



Soil Regeneration Hub

Soil Testing & Regeneration for Gardeners and Growers



The Problem

- Food, agriculture, and land use are massive contributors to climate change.
 - 22% of GHG emissions
 - 70% of water withdrawals
 - ~38% of the Earth's land surface
- Degradation of soil impacts plant health, food security, water quality, and nutrition.
- Soil testing is cumbersome, complex, and often hard to interpret.
- Lack of services promoting and educating customers on regenerative practices



Example soil report in excel format

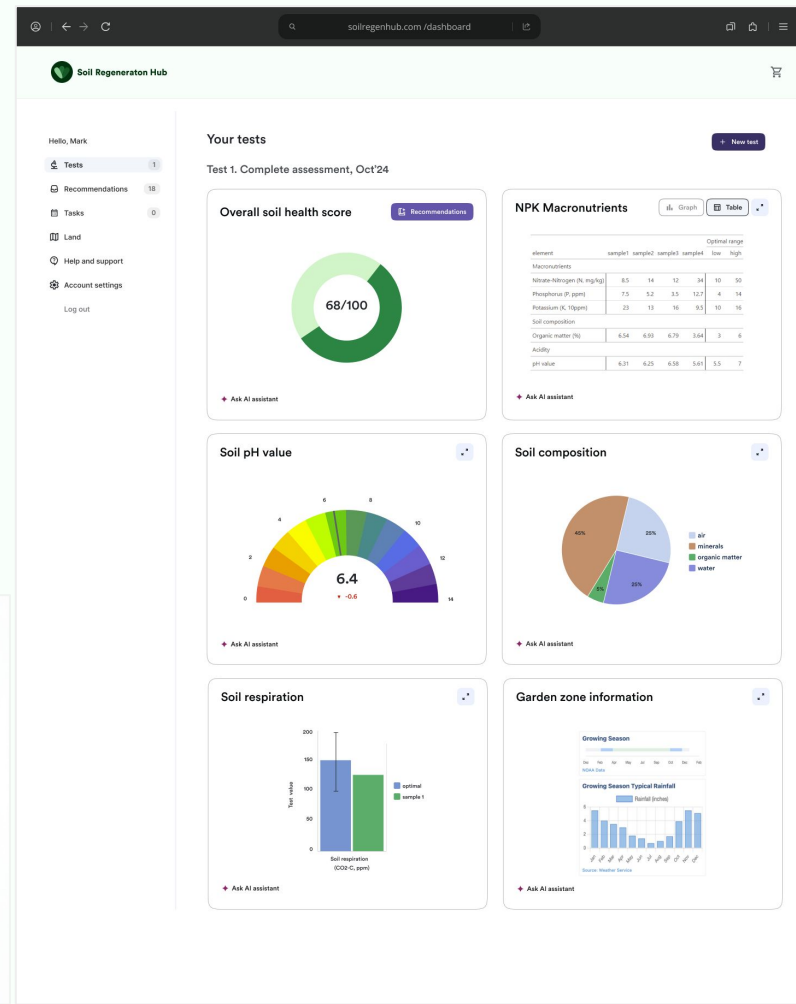
SOILS REPORT		Print Date	Jan. 4, 2022	Receive Date	1/3/22
Location		Taylor Coccari & Rebecca Friendly			
Requester		Tom Hymann, Tom Hymann & Associates			
Graphic Interpretation: *		very low, ** low, *** medium			
ammonium bicarbonate/DTPA extractable - mg/kg soil		**** high, ***** very high			
Sample ID Number		22-04-11		22-04-12	
Interpretation of data		Sample 1, Citrus, Exist + 1 New Lemon, 12-18"		Sample 2, D. G. Area, 8-12"	
low medium high		elements		elements	
0 - 7 8-15 over 15		phosphorus		phosphorus	
0-60 60-120 121-180		potassium		potassium	
0 - 4 4 - 10 over 10		iron		iron	
0-0.5 0.6-1 over 1		manganese		manganese	
0 - 1 1 - 1.5 over 1.5		zinc		zinc	
0-0.2 0.3-0.5 over 0.5		copper		copper	
0-0.2 0.2-0.5 over 1		boron		boron	
		calcium		calcium	
		magnesium		magnesium	
		sodium		sodium	
		sulfur		sulfur	
		molybdenum		molybdenum	
		nickel		nickel	
		aluminum		aluminum	
		arsenic		arsenic	
		barium		barium	
		cadmium		cadmium	
		chromium		chromium	
		cobalt		cobalt	
		lead		lead	
		lithium		lithium	
		mercury		mercury	
		technetium		technetium	
		silver		silver	
		strontium		strontium	
		tin		tin	
		vanadium		vanadium	

Our Solution

- A soil testing and regeneration service for gardeners, landowners, and small farmers.
- User-friendly sample collection and data visualisation.
- Advanced testing including:
 - Soil Health Score
 - Macronutrients, Heavy Metals
 - Soil Ph & Respiration
- Personalized recommendations to regenerate soil health, improve nutrient density, aid plant health and production, reduce runoff, and capture and store carbon.



UI Representation



Capstone Project Dream Team

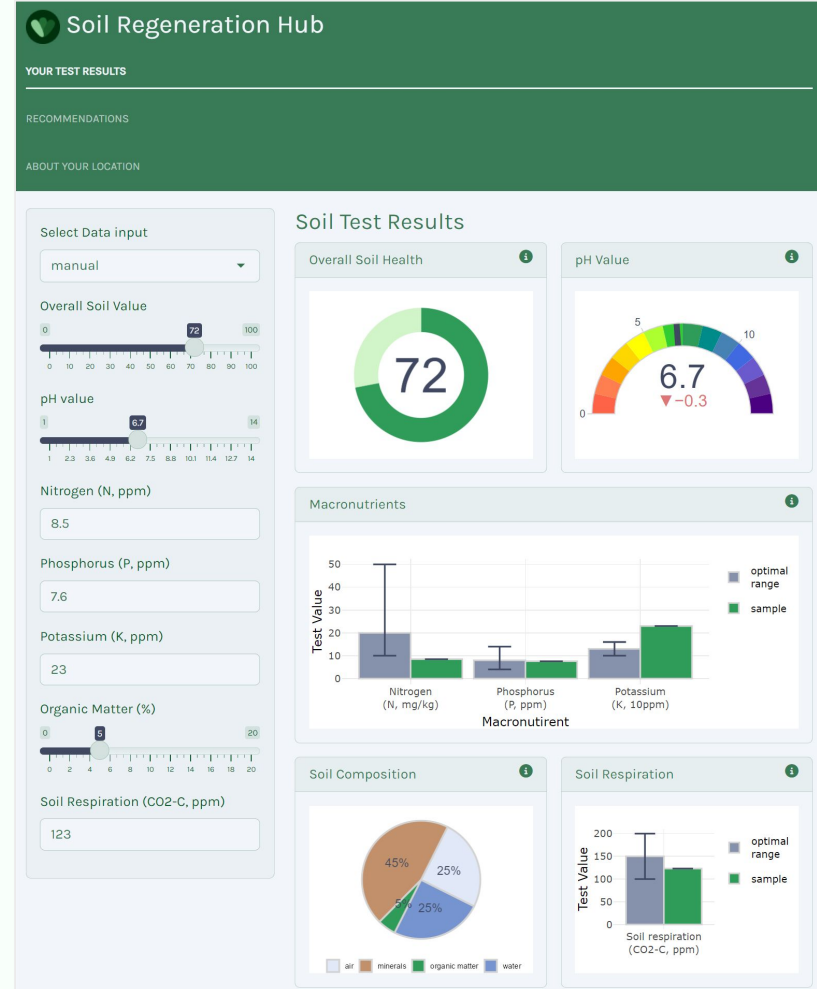


- **Taylor Coccari** - Project lead
- **Eva Harrison** - UI & Product design
- **Juliane Manitz** - Statistics & ML, App Development
- **Scott Hoffberg Wilson** - Data Engineering
- **Clarissa Maciel Fetherston** - Research
- **Eric Wallace-Deering** - Business strategy and research
- **Cole Blum** - Business strategy and research

Milestones Achieved

- **MVP Prototype:** built a product prototype with UI, branding and key UX flows
- **Functional dashboard prototype:** built in Shiny apps
- **Garden Zone Widget:** with API connections to various services (USDA, SSURGO)
- **Market Research:** conducted comprehensive research, customer segmentation, and competitive analysis
- **Customer Discovery:** market survey and customer interviews in progress to validate the product with positive early feedback

Functional Prototype



Prototype Snapshots

The screenshot shows the homepage of the Soil Regeneration Hub. The header includes the logo, navigation links (Home, Use cases, About us), and buttons for 'Get started' and 'Sign in'. The main hero section features a background image of soil roots and a white overlay with the text 'Comprehensive soil testing and regeneration' and two buttons: 'Get started' and 'Find out more'. Below this, a section titled 'Here's how it works' is divided into three steps: 1. Order your Soil Test Kit, 2. Collect your soil samples, and 3. Review results. Each step includes a brief description and a 'Get your kit' button.

Soil Regeneration Hub

Home Use cases About us Get started Sign in

Comprehensive soil testing and regeneration

Get started Find out more

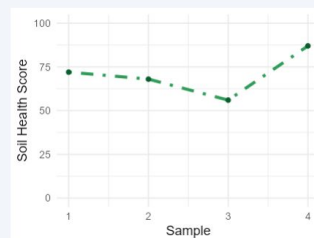
Here's how it works

- 1. Order your Soil Test Kit**
Order a test kit and create your account. Receive the test kit.
- 2. Collect your soil samples**
Follow the included instructions to gather soil samples. Mail your samples back using the prepaid envelope.
- 3. Review results**
Log into your dashboard to view test results and personalized recommendations to improve soil health.

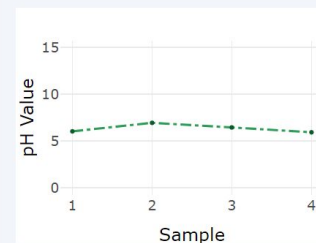
Get your kit

Your Test Results

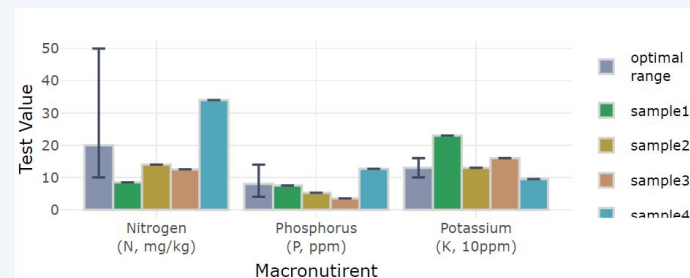
Overall Soil Health



pH Value



Macronutrients



Prototype Snapshots

Example Location Presets

Miami

New York

Los Angeles

Seattle

Chicago

Garden Zone Information

Growing Season

Typical Last Frost: March 16
Typical First Frost: September 15
NOAA Data

USDA Hardiness Zone

Zone: 7a
Source: USDA

Growing Season Typical Rainfall

Source: Weather Service

Recommended Crops

Early Season	Mid Season	Late Season
Start Indoors (Early Spring) <ul style="list-style-type: none">TomatoesPeppers	Start Indoors (Late Spring) <ul style="list-style-type: none">Squash	Start Indoors (Summer) <ul style="list-style-type: none">Cabbage
Direct Seed (Spring) <ul style="list-style-type: none">Lettuce	Direct Seed (Summer) <ul style="list-style-type: none">Beans	Direct Seed (Fall) <ul style="list-style-type: none">PotatoesHerbsCucumbers

Extension Service Data

Soil Classification

Clay Loam
Rich soil with good water retention
Source: SSURGO

Coords: 40, -74

soliregenhub.com /dashboard

Soil Regeneration Hub

Ask AI assistant

Hello, Mark

Tests 1

Recommendations 18

Tasks 0

Land

Help and support

Account settings

Log out

Recommendations

All tests

New

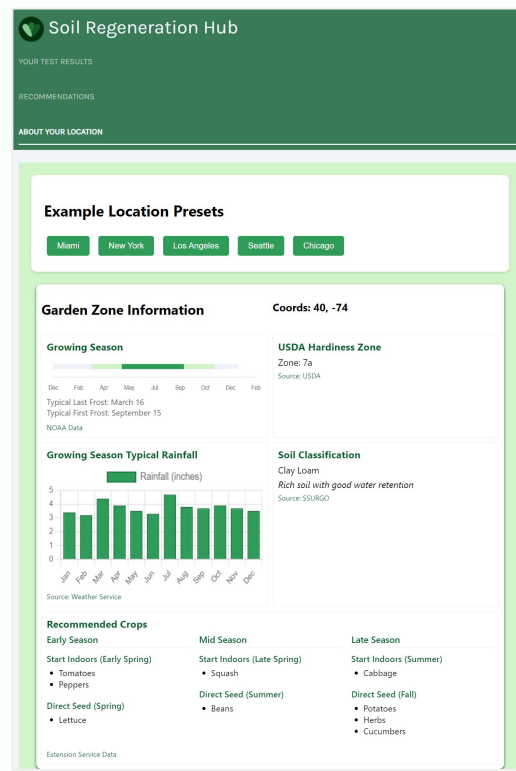
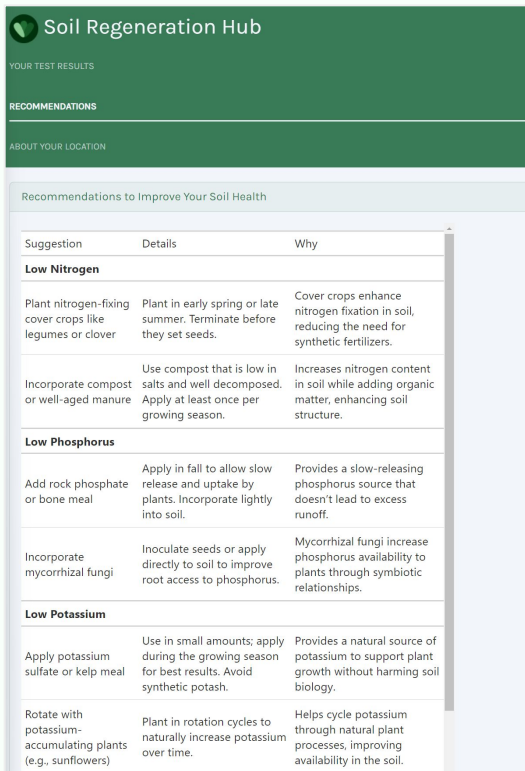
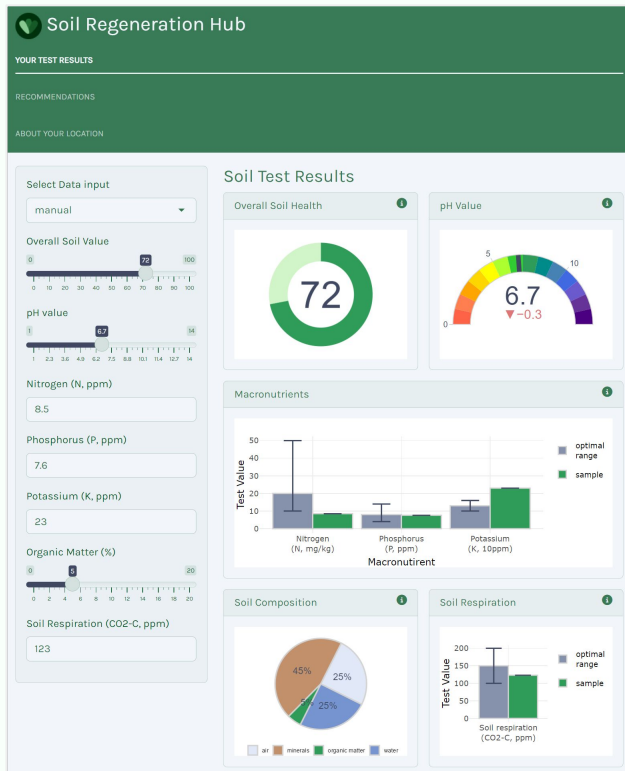
More

Select all

Convert to tasks

<input checked="" type="checkbox"/> Plant Nitrogen-Fixing Cover Crops	Examples: Legumes like clover, peas, beans, alfalfa, vetch, and lupins. Why: These plants have a symbiotic relationship with bacteria (rhizobia) in their root nodules, which can "fix" atmospheric nitrogen into the soil. This naturally boosts nitrogen levels over time.	Cover crops	9.11.24
<input checked="" type="checkbox"/> Incorporate Compost and Compost Teas	Use: Apply well-balanced composts and compost teas. Why: Beneficial fungi and bacteria in compost 'tea' help break down the organic residue, resulting in plant-ready nutrients. The result is healthier soil and root systems, as well as improved water retention and fertility.	Compost	9.11.24
<input checked="" type="checkbox"/> Apply Green Manure	Method: Plant crops specifically for plowing back into the soil while they are still green, such as ryegrass, mustard, or other cover crops. Why: Green manure is tilled into the soil to decompose and enrich it with organic nitrogen and other nutrients.	Green manure	9.11.24
<input checked="" type="checkbox"/> Use Organic Nitrogen Fertilizers	Examples: Blood meal, bone meal, fish emulsion, or feather meal. Why: These are concentrated organic sources of nitrogen that can help correct severe nitrogen deficiencies quickly.	Nitrogen	9.11.24
<input checked="" type="checkbox"/> Practice Crop Rotation	How: Rotate crops that require high nitrogen (like corn or tomatoes) with nitrogen-fixing crops (like legumes) each year. Why: This ensures that different crops deplete and replenish nutrients, maintaining the nitrogen balance in the soil over time.	Crop rotation	9.11.24
<input checked="" type="checkbox"/> Reduce Tillage	Why: Tilling disturbs soil structure and microbial life that helps with nitrogen cycling. Minimal tillage supports healthier soil ecosystems that can retain and regenerate nitrogen more effectively.	Reduced tillage	9.11.24
<input checked="" type="checkbox"/> Add Biochar (Enriched with Nitrogen)	How: Biochar can be "charged" by soaking it in compost or a nitrogen-rich solution before applying it to the soil. Why: Biochar improves soil structure and helps retain nitrogen in the soil, preventing leaching.	Biochar	9.11.24

Shiny Apps Demo <https://jmanitz.shinyapps.io/soilapp/>



Market Research Overview

Market Drivers

- Increasing demand for locally sourced, fresh, organic and nutritious produce
- Growing concerns about food security and the vulnerability of global food supply chains
- Advances in agricultural technologies, such as vertical farming systems and hydroponics

Soil Testing Market

- A range of competitors from mail-in services to labs. Pricing for basic tests from \$15-20 and comprehensive tests \$50-100
- Current offerings do not promote regenerative practices
- Commercial agriculture customers use precision technology, but there is an opportunity to serve small scale growers and hobbyist gardeners

Target Personas

- Intensive Hobbyist Gardeners
- Small Farms (for profit)
- Small Farms (nonprofit)

Use Cases

- Measuring and improving soil health
- Maximizing plant health and yield
- Increasing nutritional value of vegetables and fruits
- Reducing chemical inputs (fertilizers, pesticides)
- Reducing water usage

What's Next?

- **Customer discussions:** Continue interviews with goal of reaching 20+ gardeners and small farmers to achieve broad feedback
- **Product development:** Continue to iterate the application and recommendation engine
- **Start-up formation:** With validation, we will proceed with start-up formation, GTM planning, and product development

Support Needed (How You Can Help)

- **Technical Co-Founder:** Seeking a co-founder with soil science or agronomy expertise.
- **Customer Interviews:** Looking for gardeners and small-scale growers willing to demo our MVP prototype.
- **Collaborators & Feedback:** Open to collaboration and welcome any feedback on our MVP.

Thank you!