



# Crop Care

For NASA Space App Challenge

#earth, #cropalert, #easy

# Crop Care



IS

an early alert, collaboration system and knowledge base for crop growers

TO HELP

farmers prevent possible pest and disease threat via collaboration and awareness

BENEFIT

minimization of crop loss risks, sustainable plant protection product allocation, experience exchange with other growers

FEATURES

Threat risk zone and severity visualization.  
Crowd-sourced information on threats.  
Knowledge base

# The concept

**Crop Care** is an Android based application, created to meet the challenge of providing an accessible and reliable service to minimize the risk of crop loss from pests and diseases to crop growers and farmers.

The application structure comprises of 3 main modules:

1. **Forecast and Alerts.** This module provides a map overview of local area with a visualized forecast of possible threat zones and a list of the possible threats. The forecast is initially based on open-source historical data about past threats for the region, but every submission of feedback from our users corrects the forecast.
2. **Survey and Feedback.** Facilitates feedback from our users by regularly asking them to reply to a simple question and provide quick data on their problem. By providing the feedback user will verify the precision of our forecast and will provide us with crowd-source data to build more accurate forecasts and timely alerts.
3. **Knowledge base.** A searchable and editable database, which provides user with information on all kinds of pests and disease, and ways to protect their crops from them. Initially will contain open-source information. It will be used by our users to quickly identify the threat and receive recommendations on dealing with it. Users will be able to comment and create new entries to the database to share and exchange their experience.

# General use case

1. User launches the app. He sees a forecast with visualised map of pest/disease probability in his region and a list of possible pest/disease problem forecasted
2. The user is presented with one question to answer: Are your crops healthy? And he can reply with two large buttons (I'm Good or Need Help).
3. If user taps “I'm Good”, we display a message that it is great and obtain information about absence of problems in the area of the user. This information is used for the forecast correction
4. If user taps “Need Help”, than we present him with a list of forecasted problems and offer to choose one of them. Alternatively he has an option to choose “Other” and enter his own pest/disease.
5. After choosing the pest/disease, we present the user with a short form with several (problem specific) parameters to fill in (photo upload, date when first noticed, area affected, pesticide used on crop, etc.). He submits the data and it can be used for our forecast correction.
6. Meanwhile the user is presented with a pest/disease info card from our Knowledge base, with data about the disease and recommendation on how to deal with it.

# The user story

Eric is a farmer, who grows triticale on 30 ha of land. He uses **Crop Care** daily to be aware if his field are in a risk zone in the forecast, to check what threats are probable for his region and what is the probability of their occurrence.

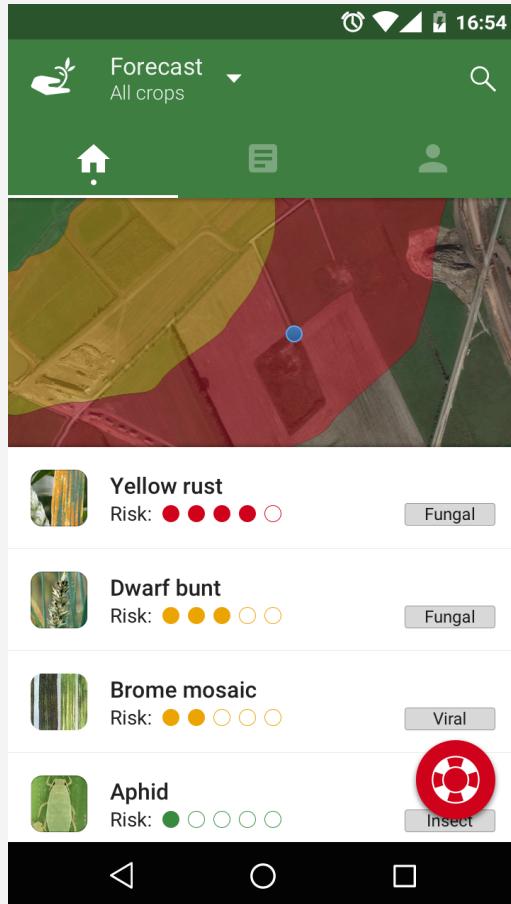
Normally, Eric views the situation on the map in his locale region and neighbouring regions to make sure he is aware of the surrounding forecast.

Bred is also a farmer from region to the East from Eric and he is cultivating the same kind of crops. He uses Crop Care as well.

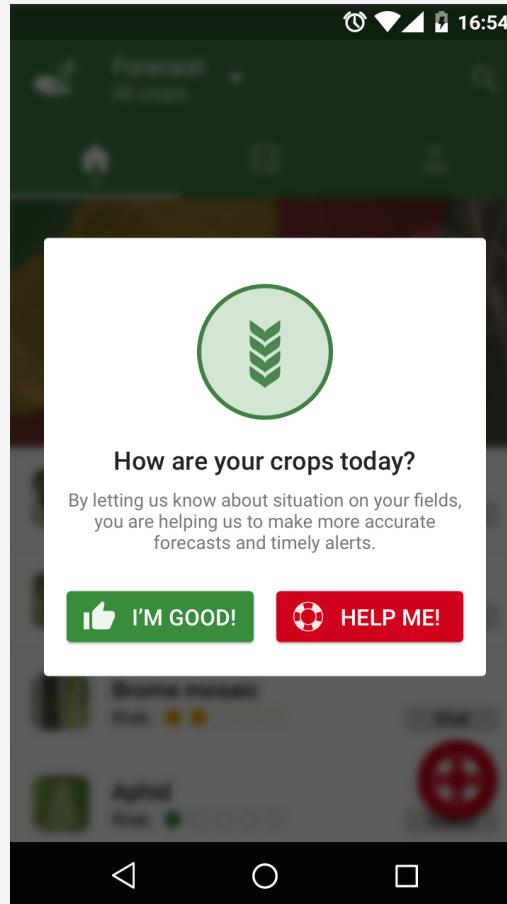
One time Bred saw a high level probability about yellow rush threat in his region. He went to the field and approved this prediction, by submitting the information with Crop Care. Based on this input Crop Care sent a push notification alert to Eric about high risk of Yellow rush contamination. Eric followed the crop protection instruction for this disease and was able to prevent any losses to his crop.

*We worked together with real growers on this application, inviting them to our brainstorm session and verifying our ideas with them.*

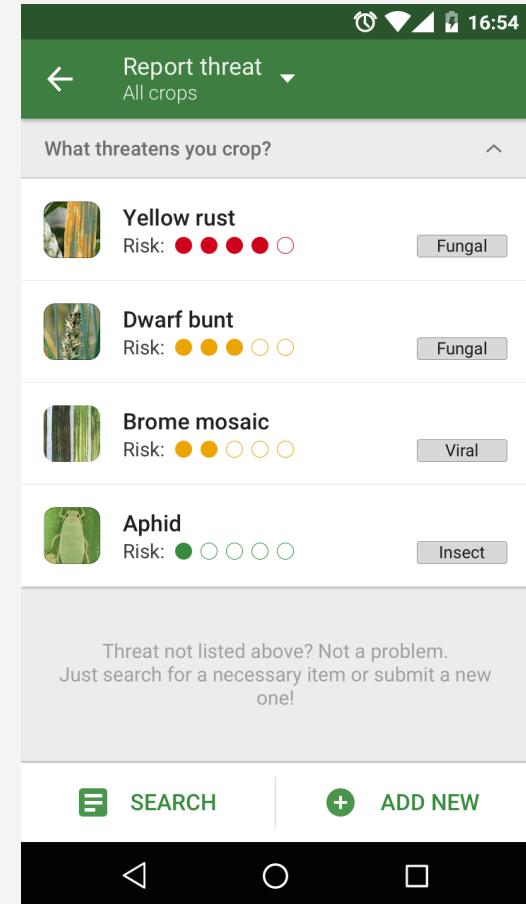
# Crop Care usual workflow



1. Risk zone and severity visualization + list of threats

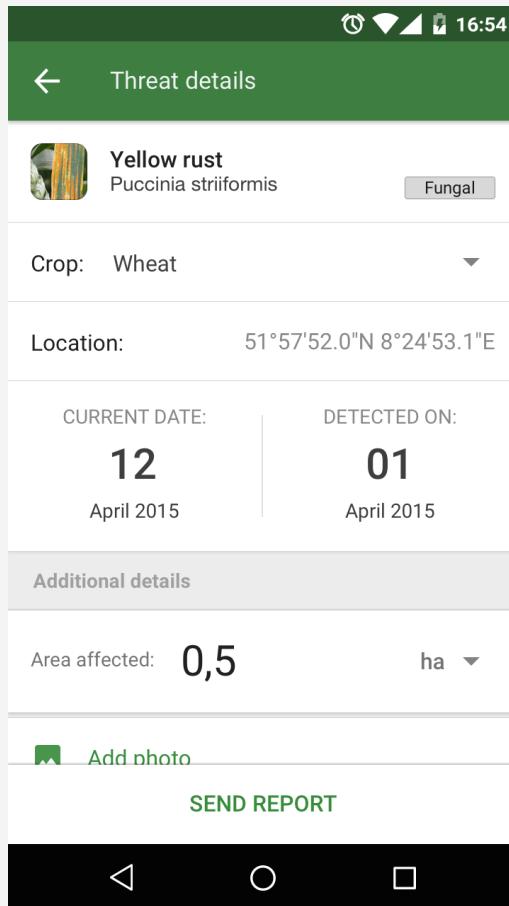


2. Regular request for feedback on the crop status

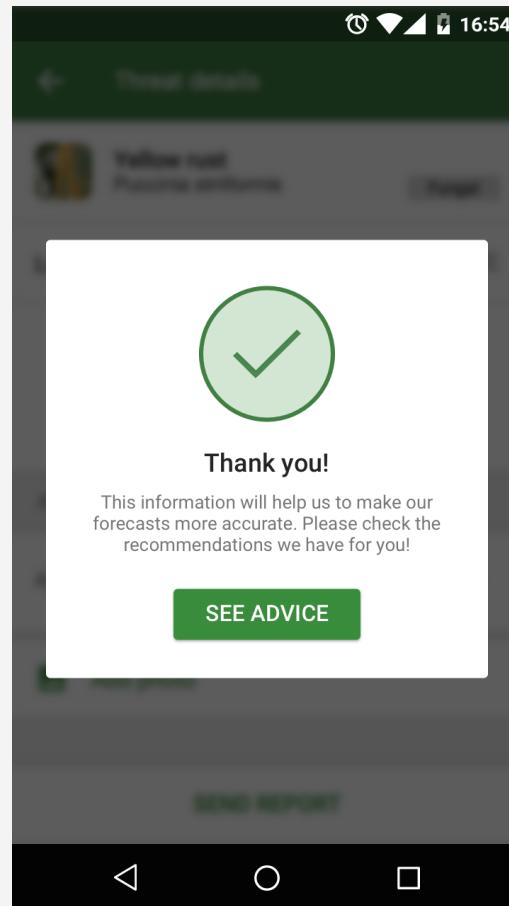


3. Choosing a threat to report on

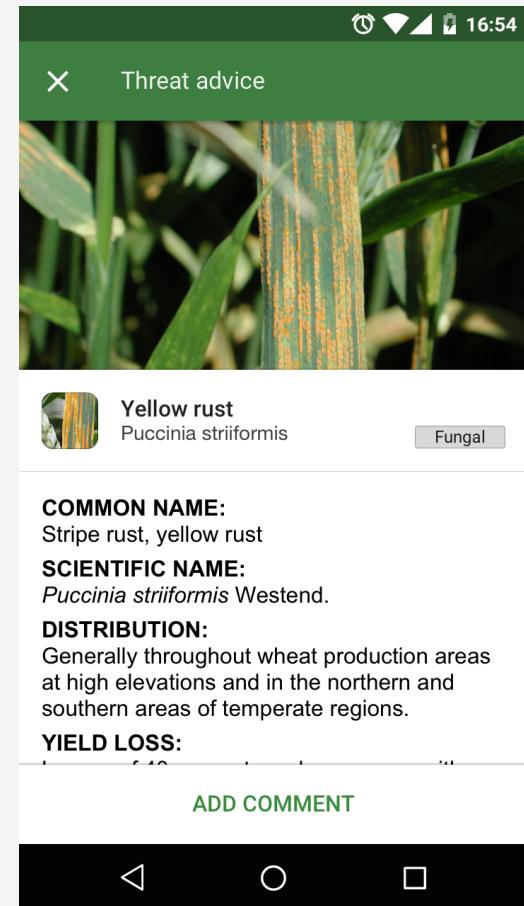
# Crop Care usual workflow



4. Entering details of the problem detected and submitting report



5. Encouraging feedback and offering to view the advice on the problem



6. Knowledge base entry with comprehensive information on the disease and methods of protection

# Our plans

What we have done:

- ✓ Validated our concept
- ✓ Developed design
- ✓ Developed cloud service MVP
- ✓ Developed android application MVP

Next steps:

- ✓ Implementation of API for integration with different sources of diseases and pest data
- ✓ Implementation of prediction models to improve forecasts

# Data structure

## Diseases:

- DateTime
- Disease type
- Disease Name
- Disease Rate:(1-5;1=healthy):
- Location
- Full image

## Prediction:

- DateTime
- Diseases
- Crop
- Location
- Prediction Disease Rate:(1-5;1=healthy):
- Prediction source (historic,alert,statistic,trend)

## Crops:

- Crop Name
- Crop Type

## Crop Diseases:

- Crop
- Diseases

## Farmer:

- Crop
- Location
- email

# Data sources

## Glossaries:

- <http://www.ipm.ucdavis.edu/MODELS/>
- <http://www.hannafords.com/disease.php?id=19>
- <http://wheat.pw.usda.gov/ggpages/wheatpests.html>
- Data model <http://www.cdpr.ca.gov/docs/pestmgt/ipminov/pestcast/dis-mod.htm>
- [Field Crop Diseases](http://cropdisease.cropsci.illinois.edu/links.html) <http://cropdisease.cropsci.illinois.edu/links.html>
- <http://www.aces.edu/pubs/docs/A/ANR-0903/>

## Historical data of diseases/pests:

???

## Prediction methods:

- <http://cdn.intechopen.com/pdfs-wm/37530.pdf>

## Additional sources:

- Images of diseases:<https://ag.purdue.edu/btny/Extension/CropDiseasePictures/Forms/AllItems.aspx>

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- <http://wheat.pw.usda.gov/ggpages/wheatpests.html>
- Data model <http://www.cdpr.ca.gov/docs/pestmgt/ipminov/pestcast/dis-mod.htm>
- [Field Crop Diseases](#) <http://cropyield.diseasedata.cropsci.illinois.edu/links.html>
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# Our team

eFarmer started out as an R&D team in a technology holding company KM Core. In September 2014 we joined the ranks of the European Space Agency business incubation centre. Now eFarmer B.V. is a registered company with its business address in Noordwijk, the Netherlands





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