

Design and Development of Management Information System for Smart Agriculture (MISSA): An Integrated ICT-based Platform introducing smart farming in Region 10

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Sec. Manny Piñol
Department of Agriculture



“Inclusive growth must start with agriculture”

“Success in agriculture is all about ***correct data***, right strategy and immediate action,”

The importance of Planting and Harvesting Data



Mr. Carlito Teneza
Farmer



**Oversupply
of
tomatoes**



The importance of Soil Fertility Data



RAPPLER.COM

Piñol calls out DA officials for using outdated soil data

Agriculture Secretary Manny Piñol says he is giving officials 45 days to...



President Duterte News

July 2, 2016 · 🌐

👍 Like Page

REPOST:

Wrong data, wrong planning

AGRI DEPARTMENT USES
40-YEAR-OLD SOILS DATA

By Manny Piñol

Imagine yourself preparing a plan on how to win a critical battle against the Abu Sayyaf using a map indicating their positions which was drawn two months ago.

That would not only be a perfect formula for a certain defeat but that would be the height of madness.

Yesterday, in the first briefing I received from officials of the Department of Agriculture (DA), I found out that the soils analysis data used by the department in waging a war against hunger were actually gathered over 40 years ago.

The briefing, which was conducted by a special group called AMIA or

Problem

- Outdated data
- No Data monitoring



- Conventional Data entry method
- Time consuming



- Farm technicians are not obliged
- Delay of reports



Problems:

- Outdated data
- Conventional Data entry method

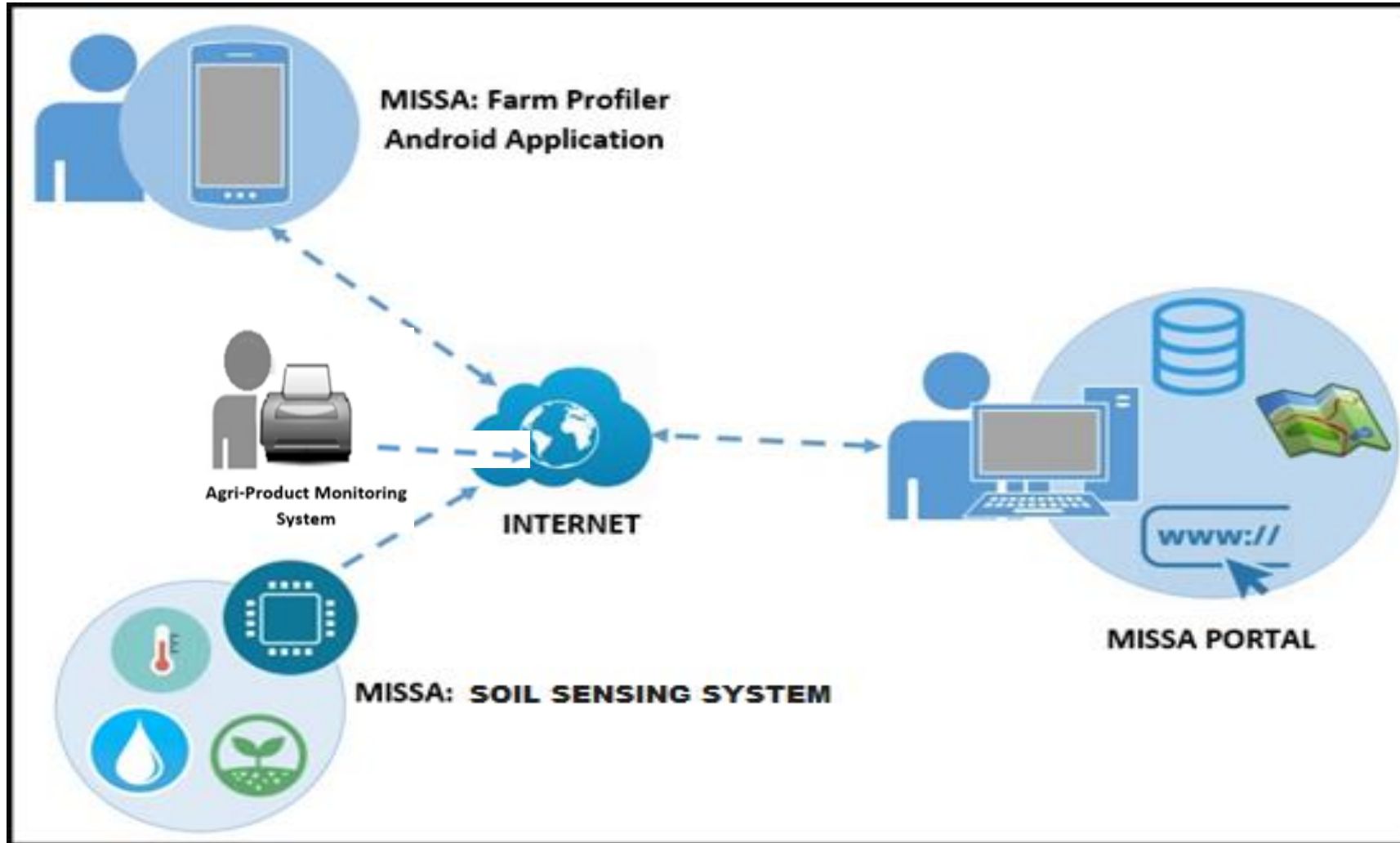
MISSA



The overall objective of the research project to establish an integrated ICT-based platform for improve agricultural production and marketing of agri-based products in region 10. Specifically, the research project aims to:

1. Design and develop an application package that can send relevant information of the agricultural products remotely, facilitate dissemination of various agricultural information for a more informed decision making by farmers traders and consumers
2. Design and develop an in-site equipment for soil testing and analysis for improve nutrient management among farming communities in the region

Conceptual Framework





MISSA or Management Information System for Smart Agriculture is an ICT-based platform that integrates technology to agriculture that will provide an enabling environment to increase production and marketing efficiency as well as policy direction. The project has four (4) components;

1. Soil Fertility Sensing Device
2. Farm Profiling Mobile Application
3. Trading Stations Agri-products Monitoring Mobile Application
4. MISSA Portal



Soil Fertility Sensing Device

The hand-held soil nutrient testing will provide farmers and agricultural technicians relevant information (NPK) that can aid in nutrient management and data interpretation for nutrient addition, optimization of crop yields while minimizing adverse environmental impact of fertilizer application. Nutrient testing will be done using colorimetric method, calibrated to the accepted method of standard nutrient analysis. Storage of the soil nutrient field data will be stored and manage within the MISSA platform.



Farm Profiling Mobile Application

The “farm profiling” android application that can send profile of farmers, farms and crops as well as data on planting and harvesting

remotely to the centralized data repository server



Trading Stations Agri-products Monitoring Mobile Application

The “tagging and monitoring” android application can be utilized by the community based “agricultural products tagging and monitoring center” that tags agricultural products with QR code containing

relevant information of the farm location, farmers profile and quality of products rating and other relevant information necessary for monitoring



MISSA Portal

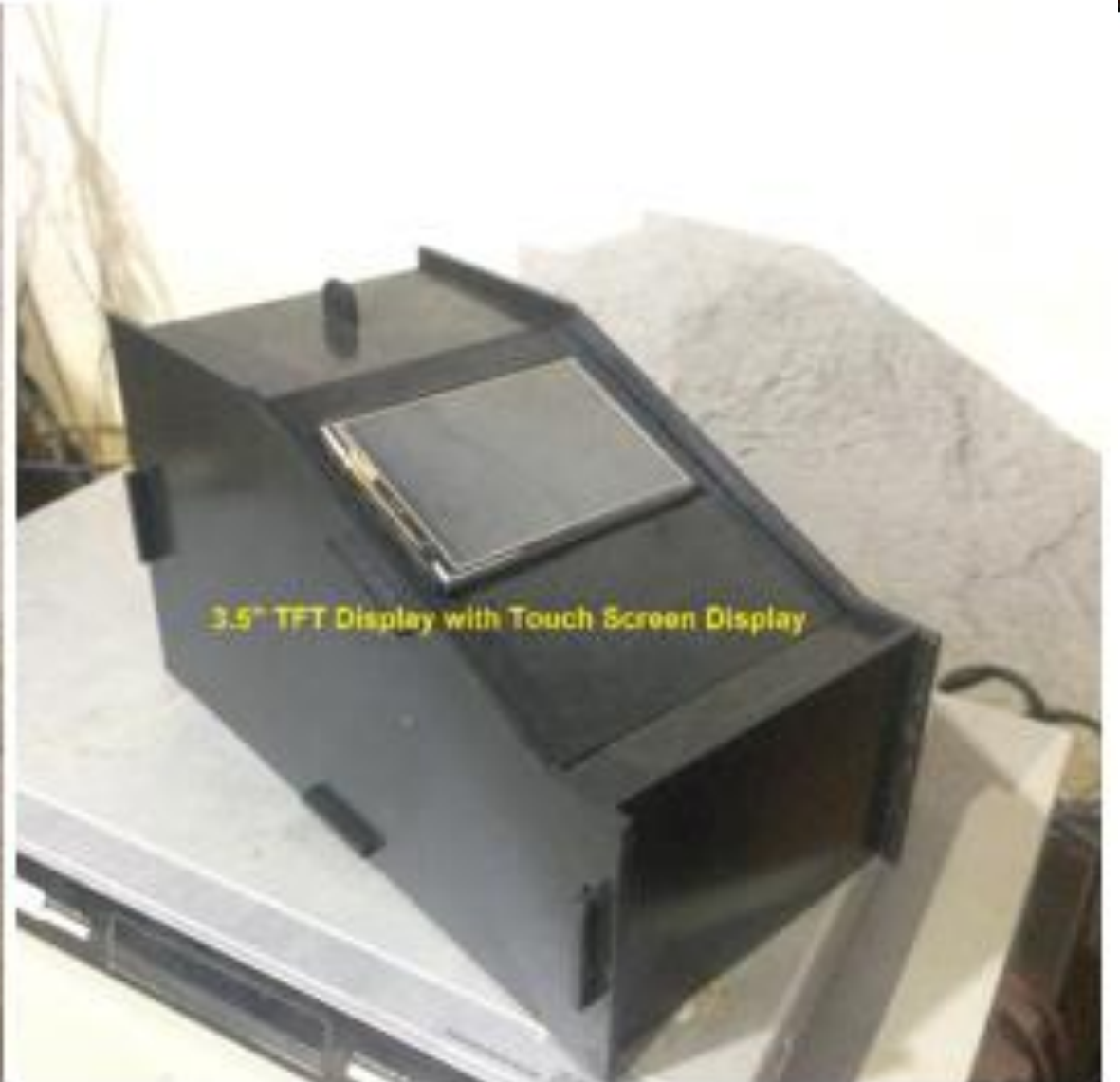
A web-based application software will facilitate:

- ✓ dissemination of information on current agricultural production

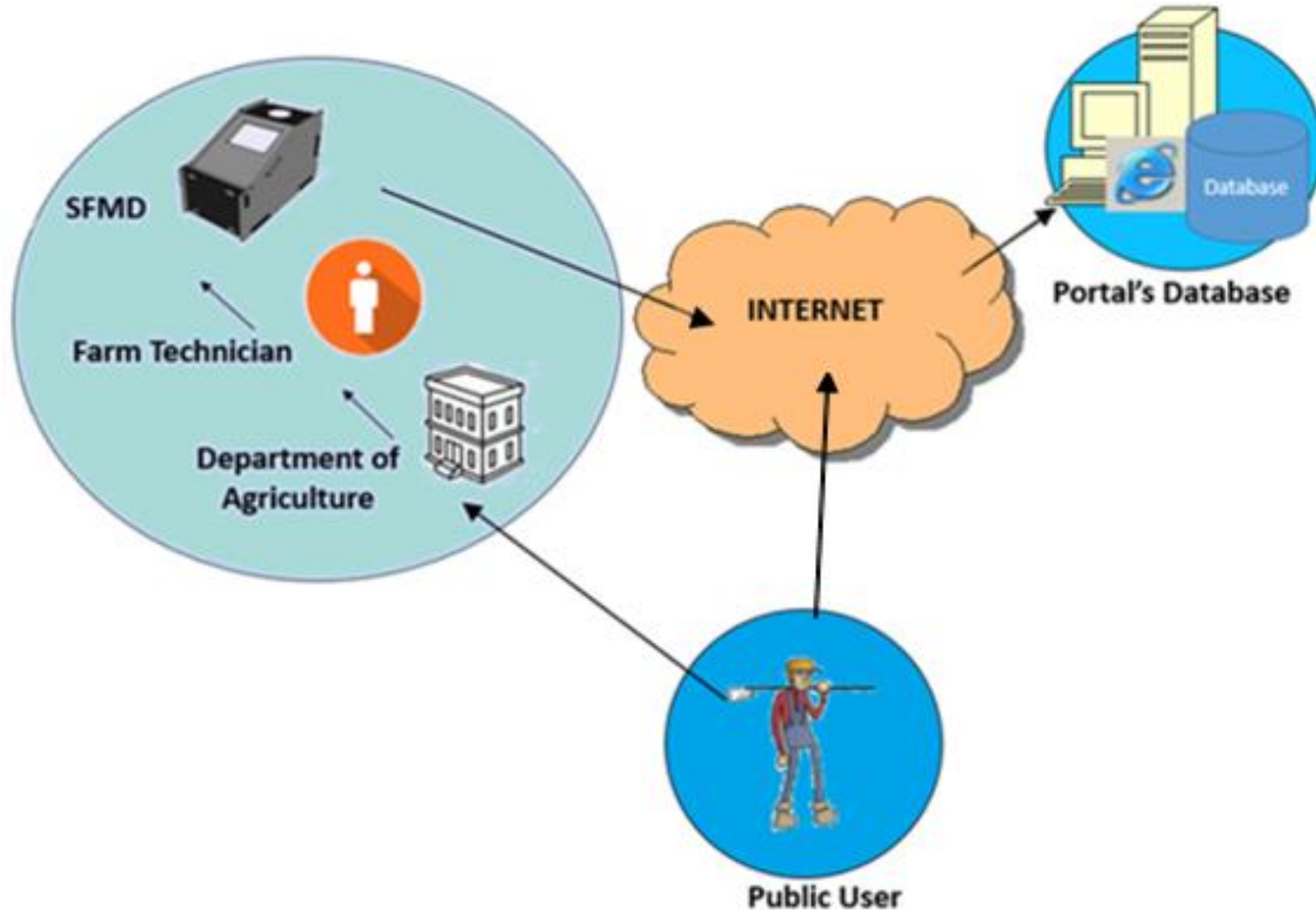
(e.g., types of crops presently produced, hectarage, location, etc.).

- ✓ price discovery for farmers, traders and other market participants
- ✓ provide farmers vital cropping information and improve decision making (e.g. on what crops to plant/produce, etc.)

Soil Fertility Sensing Device



Concept of SFMS



RESULTS:



Raspberry pi based soil fertility sensing device using Python



HARDWARE



USER INTERFACE



Figure 23. User interface result in cassava/native corn farm



Figure 24. User interface result in SL-2018-01-029-192



Figure 25. User interface result in SL-2018-01-030-193

Soil Sample	Trials	N	P	K	pH	Latitude	Longitude
Cassava/ Native Corn	Trial 1	medium	high	sufficient	4.4	8.12345	124.2665
	Trial 2	medium	high	sufficient	4.4	8.12345	124.2665
	Trial 3	low	high	deficient	4.4	8.12345	124.2665
SL-2018-01- 029-192	Trial 1	medium	high	deficient	5.8	8.12345	124.2665
	Trial 2	low	high	deficient	5.4	8.12345	124.2665
	Trial 3	low	high	deficient	5.4	8.12345	124.2665
SL-2018-01- 030-193	Trial 1	low	low	deficient	5.4	8.12345	124.2665
	Trial 2	low	high	deficient	5.8	8.12345	124.2665
	Trial 3	low	low	sufficient	5.8	8.12345	124.2665



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Republic of the Philippines

CP-905-PH
Revision 0

REGIONAL SOILS LABORATORY

LABORATORY TEST REPORT

Lab Request No.	SI-2017-12-306	Sample Origin	
Client's Name	Robert John T. Lemu	Site of Farm	Manitugao, Manolo Fortich, Bukidnon
Address	Z-6 Bugo, Genesis St., CDOC	Topography	Plain
Date Submitted	December 28, 2017, 2:35 PM	Area, ha	8.0
Submitted By	Robert John T. Lemu	Crops	Cassava (2 mos. old), Native Corn (2 mos. old)

Laboratory Test Data						
Sample		Test Method Used	Date Analyzed	Analyzed by	Test Requested	Result
Code	Description					
SI-2017-12-306-2558	Soil Dry Sampling Date: 12/09/2017 Sampling Time: 10:00 AM	Walkley and Black Spectrophotometric Method	01/04-10/2018	JOSUMECIO GAMBICA	Organic Matter, %	2.6
		Class Method		SPEN	Available Phosphorus, ppm	18
		Cold H2SO4 Extraction Method		MEGALTE	Available Potassium, ppm	222
		Potentiometric Method		KPCHAY	pH	4.21

Reference: Department of Agriculture Bureau of Soils and Water Management Laboratory Services Division. (June 2014). Updated Manual for Soil, Water, Plant Tissue and Fertilizer Analysis.

The results given in this report were obtained at the time of examination and refer only to the particular sample submitted and are of no value for advertising or sales promotion. This report shall not be reproduced except in full without the approval of the Integrated Laboratories Division DA-1202-10.

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Test Report No.: RSL-SI-2017-12-306
Page 1 of 1

Date Issued: January 15, 2018

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Republic of the Philippines

REGIONAL SOILS LABORATORY

February 19, 2018

Dear Students!

In connection to your request regarding to have at least two soil samples already tested in the laboratory together with its corresponding test report, In response we will be giving you the soil sample and a tabulated result containing sample code and its test data only. Below are the results.

Sample Code	Test Method Used	Test Requested	Res
SI-2018-01-029-192	Walkley and Black Spectrophotometric Method	Organic Matter, %	2
	Olsen Method	Available Phosphorus, ppm	6
	Cold H2SO4 Extraction Method	Available Potassium, ppm	4
	Potentiometric Method	pH	5
SI-2018-01-030-193	Walkley and Black Spectrophotometric Method	Organic Matter, %	1
	Olsen Method	Available Phosphorus, ppm	4
	Cold H2SO4 Extraction Method	Available Potassium, ppm	3
	Potentiometric Method	pH	5

Thank You.

ZENAIDA S. JOMOC
Senior Agriculturist
Regional Soils Laboratory



SOIL ANALYSIS AND FERTILIZER USAGE

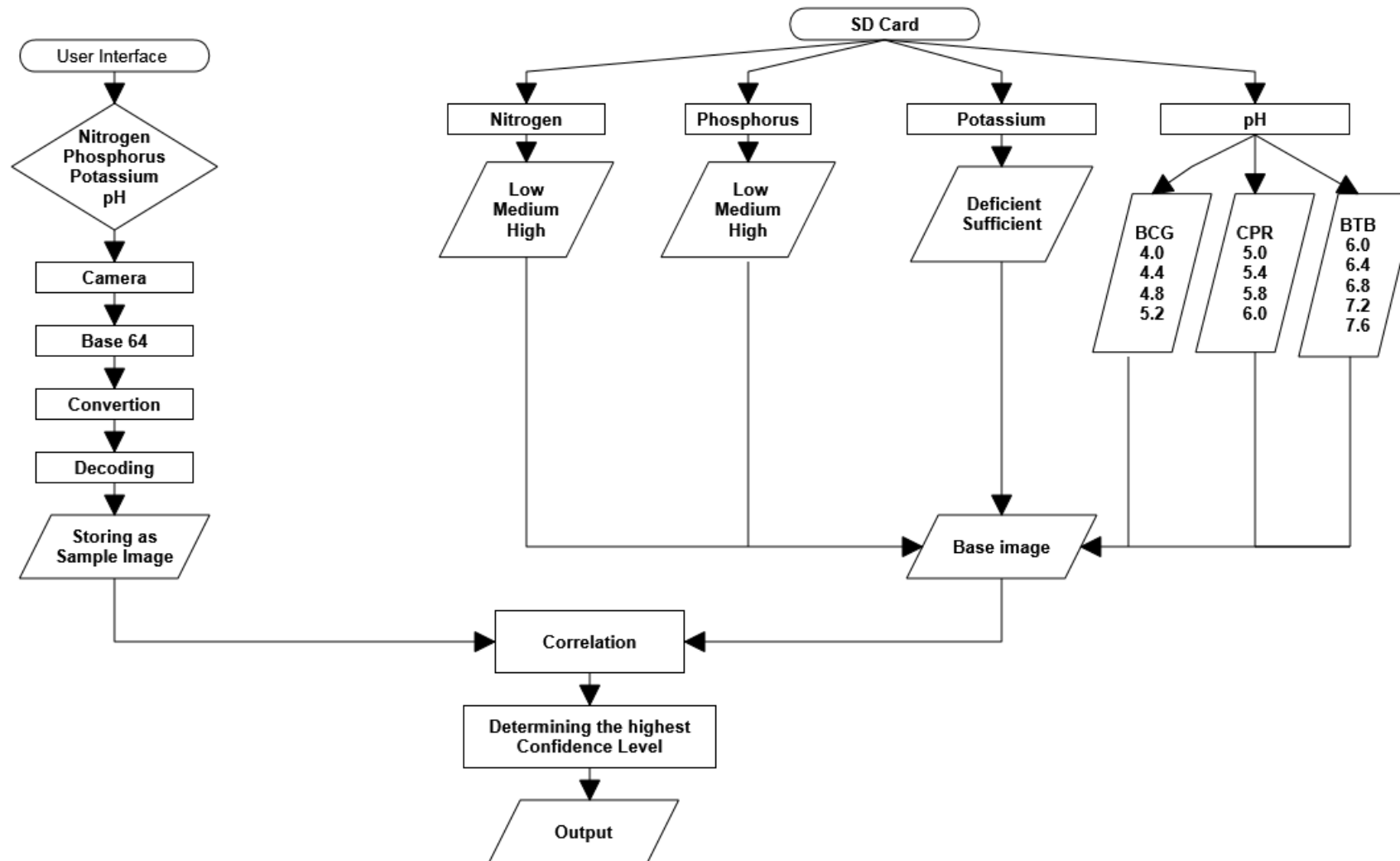


Fertilizer Recommendations for Various Crops...continued

CROP AND/OR VARIETY	NITROGEN				PHOSPHORUS					POTASSIUM			
	Low	Medium	High	Very High	Low	Moderately Low	Moderately High	High	Very High	Low	Sufficient	Sufficient'	Sufficient
ROOTCROPS	0 to 2	2.1 to 3.5	3.6 to 4.5	More than 4.5	0 to 6	7 to 10	11 to 15	16 to 20	More than 20	0 to 75	76 to 113	114 to 150	More than 150
ARROW ROOT	60	50	40	30	60	40	30	20	0	90	60	30	0
CAMOTE	60	50	40	30	60	40	30	20	0	90	60	30	0
CASSAVA	60	50	40	30	60	40	30	20	0	90	60	30	0
GABI	60	50	40	30	50	40	30	20	0	90	60	30	0
TUGUI	60	50	40	30	40	60	40	30	20	90	60	30	0
YAM (Ubi)	120	80	60	20	60	40	30	20	0	120	80	60	20
SHRUBS													
Flowering	0.031			0	0.04				0	0.06			0
Non flowering	0.03			0	0.02				0	0.03			0
ALGAE													
Fishpond	45	40	30		60	40	30	0		60	45	30	0



Algorithm of color sensing to determine the NPK and pH level of the soil.





Transmission system that sends collected data from the device to the portal's database.

Nitrogen ↑	Phosphor	Potassium
low	high	deficient
low	high	deficient
low	high	deficient
low	high	deficient

8.12345, 124.01215

Potassium	pH	Latitude	Longitude
deficient	5.4	8.1312	124.2665
deficient	6.0	8.1312	124.2665
deficient	6.0	8.1312	124.2665
deficient	6.0	8.1312	124.2665

8.12345, 124.01215

LOCAL DATABASE

smart-agri - Database

smart-agri-6e5dd > soil-fertility

soil-fertility

- L5oMXnvlj5apEDY2NcX
- L5oNLwH7ZNCI_QQu9AC
- L5oNNI9ZV2szeEayxcw
- L5oNNihF8_-csn_ErOZ
- L5oW7eBgo373E-my5Cr
- L5oW8Gzm_SAARa0zn1N
- L5oWrJLPgyf0823owd1
- L5oXSvQcv7vzZNN_i0-
- L5oe8JWoEUPmwIQGhcl
- L5oe8IMMCKKg0byn1fM

dateAdded: "2018-2-21 03:20:0"

latitude: 8.1312

longitude: 124.2665

nitrogen: "low"

ph: "5.8"

phosphorus: "low"

potassium: "sufficient"

TEMPORARY PORTAL

Farm Profiling Mobile Application



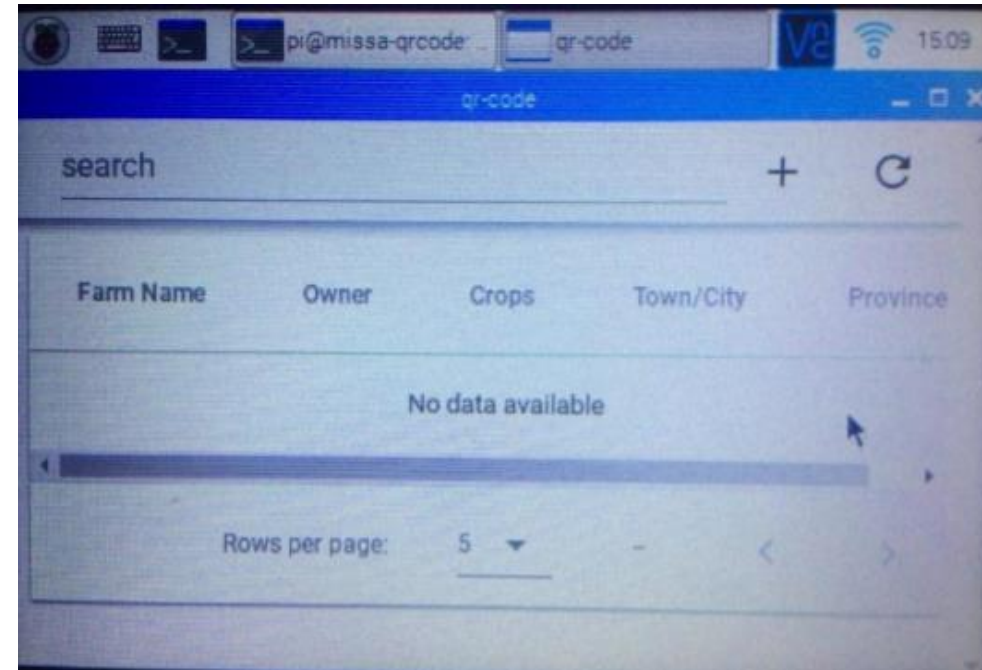




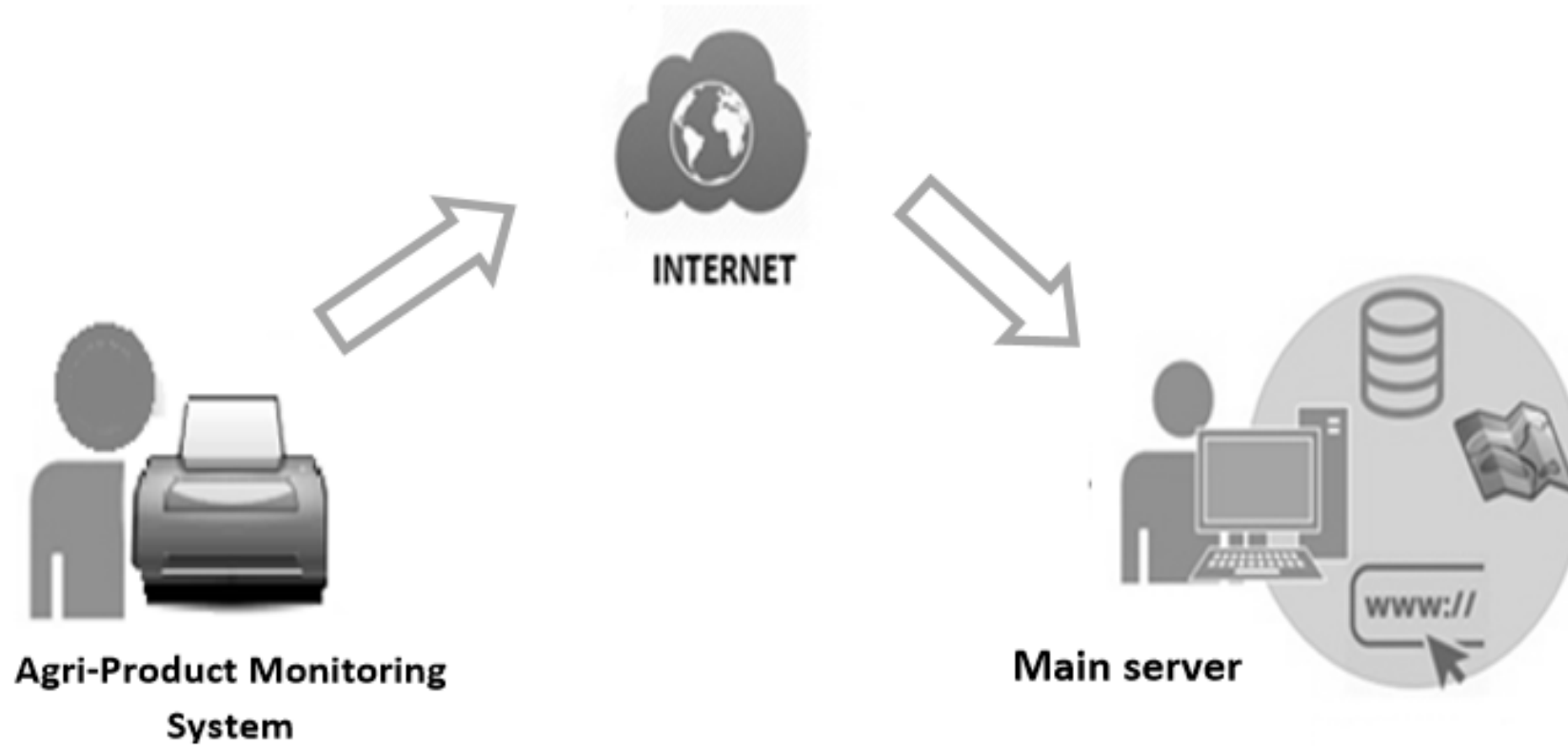
MISSA FARM PROFILER ANDROID APPLICATION



Trading Stations Agri-products Monitoring Mobile Application



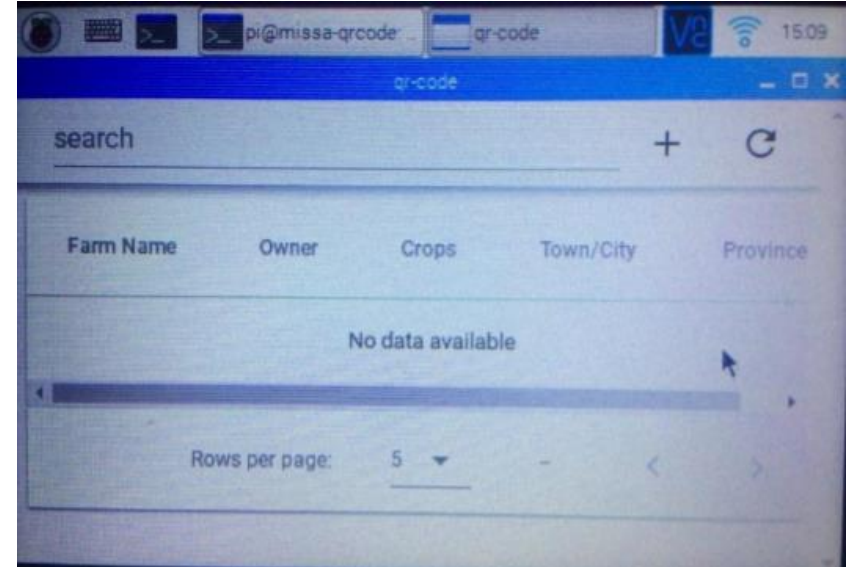
Conceptual Framework



RESULTS:



Prototype



User Interface

Register Form



Register

GO BACK

Faye

Middle Name*

Last Name*

Cagampang

REGISTER

(a)

Register

GO BACK

Age*

39

Contact Number*

09273993813

Farm Name*

Cagampang Farm

REGISTER

(b)

Register

GO BACK

Street*

Kibanggay

Province*

Bukidnon

Lantapan

REGISTER

(c)

Register

GO BACK

Street*

Bukidnon

Camiguin

Misamis Oriental

(d)

Kalilangan

Kibawe

Kitaotao

Lantapan

Libona

Malavbalav

(e)

Cagampang Farm

NEW CROP

Crop	Type	Harvest Info	Options
No data available			

Rows per page: 5

DELETE THIS FARM

BACK

SAVE

(f)

Fill-up form for crop name, type of crop and harvest information



q-code

Add New Crop

Crop Name*
Broccoli

Vegetable

CANCEL SAVE

q-code

Print Broccoli

1000 kilos per day

No. of Copies*
1

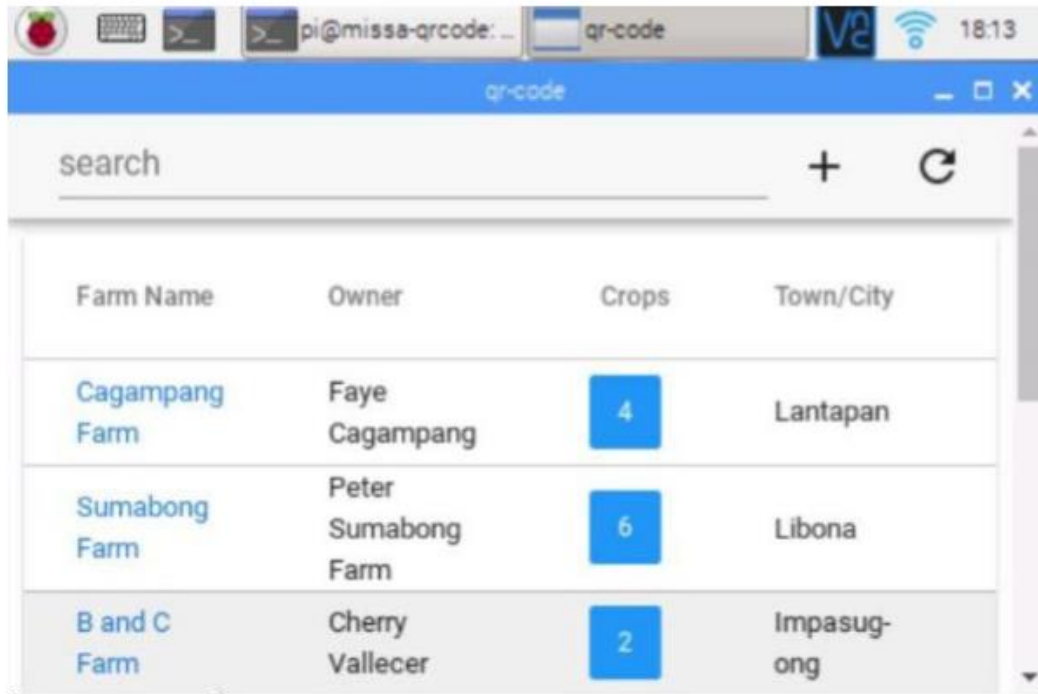
QR CODE

CANCEL PRINT

Software Generated QR Code

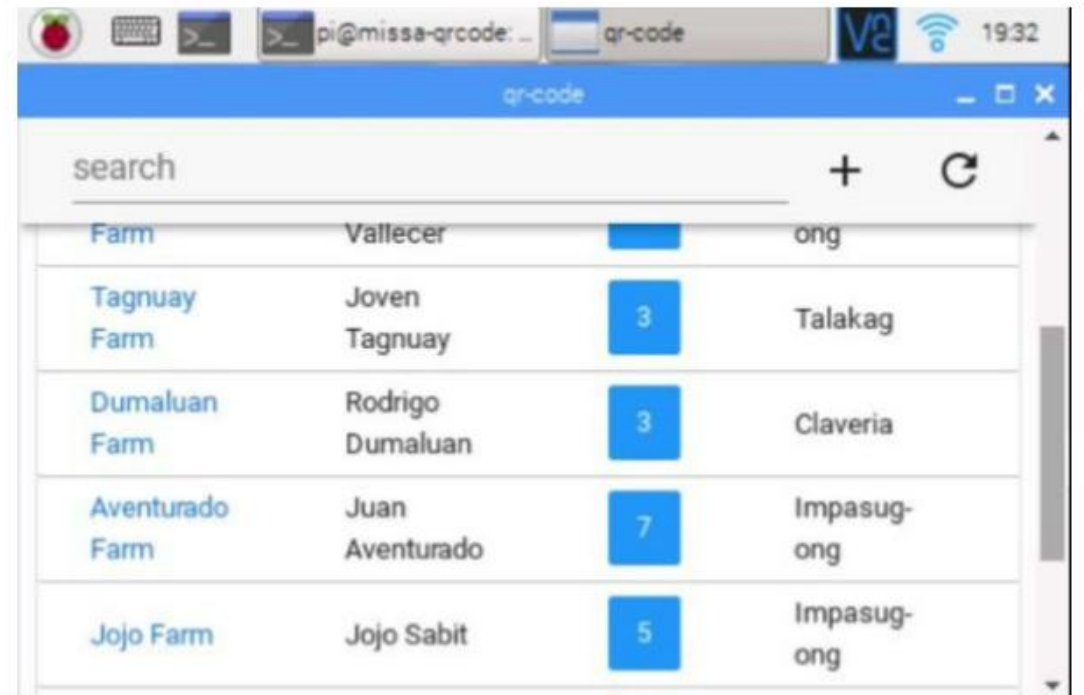


List of Registered Farms in the system



Farm Name	Owner	Crops	Town/City
Cagampang Farm	Faye Cagampang	4	Lantapan
Sumabong Farm	Peter Sumabong Farm	6	Libona
B and C Farm	Cherry Vallecer	2	Impasug-ong

(a)



Farm Name	Owner	Crops	Town/City
Vallecer			ong
Tagnuay Farm	Joven Tagnuay	3	Talakag
Dumaluan Farm	Rodrigo Dumaluan	3	Claveria
Aventurado Farm	Juan Aventurado	7	Impasug-ong
Jojo Farm	Jojo Sabit	5	Impasug-ong

(b)

Printed QR Code



Scanned QR Code



[< Back](#)

Scan Detail

FARM NAME: Cagampang F
arm

OWNER: Faye Cagampang

CONTACT INFO: 09273993
813



CROP NAME: Broccoli

CROP TYPE: Vegetable

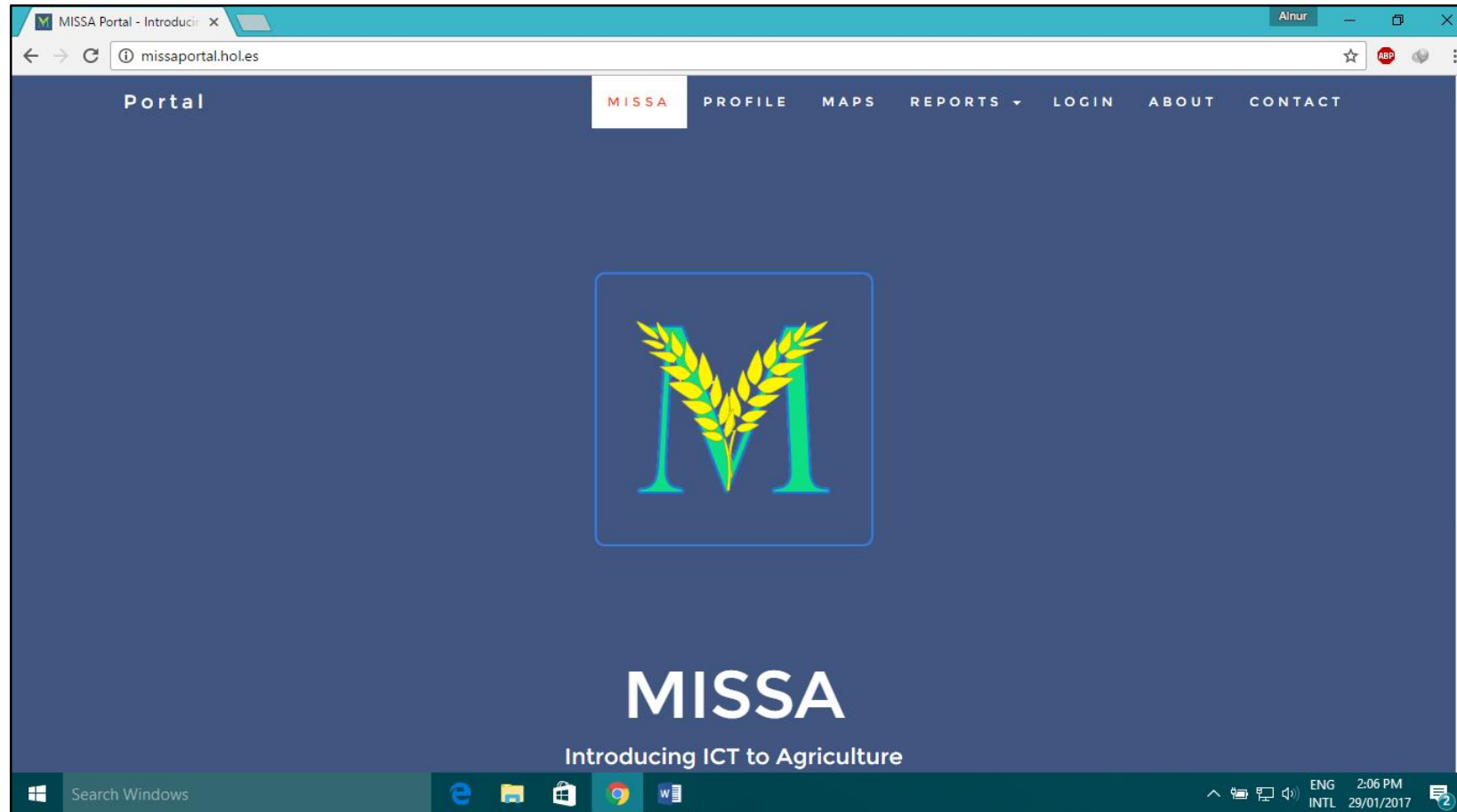
HARVEST INFO: 1000 kilos p
er day

FARM ADDRESS: Kibanggay,
Lantapan, Bukidnon, undefi
ned

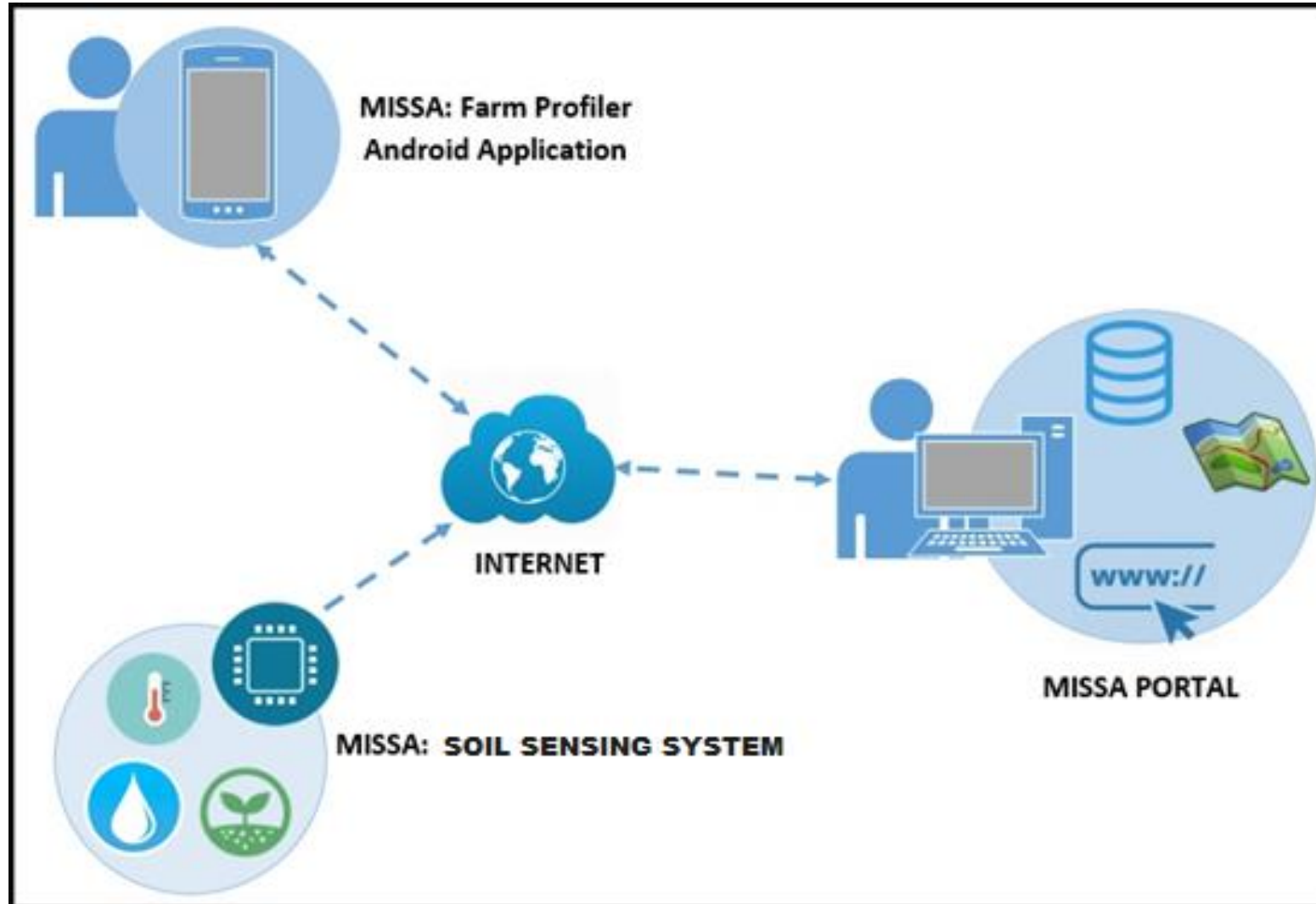
Copy to Clipboard



MISSA Portal



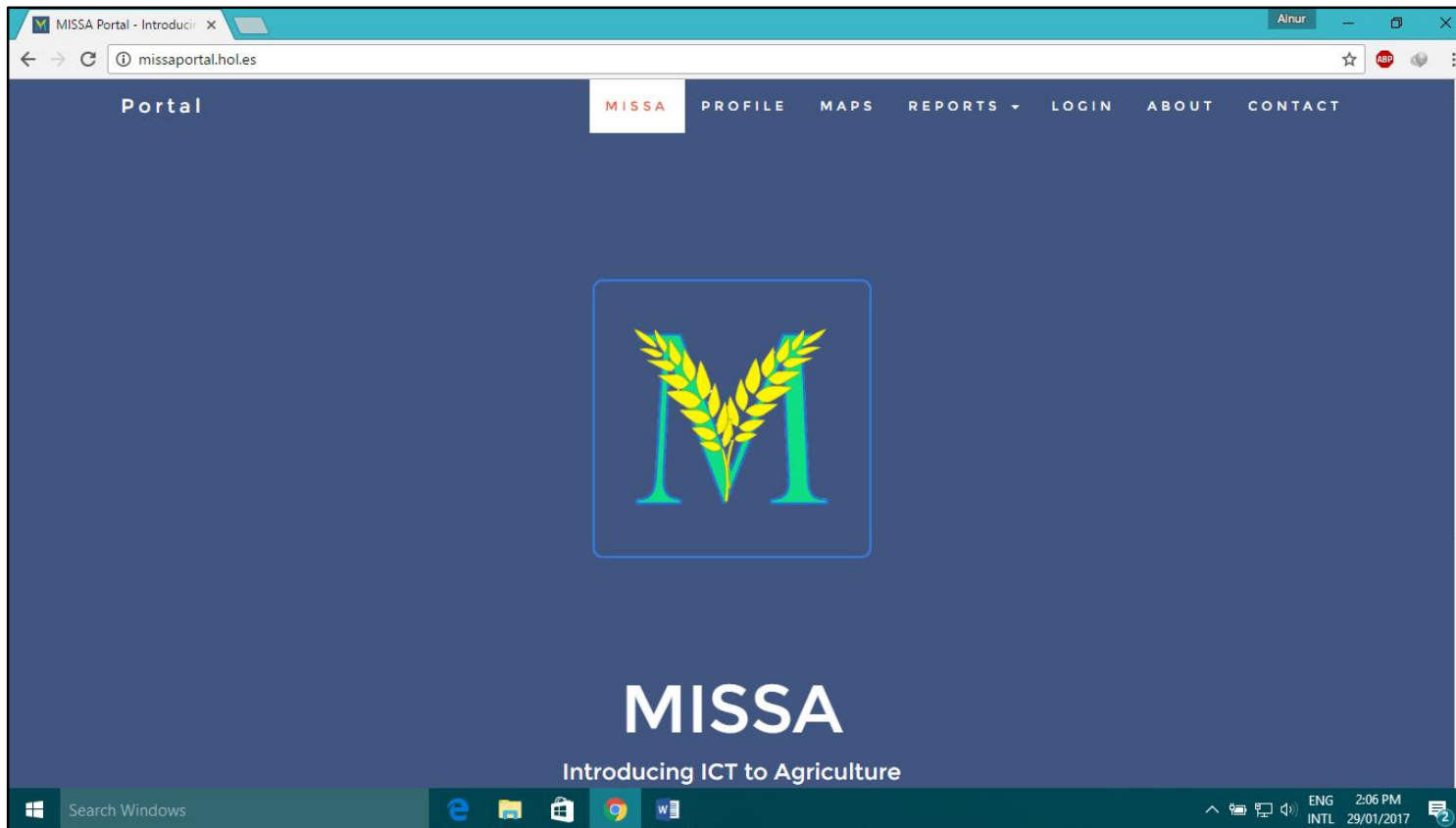
Conceptual Framework



RESULTS:



Main page of MISSA Portal



Dropdown List for the tabs of MISSA Portal in Mobile View



Crop Information page of MISSA Portal



Farms Information x

missaportal.hol.es/missa/administrator/cropinfo.php

Portal

MISSA PROFILE MAPS REPORTS ▾ LOGOUT ABOUT CONTACT

Value To Search

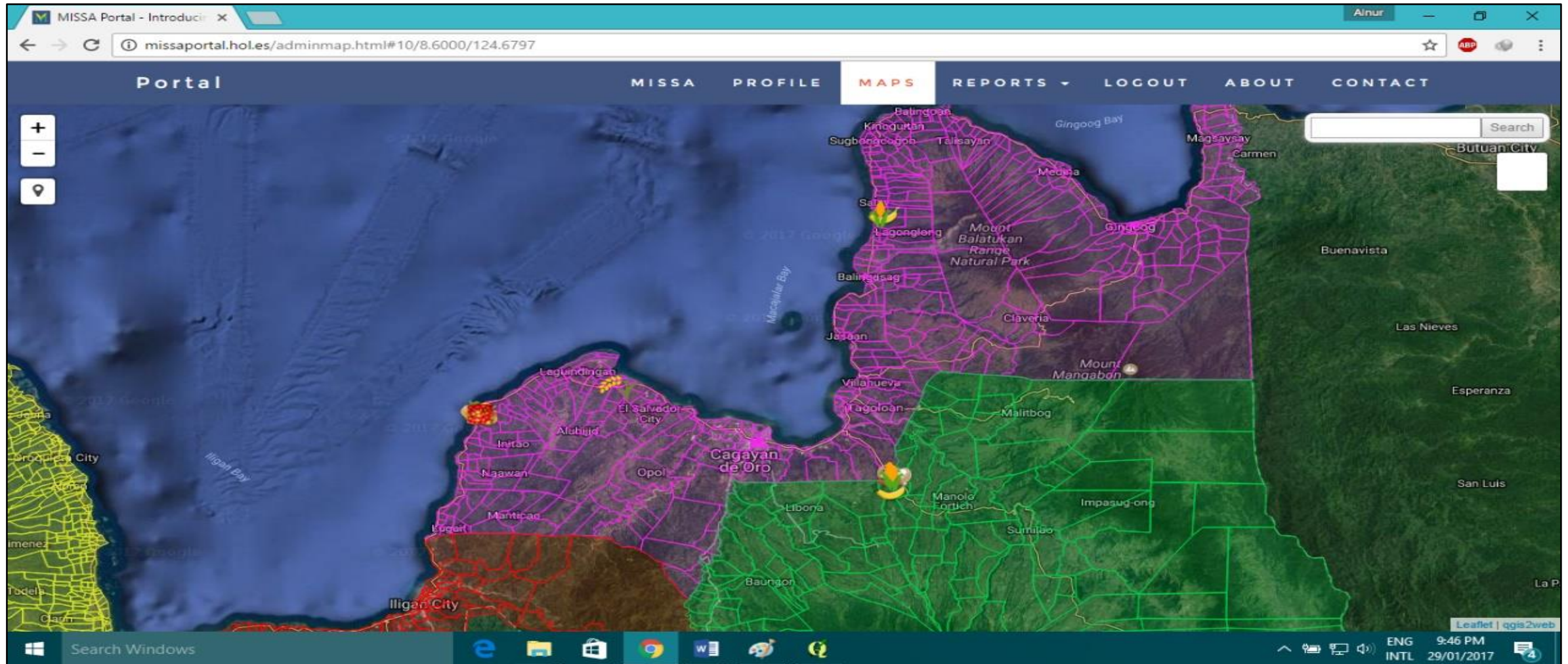
Submit

Farmers Name	Crop	Crop Type	Corn Breed	Corn Type	Corn Operation	Corn Planted	Corn Harvested	Corn Yeild	Corn Production	Fruit Bearing	Fruit Production	Fruit Existing	Fruit New Planting	Fruit Operatio
tilap bsbs bsbs	Cassava	Industrial or Root Crops/Flowers/Ornamentals												
Leonilo Godi Tilap	Cassava	Industrial or Root Crops/Flowers/Ornamentals												
Jonas Roble Preglo	Corn	Corn	Sige-Sige	White	Harvesting		.5	.3	1.5					
Pedro Cahatian Maglupay	Coconut	Industrial or Root Crops/Flowers/Ornamentals												
Mario Liwa	Corn	Corn	Traditional	White	Planting	0.25		0.25	5 Sacks					
Wilfreda Poblete Echavez	Serguelas	Fruit Crops								3	.12	3	3	

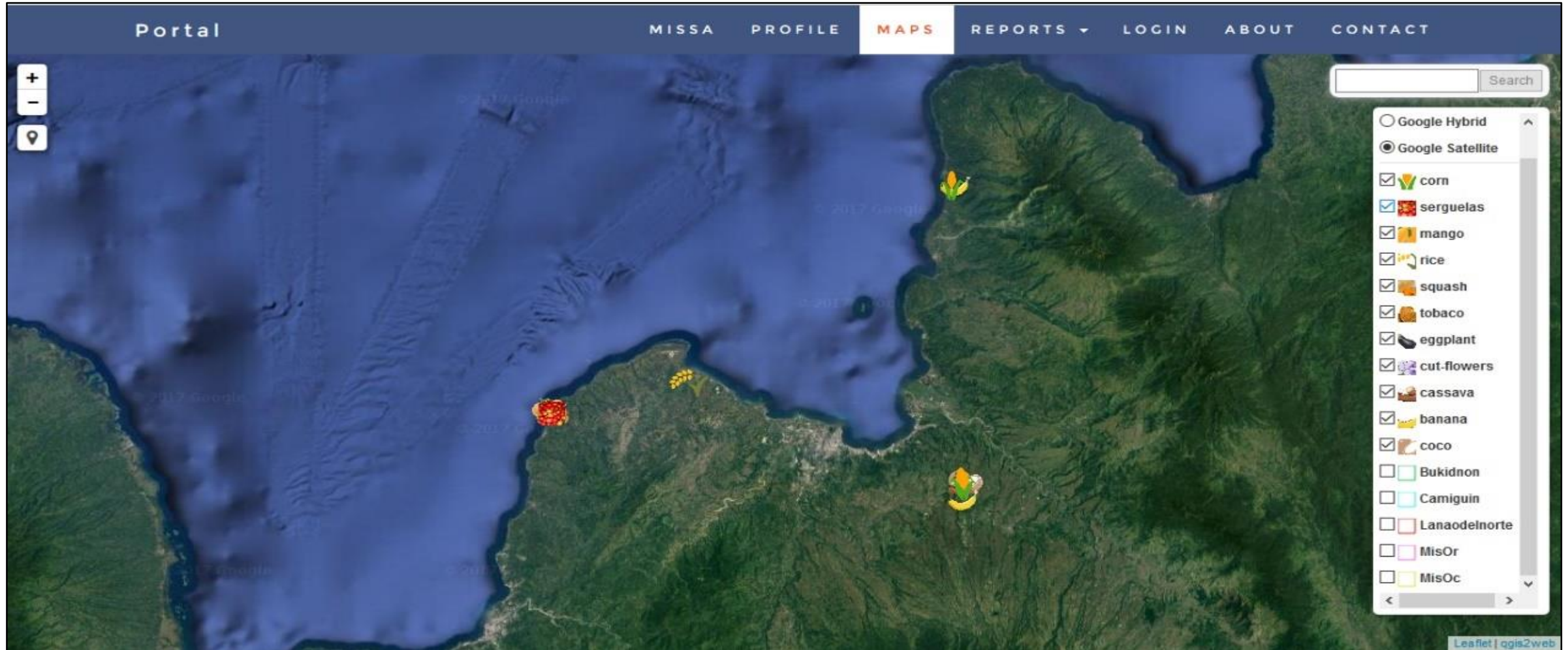
Search Windows

ENG INTL 3:32 PM 29/01/2017

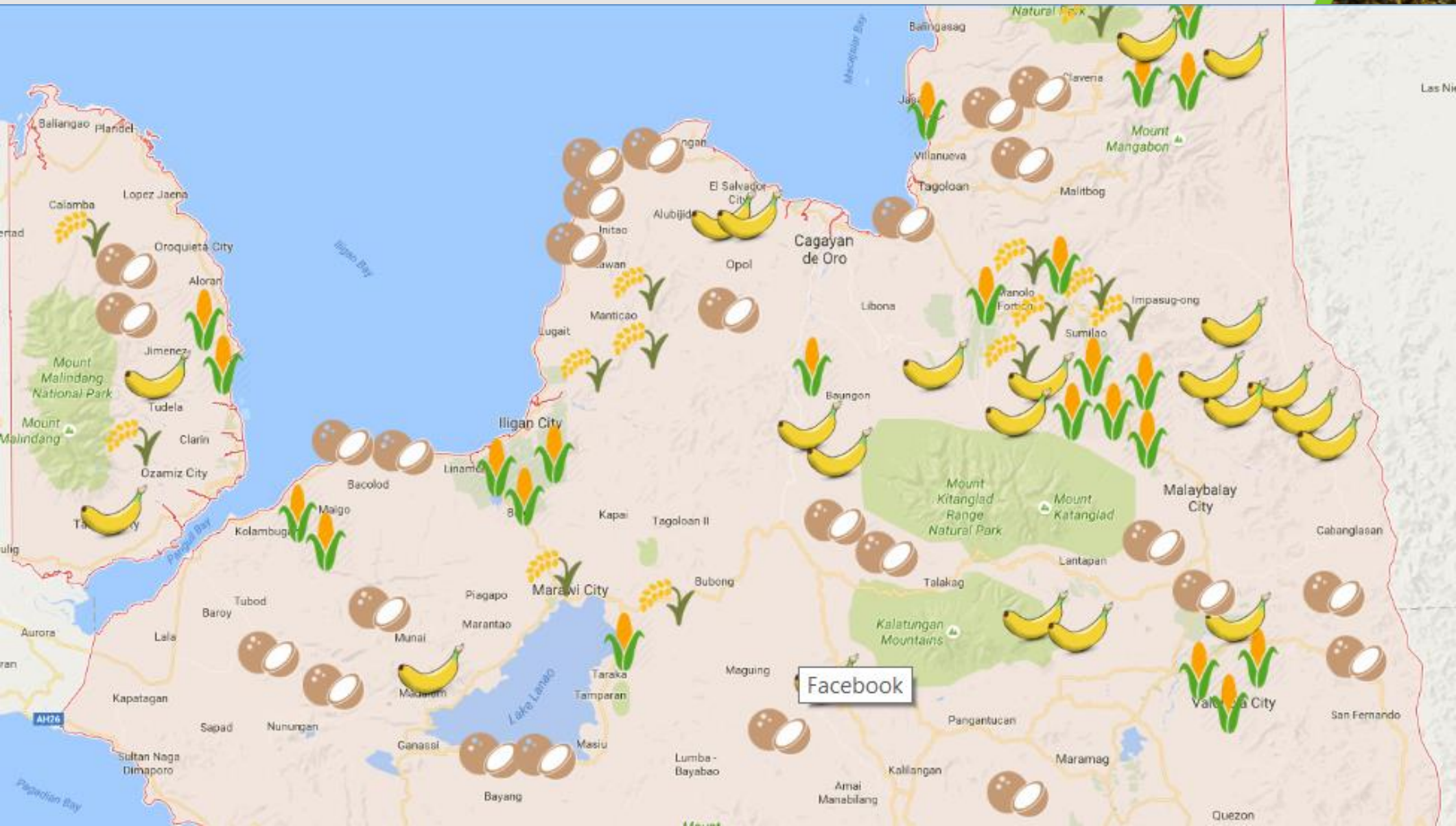
Coverage area with the crop icons



Map without the province boundaries



Map without the province boundaries





Thank You