



RUSTWATCH

WHEAT RUST EARLY WARNING

## Trap Nursery Data Management System (TNDMS)

26 February, Jens G.Hansen & Valerie Cadot

# WHEAT RUST TOOLBOX



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## TRIAL INPUT

### Observations








Year ☐ 2019 ☒ 2018

Trial






Replicates

Observation date

### DISEASE SEVERITY IN DIFFERENTIALS

Cultivar	Color	Disease	24. Jun, Rep. 1	Sample
Ambition		Yellow Rust	<input type="text" value="1%"/>	<input type="checkbox"/>
Spalding Prolific		Yellow Rust	<input type="text" value="0.5%"/>	<input type="checkbox"/>
Compair		Yellow Rust	<input type="text" value="0%"/>	<input type="checkbox"/>
Moro		Yellow Rust	<input type="text" value="0%"/>	<input type="checkbox"/>
Mariboss		Yellow Rust	<input type="text" value="0%"/>	<input type="checkbox"/>
Rendezvous		Yellow Rust	<input type="text" value="0%"/>	<input type="checkbox"/>
Nemo		Yellow Rust	<input type="text" value="0.1%"/>	<input checked="" type="checkbox"/>

### DISEASE SEVERITY IN LOCAL CULTIVARS

Local cultivar	Color	Disease	24. Jun, Rep. 1	Sample
Substance		Yellow Rust	<input type="text" value="10%"/>	<input type="checkbox"/>
Ambition		Yellow Rust	<input type="text" value="1%"/>	<input type="checkbox"/>
Florida		Yellow Rust	<input type="text" value="5%"/>	<input type="checkbox"/>
MS-Brunrust		Leaf Rust	<input type="text" value="0.1%"/>	<input checked="" type="checkbox"/>
MS-Sortrust		Stem Rust	<input type="text" value="0%"/>	<input type="checkbox"/>

## **Objectives**

1. Improve the VCU test of wheat cultivars regarding assessment for wheat yellow rust, - by phenotyping new virulences, identifying genotypes and races of yellow rust sampled from six selected differentials at appr. 70 VCU trial sites in Europe
2. Contribute to a Europe mapping tool indicating the disease pressure from yellow rust, leaf rust and stem rust, - by scoring of rust disease 2-3 times per season in local susceptible cultivars at VCU trial sites

## **Output**

1. A Trap Nursery Data Management and display system in the Wheat rust toolbox, managed by the VCU network in collaboration with RustWatch and GRRC.

## **Outcome**

1. VCU contribute to the European early warning system for wheat rusts
2. The evaluation of the VCU trials on wheat will be improved, because knowledge on local wheat rust genotypes and race phenotypes can be included in the evaluation of results
3. Using a common database system will strengthen collaboration, stimulate harmonisation of methods and make results more robust.

### User guide – getting started

- Score disease severity 2-3 times according to RustWatch Scale in:
  - 6 RustWatch differentials
  - 1 local YR susceptible cultivar,
  - 1 local LT susceptible cultivar
  - 1 local SR susceptible cultivar
- Trap nursery partners upload data via webform (login to the Wheat Rust Toolbox (WRT)). After test of this approach in 2019 we develop a a corresponding smartphone for 2020 if this is requested by VCU.
- In the Toolbox, data will be stored as original scored and transferred also to the BGRI categories for disease level.
- Valerie Cadot will manage the list of Trap Nursery partners in the VCU network
- Local Trap Nursery partners will manage own data upload and quality control in the WRT. They can download own data and see all results from the VCU network.
- The link between the VCU trial and results of race phenotyping and /or genotyping will be the sample ID affiliated with a sample sent for race phenotyping at GRRC or another recognised lab.

Disease severity (in %)	Breeder's scale 1-9
0	1
0,1 (trace)	2
0,5	3
1	4
5	5
10	6
25	7
50	8
>75	9

BGRI:
1. 0
2. 0-20
3. 20-40
4. >40

**Table 1 : scale of visual scoring**

Disease severity : % leaf or spike area infected
0
1
5
10
20
30
40
50
60
70
80
90
100

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## USER MANAGEMENT

Init	Firstname	Lastname	Institution	Department	Country	Active	
GDE	Gerhard	Deneken	Tystofte Foundation		Denmark	<input checked="" type="checkbox"/>	
GJA	Guillaume	Jacquemin	CRA		Belgium	<input checked="" type="checkbox"/>	
FMA	Fabio	Mascher	Agroscope		Switzerland	<input checked="" type="checkbox"/>	
MOB	Michael	Oberforster	AGES		Austria	<input checked="" type="checkbox"/>	

[New user](#)

User Management

Valerie can create all users

Users can login and

- Upload data
- Analyse VCU data
- Download data
- See results of disease scorings, and race and genotyping before public

### WHEAT RUST TOOLBOX

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#### TRAP NURSERY MANAGEMENT

Trials Trial sites Trial site map Cultivars

Country	Institution	Name	Latitude	Longitude	Altitude	Selected
Austria	AGES	Fuchsenbühl	48.19120	16.70350		<input type="checkbox"/>
Austria	AGES	Gerhaus	48.06558	16.84747		<input type="checkbox"/>
Austria	AGES	Grabenegg	48.15018	15.24859		<input type="checkbox"/>
Belgium	ILVO	Leffinge	51.15270	2.90990		<input type="checkbox"/>
Belgium	ILVO	Merebeke	50.98290	3.77110		<input type="checkbox"/>
Belgium	ILVO	Poperinge	50.89020	2.78260		<input type="checkbox"/>
Belgium	ILVO	Waterloet	51.26790	3.64430		<input type="checkbox"/>
Belgium	OBEV-CRA-W	Engghien	50.67035	4.08419		<input type="checkbox"/>
Belgium	OBEV-CRA-W	Gembloux	50.61963	4.76010		<input type="checkbox"/>
Belgium	OBEV-CRA-W	Hannut	50.67747	5.06051		<input type="checkbox"/>
Belgium	OBEV-CRA-W	Ohey	50.39073	5.12526		<input type="checkbox"/>
Belgium	OBEV-CRA-W	Soy	50.30821	5.21880		<input type="checkbox"/>
Belgium	OBEV-CRA-W	Thorembais	50.61580	4.76070		<input type="checkbox"/>
Croatia	CCARRA/NCPS					<input type="checkbox"/>
Croatia	CCARRA/NCPS	Osijek	45.48763	18.69873		<input type="checkbox"/>
Czech Republic	UKZUZ	Brno Chřstce	49.12472	16.63417		<input type="checkbox"/>
Czech Republic	UKZUZ	Čáslav Filipov	49.90222	15.41472		<input type="checkbox"/>
Czech Republic	UKZUZ	Chrastava	50.81750	14.95861		<input type="checkbox"/>
Czech Republic	UKZUZ	Uherský Ostroh	48.99043	17.41903		<input type="checkbox"/>
Czech Republic	UKZUZ	Vysoká u Příbramě	49.63417	13.95250		<input type="checkbox"/>
Czech Republic	VURV	Prague - Ruzyně	50.06485	14.30053		<input type="checkbox"/>

N = 77

[New trial site](#)

Basic system setup

Define Trial sites



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#### TRAP NURSERY MANAGEMENT

Trials Trial sites Trial site map Cultivars

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Wheat Rust by Stamen Design, under CC-BY 3.0  
Data by OpenStreetMap, under ODbL

Show Trial sites on a map

Define Trials based on Trial site names

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#### TRAP NURSERY MANAGEMENT

Trials Trial sites Trial site map Cultivars

Year: 2019

Generate trials for a selected year: Year for creating: 2019 Trial sites for creating: 10 trial sites selected

Trial	Site	Country	Host genus	Host species	User
2019_Fuchsenbühl, AGES, AT	Fuchsenbühl	Austria	Triticum	sp.	JGH
2019_Gerhaus, AGES, AT	Gerhaus	Austria	Triticum	sp.	JGH
2019_Grabenegg, AGES, AT	Grabenegg	Austria	Triticum	sp.	JGH
2019_Engghien, OBEV-CRA-W, BE	Engghien	Belgium	Triticum	sp.	JGH
2019_Hannut, OBEV-CRA-W, BE	Hannut	Belgium	Triticum	sp.	JGH
2019_Leffinge, ILVO, BE	Leffinge	Belgium	Triticum	sp.	JGH
2019_Ohey, OBEV-CRA-W, BE	Ohey	Belgium	Triticum	sp.	JGH
2019_Poperinge, ILVO, BE	Poperinge	Belgium	Triticum	sp.	JGH
2019_Soy, OBEV-CRA-W, BE	Soy	Belgium	Triticum	sp.	JGH
2019_Thorembais, OBEV-CRA-W, BE	Thorembais	Belgium	Triticum	sp.	JGH

N = 10

Define Differential set(s)

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#### TRAP NURSERY MANAGEMENT

Trials Trial sites Trial site map Cultivars

Cultivar	Sorting	Image	Color	Gene	Origin	Score
Ambition	1		08CCCC			
Spalding Proific	2		666600			
Compair	3		FF00FF			
Moro	4		FF6666			
Marbloss	5		0000FF			
Rendevous	6		FF9966			
Nemo	7		CC3333			

N = 7

[New cultivar](#)

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## TRAP NURSERY MANAGEMENT

TRAP NURSERY MANAGEMENT								
Trials Trial sites Trial site map Cultivars								
Country	Institution	Name	Latitude	Longitude	Altitude	Selected		
Austria	AGES	Fuchsenbigl	48.19120	16.78580		<input checked="" type="checkbox"/>		
Austria	AGES	Gerhaus	48.06558	16.84747		<input checked="" type="checkbox"/>		
Austria	AGES	Grabenegg	48.15038	15.24859		<input checked="" type="checkbox"/>		
Belgium	ILVO	Leffinge	51.15270	2.90990		<input checked="" type="checkbox"/>		
Belgium	ILVO	Merelbeke	50.98290	3.77110		<input checked="" type="checkbox"/>		
Belgium	ILVO	Poperinge	50.89020	2.78260		<input checked="" type="checkbox"/>		
Belgium	ILVO	Watervliet	51.26790	3.64430		<input checked="" type="checkbox"/>		
Belgium	OBEV-CRA-W	Enghien	50.67035	4.08419		<input checked="" type="checkbox"/>		
Belgium	OBEV-CRA-W	Gembloux	50.61963	4.76010		<input checked="" type="checkbox"/>		

### A trial site is identified with variables:

- Country,
- Responsible Institution
- Name (of the area or responsible experimental station / company)
- Geoposition (lat/long in decimal coordinates)
- Altitude

**A trial site is a fixed unit. Even the exact location of the trials changes (up to 5 km) between years, then use the same Trial site name!!!!**

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## TRAP NURSERY MANAGEMENT

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Year ☒ 2019 ☐ 2018

Generate trials for a selected year

Year for creating 2019

Trial sites for creating 6 trial sites selected

Trial	Site	Country	Host genus	Host species	User	
2019_Fuchsenbigl, AGES, AT	Fuchsenbigl	Austria	Triticum	sp.	JGH	
2019_Gerhaus, AGES, AT	Gerhaus	Austria	Triticum	sp.	JGH	
2019_Grabenegg, AGES, AT	Grabenegg	Austria	Triticum	sp.	JGH	
2019_Hannut, OBEV-CRA-W, BE	Hannut	Belgium	Triticum	sp.	JGH	
2019_Ohey, OBEV-CRA-W, BE	Ohey	Belgium	Triticum	sp.	JGH	
2019_Poperinge, ILVO, BE	Poperinge	Belgium	Triticum	sp.	JGH	
N = 6						

- **Trial names** are generated based on a combination of year\_Trial site name\_responsible Institution\_Country
- Therefore, it is important that all trial sites have these four variables defined
- To generate new trials for a new year the Manager can select any trial site names via a drop down list with checkmarks
- In the example above is generated 6 trials based on trial site information. If you have two trials related to a Trial site then call the Trial sites e.g. Arras\_A and Arras\_B to make two trials close to the location Arras.





## TRIAL INPUT

Observations

Year 2018

Trial 

2018\_Ciminna, AS.A.R., IT, Ciminna

Replicates 

1

Observation date 

New date

Delete date

Save

Samples

Comments

DISEASE SEVERITY IN DIFFERENTIALS

Cultivar	Color	Disease	3. Jun, Rep. 1	Sample
Ambition		Yellow Rust	<div>0.1</div>	<input checked="" type="checkbox"/>
Spalding Prolific		Yellow Rust	<div>0</div>	<input type="checkbox"/>
Compair		Yellow Rust	<div>0</div>	<input type="checkbox"/>
Moro		Yellow Rust	<div>50</div>	<input checked="" type="checkbox"/>
Mariboss		Yellow Rust	<div>0</div>	<input type="checkbox"/>
Rendezvous		Yellow Rust	<div>0</div>	<input type="checkbox"/>
Nemo		Yellow Rust	<div>N/A</div>	<input type="checkbox"/>

DISEASE SEVERITY IN LOCAL CULTIVARS

Local cultivar	Color	Disease	3. Jun, Rep. 1	Sample
Core		Yellow Rust	<div>N/A</div>	<input type="checkbox"/>
Cappelli		Leaf Rust	<div>N/A</div>	<input type="checkbox"/>
Simeto		Stem Rust	<div>N/A</div>	<input type="checkbox"/>

New local cultivar

Delete local cultivar

When a user log into the toolbox, the system will know which trials are related to this user

First time:

- Select your trial
- Select New local cultivar and enter the name of one YR susceptible cultivar and select YR
- Same again but enter name of one LR susceptible cultivar
- Same again but enter name of one SR susceptible cultivar

Steps entering observations:

- Select Trial name in the drop down list with your trials
- Select number of replicates in your trial
- Click New date
- Select disease level from drop down
- If sample were taken for race anaysis then checkmark the cultivar that the sample was taken from
- Select the button samples and enter the sample IDS for all samples taken
- Select the comment button and enter information if any other diseases dominated in the Diff cultivars or any other relevant information



**Under construction**

**TRIAL OUTPUT**

## Output 1

Aaaa

Bbbb

Cccc

Trial site map

Disease on Differentials single or in combinations (via checkmarks)  
Interactive Europe map



**Under construction**

**TRIAL OUTPUT**

## Output 2

[Aaaa](#)

[Bbbb](#)

[Cccc](#)

[Trial site map](#)

Disease on local cultivars re YR, LR and SR (Interactive Europe map)



**Under construction**

**TRIAL OUTPUT**

## Output 3

Aaaa

Bbbb

Cccc

Trial site map

Races and genotypes sampled at VCU locations (Interactive Europe map)

Data will feed into WP2 and WP4 – development of a RustWatch Risk management Tool

## Roadmap 2019

1. Generate login to the Wheat Rust Toolbox for all VCU partners that are responsible for data upload / Valerie and Jens. Deadline 8 March
2. List of trial sites and trials in 2019 including all background information e.g. GPS as decimal coordinates / Valerie + all VCU trial hosts. Deadline 8 March
3. Trial sites and trials implemented in the wheat Rust Toolbox / Jens and Valerie. Deadline 8 March
4. Web training course for those interested / last week in March
5. Each partner decide on one YR susceptible, one LR susceptible and one SR susceptible cultivar from the VCU set of cultivars. Add to a common Excel and add as local cultivars on the Toolbox under the menu Trap Nurseries / Trap Nursery input. Deadline 1 April
6. Output tools maps and charts available in the toolbox / Valerie, Poul and Jens / 15 April
7. Each partner score and sample YR in the Diff set and score three local cultivars for YR, LR and SR respectively – and upload data on the same date as scored / all (use a tablet/PC in the field or via paper in the field and then upload at the office)
8. Discussion of results, usefulness and evaluation of the system at VCU meeting.