SCI for Sustainable Sugar

Proposing a Satellite Controlled Incentive System for Sustainable Sugar Beet Production

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2022 Joint Call
Kick-off Projects Seminar
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This project has received funding from the European Union's Horizon 2020 research and innovation programme under grand agreement no 862665 ICT-AGRI-FOOD.

SCI for Sustainable Sugar

- ✓ **Project Goal:** Increasing yield and root quality efficiency in the sugar beet production while encouraging sustainable agricultural production habits.

- ✓ **Project Start:** 17 April 2023 – 16 April 2025 (24 months)
- ✓ **Budget:** 386,400 EUR
- ✓ **Partners:** 4 partners from 3 different country
  - ✓ Estonia: Agrovisio OÜ,
  - ✓ Turkey : Ege University Faculty of Agriculture, Kayseri Seker Fabrikaları A.S
  - ✓ Israel : Rivulis Irrigation Ltd

SCI for Sustainable Sugar

Partners: 4 partners from 3 different country

Estonia:
Agrovisio OÜ,

Turkey
Ege University Faculty of Agriculture,
Kayseri Sugar Factory

Israel
Rivulis Irrigation Ltd

Objective

1.Increasing Extracted Sugar (Sucrose): The correlation between fertilization/irrigation practices and yield/root quality will be examined using satellite/drone observations.

2. Cost-Effective Sustainable Production: Via satellite/drone-based early warning system abnormalities will be monitored and producers will be notified via mobile app to prevent yield loss. This app will also play a critical role in sharing guidelines on cost-effective fertilization and irrigation practices with farmers and observing the results.

3. Production Forecasting: Satellite/drone observations will also be used for yield estimation and root quality estimation. Sugar factory experts will be able to use the software to achieve field-by-field examination, and forecast the total amount of expected sugar production.

4. Dissemination of Technology Use among Farmers: Distribution of satellite monitoring tools among farmers freely and engaging with them via KSF field experts, hopefully, will break that barrier of tecnology adoptation with by farmers.

Main project activities and challenges

WP no.	Work package title (Lead: Duration)	Objectives
2	Production Estimation (Agrovisio: 3-23)	1. Estimate the amount of Alpha Amino Nitrogenous per field 2. Estimate amount of crop yield per decares 3. Estimate amount of extracted Sugar per unit mass of the plant
3	Fertilizer Modelling (Ege: 1-22)	1. Creation of fertilization guide map to reduce Ammonium Sulfate 21-0-0 by 25% while managing root quality and yield.
4	Irrigation Modelling (Rivulis: 1-22)	1. Creation irrigation guide map to reduce water usage by 20% while managing root quality and yield. 2. Preparing irrigation schedules according to crop growth, ensuring irrigation monitoring 3. Comparing effects of drip and sprinkler irrigation methods on accumulation of harmful N level
5	Data Space Design and Software Development (Agrovisio: 1-22)	1. Developing software component to analyze the satellite and drone images of the parcels 2. Creating a db and UI for manual data entry 3. Designing and developing web and mobile software platform 4. Software implementation of the production estimation models 5. Integrated crop monitoring software
6	Dissemination of knowledge and experience among farmers (KSF: 1-22)	1. Creating a website for the project and creating contents 2. Sharing the process, progress and results of the project with public and interested sectors 3. Increasing the visibility of the project and developed outputs 4. Sharing the results with partners and interested parties 5. Establishing a strong partnership which may open a door into new opportunities 6. Exploring new business models and governance opportunities

Expected results and potential impact

Hopefully, the reward system will be a catalyst for farmers to adopt sustainable production habits with reduced usage of water and fertilizer. Considering current usage of KSF, the project aims:

Economic Impact

- ✓ Irrigation reduction by 20% (~115 Million m3 of water: economic value ~8.3 Mn EUR) while
- ✓ Fertilization reduction by 25% (~6250 tons fertilizer: economic value ~1.4 Million EUR)
- ✓ YEARLY TOTAL SAVINGS: ~10 Million EUR will lay a foundation for incentive budget

Other Impacts

- Promoting sustainable farming practices via incentives
- Increasing awareness of farmers about digital tools and sustainable production practices
- Soil Fertility Maintenance
- Protection of Water Bodies (from excessive usage and nitrogenous pollution)

Field Experiments - I

- ✓ KSF provided 72 da of land for fertilization and irrigation experiments.
  (3da/region)x(2 irrigation type)x(4 fertilization trial)x(3 repetition)
- ✓ Irrigation types (drip, sprinkler),
- ✓ Fertilization trials (6, 12, 18, 24 kg N/da)

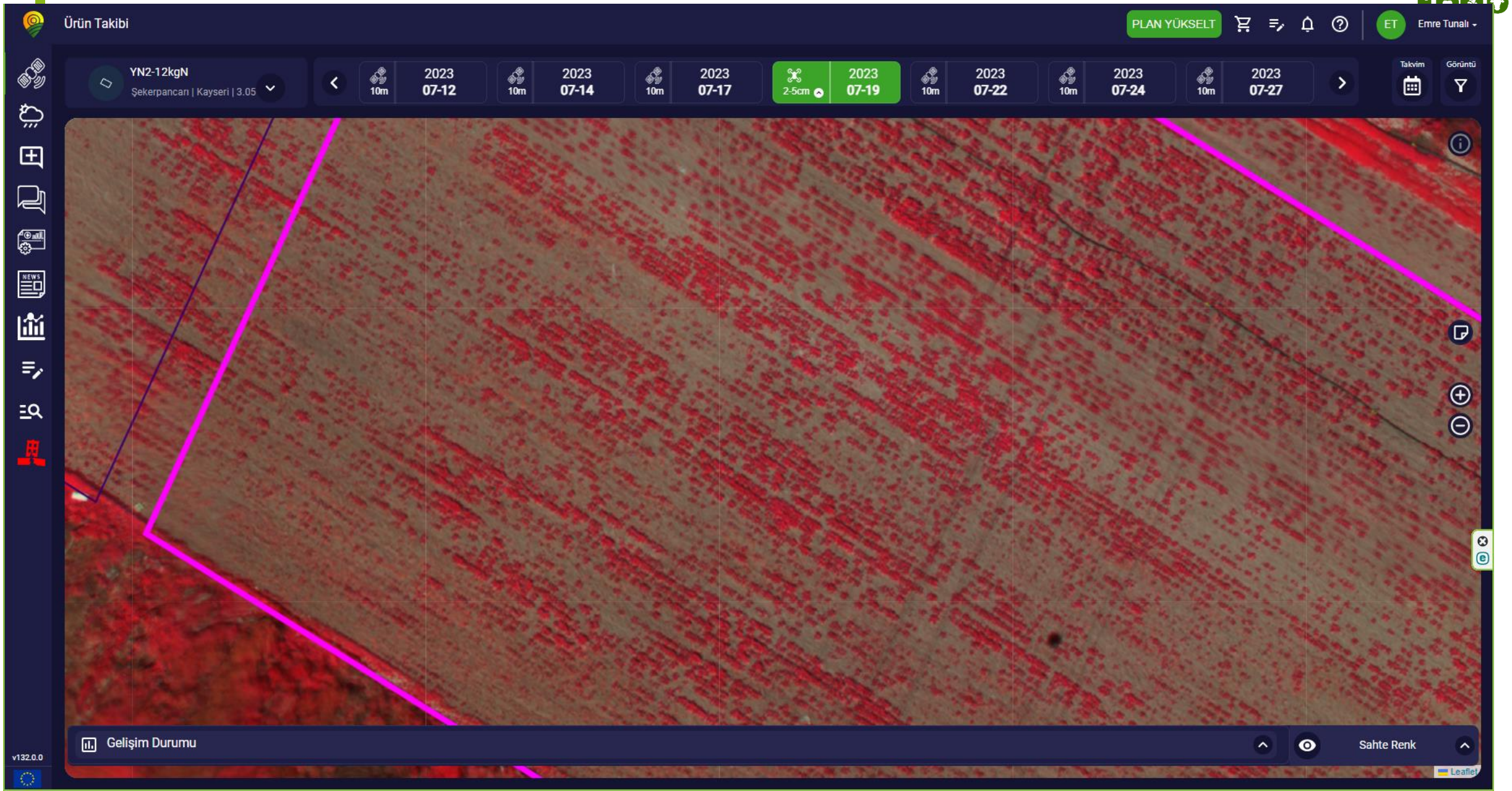
ICT-AGRI ŞEKERPANCARI DENEME DESENİ (TESADÜF BLOKLARI)					
1. BLOK			2. BLOK		
UYGULAMA		NO	UYGULAMA		NO
N-1 Uygulaması (6 kg/da N)			N-2 Uygulaması (12 kg/da N)		
Temel: 13.24.12 (+%10S) 46 kg/da			Temel: 13.24.12 (+%10S) 46 kg/da		
1.Üst gübre (Ara çapa): 29 kg/da Potasyum sülfat			1.Üst gübre (Ara çapa): 15 kg/da Amonyum sülfat 29 kg/da Potasyum sülfat		
2. Üst gübre: ------ (uygulama yok)			2. Üst gübre: 11,54 kg/da CAN		
N-3 Uygulaması (18 kg/da N)			N-4 Uygulaması (24 kg/da N)		
Temel: 13.24.12 (+%10S) 46 kg/da			Temel: 13.24.12 (+%10S) 46 kg/da		
1.Üst gübre (Ara çapa): 29 kg/da Amonyum sülfat 29 kg/da Potasyum sülfat			1.Üst gübre (Ara çapa): 43 kg/da Amonyum sülfat 29 kg/da Potasyum sülfat		
2. Üst gübre: 23 kg/da CAN			2. Üst gübre: 35 kg/da CAN		
Kontrol Parseli: 2 yada 3 Adet Temel gübreleme: N'lu gübre uygulaması yok!!! TSP 26 kg/da, 20 kg/da K2SO4 1. Üst gübre: 20 kg/da K2SO4 2. Üst gübre uygulaması: --- (uygulama yok)					

Field Experiments - II

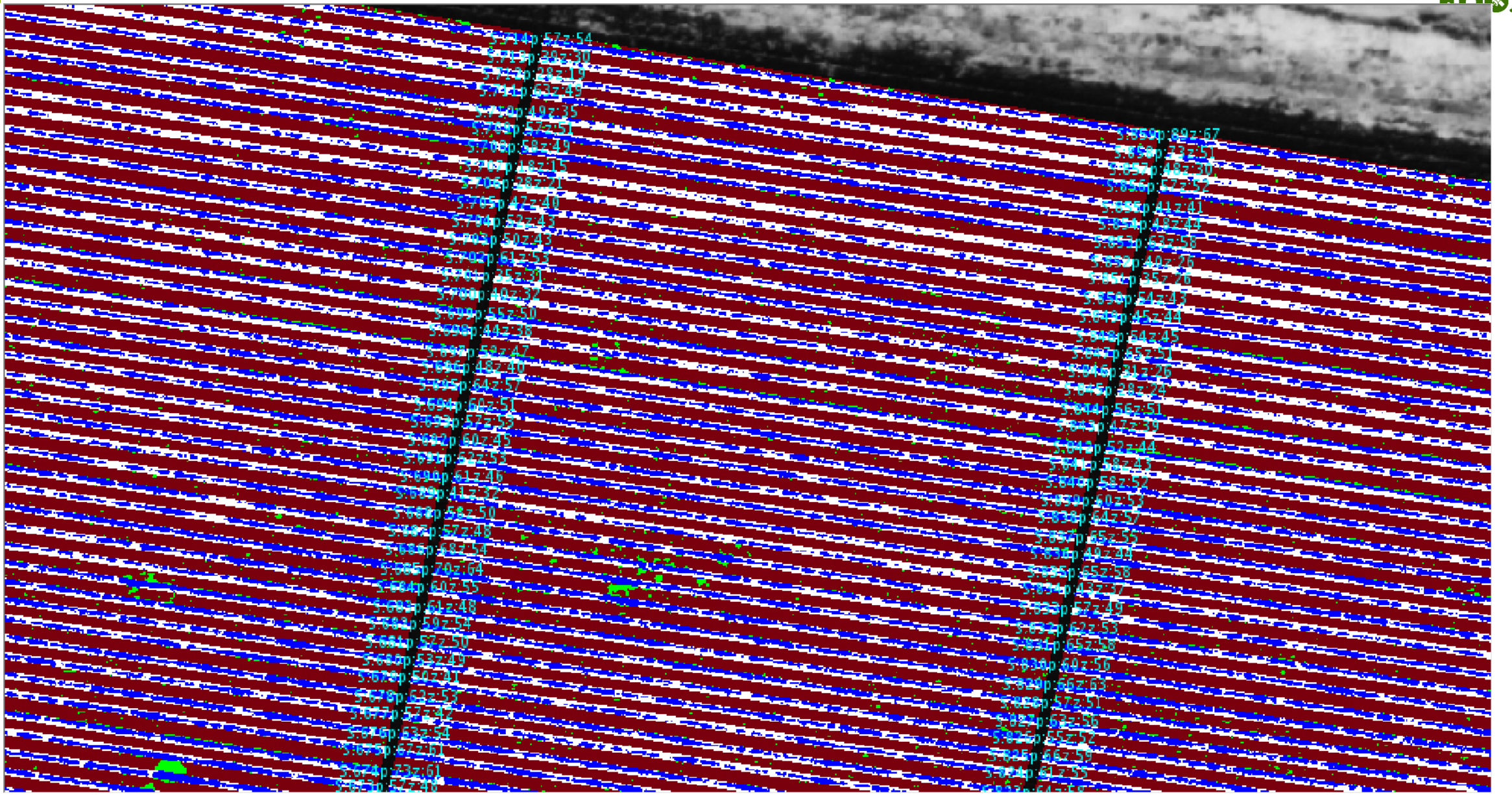
Field Experiments - III

Production Estimation (Satellite+Drones)

Production Estimation (Satellite+Drones)

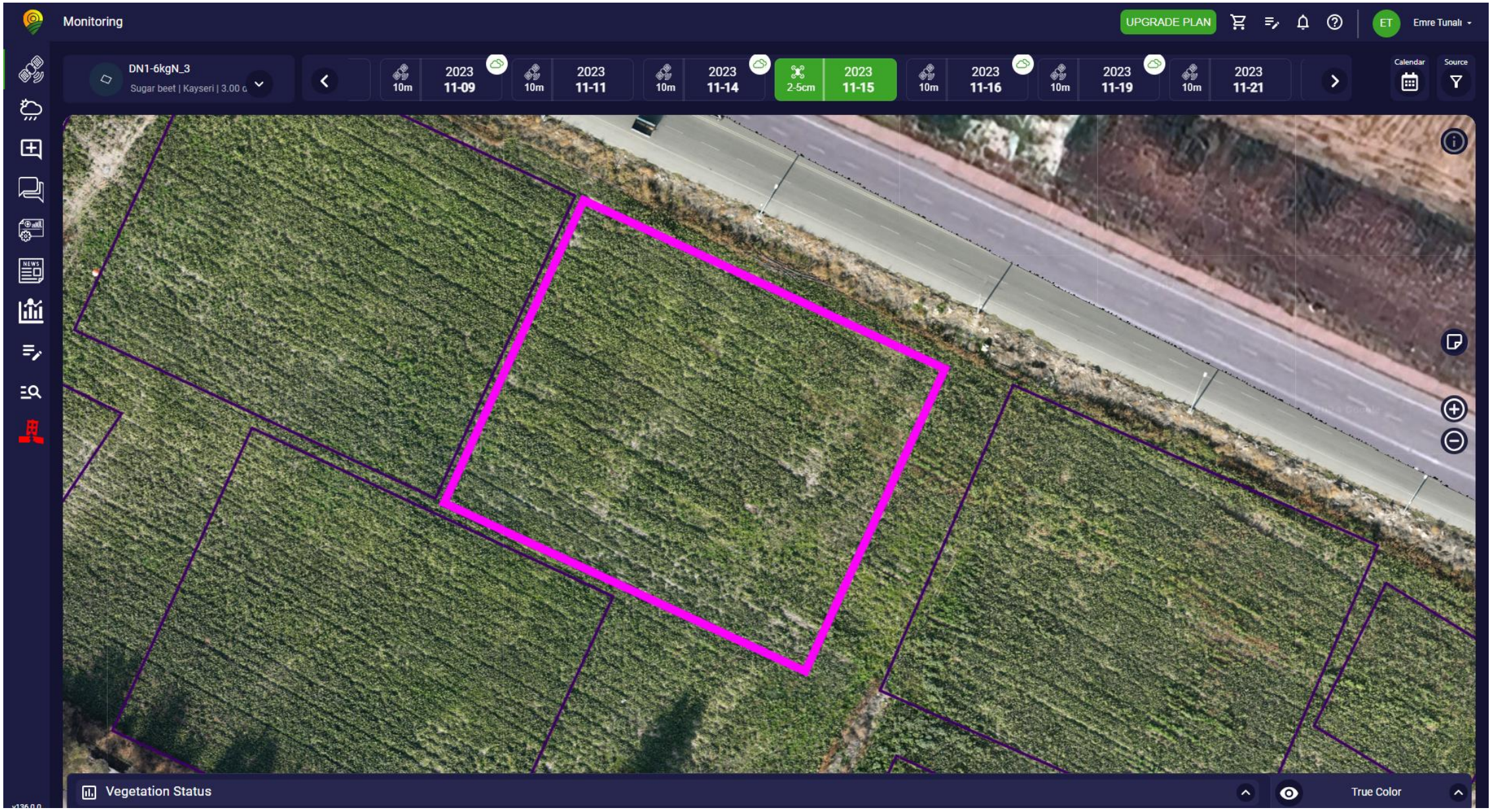


Production Estimation (Satellite+Drones)



Detection of Problematic Zones- I

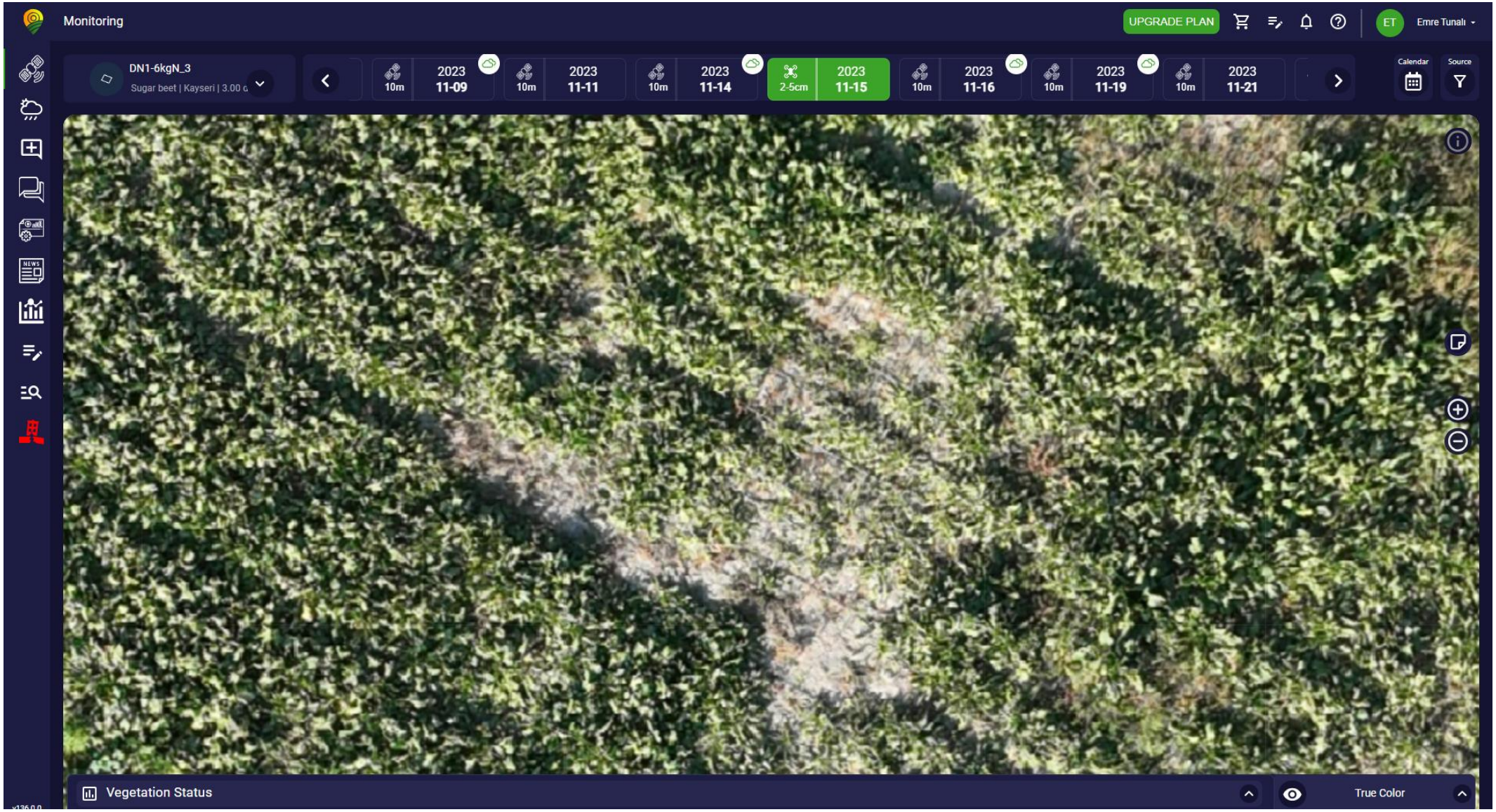
Detection of Problematic Zones- II



Detection of Problematic Zones- III

Detection of Problematic Zones- IV

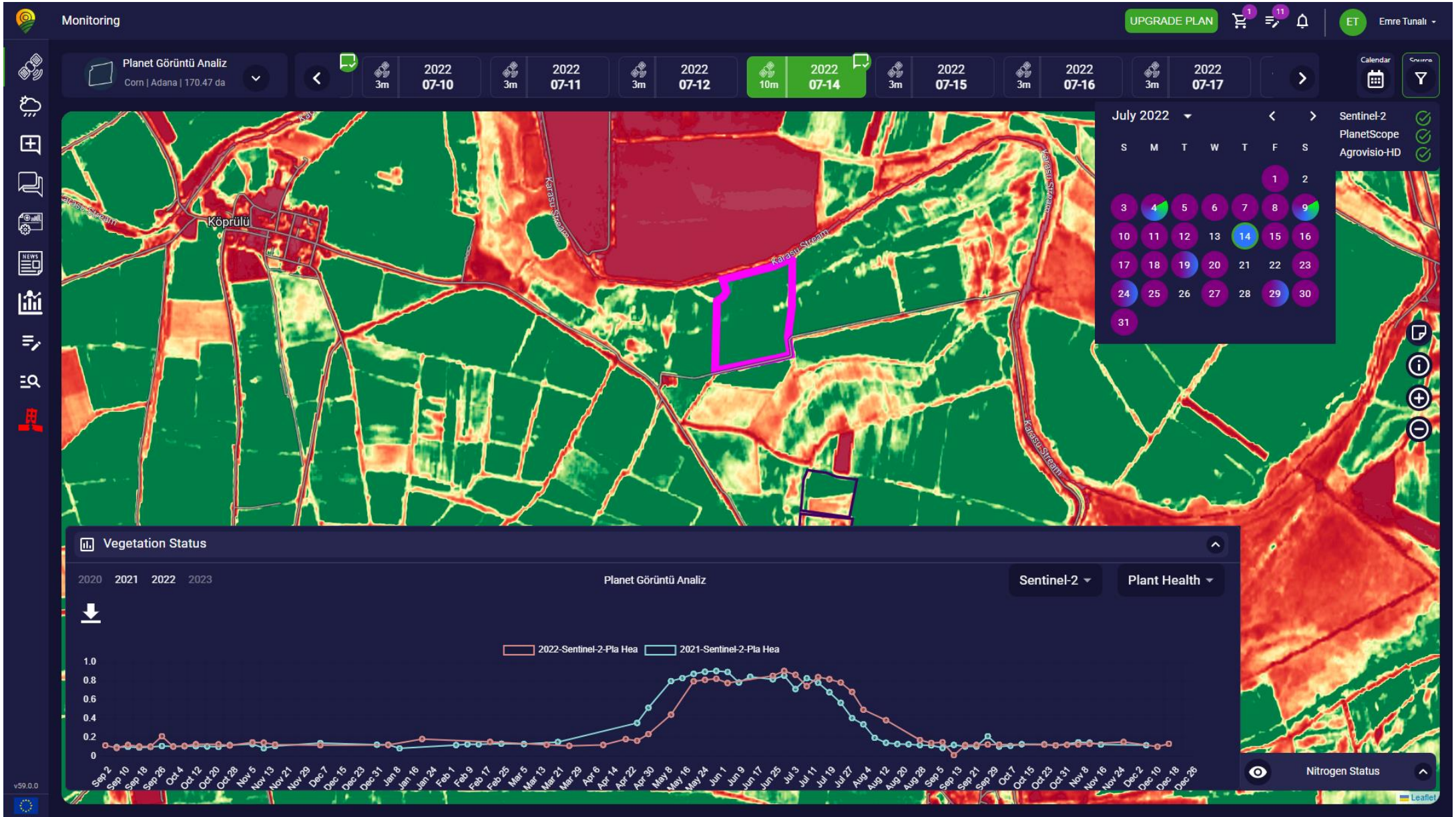
Detection of Problematic Zones- V



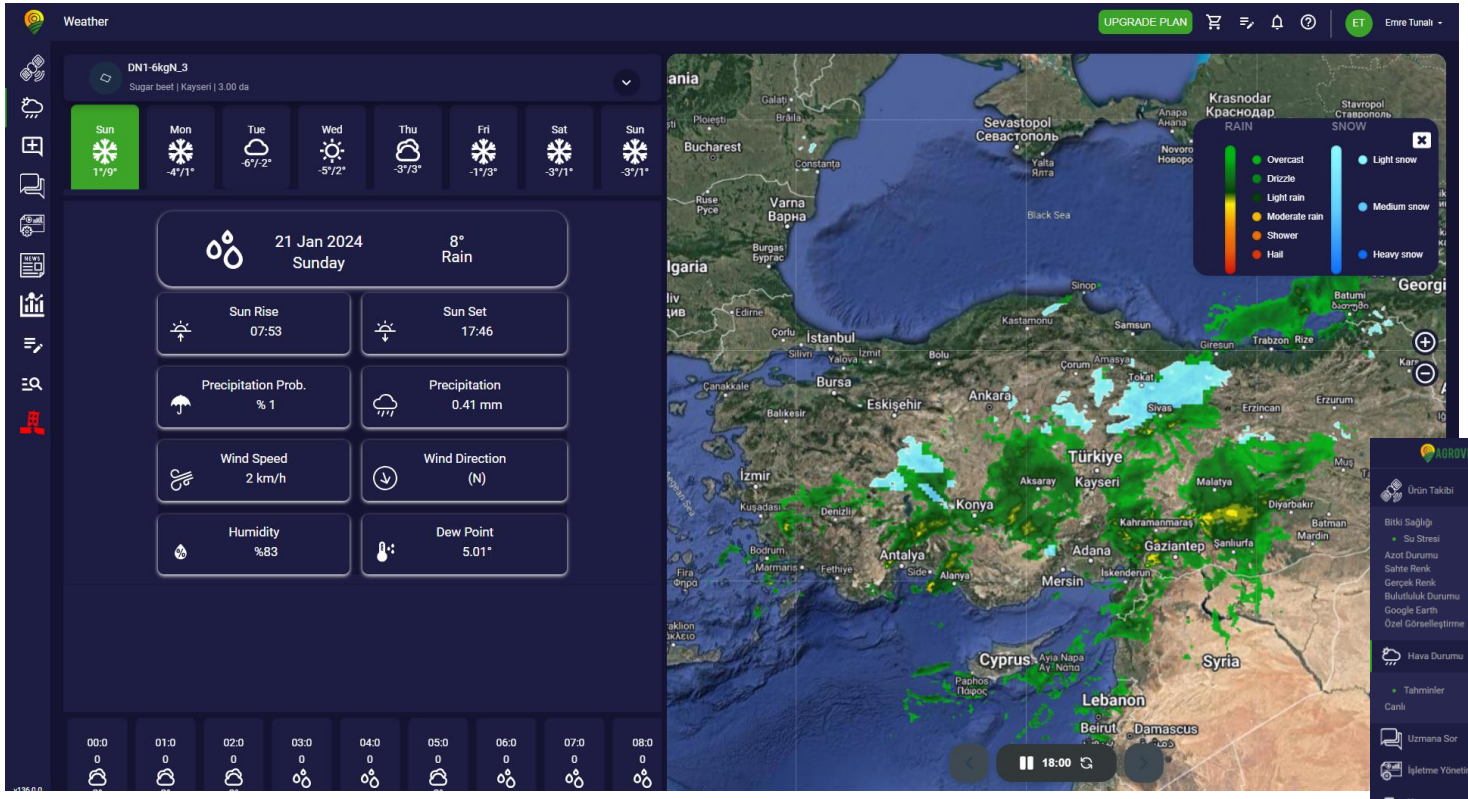
Field Experiments - VI

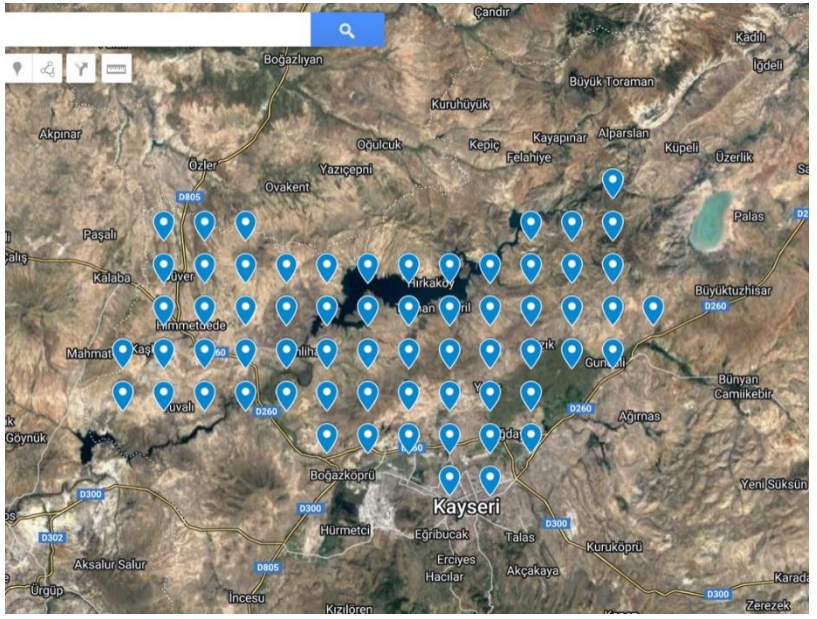
Web and Mobile Platform - I

Web and Mobile Platform - II



Web and Mobile Platform - III





Dissemination of Knowledge - I

Dissemination of Knowledge - II

Next steps

1. Comparing effects of drip and sprinkler irrigation methods on accumulation of harmful N level
2. Estimate the amount of Alpha Amino Nitrogenous per field
3. Estimate amount of extracted Sugar per unit mass of the plant
4. Software implementation of the production estimation models
5. Sharing the process, progress and results of the project with public and interested sectors

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