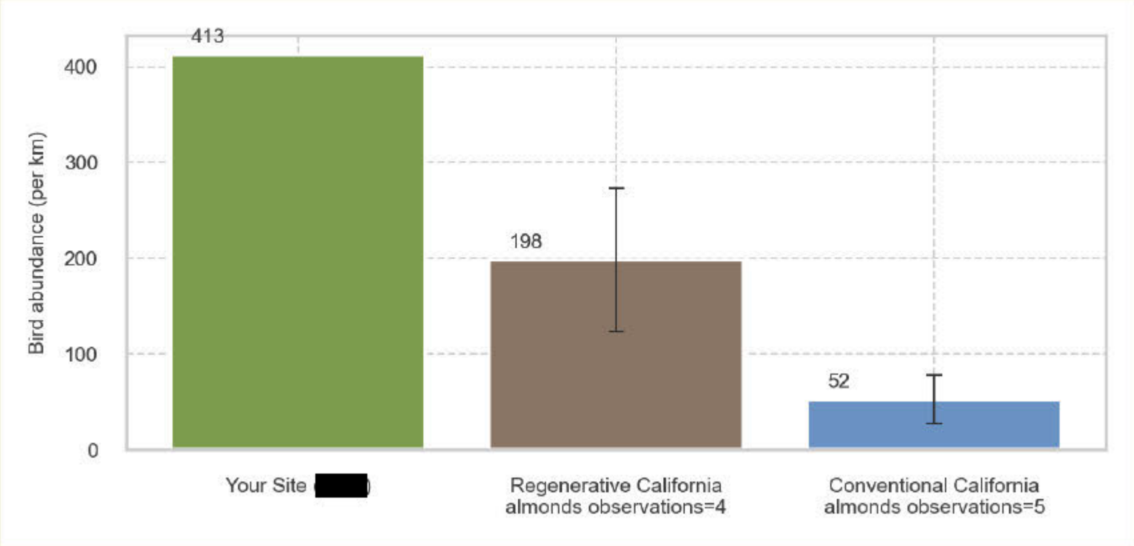
We present the abundance (the number of insects), species richness (or the total number of insect species we saw) and a mathematical index called a Hill number (H2), which is a measure of diversity that reflects the relative abundance of each species. Think of H2 as an estimate for how many species are common in your field. In all of these measurements, the higher the value, the stronger the community.

How Are Farmers Improving For Insects?

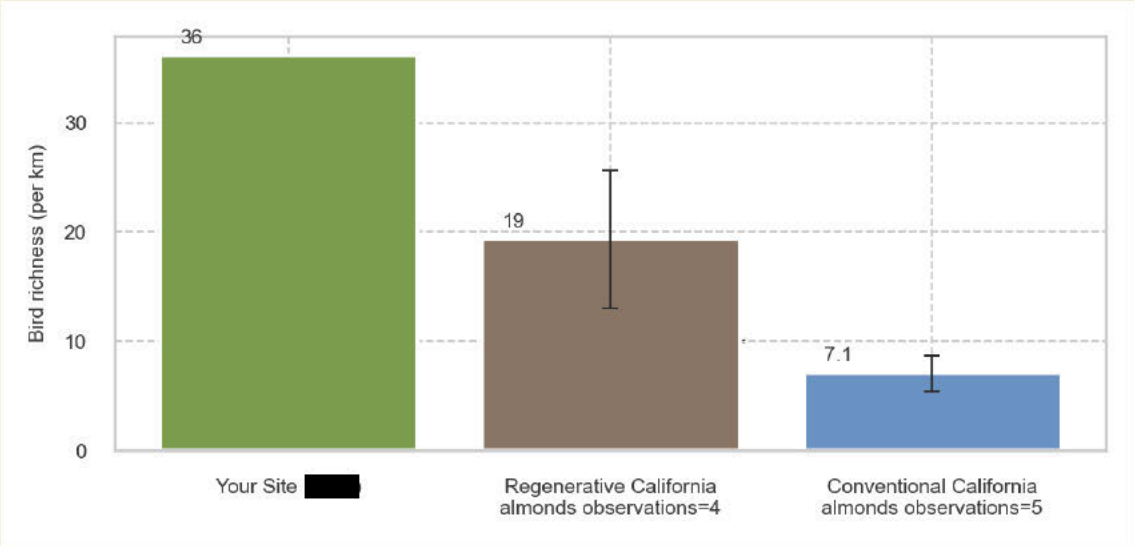
The first step in insect conservation is to stop spraying insecticides, fungicides, and herbicides. This means even avoiding seed treatments (insecticides and fungicides that color your crop seeds), which are proven not to help most farmers. All of these products kill life on your farm, especially insects. The next thing is to stop tilling the soil, which removes much of the soil invertebrates from your fields. To grow insect populations, increase plant life on your farms. This can mean increasing crop diversity, intercropping multiple crops per field, growing diverse cover crop mixtures, and planting perennial crops in fields. Marginal areas near fields are very important habitat for insects and other life, and can be planted to pollinator mixes, beetle banks, and conservation strips. In rangelands, replacing dewormers and fostering plant diversity and biomass with high stocking densities, frequent rotation, and long rest periods reduce parasite loads on livestock and in pastures, while promoting insect life and the services they provide to ranchers. When combined with frequent rotation at high stocking densities, this reduced use is correlated with an increase in species richness, predator species, and dung beetle abundance (52). For cropland, adding just one additional cash crop (intercropping) was found to double insect abundance and richness (51, 53).

BIRDS

Bird abundance



Number of bird species (richness)



Why Do We Care About Birds?

Birds add life to a farm and the songs of birds give feeling and peace to our lives, but these important animals also provide many other services to farmers and society. Most farmers have some birds present on their property, but the variety of birds and their impact vary greatly and can be heavily influenced by management practices. Birds eat unwanted insect and rodent pests, and also influence plant/weed communities. Many birds are threatened and endangered, and our farmland is an important tool for their conservation.

How Did We Measure For Birds?

Our ornithologists walked for an hour on your field, listening and looking for birds (around 1 mile of walking). From these observations, the number of birds, the number of bird species, and Shannon H (or bird diversity) were recorded. Bird diversity (Shannon H) combines both abundance and richness to compare the population sizes of all the bird species present on a property. For example, this could help you determine the species that are very prevalent versus which are rarest in your field. Having a combination of high abundance and high richness will result in a higher diversity number. The higher the number, the more diverse an area is.

How Are Farmers Improving For Birds?

In general, more plant diversity with different species and structures promote bird diversity, especially trees (57). Also, reducing soil disturbance helps to promote soil-nesting bird species, and timing of harvest to minimize disruption to nesting birds helps encourage bird communities. Allowing ephemeral or small wetlands to persist within a farm can also encourage bird diversity. Pesticides and synthetic fertilizers either directly kill birds, or reduce/eliminate their food sources, making elimination or reduction of synthetic chemicals an important step in encouraging birds on your farm (56). Installing a few nesting boxes can encourage insect-eating birds to stick around (55). In rangeland ecosystems, rotational grazing and periodic burning can encourage healthy bird diversity on a pasture (54).

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