# The use of GIS, satellite and aerial images in agricultural soil surveys

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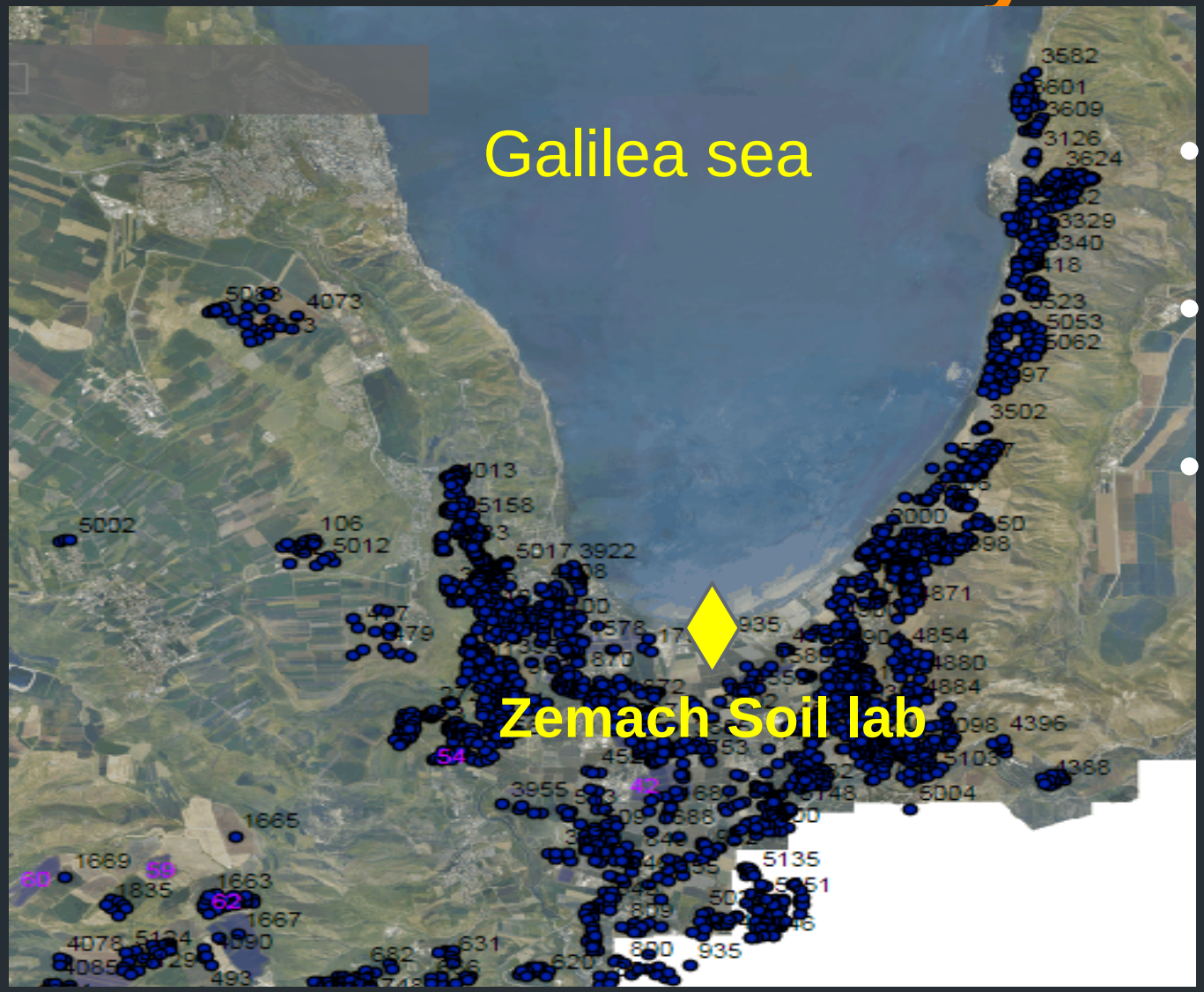
- Five *Field Service Laboratories* in Israel spreading from North (Zemach, Jordan Valley) to South (Gilat, Beer Sheva)
- The Laboratories specialize in soil, leaf and water analysis, for Agriculture and Environmental Protection
- Their accreditation comes from the *Israel Laboratory Accreditation Authority,* the *Ministry of Health*, and they work in professional collaboration with the *Ministry of Agriculture*

# The Soil Laboratory in the Jordan Valley



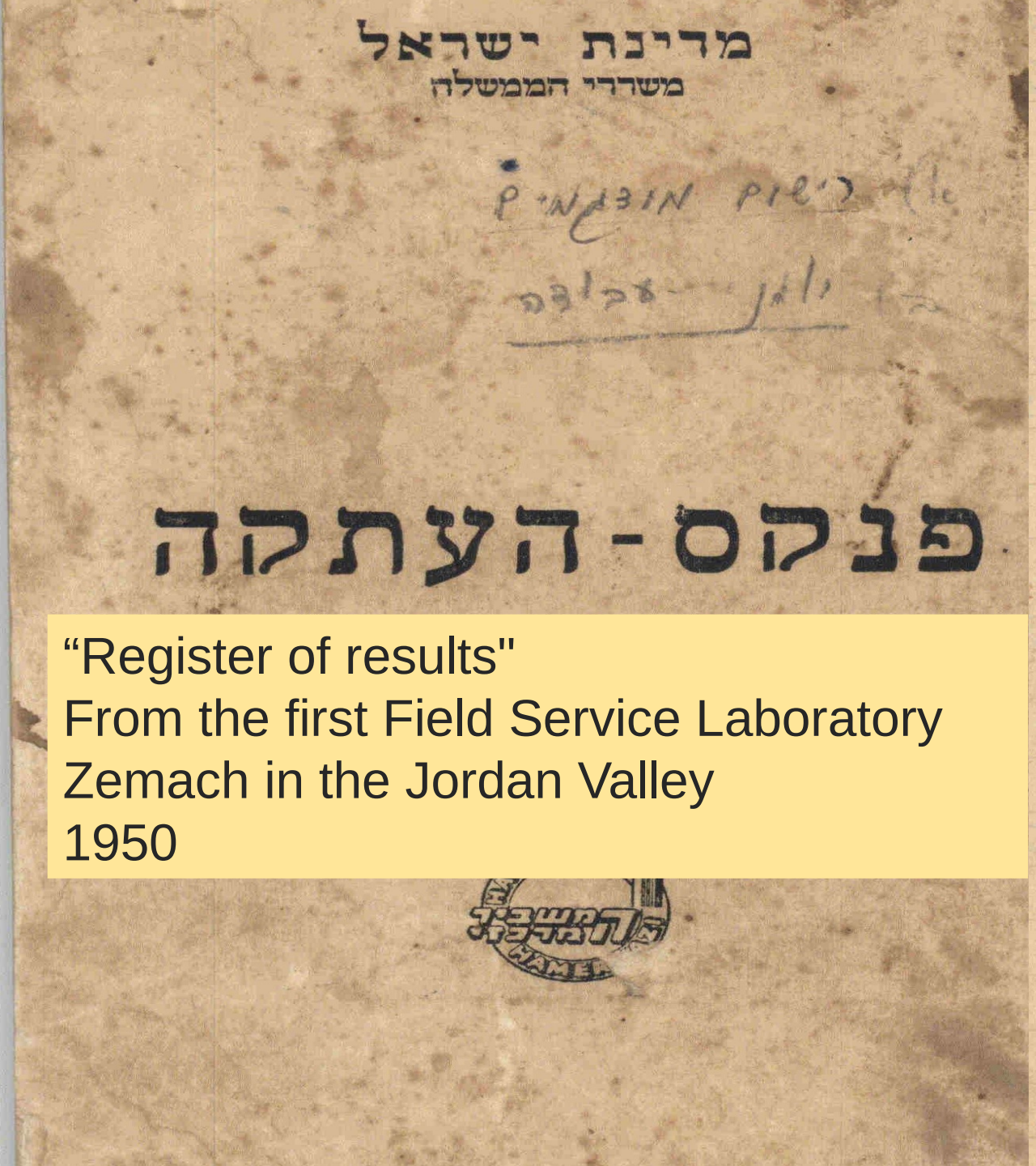

- The soil survey data goes 70 years back
- Each plot surveyed is recorded in the GIS
- Each blue point indicates a borehole and its agronomic info: physical and chemical soil data

מדינת ישראל

משרדי הממשלה

# פנקס-העתקה

“Register of results"
From the first Field Service Laboratory
Zemach in the Jordan Valley
1950



**Study on drainage in Bet Zera kibbutz 27/8/1950**

**The soils archive in Zemach Laboratory contains:**

- **More than 1000 boxes with 24 cells each, containing 24,000 representative soil samples**
- **20 Thick Files with thousands of pages with reports, table charts and laboratory results**

**Ten years ago all these data has been uploaded in a GIS system that allows easy access to data and is continuously updated since then**

# Examples on the use of remote sensing, lab tests results and GIS survey data, for solving practical agricultural questions regarding:

1. Soil Type
2. Soil Texture
3. Soil Salinity

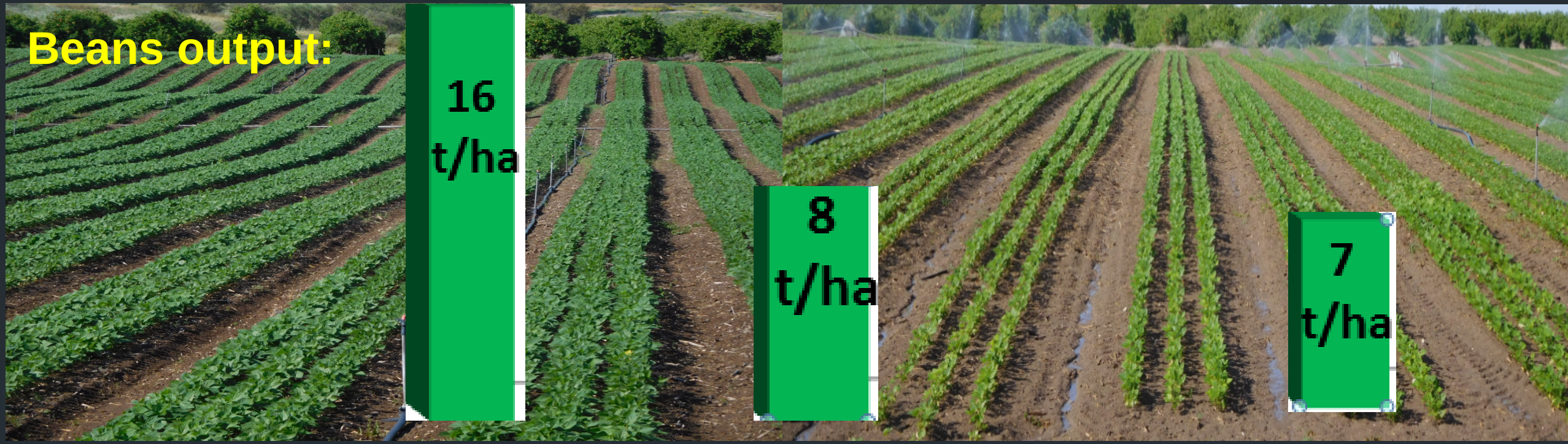
# Soil Type-1

Basaltic Grumosol

Light Rendzina of valley

Marly Calcareous Sierozem

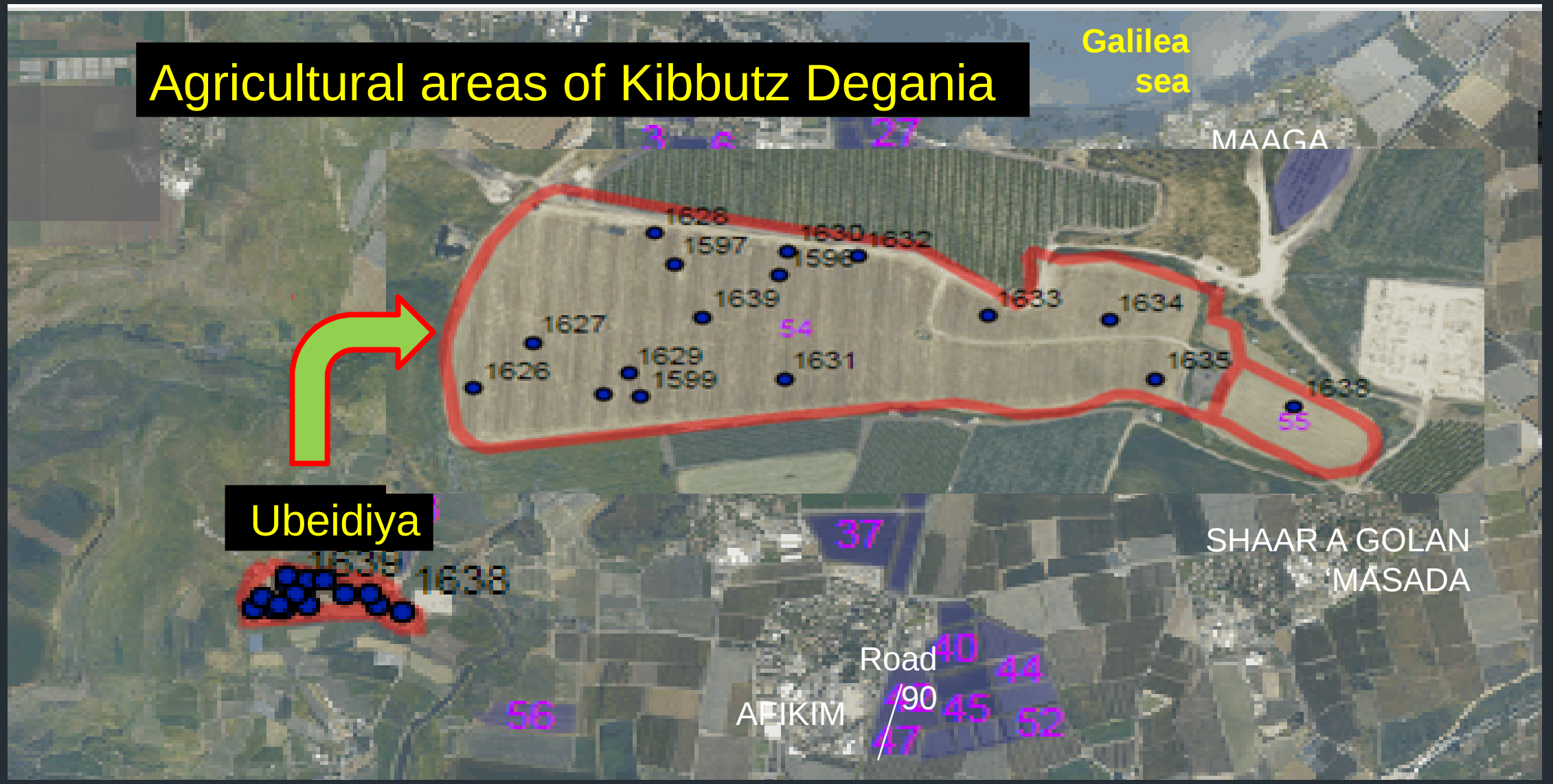
# Kibbutz Deganya - Ubeidiya plot.




western area of the plot

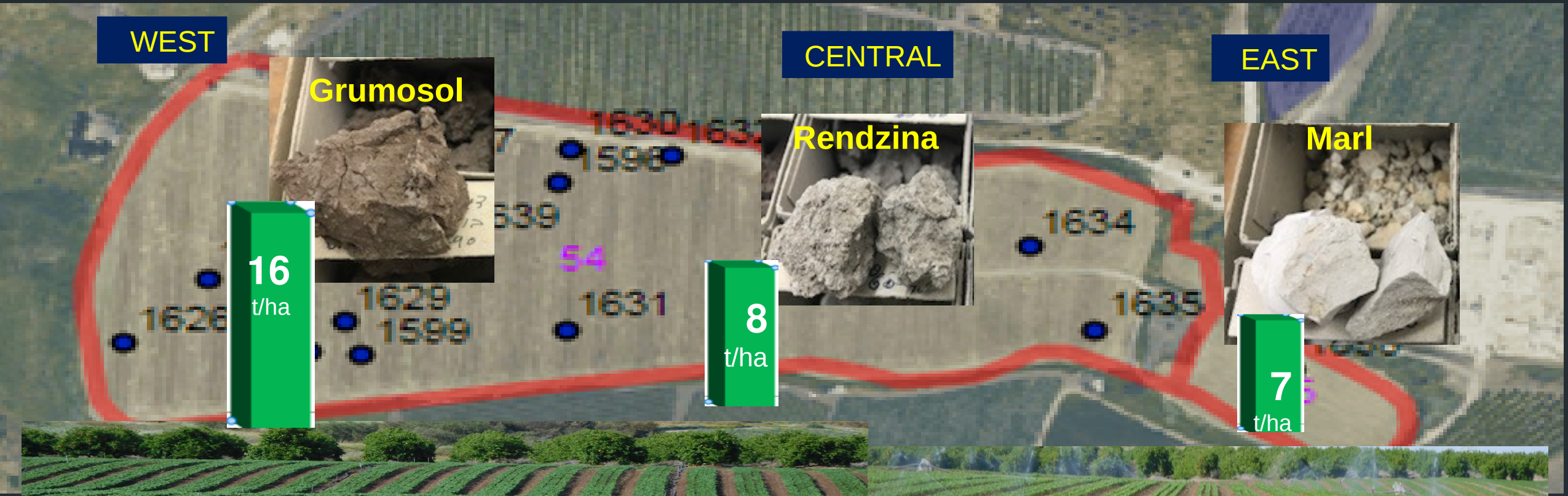
eastern area of the plot

april 2017




**After locating the bean plot in the GIS map we found detailed survey data from 1988 which shows different types of soil in the plot of Ubeidiya. (13 Ha, 780 m width)**

# KIBBUTZ DEGANYA UBEIDYA PLOT

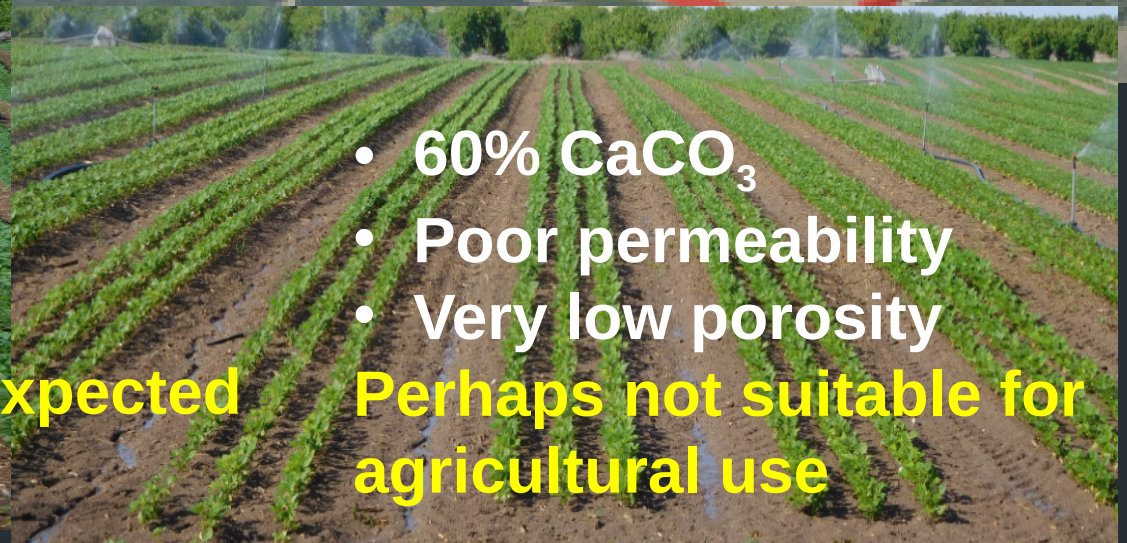



- 20% $CaCO_3$
- Good soil structure

**Almost optimal conditions**

- 40% of $CaCO_3$

**Iron deficiency expected**

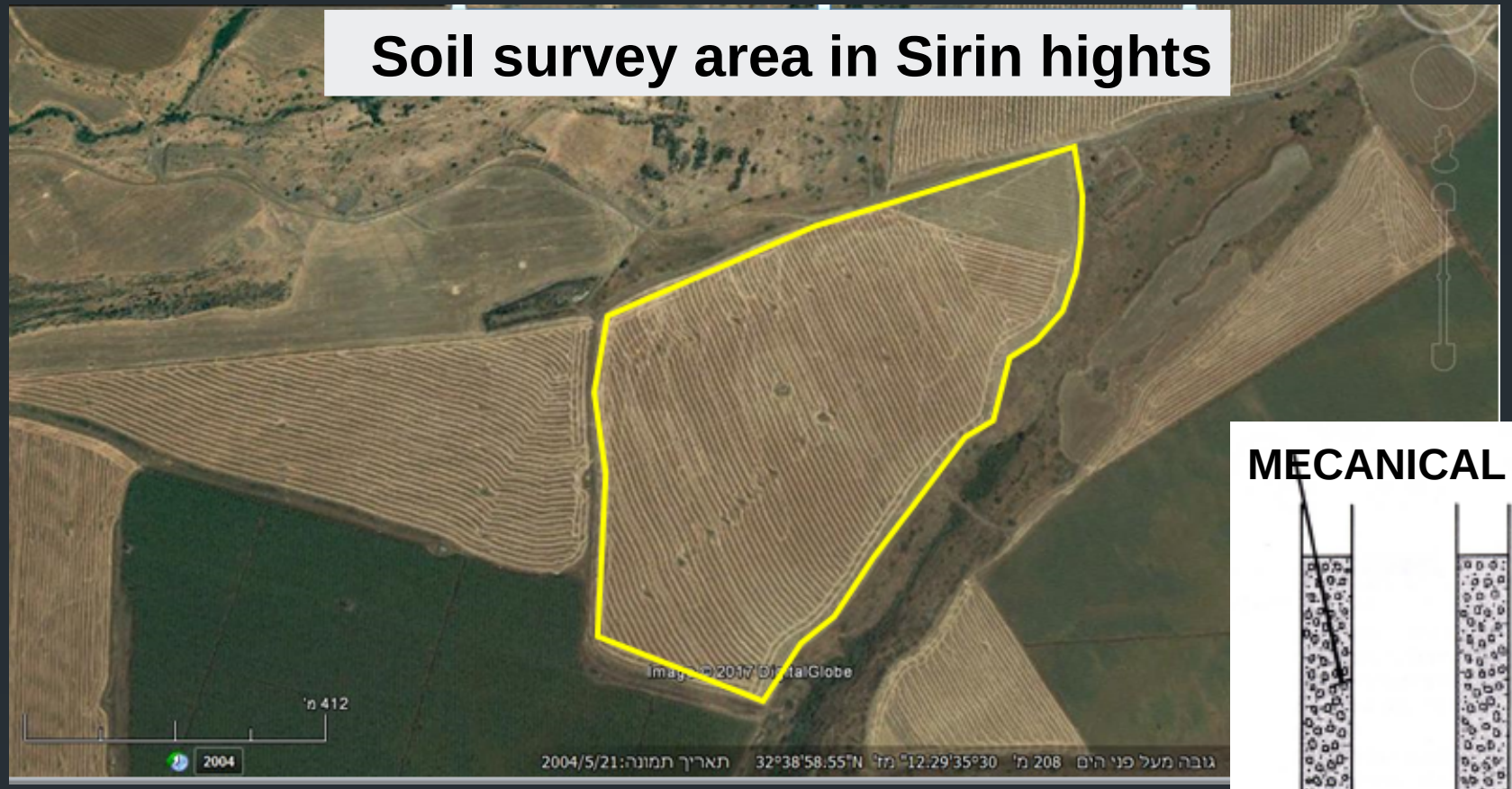


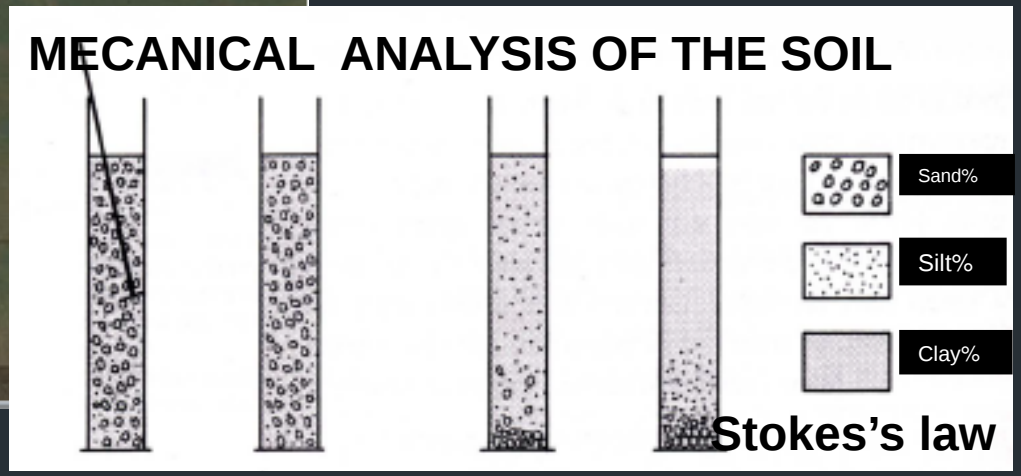
- 60% $CaCO_3$
- Poor permeability
- Very low porosity

**Perhaps not suitable for agricultural use**

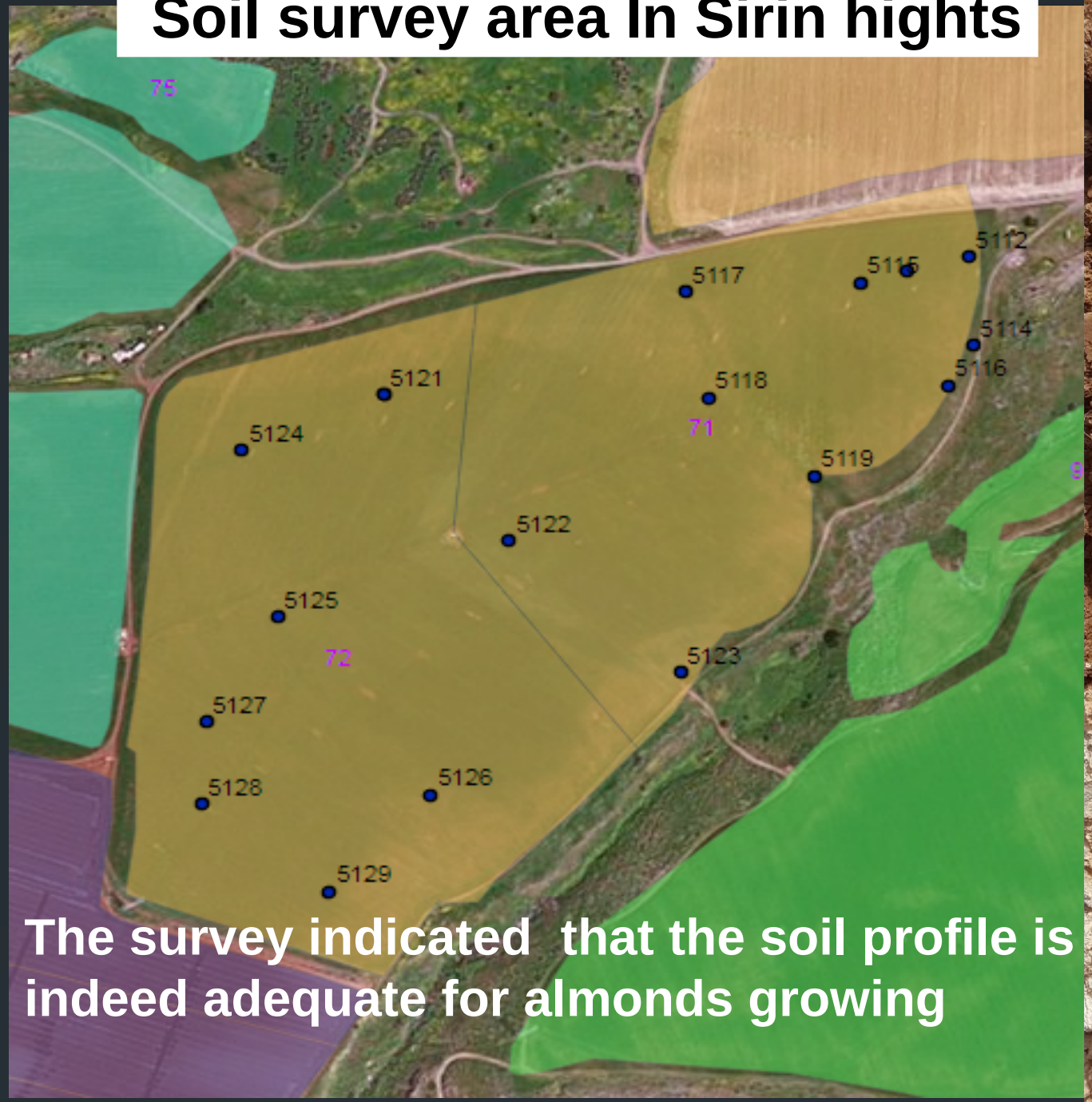
## Soil Texture- 2

**The use of laboratory test results, allow us to understand the soil variation present in the plot**



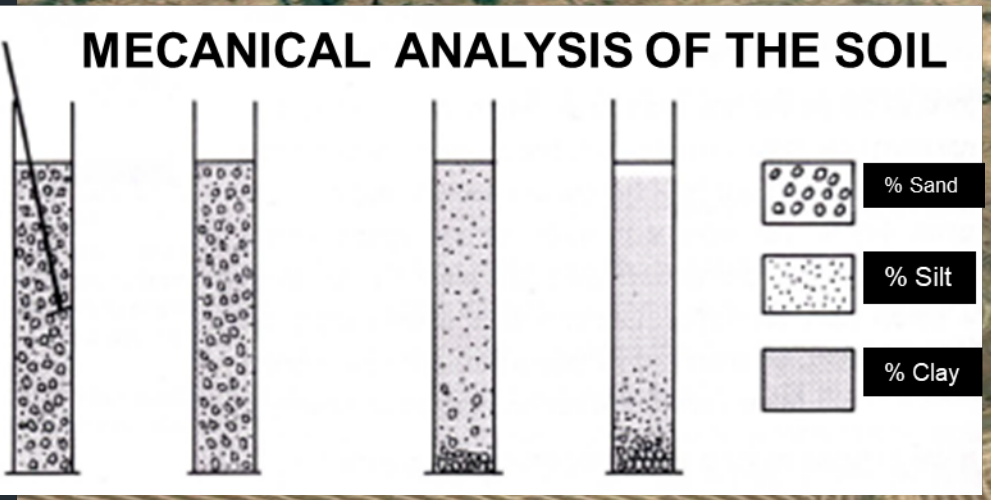



# Soil survey area In Sirin hights




The survey indicated  that the soil profile is indeed adequate for almonds growing

# Soil clay content of first layer




Rate of water infiltration

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Clay: 29%

Clay: 57%

Clay: 65%

water and fertilizer retention

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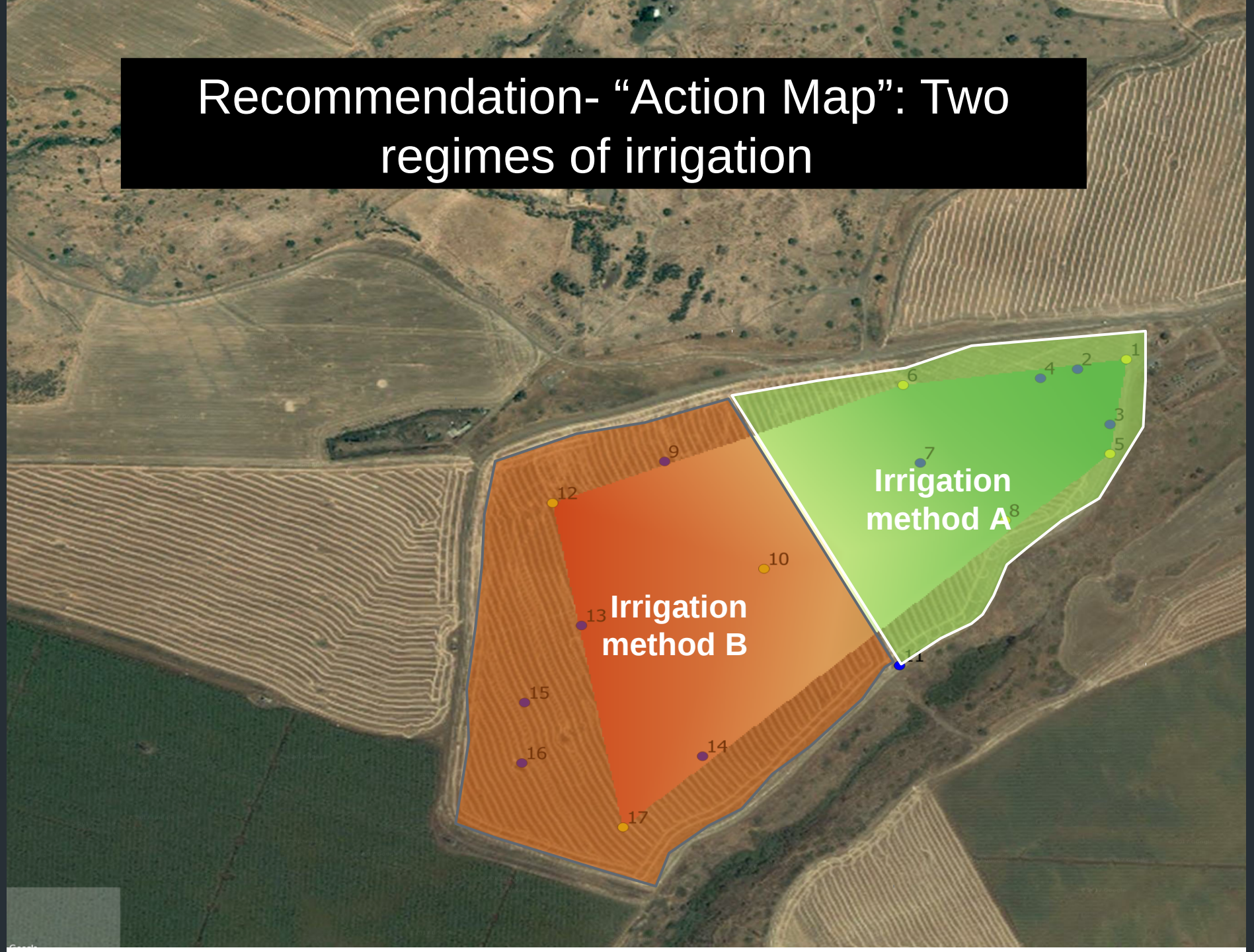
% Clay
30
50
70
Google Satellite

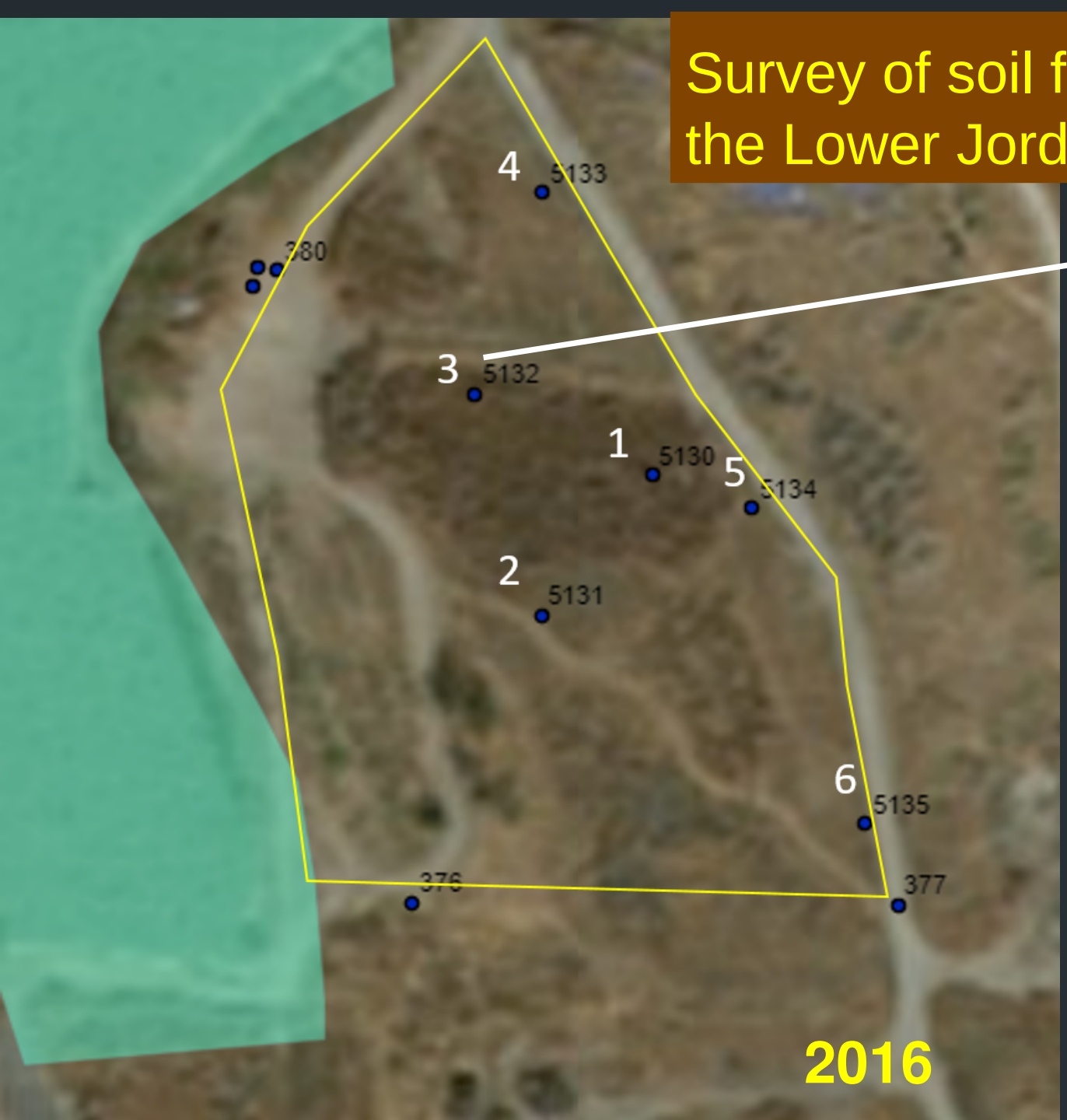
# Recommendation- “Action Map”: Two regimes of irrigation




# Soil Salinity- 3

Salinity is not a feature  that we can diagnose by remote sensing. BUT Here is an example of how Google maps of the area over the years confirmed and enabled the understanding of chemical findings

# Survey of soil for the planting of **avocados** in the Lower Jordan valley, Kibbutz Afikim





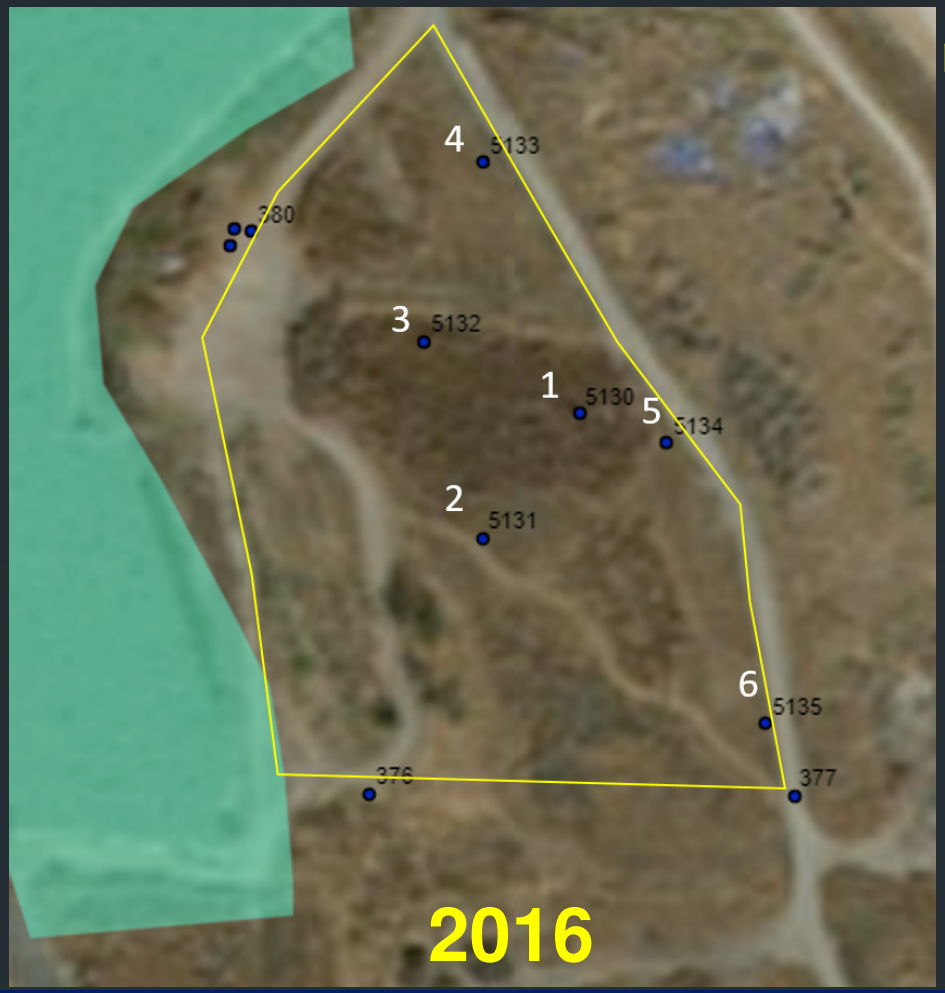
**The survey shows no limiting factors in terms of structure**

# Results of chemical tests from a representative borehole in the survey


| Depth (cm) | SALINITY PARAMETERS | | NUTRIENT PARAMETERS | |
|---|---|---|---|---|
| | EC [dS/m] | SAR | Phosphorus [mg/kg] | Potassium [mg/kg] |
| 25 | 3 | 2 | 647 | 1294 |
| 65 | 20 | 16 | 394 | 2269 |
| 90 | 13 | 6 | 270 | 1504 |
| 120 | 13 | 17 | 256 | 889 |
| 150 | 21 | 17 | 266 | 779 |
| **should be less than:** | 2 | 5 | 50 | 300 |

**Salinity and the nutrient content examined in the laboratory were too high for a sensitive plant like avocado**

# Afikim lower jordan valley





**aerial photos over the years show that in the past the plot was used to prepare animal compost**

This fact do not allow the development of a growth sensitive to high salinity like avocado

**The Zemach laboratory produce and maintain soil data of great economic value for the benefit of farmers, field-training consultants and agriculture research in Israel**

**The laboratory use Remote sensing tools together with GIS to improve the information and services provided**

**Thanks for**
**!your attention**