



Getting started  
with  
the Rust survey App



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## Objective

An early warning campaign will be carried out 1-15 March, 2020 - using the Rust survey crowdsource App

- **Target:** To establish the status of mainly yellow rust in common wheat, durum wheat and triticale in the beginning of March in Europe. It is important also to upload "no disease" as the objective of the campaign is to monitor the status of the wheat rusts and which cultivars are affected and which are not.
- **Where:** In six case study regions, Navarra Spain, Sicily Italy, Switzerland, Cambridge region UK, Denmark and Brandenburg Germany
- **What we ask for:** Cultivar name, Growth stage wheat rust incidence, and one or more photos
- **What is given automatically:** Date, latitude and longitude, country etc. is provided automatically using the App.
- **Who to contact re local organising:** [Contacts in the six case study regions](#)
- **Where are the results:** Results and photos will be publicly available on the Wheat rust dashboard
- **When:** From 1 to 15 March, 2020
- **Will samples be taken for genotype and race analysis:** A group of experts will analyse disease data coming in, and via the regional coordinator, isolates will be sampled in selected fields or trials and sent for genotype analysis in one of the RustWatch labs.

Results will be communicated to the European farming community as soon as possible. Our goal is to have genotype results ready before the end of April. These results will be a part of an early warning message on the RustWatch website and Twitter. The same alert will be issued via regional [Agricultural Knowledge and Innovation Systems](#) web sites in local language.

It is important also to upload "no disease" as the objective of the campaign is to monitor status of the wheat rusts and which cultivars are affected or not. Based on the experiences from this early campaign and feedback from stakeholder groups, we will decide if another campaign will be launched later in the season.

## How to use

Decide on a campaign where you visit preselected fields, because we also would like to include fields/cultivars with no disease. Include farmers, extension officers, VCU partners, Breeders, AgChem partners or any stakeholder interested to contribute to this campaign. The idea is that all stakeholders should contribute – “all contribute with a small share, but we all gain a lot”. It is relevant for the farmers to know if rust is found in fields in the region “with the same cultivar as is in my own field”. Now the farmers can also see what cultivars the other farmers in the region grow. The breeders should be interested to follow the cultivars still effective and some being under pressure from new races in the region. The advisors will gain a better foundation for optimal recommendation on type and timing of optimal prevention and control measures etc.

## Open the App

Send the link to the stakeholders to be involved

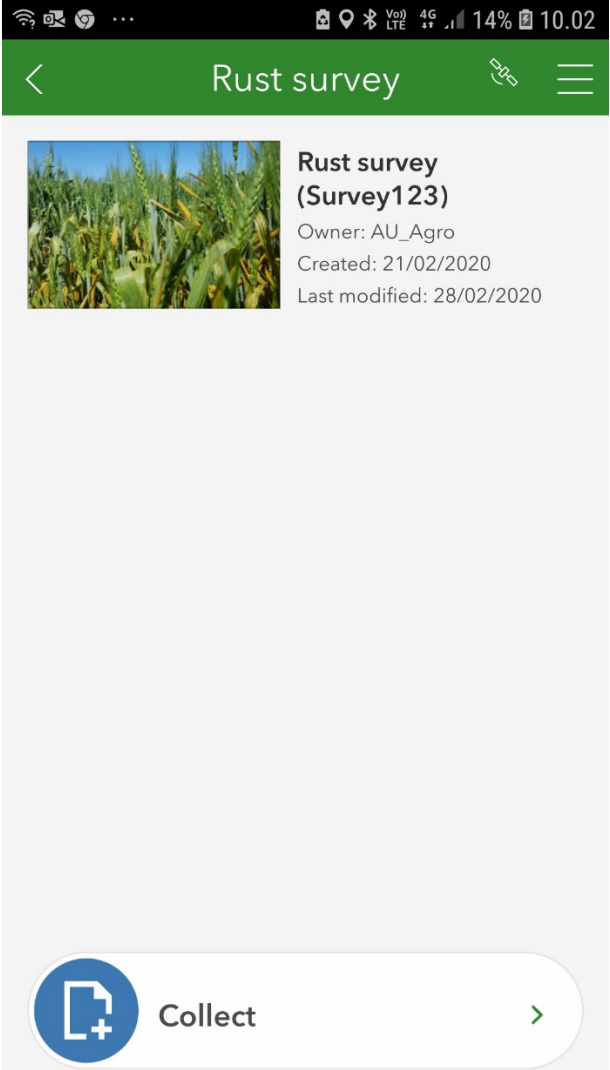
<https://survey123.arcgis.com/share/3ad3d31e0ef646a9930ce80abd909c0b?portalUrl=http://gis-au.maps.arcgis.com>

or include the link to the page in RustWatch holding the link to the App:

<https://agro.au.dk/forskning/projekter/rustwatch/wheat-rust-early-warning/>

The App can run on any mobile phone, Tablets and computers using this link

## Enter your observation on a smartphone

Samsung Smartphone	Explanation
	<p>Select the button Collect</p>

✕ Rust survey

▶ Info and help

Date

Friday, 28 February 2020

Crop Type \*

Common wheat

Growth stage

Boot

Cultivar name \*

Benchmark

▼ Yellow rust

Severity YR [%]

0.5

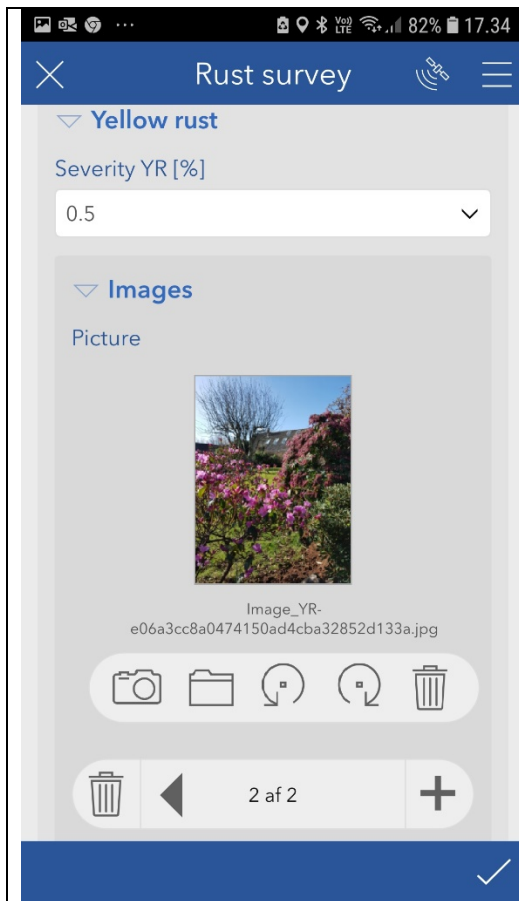
Images

The current date is given. Press the calendar button to change the date

Select the crop type via the drop down menu

Select the growth stage via the drop down menu

Write the cultivar name



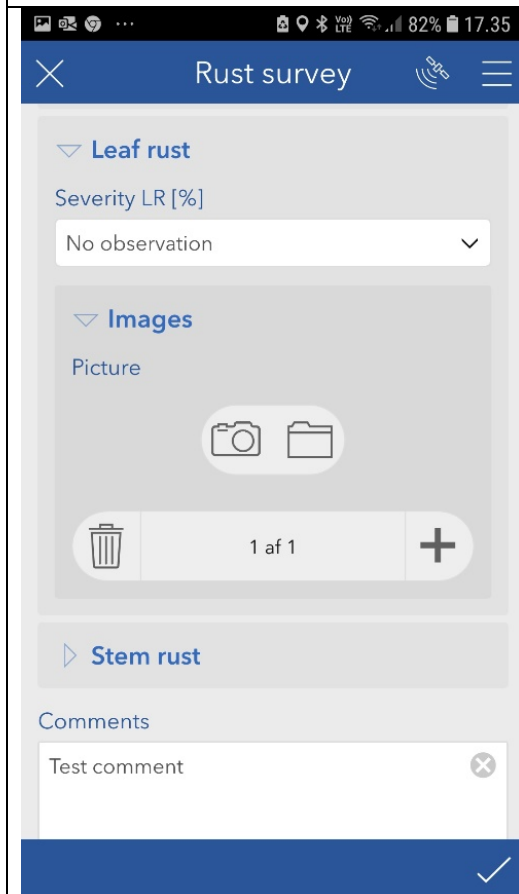
Open the yellow rust menu and enter the severity level from drop down menu

Take a photo (one close-up of symptoms and maybe one of the general surroundings) or insert a photo already stored on the phone or computer

You can delete a photo

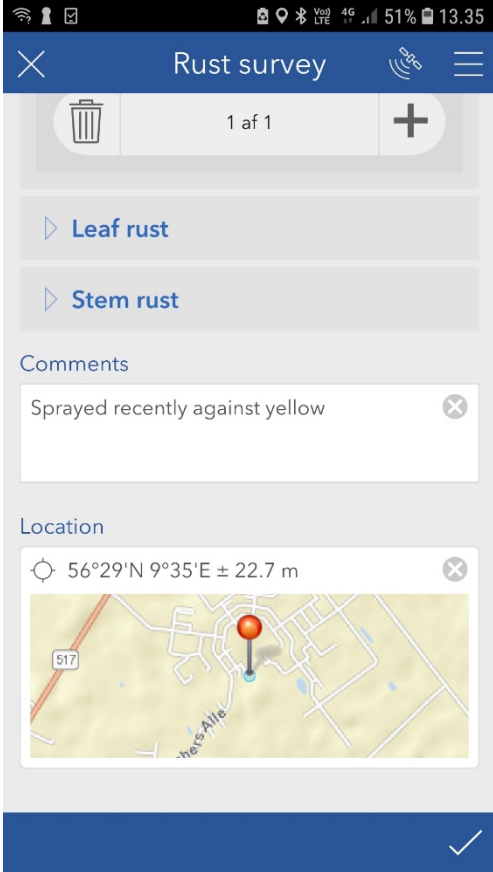
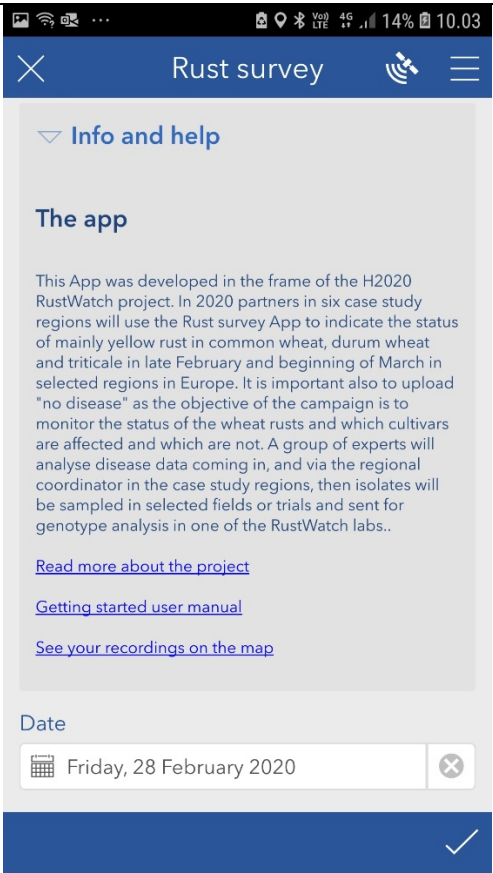
You can add one more photo by selecting the plus (+) button

You can scroll between photos using the arrow button



You can do similar for leaf rust and stem rust whenever relevant

## Wheat Rust Surveillance

	<p>Write a comment</p> <p>Click on the compass to get the current position or click on the map to capture another position</p> <p>Submit the recording via the blue bar at the bottom</p>
	<p>Select Info and help at the top</p> <p>Link to the RustWatch project</p> <p>Link to Getting started manual</p> <p>Link to map with all recordings</p>

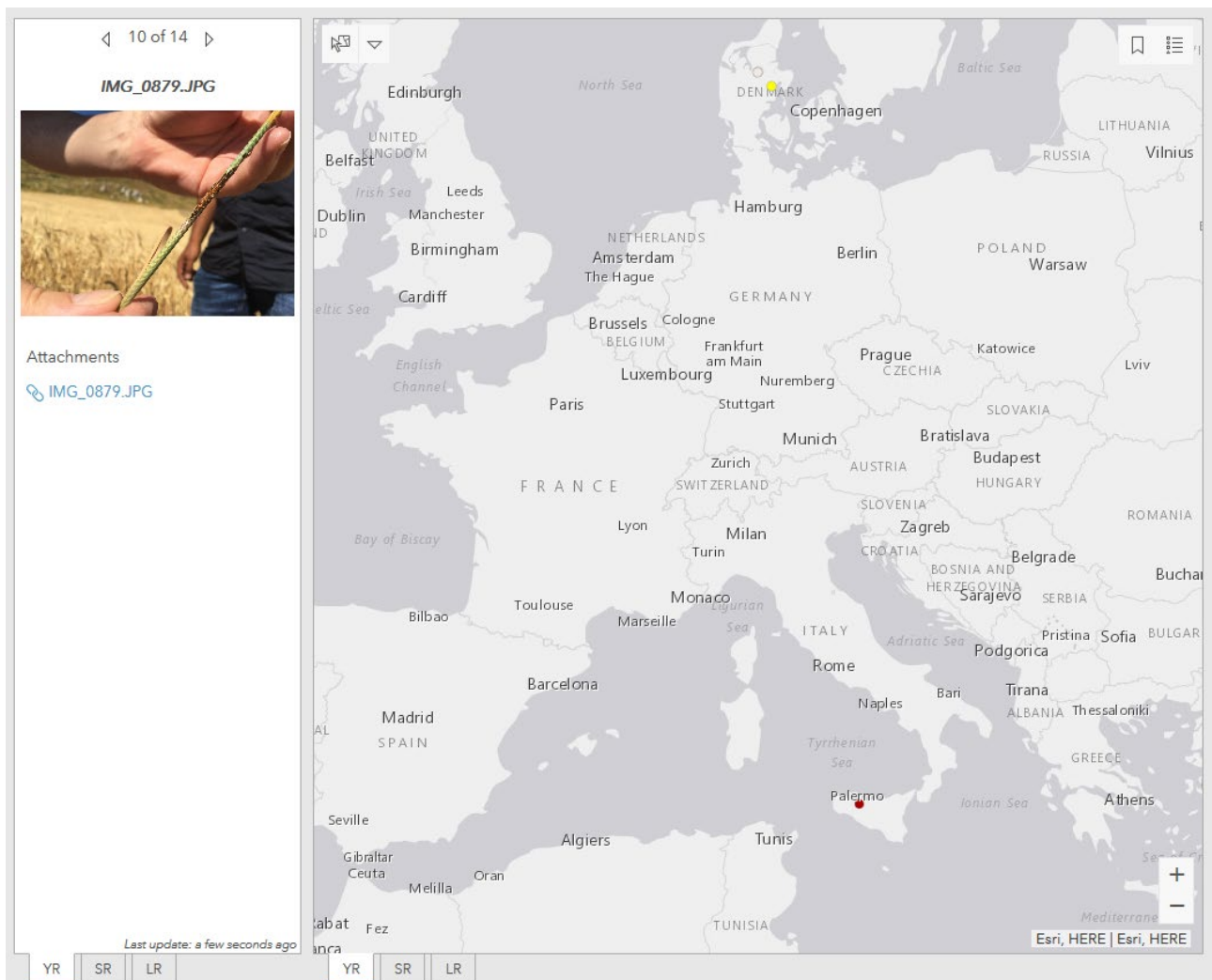
## Enter your observations via a computer

<div><div>Rust survey</div><div><div>Info and help</div><div><div>Date</div><div><div>2/28/20</div></div></div><div><div>Crop Type*</div><div>Common wheat</div></div><div><div>Growth stage</div><div>Tillering</div></div><div><div>Cultivar name*</div><div>BenchMark</div></div><div><div>Yellow rust</div><div><div>Severity YR [%]</div><div>1</div></div><div><div>Images</div><div><div>Picture</div><div><div>IMG_0877.JPG</div><div>3.0MB</div></div></div></div><div><div>Leaf rust</div></div><div><div>Stem rust</div></div><div><div>Comments</div><div></div></div><div><div>Location</div><div><div>Find address or place</div><div><div>Lat: 56.48796 Lon: 9.58315</div></div></div></div><div>Submit</div></div></div><td><div>Help with links to website, documentation and map with all recordings</div><div>Date</div><div>Crop type</div><div>Growth stage</div><div>Cultivar name</div><div>Yellow rust (collapse open)</div><div>Enter severity</div><div>Take or upload a photo</div><div>Leaf rust (collapse closed)</div><div>Stem rust (collapse closed)</div><div>Comment</div><div>GPS position</div><div>lead to map enlarged</div><div>Capture GPS for current position</div><div>Submit</div></td></div>	<div>Help with links to website, documentation and map with all recordings</div> <div>Date</div> <div>Crop type</div> <div>Growth stage</div> <div>Cultivar name</div> <div>Yellow rust (collapse open)</div> <div>Enter severity</div> <div>Take or upload a photo</div> <div>Leaf rust (collapse closed)</div> <div>Stem rust (collapse closed)</div> <div>Comment</div> <div>GPS position</div> <div>lead to map enlarged</div> <div>Capture GPS for current position</div> <div>Submit</div>
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### The Dashboard

The Dashboard is under construction and currently (28 February) the photos will not be available. We work on this, and we will announce you when this is improved on the “Read more about then project ” website.

On the map, the user can shift between YR, LR and SR via the three tabs at the bottom of the map. Similarly, if more photos were taken on more than one disease in the same field, then the user can shift between photos of YR, SR and LR. A click on the photo will enlarge the photo.



### Data analysis and interpretation

When data are submitted they will initially be stored in the ESRI cloud server and be immediately available via the ArcGIS Dashboard. The immediate analysis will be to evaluate which cultivars in each region that are affected by rust and which that are not affected. One option is to visit the same fields in a second campaign later in April or May. The results will be used to feed into an early warning on rust diseases followed by a recommendation on IPM control actions.

## Use of disease scale

The disease scale used is the same used in all other tools in RustWatch i.e. Wheat rust surveillance, the Trap nursery mapping tool and the Field Nursery analysing tools.

In some countries the scoring early season until GS31 (stem elongation) use incidence (number of plants attacked). In the early campaign this would cover the disease severity scale from 0 to 1% as 50-100% plants attacked for yellow rust corresponds with 1% severity. For the early campaign the key focus is to discriminate between rust yes or no and link up with which cultivars that are affected and which are clean.

Take notice that if only a few plants per ha is affected with rust, this might be caused by impurities (unclean) of the seed (0,1, Trace) and then the color will still be green.

Disease severity [%]	Interval of severity	Breeder's scale	Color gradient	Symptoms on wheat, crop/plot level (indicative)			
				Leaf Rust	Yellow Rust	Powdery Mildew	Septoria/Tan spot
0	0	1		No attack	No attack	No attack	No attack
0,1 (trace)	$0 < x < 0,3$	2		Few postules per plant - may be uneven	Few stripes per plant - may be uneven (foci)	Few colonies per plant - may be uneven	Max one spot per plant
0,5	$0,3 \leq x < 0,75$	3		Few postules per tiller - may be uneven	Few stripes per tiller	Few colonies per tiller - may be uneven	Max one spot per tiller
1	$0,75 \leq x < 3$	4		Several postules per tiller on lower leaves	Several lesions/stripes per tiller on lower leaves	Several colonies per tiller on lower leaves	Few spots per plant on lower leaves
5	$3 \leq x < 7,5$	5		Lower leaves up to 10 - 25% coverage	Leaves with overlapping lesions	Lower leaves up to 10 - 25% coverage	Lower leaves up to 10-25% coverage
10	$7,5 \leq x < 17,5$	6		Lower leaves typically 25% coverage or more			
25	$17,5 \leq x < 37,5$	7		Lower leaves 50% coverage or more			
50	$37,5 \leq x < 75$	8		Half of leaves senescent, lower leaves 75-100% coverage			
$\geq 75$	$x \geq 75$	9		Almost no green leaf area left			

We decided to use only the severity scale, because this scale is also applicable for survey campaigns later in the season (>GS32). At this stage severity is scored on the upper 2-3 leaves.