

# Monitoring *Scaphoideus titanus* and related in-Field Activities: the experience in Switzerland and France using PreDiVine DSS

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DolphinEngineering<sup>1</sup>



Schweizerische Eidgenossenschaft <sup>2</sup>  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Dipartimento federale dell'economia,  
della formazione e della ricerca DEFR  
Agroscope



# Outline



- PreDiVine DSS
- S.t. life stages prediction
- Benefits
- Continous dialogue between DSS and end-user
- Results in Switzerland and France in 2015
- Conclusions

# Decision Support System (DSS)



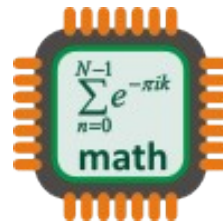
- DSS Definition:
  - “*Computer-based information system that supports decision-making activities.*”
- Everyday more important for:
  - wine growers, phytosanitary services, scouts
- Helping in:
  - taking the right decisions
  - planning strategies in advance

# PreDiVine DSS



*(PreDiVine = Predicting Diseases of Vine)*

Decision Support System  
**predicting** the evolution  
of vineyard's pests and diseases  
and **suggesting** just in time targeted treatments



**Micro-climate data  
acquisition**

**Prediction of  
S.t. Life stages**

**Decision support**

# S.t. Life stages predictions



- Life stages:

- **L1 (egg hatching)**, L2, **L3**, L4, L5, **Adults**



Important event to start predicting the future stages

Important to decide when to start with chemical treatments (in Switzerland)

Important to check whether treatments were efficient

Prevostini M., Taddeo A. V., Balac K., Jermini M., Linder C., 2013  
*Calibration and in-Field Validation Tests of a Web-based Adaptive Management System for Monitoring - Scaphoideus titanus.*,  
Future Integrated Pest Management in Europe., Riva del Garda, Italy, March 19-21, 2013

Prevostini M., Taddeo A. V., Balac K., Rigamonti I., Baumgärtner J., Jermini M., 2011.  
*WAMS - an adaptive system for knowledge acquisition and decision support: the case of Scaphoideus titanus.*, IOBC Bulletin 2011

# Benefits



- Better planning of in-field activities
  - Prediction with 2-3 weeks in advance
  - Automatic notifications (SMS, email)
- Resources optimization
- Better efficacy of the vector control and lower FD spread
- Positive ecological impact
- Better awareness
- Real-time predictions

# Data acquisition



- Weather Stations

- Temperature
- Humidity
- Rainfall
- Leaf Wetness



- Wireless Sensor Networks



# Data acquisition (2)





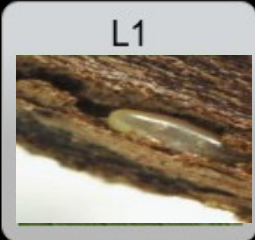
# PreDiVine Dashboard (L1)



### Pest Status

Yvorne    St\_M1    YvoApr29


**L1**    **L3**    **Adult**



**May 2015**

Su	Mo	Tu	We	Th	Fr	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

**Risk (%)**



**Last Feedback**  
May 18, by clinder

**Next Notice**  
Stage reached. Notice

**Report**

**Set Notice**

**This stage has been reached on May 18**



## Report feedback

Fields with \* are required.

Crop \*

Yvorne ▼

Model \*

St M1 ▼

Life Stage \*

L1 ▼

Observation Date \*

Has the stage been observed?

- No  
 Yes

Comments

Create

# Feedback



# Usage of common sampling plans

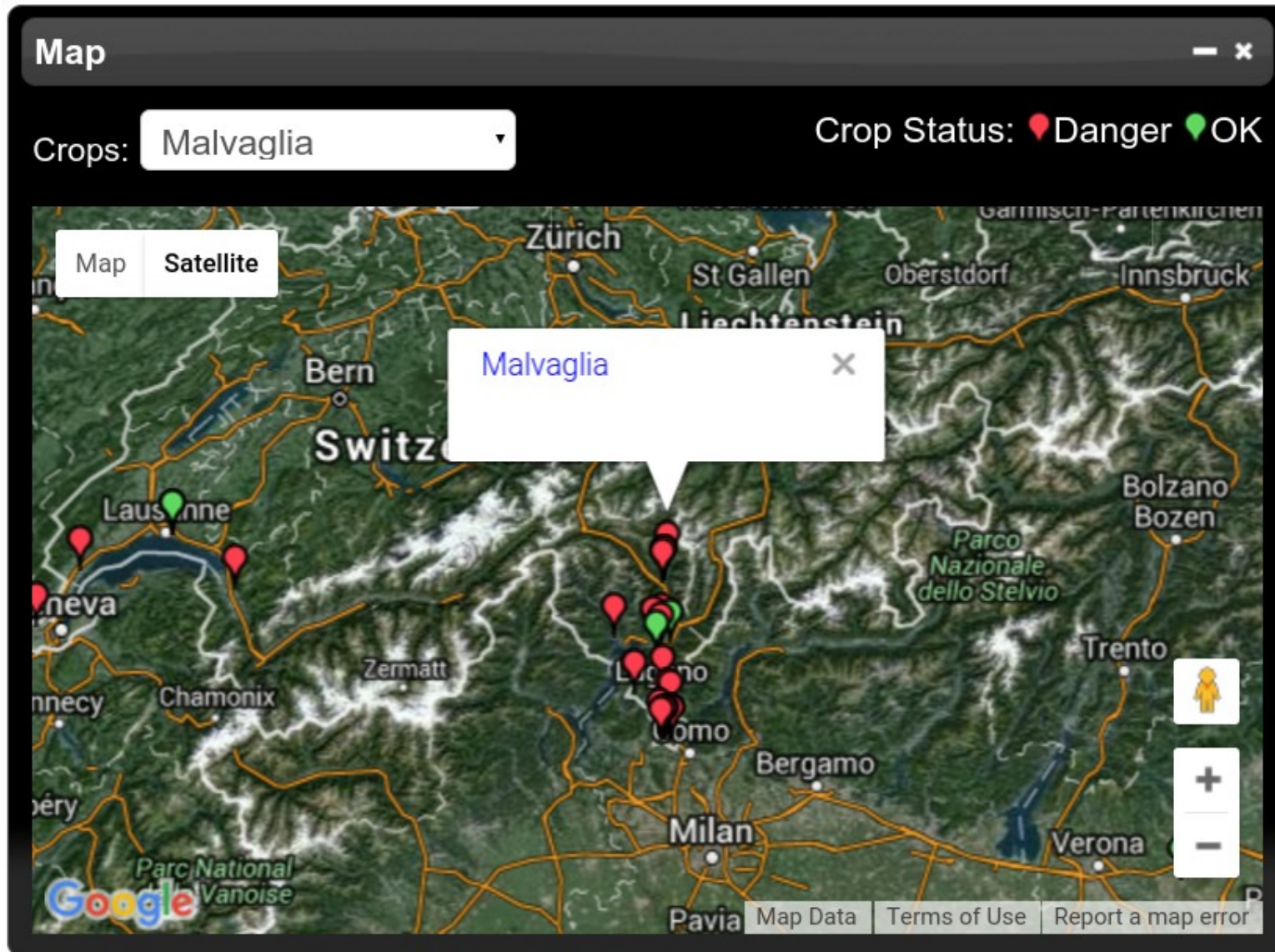


- For *S. titanus* nymphs and adults
- Allow comparison of results over time and space
- Accuracy in the population density estimation
- Spare time during controls
- Jointly developed by the University of Milan, CASAS and Agroscope

Rigamonti et al 2015. *Spatial distribution and sampling plans for Grape vine plant canopy inhabiting Scaphoideus titanus (Hemiptera, Cicadellidae) nymphs.* (Submitted)




Jermini, et al. 1993. *Nombre de pièges englués nécessaires pour estimer la densité relative des populations de la cicadelle Scaphoideus titanus Ball.* en vignoble. Boll. Zool. Agr. Bachic. Ser II, 25 (1): 91-102.

# 2015 – Results – Ticino



# 2015 – Results – Ticino – Malvaglia

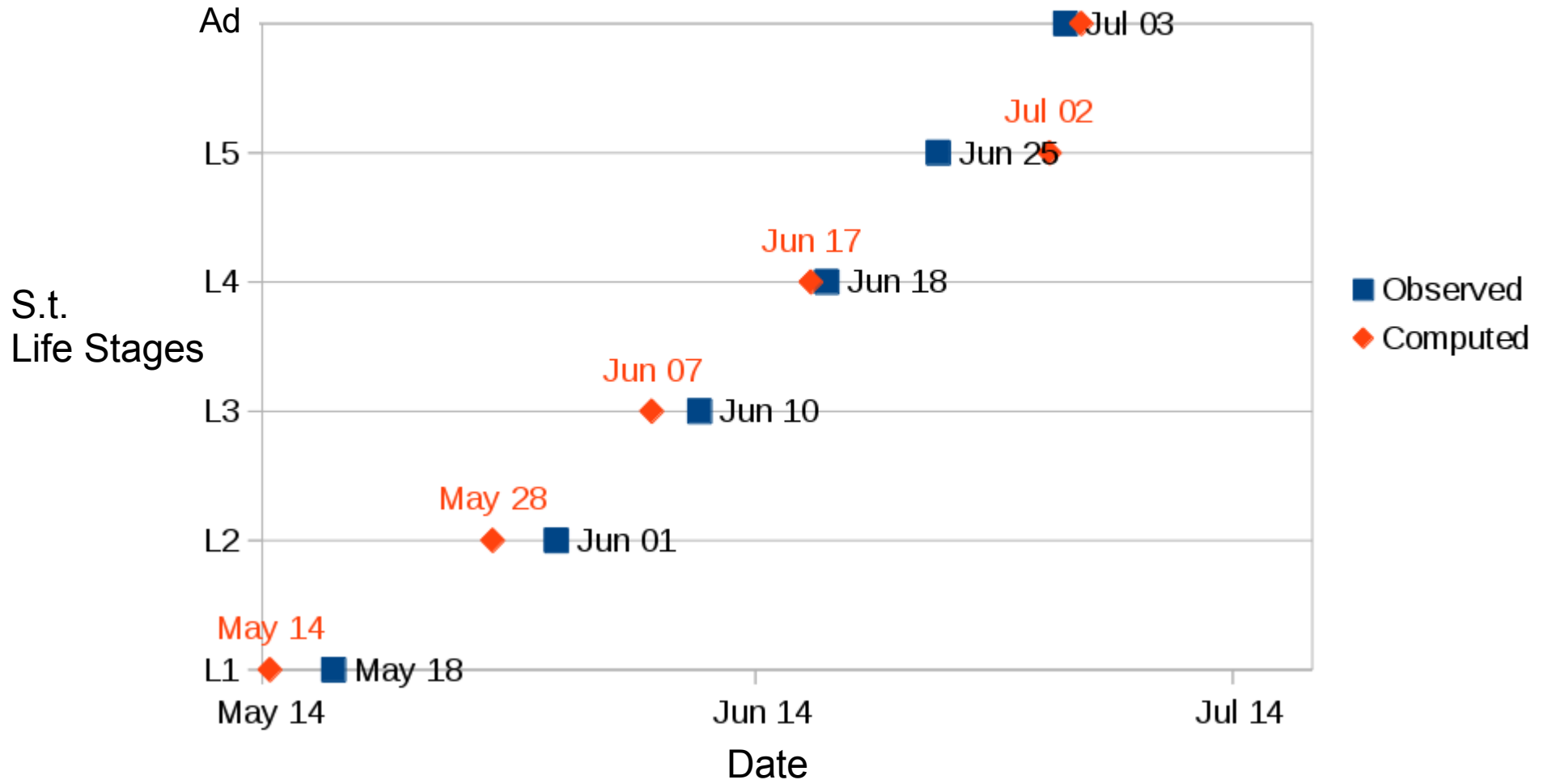


Life Stage	Prediction	Computed	Observed
 <b>L1</b>	May 14 – 23 <i>(prediction of May 4)</i>	May 14	May 18
 <b>L3</b>	June 6 – 14 <i>(prediction of May 18)</i>	June 7	June 10
 <b>Adults</b>	July 2 – 5 <i>(prediction of June 7)</i>	July 4	June 30 - July 3 <i>(Mezzovico)</i>

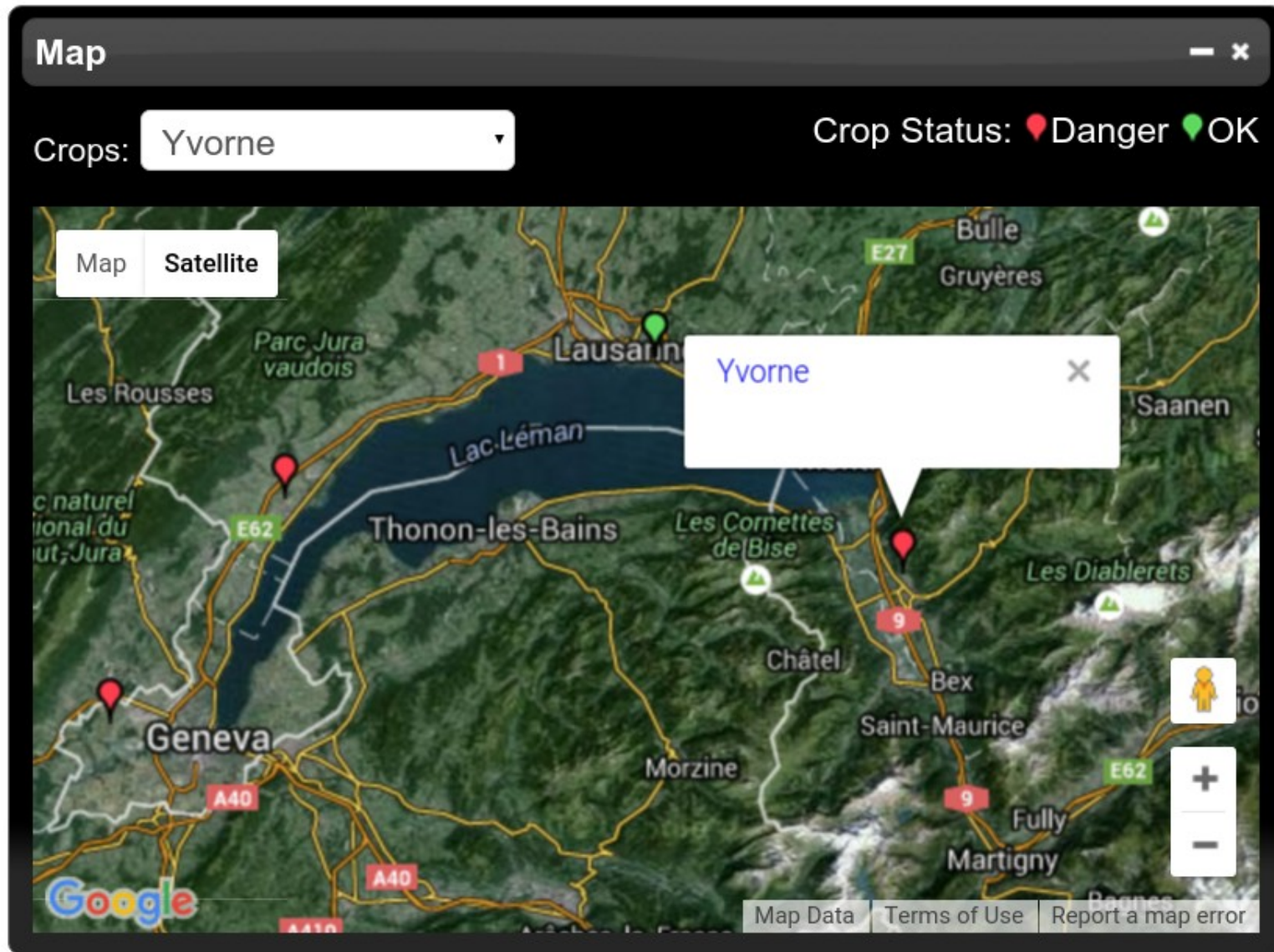
# 2015 – Results – Ticino



## Malvaglia






# 2015 – Results – Romandie



# 2015 – Results – Romandie – Yvorne



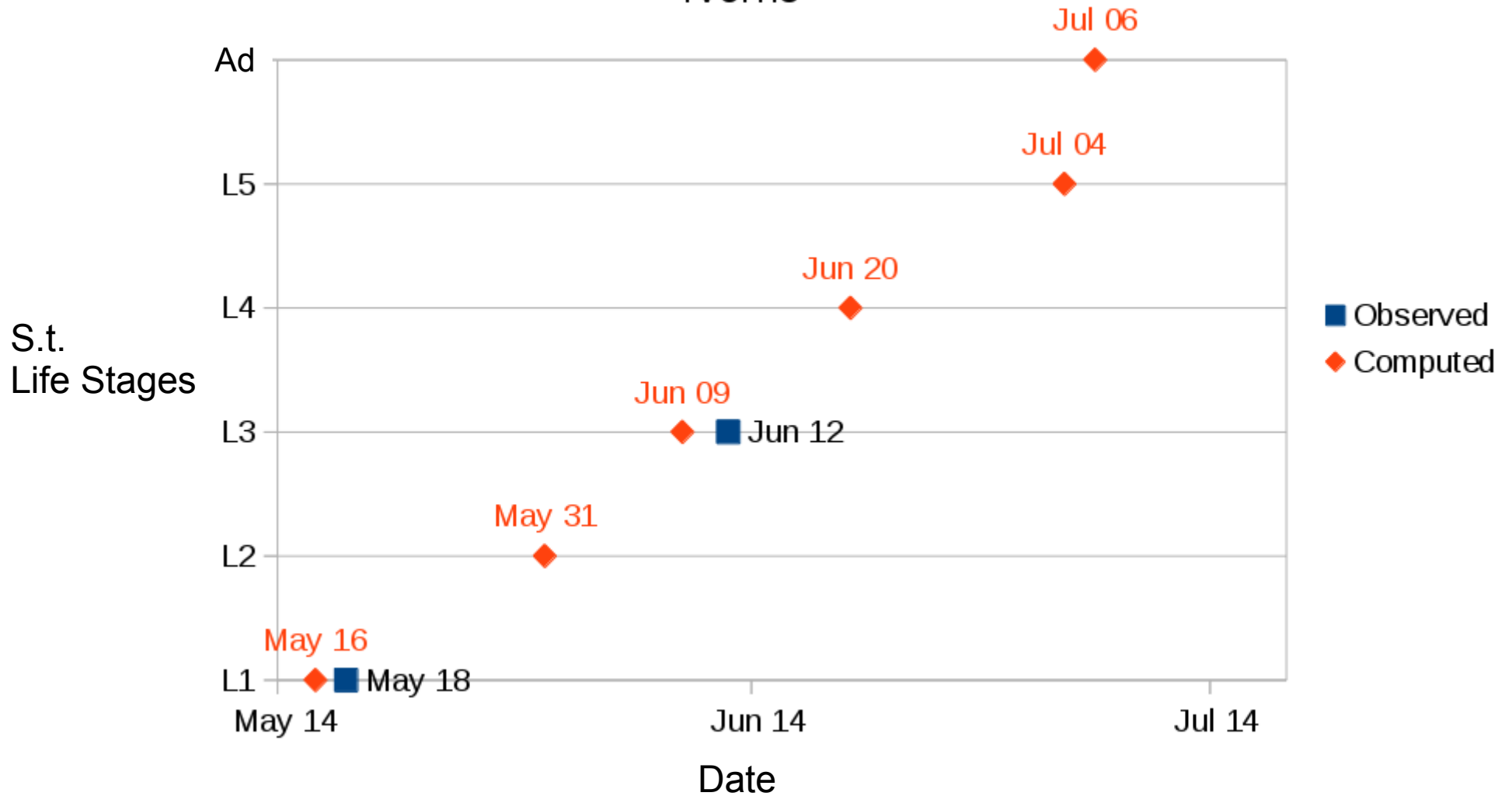
Life Stage	Prediction	Computed	Observed
 <b>L1</b>	May 16 – June 5 <i>(prediction of May 4)</i>	May 16	May 18
 <b>L3</b>	June 8 – 19 <i>(prediction of May 18)</i>	June 9	June 12
 <b>Adults</b>	July 9 – 13 <i>(prediction of June 9)</i>	July 6	N/A

N/A = Not Available

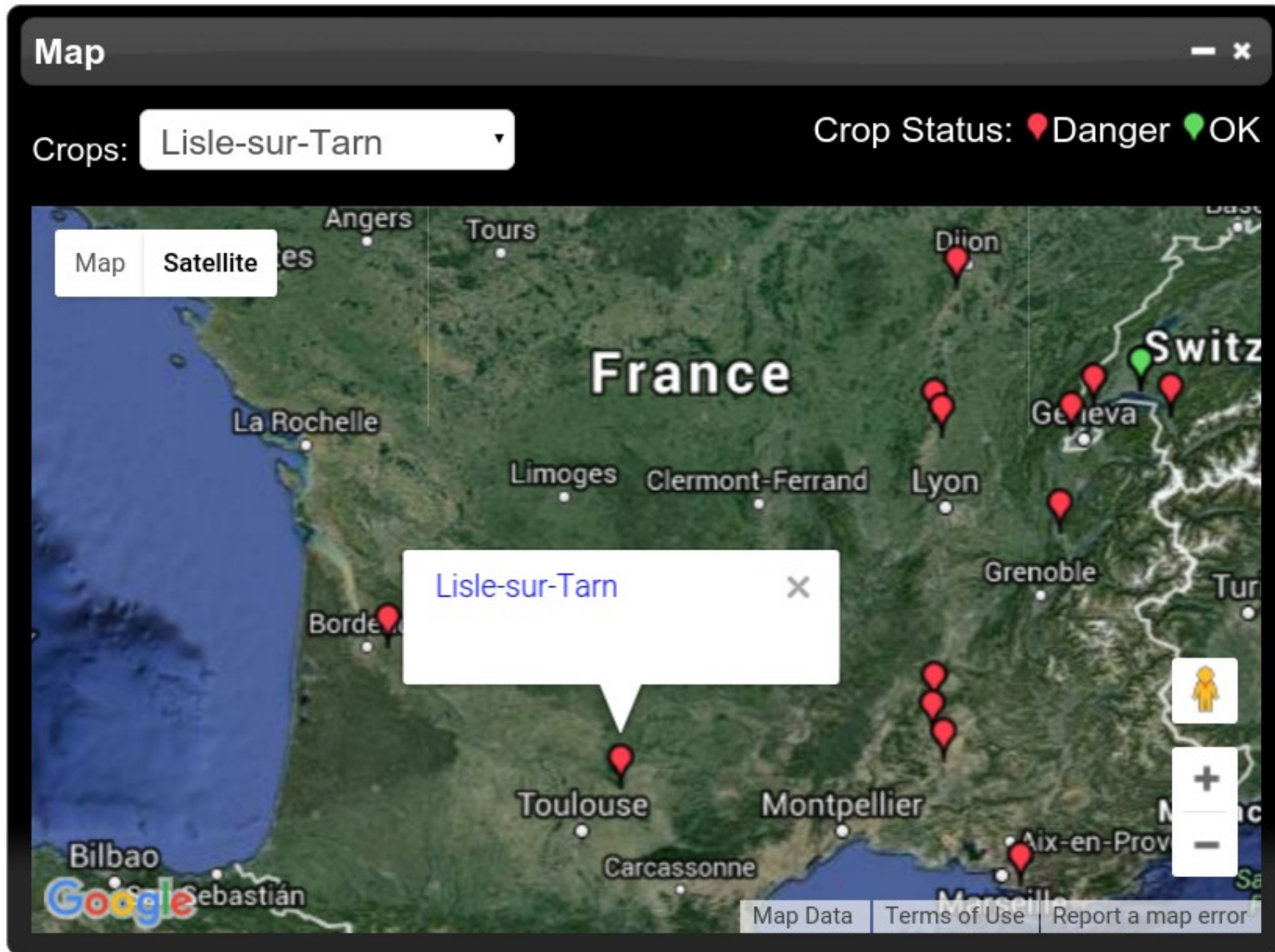
# 2015 – Results – Romandie



Yvorne






# 2015 – Results – France



# 2015 – Results – France – Lisle sur Tarn



Life Stage	Prediction	Computed	Observed
 <b>L1</b>	N/A	May 1	May 12
 <b>L3</b>	N/A	June 4	May 28
 <b>Adults</b>	July 8 – 13 <i>(prediction of June 10)</i>	July 6	July 9

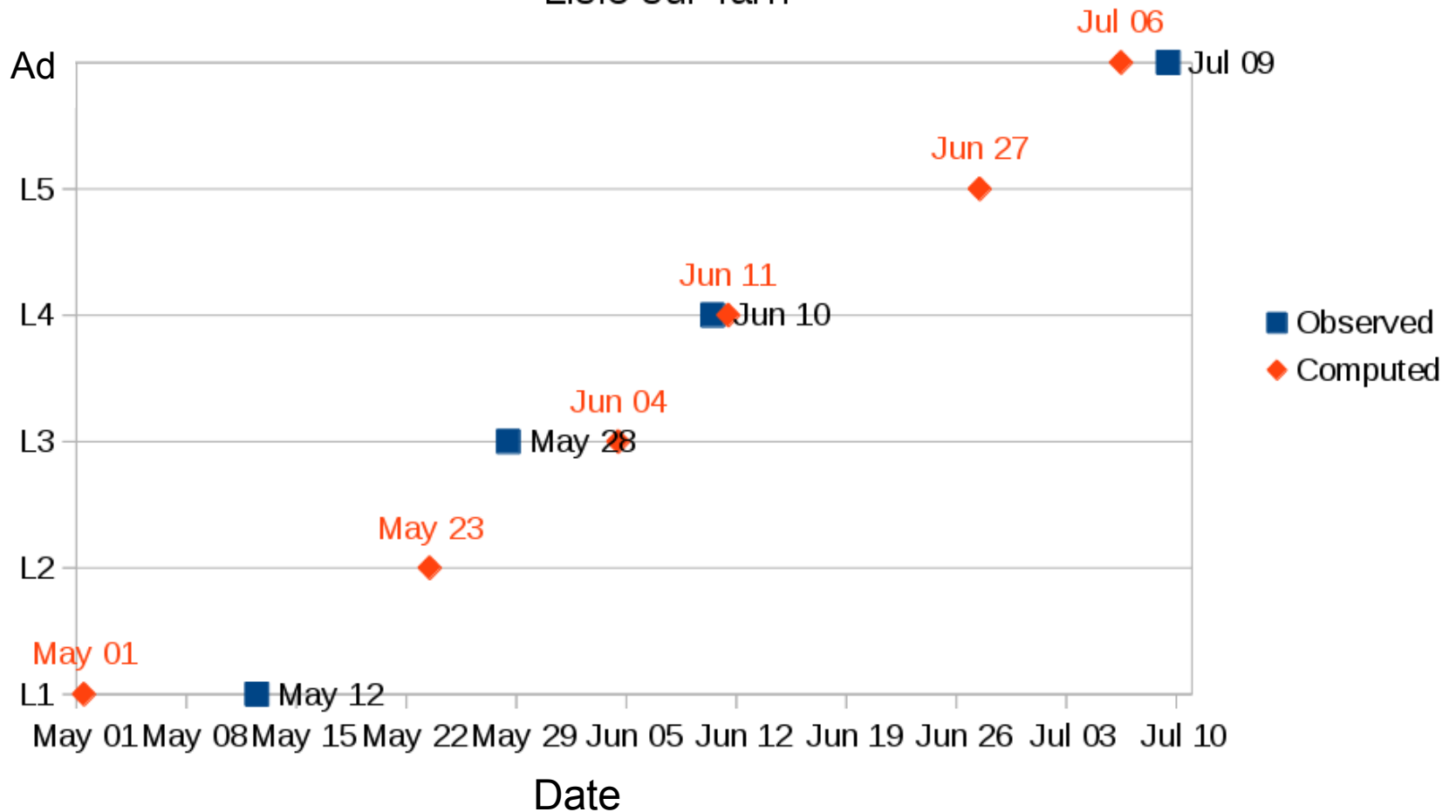
N/A = Not Available

# 2015 – Results – France



## Lisle sur Tarn

S.t.  
Life Stages



# PreDiVine

## S.t. - Downy & Powdery Mildew



- Map
- Oldium
- Pest Status
- Plasmopara
- Sensor Temp.
- Weather Values

### Pest Status

Test-PreDiVine | St M1 | USI-Apr15

L1

L3

Adult

May 2015

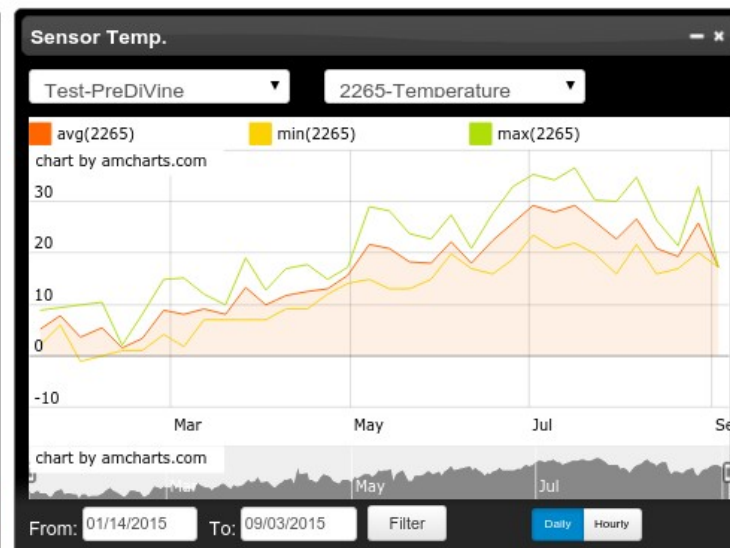
Su	Mo	Tu	We	Th	Fr	Sa
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

Risk (%)

**Last Feedback**  
No feedback reported.

**Next Notice**  
Stage reached. Notice

**This stage has been reached on May 10**



### Plasmopara

Test-PreDiVine | TestPlasmopara

Aug 30	Aug 31	Sep 01	Sep 02	Sep 03
Sep 04	Sep 05	Sep 06	Sep 07	Sep 08

Primary Infection on: 26.04.2015

Info Graph | Weather Graph

Last Update on: 03.09. 08:06

### Oldium

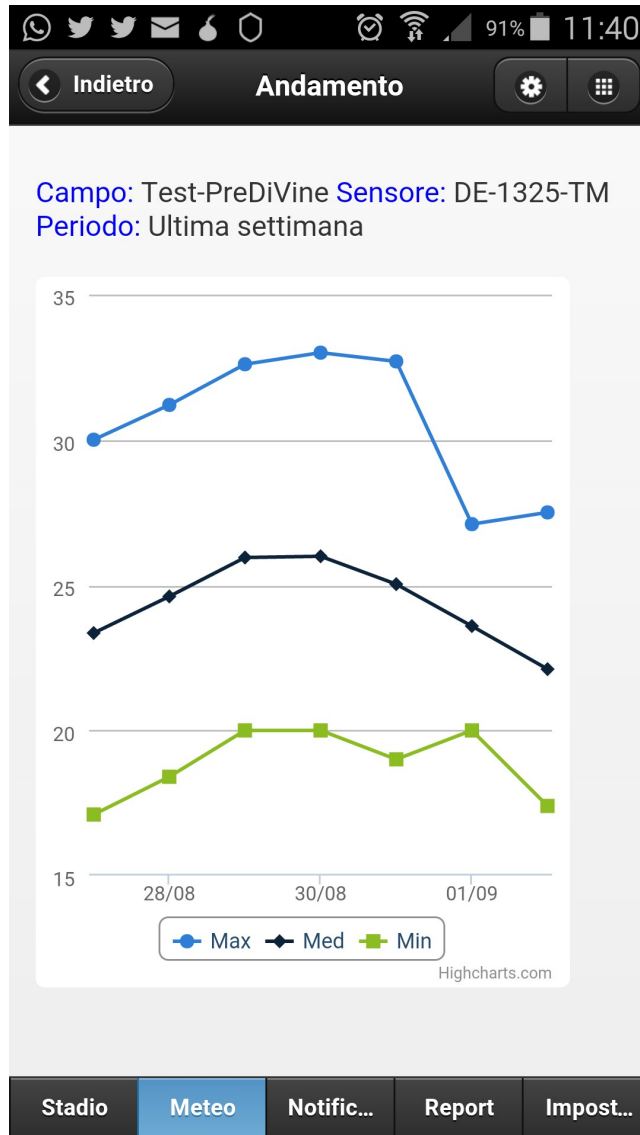
Test-PreDiVine | TestOldium

Aug 30	Aug 31	Sep 01	Sep 02	Sep 03
Sep 04	Sep 05	Sep 06	Sep 07	Sep 08

Info Graph | Expert Graph

Last Update on: 03.09.2015 08:09:41

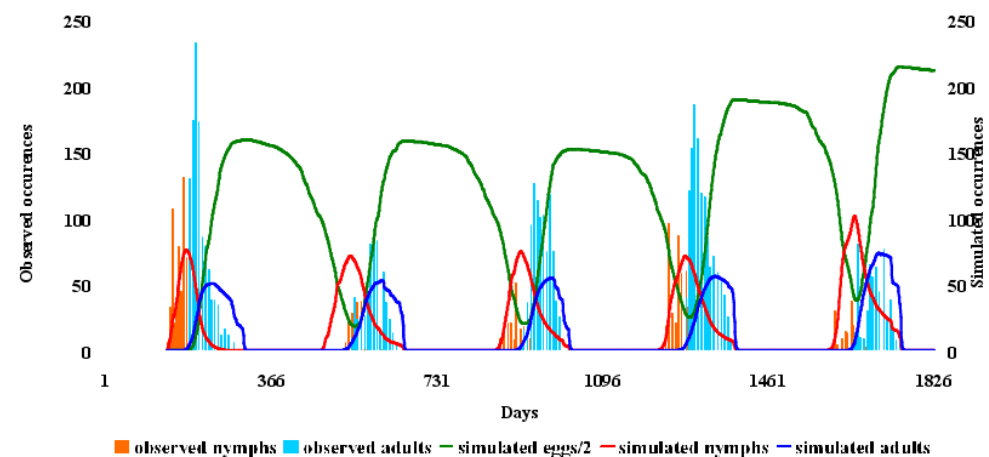
# Predivine App



# Conclusions and Future Works



- Valuable results
  - Calibration should be improved every year
- Importance of user feedback
  - Continuous dialogue between DSS and end-user
- Importance of common sampling protocol
- Future works:
  - Multiannual model



Rigamonti *et al.*, 2014. *The Canadian Entomologist*, 146: 67-79

# Thank you!

