Posukha –
drought forecasting web service

Herman Mossur
Frontend Developer

Nataliia Nikitenko
UI/UX Designer, Researcher

Texas A&M AgriLife Research

Ukrainian Hydrometeorological Institute

Laboratory of the River Systems Modeling

Drought problem in Ukraine

Annual crop losses due to drought

Crop losses due to adverse weather conditions in Ukraine can range from 10% to 50%, with droughts being the primary cause of these losses.

CROP YIELD LOSSES UP TO

~50%

Kakhovka Dam destruction

The destruction of the Kakhovka dam left the South of Ukraine without a source of water supply: 94% of irrigation systems in Kherson, 74% - in Zaporizhzhya and 30% - in Dnipropetrovsk regions

LOSS OF IRRIGATION SYSTEMS IN KHERSON

94%

Soil moisture deficit

More than 30% of the areas of the best agricultural lands are consistently experiencing a significant moisture deficit

AREA OF SOIL WATER DEFICIT, % OF AG LANDS

30%+

Types of drought: Meteorological and Agricultural

METEOROLOGICAL DROUGHTS

Meteorological drought occurs due to a lack of precipitation combined with high temperatures and low humidity, which lead to the suppression or death of plants.

AGRICULTURAL DROUGHTS

Agricultural drought arises as a result of prolonged atmospheric drought, where intensified evaporation quickly depletes soil moisture reserves, making them insufficient for the normal growth and development of plants.

Data for drought forecast

ERA5-Land

1950 - present-5days

IBM EIS

Past 30 days Daily Summaries

IBM EIS

15-Day Daily Forecast

SWAT outputs

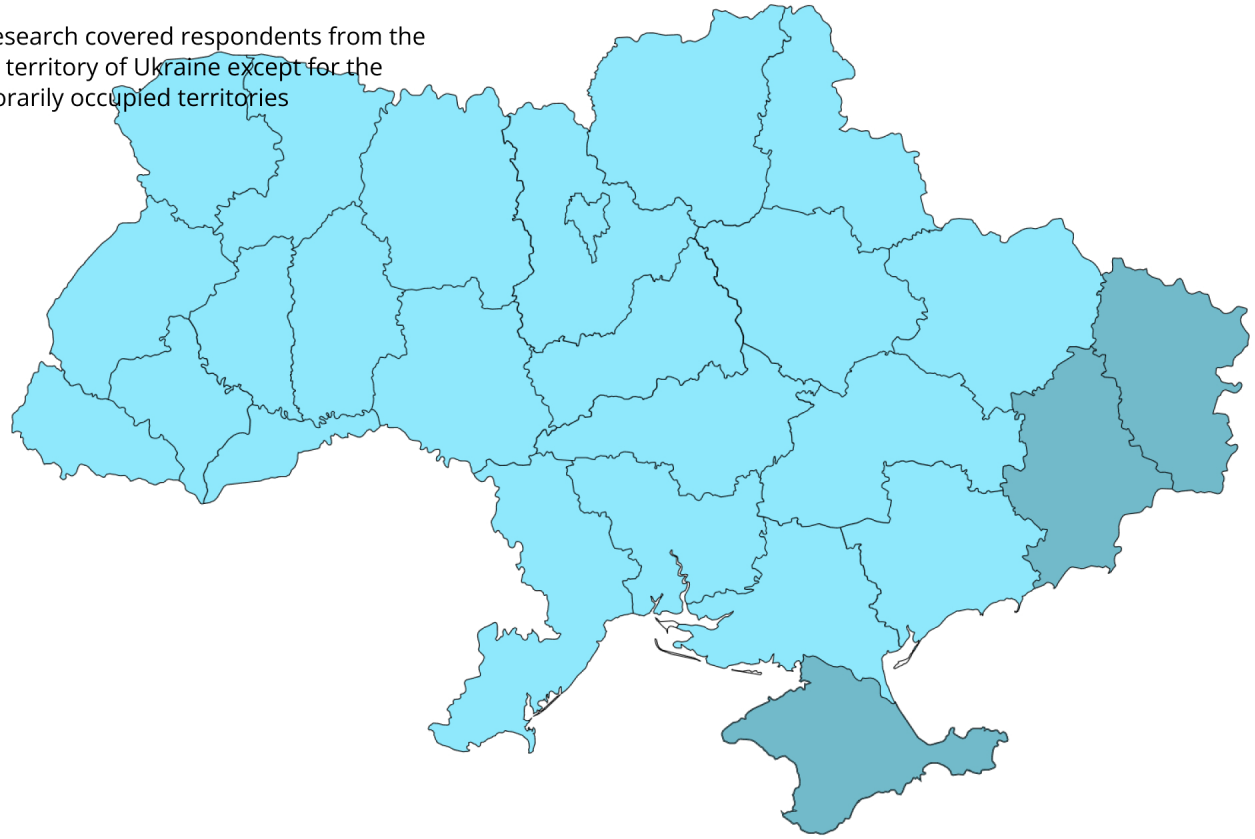
Soil water

METEOROLOGICAL DROUGHT

AGRICULTURAL DROUGHT

Survey conclusions. Coverage of the researh

The research covered respondents from the entire territory of Ukraine except for the temporarily occupied territories



41%

SMALL FARMS UP TO 50 HECTARES OF LAND

17%

AVERAGE FARMS FROM 50 TO 200 HECTARES OF LAND

42%

LARGE FARMS MORE THAN 200 HECTARES OF LAND

Survey conclusions in numbers

105

RESPONSES RECEIVED IN THE SURVEY

57%

IDENTIFIED RAINFALL AS THE PRIMARY SOURCE OF IRRIGATION

37%

RESPONDENTS WOULD CHANGE THEIR PLANTING DECISIONS IF THEY HAD A DROUGHT FORECAST.

37%

WOULDN'T ALTER PLANTING DECISIONS BUT WOULD MITIGATE NEGATIVE IMPACTS.

How farmers envision drought prediction

Every leap year - rains

In recent years, groundwater levels have been abnormal; maybe something was blocked.

I don't believe any forecasts; they never come true.

If the previous year was normal, then the next one will be a drought.

It would be good if you said the forecast of what to sow

Droughts are just the absence of precipitation.

When it comes to perennial plants, knowledge about droughts doesn't change anything.

Drought occurs every 5-10 years; I just count.

Human activity has greatly changed the climate, and we can no longer do anything about it.

What farmers actually need from drought prediction

Like all of us, we depend on electricity. If there is no light, watering is difficult to organize. Therefore, a forecast would help us

We do a lot based on our observations and feelings. The supply of productive moisture in our region is small, so we often make decisions at our own peril and risk

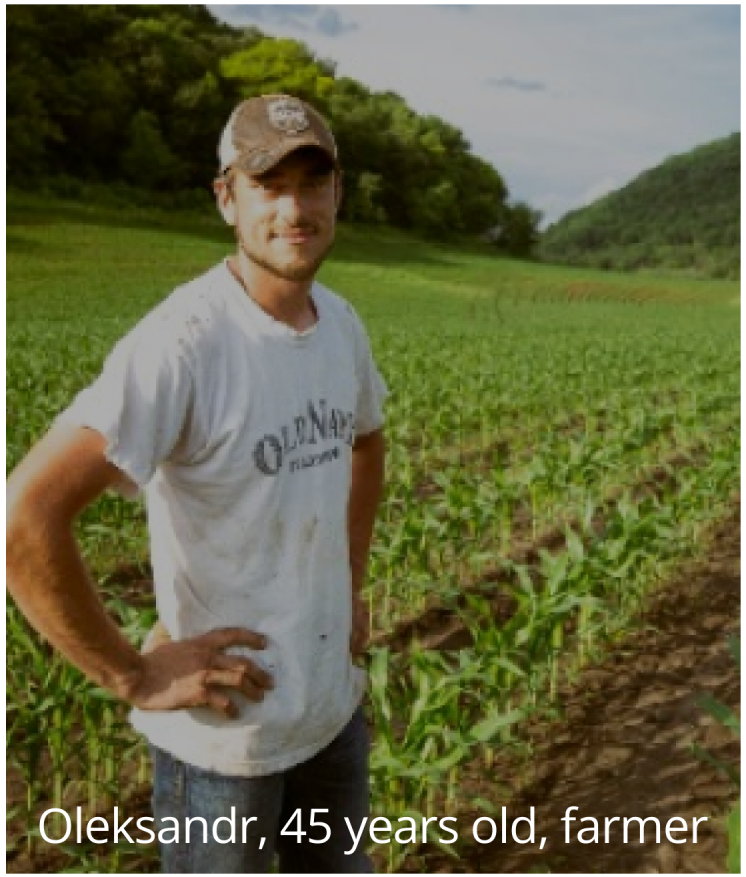
Human activity has greatly affected the climate and us. You have to constantly adjust. You will help a lot if you provide a supply of productive moisture, moisten the soil and air

Now I'm looking at weather sites, watching the direction of the cyclone. That's why I decided to change the sowing rate. It would be good to take the moisture in the soil into account

You are doing a great job, good luck

We have methodologies for actions in case of drought (seeding density, crop selection, special additives, and technologies for the soil).

User persona



Bio

Education: agricultural college;
Region: Mykolayiv region (south of Ukraine);
Area: 300 hectares;
Grows: grain and industrial crops;
Irrigation source: rainfall;
Openness to technology: slow, not strong trust

Challenges

- Correct conclusions require more than just knowing the numbers.
- Fear of overcaution, infrequent sowing, and inaccurate forecasts.
- Influences of wind, temperature, and so on.

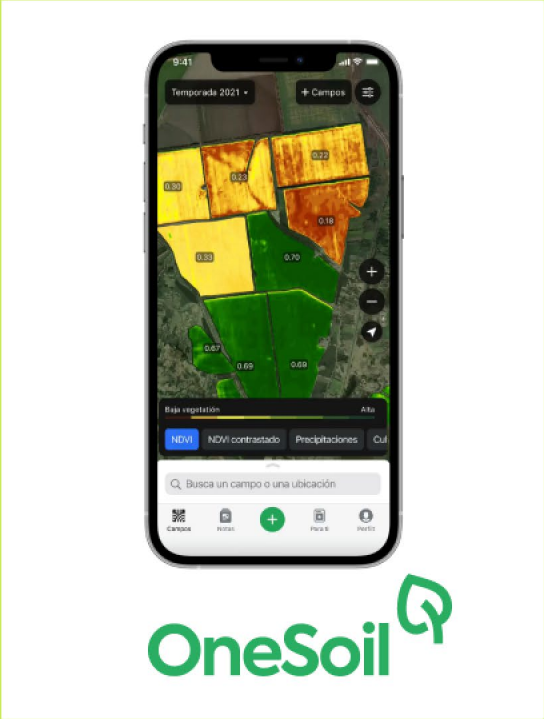
Issues

- Unpedictable grandwater changes
- Long-term forecasts are inaccurate
- We must consider agricultural capabilities and market demands.

Desires

- Three-month minimum forecast
- Understanding the forecast assessment
- User-friendly website with default settings

User experience

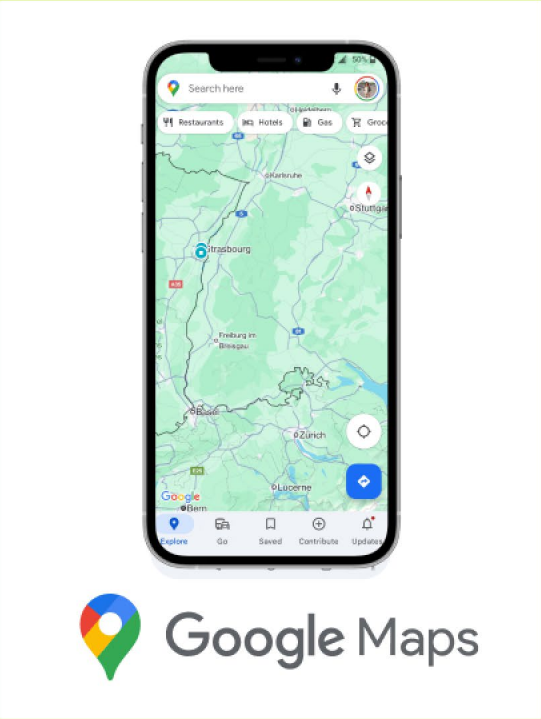


ONESOIL

Most farmers have identified this application as the most relevant in their work.

CROP-MONITORING

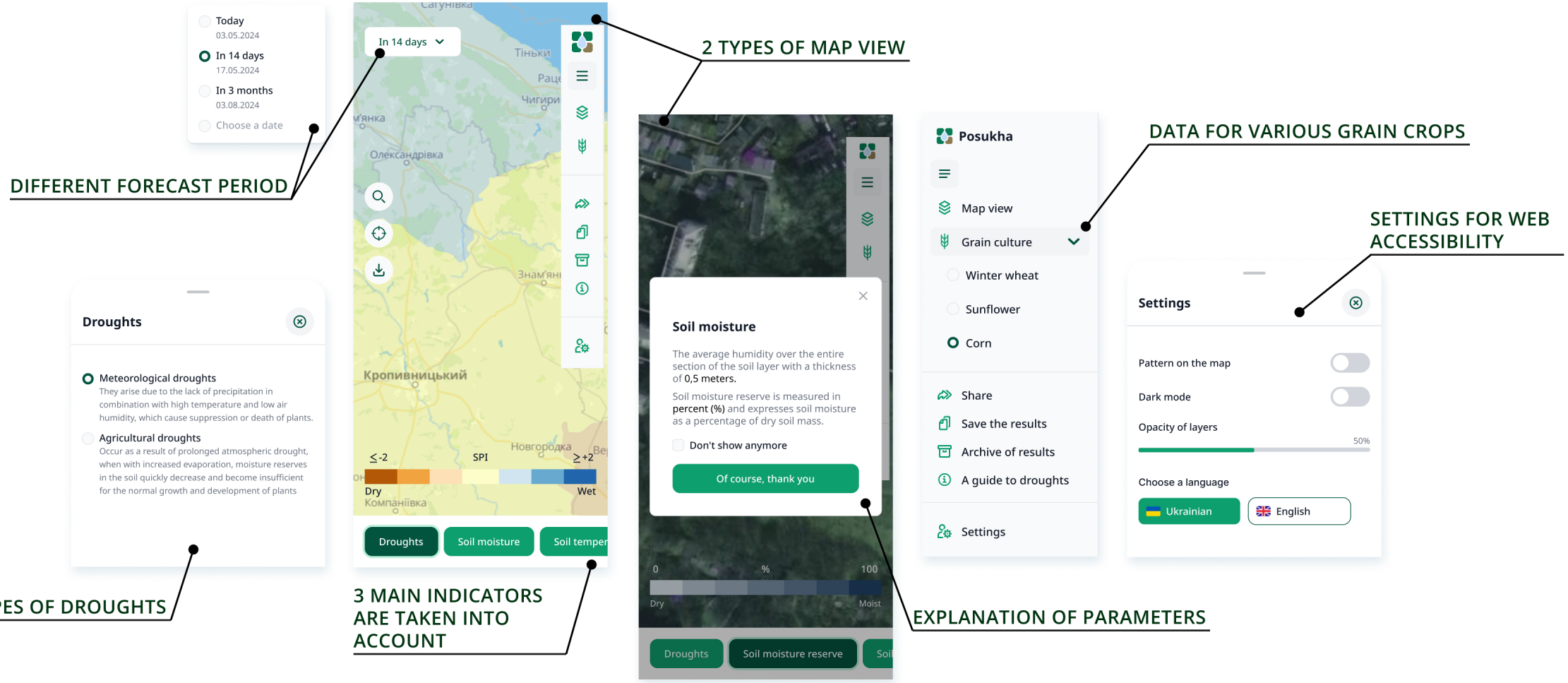
His website is popular and familiar to most farmers.



GOOGLE.COM.UA/MAPS

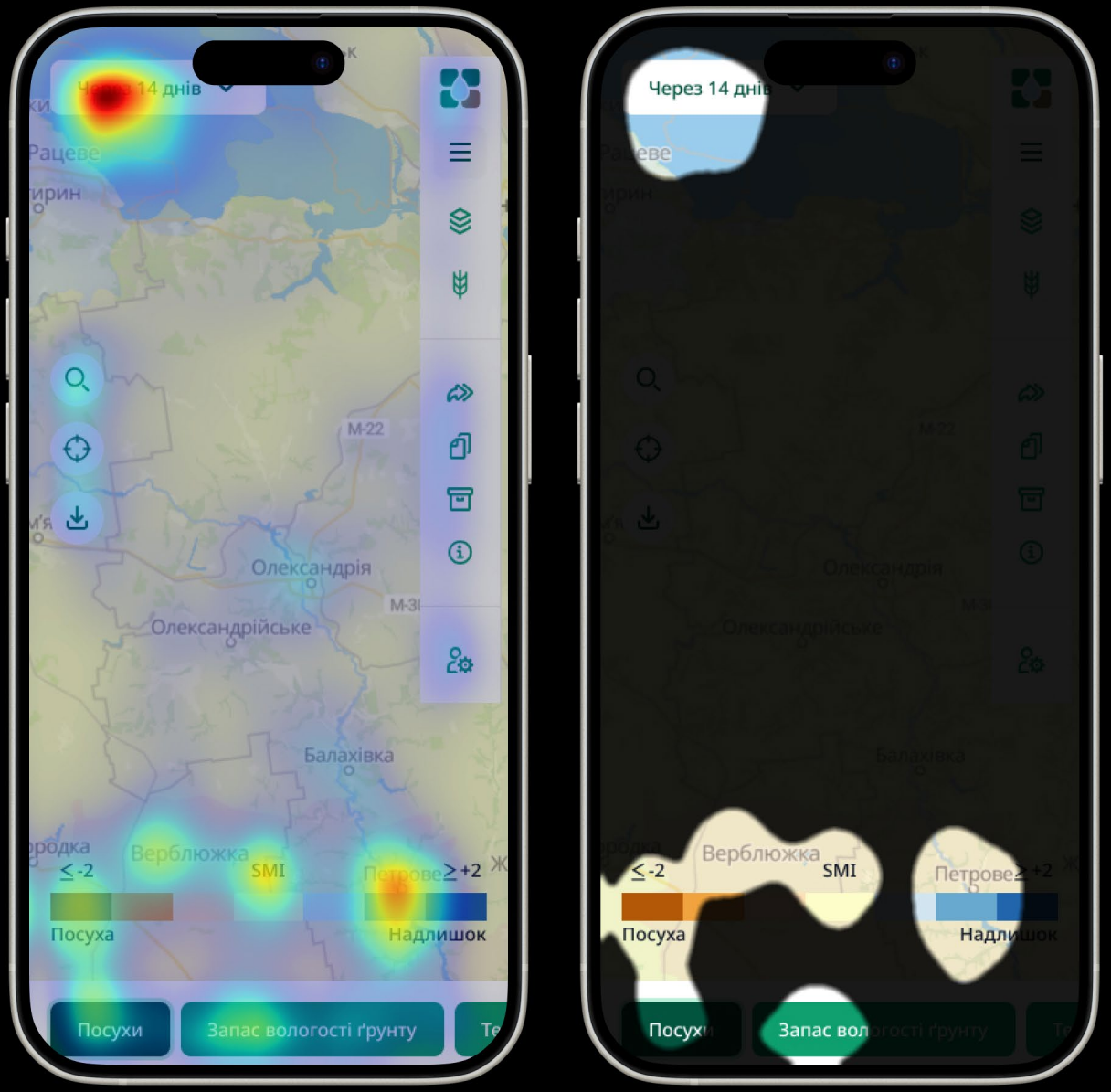
Nearly 100% indicated Google as the sole or one of several.

Main screens of the “Posukha”



Analysis and testing. Next steps

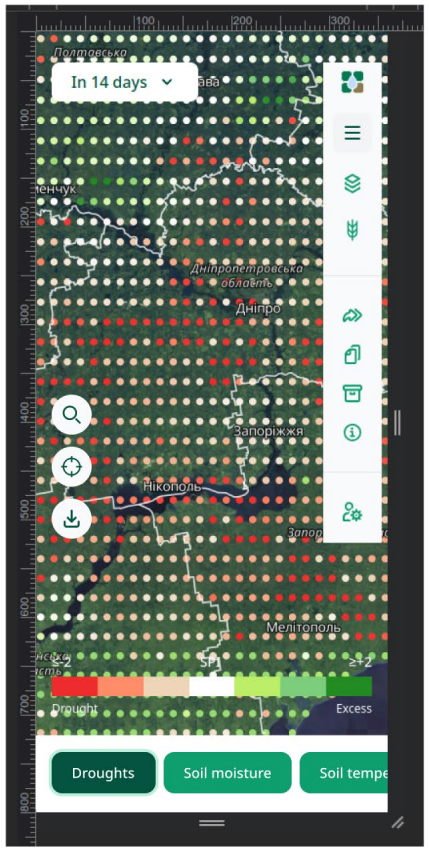
75.5% of respondents agreed to undergo testing. Respondents will address the tasks assigned to them and provide feedback on usability and the benefits of the platform.



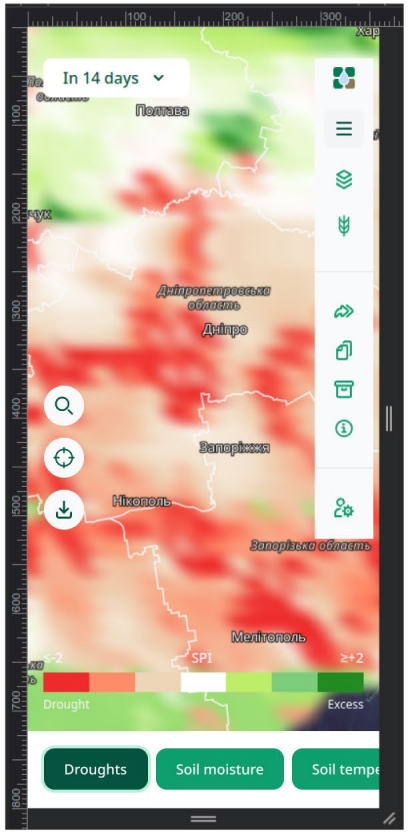
An Idea and a Map

An Idea and a Map

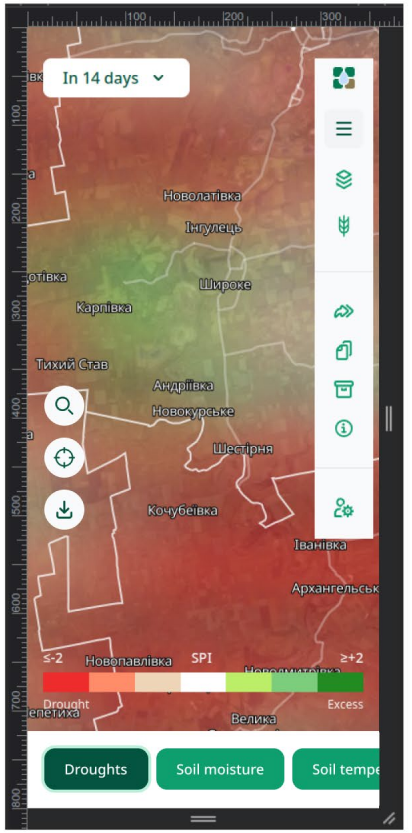
1. adjust size of circles;
2. add blur for better overlay;
3. add opacity to be able to find needed field.



Ex. 1



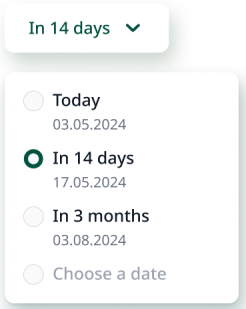
Ex. 2



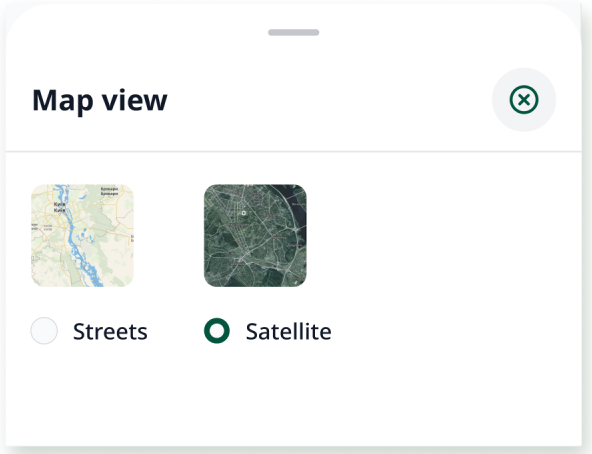
Ex. 3

Parameters control

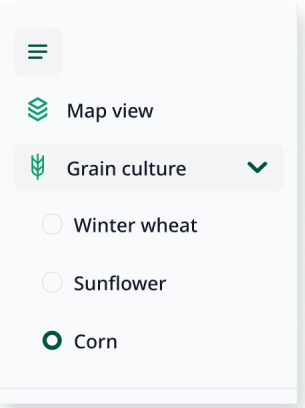
1. a time of the future forecast;
2. a map type;
3. a crop that grows and consumes different (from other crops) amount of water;



Par. 1



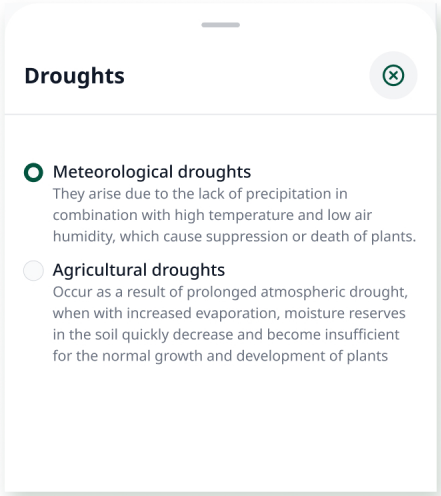
Par. 2



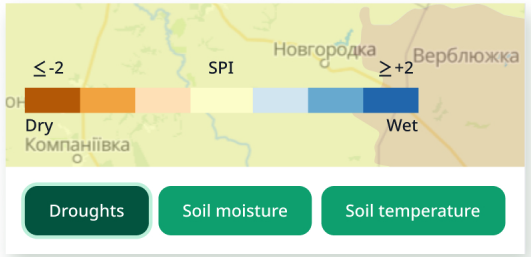
Par. 3

Parameters control

4. another type of drought (meteorological or agricultural);
5. not only drought index, but also soil's moisture or soil's temperature.

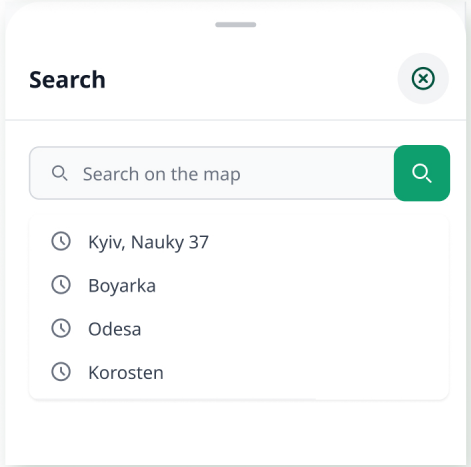


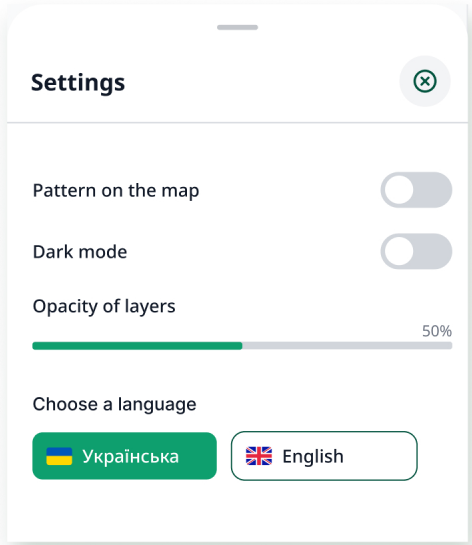
Par. 4

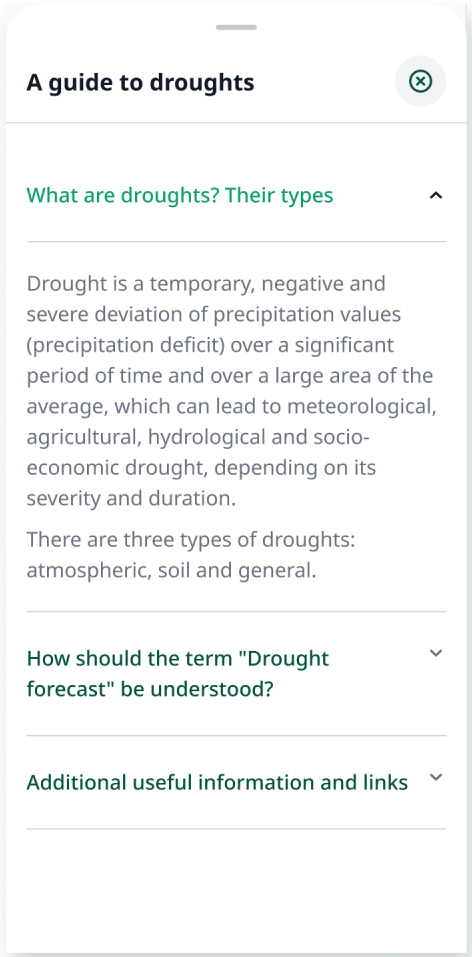


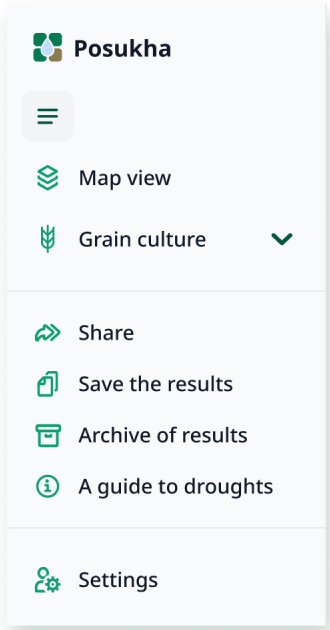
Par. 5

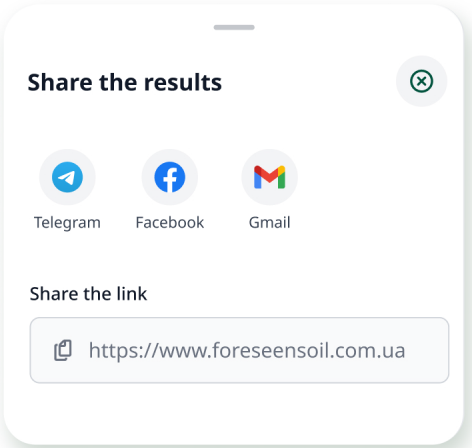
Settings and helpers











Technologies

VUE

SASS

PINIA

TYPESRIPT

MAPTILER

Conclusions:

1. Droughts is coming

The first platform in Ukraine about the drought .

2. Know your user

The first step to help a user is to understand a real user. Different people have different contacting points.

Stick to your researches and collect feedback. You serve the farmers. "Keep it stupid simple".

3. With SWAT & IBM data, drought forecasting is possible

The automation of data collection and model runs enables drought prediction.

4. Balance the technologies

Use newer technologies with large community support. Take your time to master your instuments and set realistic mandatory goals. Try to learn new ways (methodologies) to give your results as a developer and to receive them as a customer.

We aim to make our land and water tools not only useful, but also more accessible.

Our team

Valeriy Osypov[1], Herman Mossur[1], Yurii Ahafonov[1], Vira Balabukh[1], Nataliia Nikitenko[1], Nataliia Osadcha[1], Andrii Bonchkovskyi[1], Viktor Nikoriak[1], Yevhenii Matviienko[1,2], Arun Bawa[3], Raghavan Srinivasan[3], Fearghal O'Donncha[4], Michael Jacobs[4]

1. UKRAINIAN HYDROMETEOROLOGICAL INSTITUTE
2. TARAS SHEVCHENKO NATIONAL UNIVERSITY OF KYIV
3. TEXAS A&M AGRILIFE RESEARCH
4. IBM RESEARCH

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