

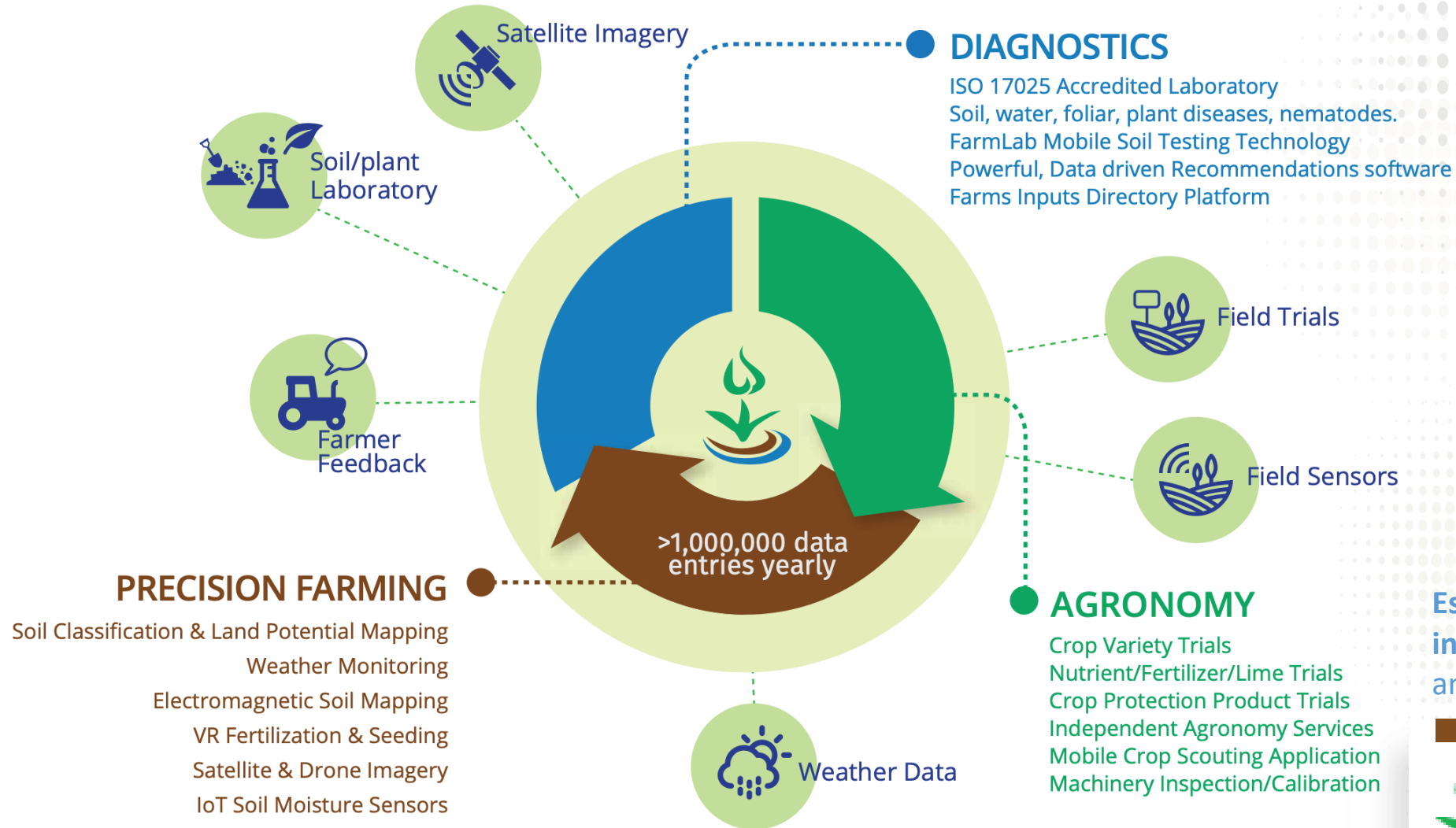


FARMLAB: Climate Smart AgTech for Smallholder Farmers

MARCH 2022



Agronomy Platform



Established 1999, Offices
in UK, Kenya, Zambia
and Nigeria



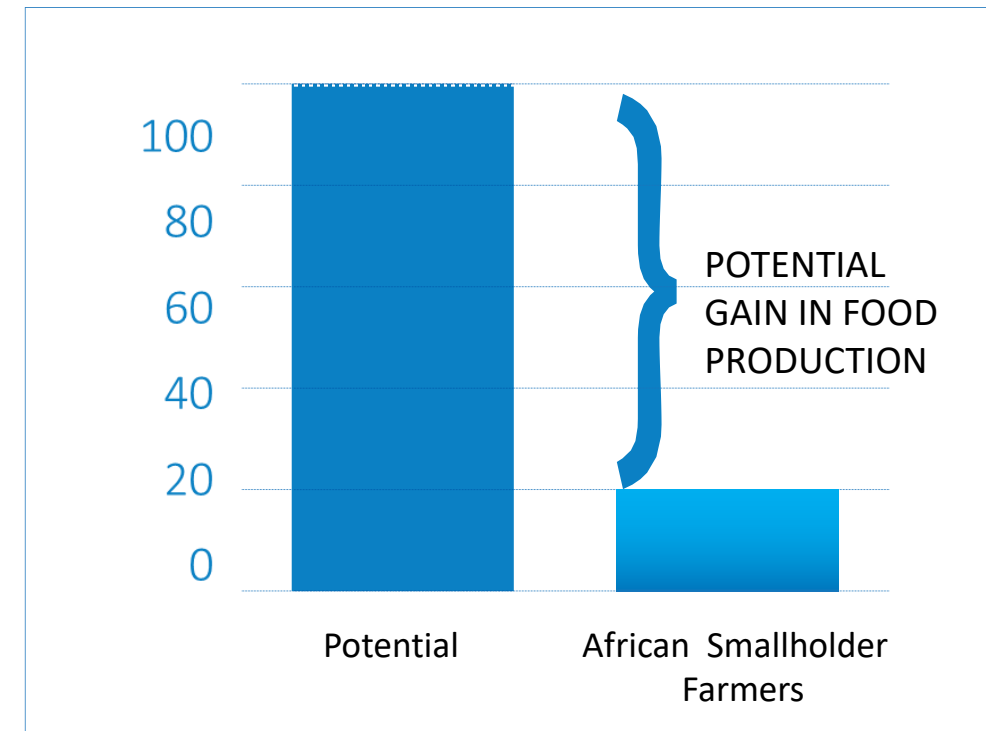
African smallholder yield gap of 80%

50% attributed to poor soil fertility, so large opportunities around improving soil health, leading to:

- Higher crop yields - improving farmer livelihoods
- Greater climate resilience
- Improving food security
- Inclusive economic growth

Why it matters

- 50+ million smallholder farms in Africa²
- Contributing 70% of the food supply³
- Over 20% of GDP and 40% of employment⁴



1. <https://openknowledge.worldbank.org/bitstream/handle/10986/26082/756630v10REPLA0frica0pub03011013web.pdf?sequence=1>

2. Lowder, S.K., Scoet, J. & Raney, T. (2016) The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide, World Development Vol. 87, pp. 16–29, p.21

3. <https://www.ifad.org/thefieldreport/>

4. AGRA, <https://agra.org/news/africas-smallholder-farmers-are-the-linchpin-to-economic-success/>

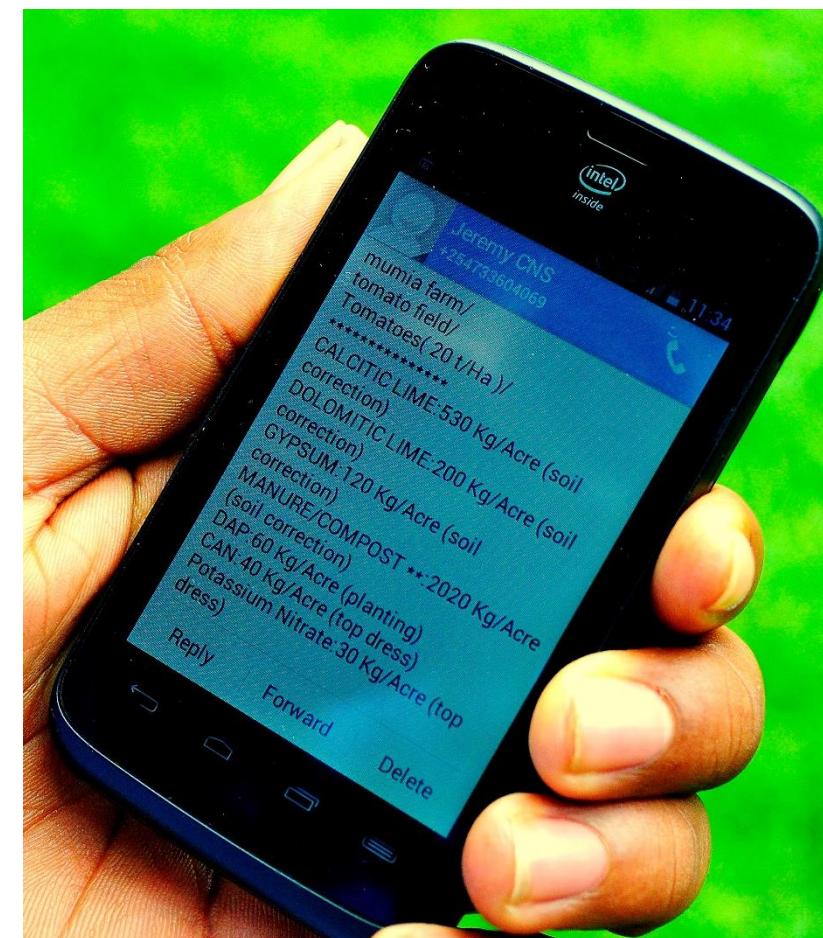
The Law of Minimum - balancing soil and fertilizer management for increasing yields



Farmers need soil information to improve soil health and boost yields

FarmLab – an artificial intelligence driven soil testing and advisory service designed for smallholder farmers

- Field-specific recommendations
- Climate smart results
- Digital and SMS delivery
- Field agent support and training
- Per sample fee of USD 4 (volume dependent)



B2B Model

Cost effective soil testing delivery at scale



Smallholder Farmers



- Service delivered via Business to Business (B2B) partners with existing farmer networks
- Complements B2B Partner's existing business eg cross-selling inputs, de-risking lending
- Partners include fertilizer companies, aggregators, public extension, lenders, digital platforms, outgrower programmes

Climate Smart Impact

- Empower farmers with soil health knowledge
- Increases farmer adoption of climate smart farming practices
- Creating higher crop yields and higher income, with higher fertilizer efficiency
- Helping farmers become climate resistant (more soil water storage)
- Fighting climate change through carbon sequestration (carbon farming)



Corporate Social Responsibility (covers 9 SDGs)

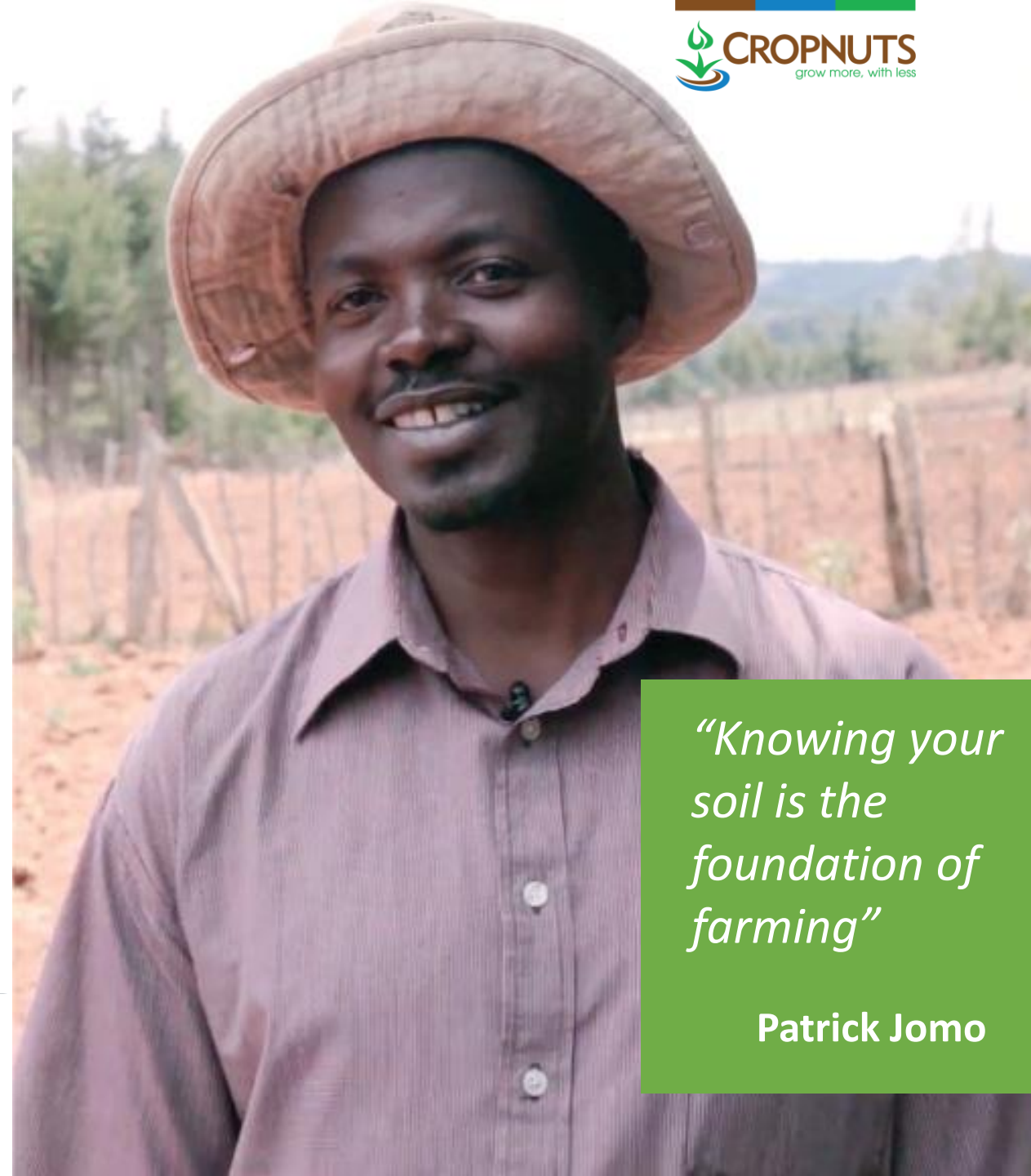
- Improves climate resilience for outgrowers
- Reduces farmer poverty and inequality
- Boosts financial inclusion
- Improves African food security
- Absorbs atmospheric carbon into the soil
- Makes knowledge and innovation accessible
- Contributes to growing sustainable communities



Improving Patrick's potato crop

- Patrick started growing potatoes in 2016
- Yield declined from 9 to 2.6 tons
- Following our soil test and fertilizer/soil health recommendations ...
- ...his yield jumped from 2.6 tons to 12 tons from the same 1-acre. Just from using the right inputs, **no extra input cost.**

▶ See Patrick's story on YouTube:
<https://www.youtube.com/watch?v=oFsfnP3UIE>



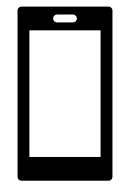
“Knowing your soil is the foundation of farming”

Patrick Jomo

How it would work...

START >

Farmer allocated soil test from Partner Platform



Farmer matched to Partners Local Field Officer

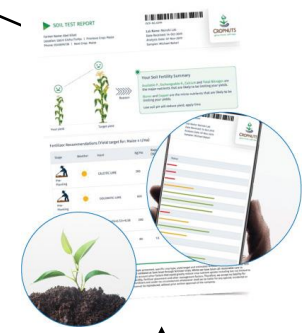


Field officer collects soil sample. Logs details in FarmLab App

Soil delivered to mobile or fixed FarmLab



Ongoing SMS advice on planting and input application (optional)



Soil data and Report sent to Partners platform via API, delivered to Field officer via mobile app, and farmer via SMS

Soil test results and agronomic recommendations



Spectral analysis output digitally transmitted to cloud based AI platform

How it Works



Soil Sampling

The process starts with instruction for farmers and sample takers on how to sample a field and store information properly. The sampling and data collection is guided by an app.

01
STEP



Process Sample

Samples received by the FarmLab are dried sieved into a homogeneous fraction that can be used for analyses.

02
STEP



Analyse

Soil scans and sensor reading are automatically uploaded and processed into the Cropnuts Africa FarmLab Database and analysed within minutes.

03
STEP



Interpret

Farmer and yield data are combined with the test results from the soil analyses and interpreted in the outstanding agronomy advisory system of CROPNUTS.

04
STEP



Report

A simplified and visualized recommendation is created offering farmers instructions on what to do to improve yields. The report can be printed or sent as a text message.

05
STEP



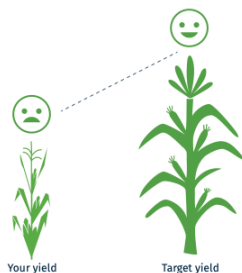
Recommendations

SOIL TEST REPORT

Farmer Name: Kennedy Kavemba
Location: Emuhaya/Vihiga Phone: +254 081 279 739
Previous Crop: Rice **Next Crop:** Maize



Lab Name: Mashiara Lab One
Date Received: 17-Jul-2019
Analysis Date: 24-Jul-2019



Reason

Your Soil Fertility Summary

Available P, Exchangeable K and Total Nitrogen are the major nutrients that are likely to be limiting your yields.

Boron and Copper are the micro-nutrients that are likely to be limiting your yields.

Fertilizer Recommendations (Yield target for: Maize 4 t/Ha)

See below your soil correction plan.

Stage	Weather	Input	Kg/Ha	Bags/Ha (50kg Bags)	Comments
Planting		NPK (15:15:15)	320	6.4	Apply at planting.
Top Dress		Urea	50	1	Apply 30 days after crop emergence
Top Dress		Urea	50	1	Apply second application at 45 days after crop emergence

- Apply copper foliar feed
- Request extra boron in planting fertilizer
- Build organic matter with green manure crops, improved residue management and reduced tillage systems.

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Disclaimer: These fertilizer recommendations are only valid for the sample presented, specific crop type, yield target and estimated fertilizer recovery. Please also note that the recommendations provide indicative rates only and should be validated at farm level through fertilizer trials. Whilst we have taken all reasonable care to ensure that our recommendations are accurate, we have not taken into account other factors that could greatly reduce crop nutrient uptake including but not limited to soil moisture, root diseases, nematodes, water logging, compaction, acidity, fertilizer placement and other management factors. Therefore, we accept no liability for any loss or damage arising directly or indirectly from the use of the fertilizers and under no circumstances whatsoever shall we be liable for any special, incidental or consequential damages which may arise therefrom. This document cannot be reproduced, without prior written approval of the company.

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SOIL TEST REPORT



Sample ID: CNLS-MH-L01-0308



Lab Name: Mashiara Lab One
Date Received: 17-Jul-2019
Analysis Date: 24-Jul-2019

Your Soil Fertility Status

Your soil has or lacks the following elements.

Parameter	Unit	Results	Status
pH	(in water)	6.9	
Available P	ppm	0-10	
Exchangeable K	ppm	92	
Calcium	ppm	709	
Magnesium	ppm	105	
Iron	ppm	82	
Manganese	ppm	41	
Boron	ppm	<0.5	
Copper	ppm	< 1	
Zinc	ppm	6.5	
C.E.C	meq/100g	5.1	
Total Nitrogen	%	0.05	
Organic Matter	%	1.3	
C/N ratio		14.7	
Soil Texture	Loamy Sand		<div style="display: flex; justify-content: space-between;"> <div style="background-color: red; color: white; padding: 2px;">Very Low</div> <div style="background-color: orange; color: white; padding: 2px;">Low</div> <div style="background-color: green; color: white; padding: 2px;">Adequate</div> <div style="background-color: blue; color: white; padding: 2px;">High</div> </div> <div style="display: flex; justify-content: space-around; margin-top: 5px;"> </div>

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Disclaimer: Due care and skill are applied in handling of samples presented for examination at the Laboratory to ensure that the Analysis Report is as accurate as possible. It is noteworthy that the Analysis Report exclusively relates to the sample presented and examined by the Laboratory. The Company gives no warranty that the Analysis Report relates to the source or any part of the source of the sample. Please note that the recommendations given in the Analysis Report are based on the parameters included in the request for analysis. The sporadic character of samples and the date of the Analysis Report shall be fundamental in the reading and interpretation of the Analysis Report. This document cannot be reproduced without prior written approval of the company.

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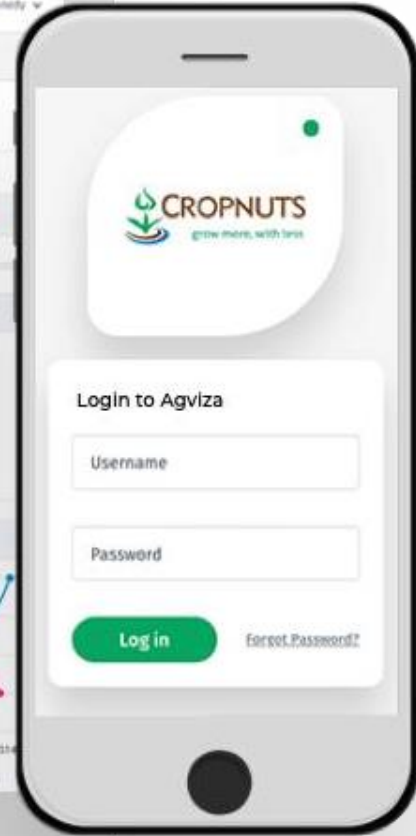
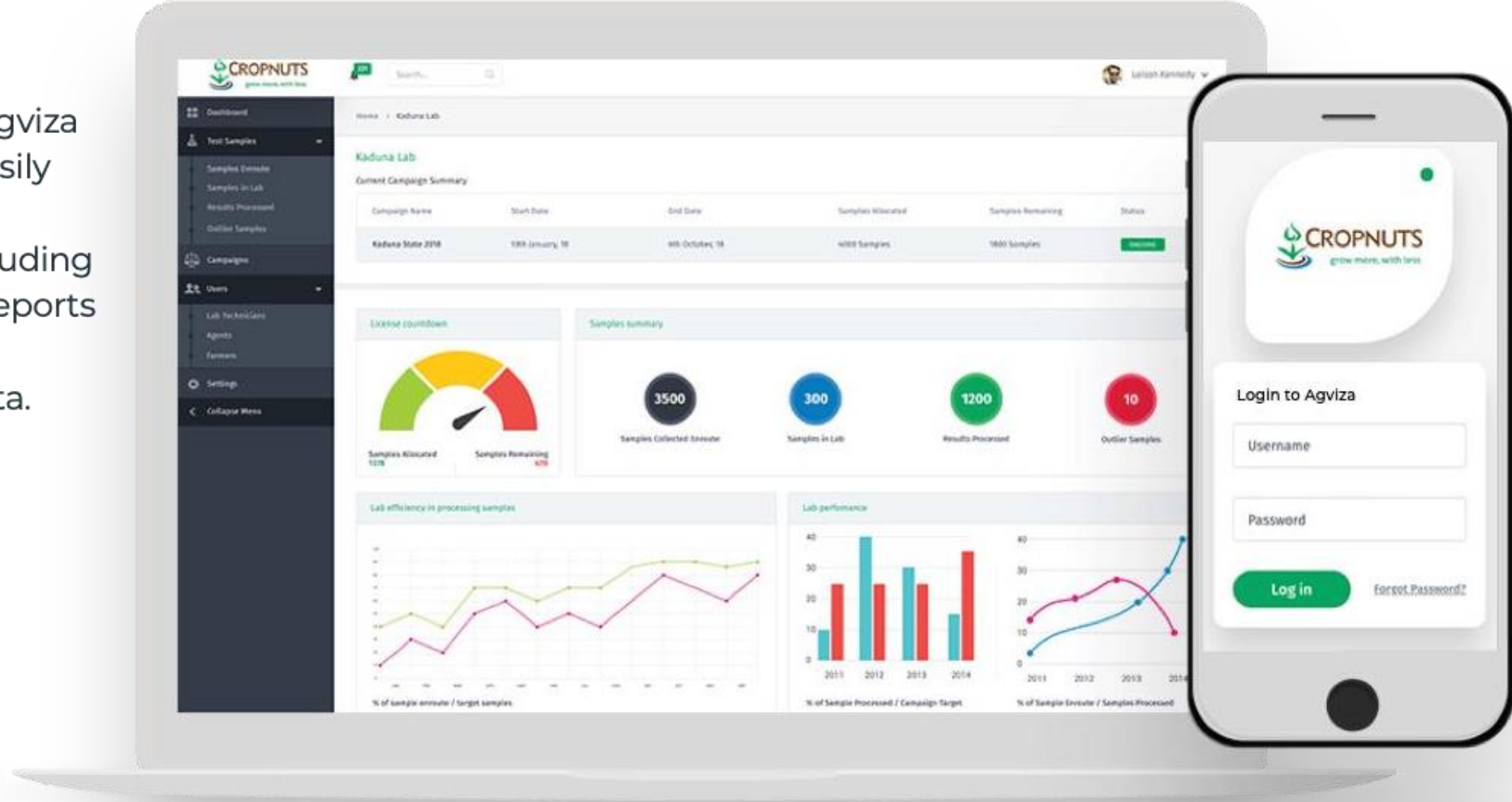


Summary of FarmLab farmer soil test recommendations for high yielding, sustainable small holder crop production

ADVICE	PARAMETERS USED	COMMENTS
Lime	pH, Acid saturation % , Calcium and Magnesium levels (Ca/Mg ratio)	Rate and type of lime given in 50 kg bags per acre/Ha
Organic Matter (soil health)	Organic carbon % and C:N ratio	Soil Health assessment & monitoring Green manure/crop rotation program Manure or compost requirements Carbon Credit measurement
Nitrogen	Soil Texture, Organic matter levels and Yield target	Nitrogen at planting as basal NPK and balance of Nitrogen required as Topdress
Phosphate	Phosphorus Class, P sorption, soil texture and Yield Target	Soil P correction made with RP, SSP or TSP Determines basal NPK fertilizer rate
Potassium	Soil Potassium levels , soil texture and Yield target	Supports best basal NPK formulation, rate of additional K as Topdress
Micronutrients	Zinc, Copper and Boron Soil Class	Determines the requirement for micronutrients

Client Portal

In the dedicated Cropnuts Agviza Partner Portal, clients can easily see the performance of each regional extension team including all soil testing and advisory reports produced including maps of sample locations and soil data.

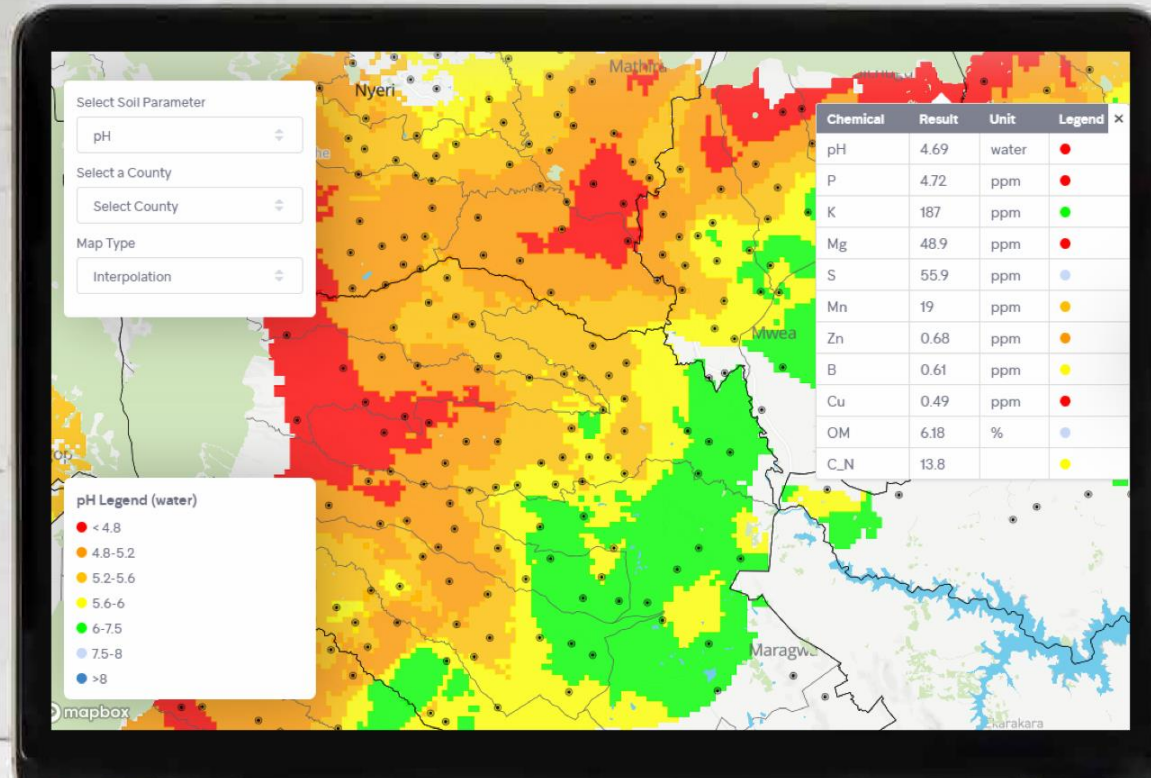


Build your own **Soil Maps**

View your geo referenced farmers soil data as highly visual, colour coded soil maps within your Farmlab portal. These maps show how soil acidity and fertility levels vary across your farming region.

By better understanding soil variations, lime and fertilizer inputs can be better selected, manufactured and distributed within smallholder value chains, resulting in more efficiency and high crop yields.

...COMING SOON!



Monetising Soil Organic Carbon

- Improving soil health builds farmer climate resilience. Also potential income source through carbon credits
- Carbon standards agencies have clearer requirements/ guidelines on cropland based programs
- Smallholder cropland based carbon credit programs are challenging – none in Africa yet.

Issue	Working towards addressing the issues:
Aggregation – large areas and establishing field boundaries.	Combine farmer level location data with remote sensing imagery. Include error rate of land size covered to avoid over-stating
Long term viability – farmer commitment; land tenure and migration.	Ensure material benefits to farmers – primarily through increasing yields. Climate resilience/ carbon credits are a bonus. Haircut to reflect <100% participation.
Cost – measurement and ongoing evaluation are expensive	Spectral testing + remote sensing reduces costs. Carbon already measured as part of soil health program meaning lower incremental measurement costs. Digitise field data collection. Include scalability to expand program once it is established
Time – takes long time to build up soil organic carbon levels	Funding against future carbon production. Internal carbon programs offer greater flexibility.



Thank you for your valuable time



Farm Advisory Services
Lab Tests
Agtech Solutions



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