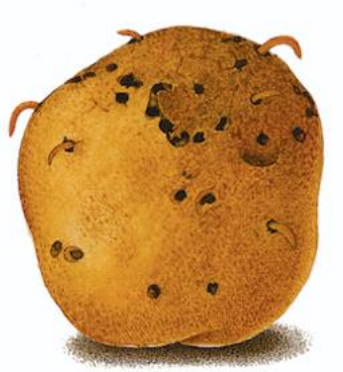
Keynote Presentations: 1st EWRN Workshop

Keynote N°2

Wireworms in Austria: a challenge for farmers, producers, and researchers



Katharina Wechselberger[1], Anita Kamptner[2], Patrick Hann[3], Carina Schragl[3], Birgit Putz [3], Claus Trska [3], Jakob Angerer [4], Josef Eitzinger [5], Matthias Wernicke[1], Stephan Manhalter[1], Anna Moyses[1], and Vitore Shala-Mayrhofer[6].

EWRN Workshop

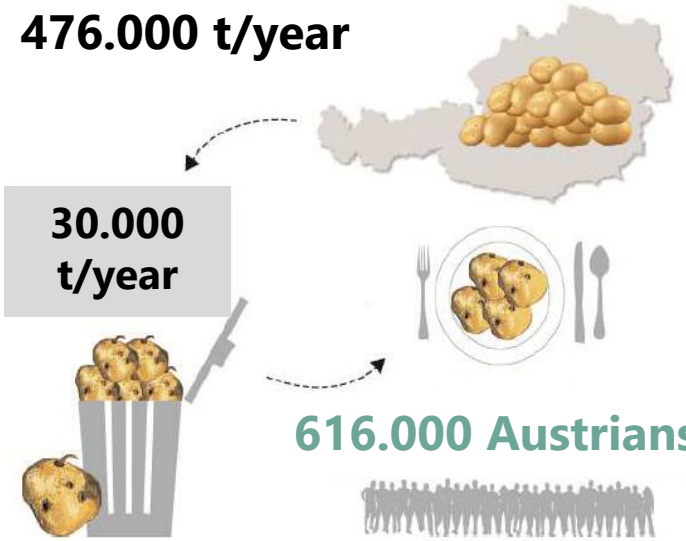
7th July 2024, Oslo

[1] Austrian Agency for Health and Food Safety (AGES GmbH)
[2] Agriculture Chamber of Lower Austria; IGE
[3] Meles GmbH, Consulting Engineers for Biology
[4] Agriculture Chamber of Upper Austria
[5] BOKU - University of Natural Resources and Life Sciences Vienna
[6] Austrian Chamber of Agriculture

Damage caused by wireworms to table potatoes in Austria

Average Year

476.000 t/year



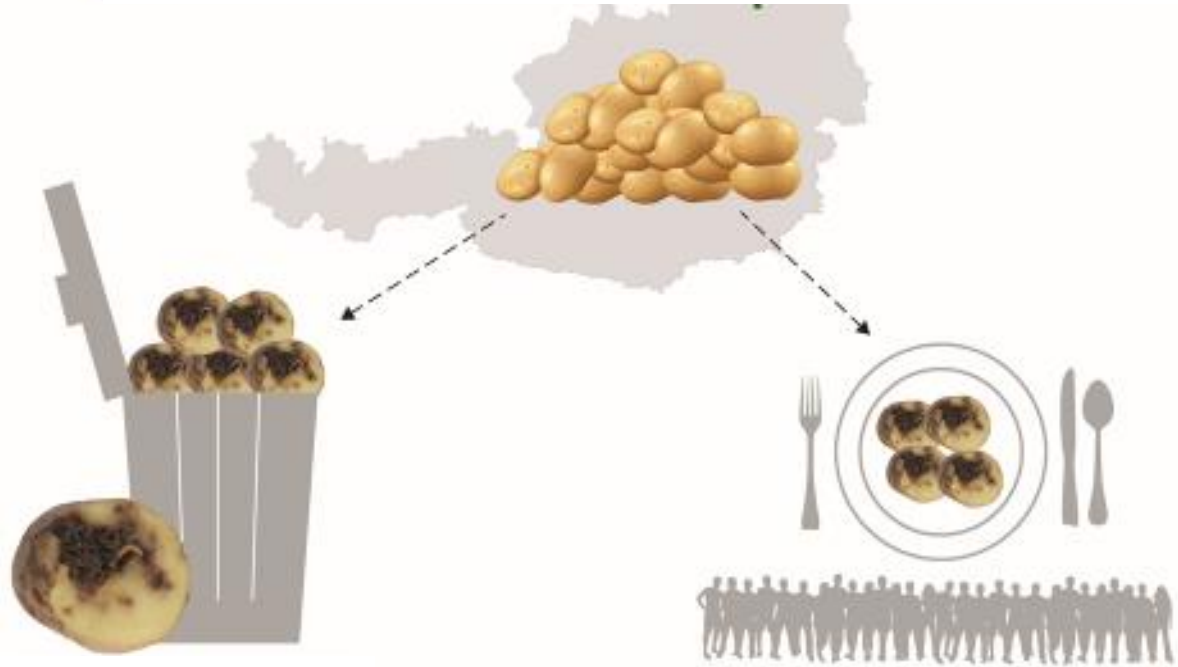
30.000 t/year

616.000 Austrians/year

VIELFALT IST UNSERE STÄRKE

Landwirtschaftskammer Niederösterreich

450.000 t of table potatoes in **2018**

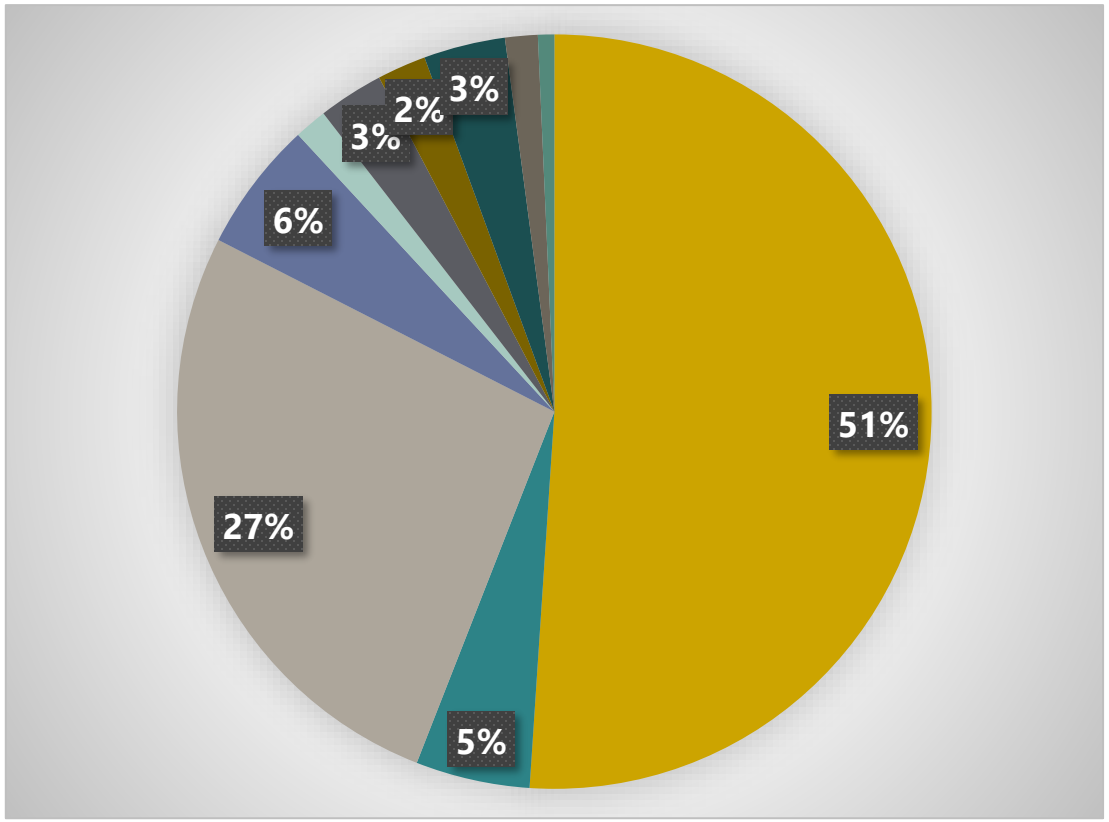


112.500 t

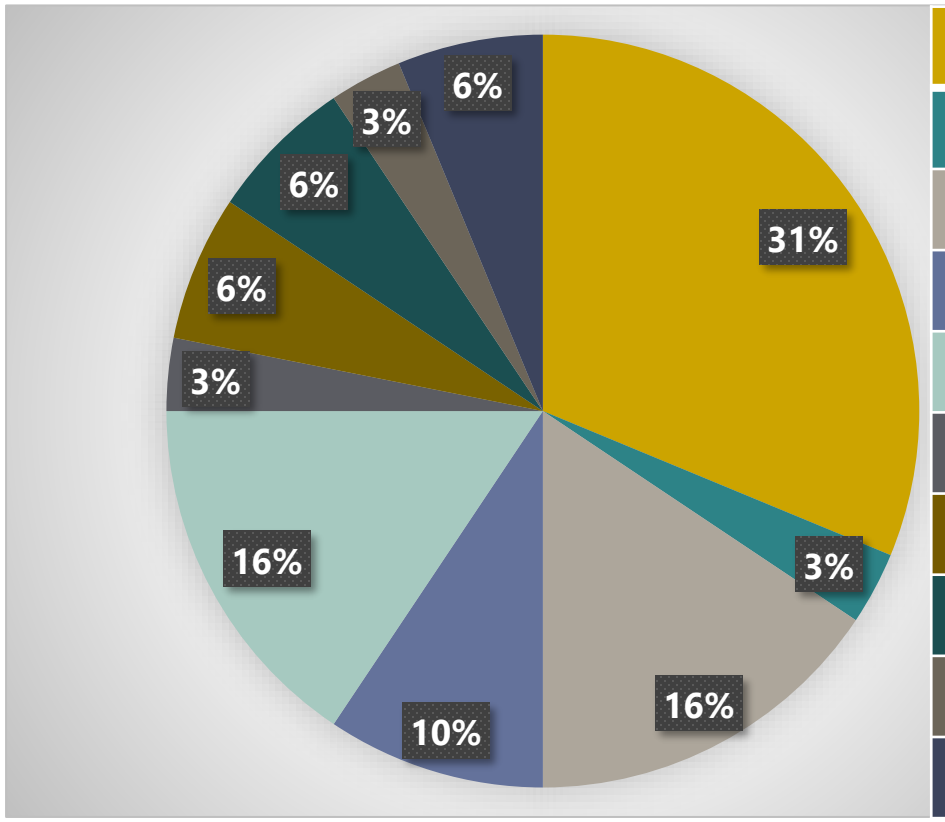
2.250.000 Austrians/year

Potato growers' crops damaged by wireworms (survey results, multiple answers)

Integrated farmers (n=163)



Organic farmers (n=42)



- Maize
- Sunflower
- Oil pumpkin
- Onion
- Root vegetables
- Sugar beet
- Lettuce
- Other vegetables
- Cereals
- Cover crops

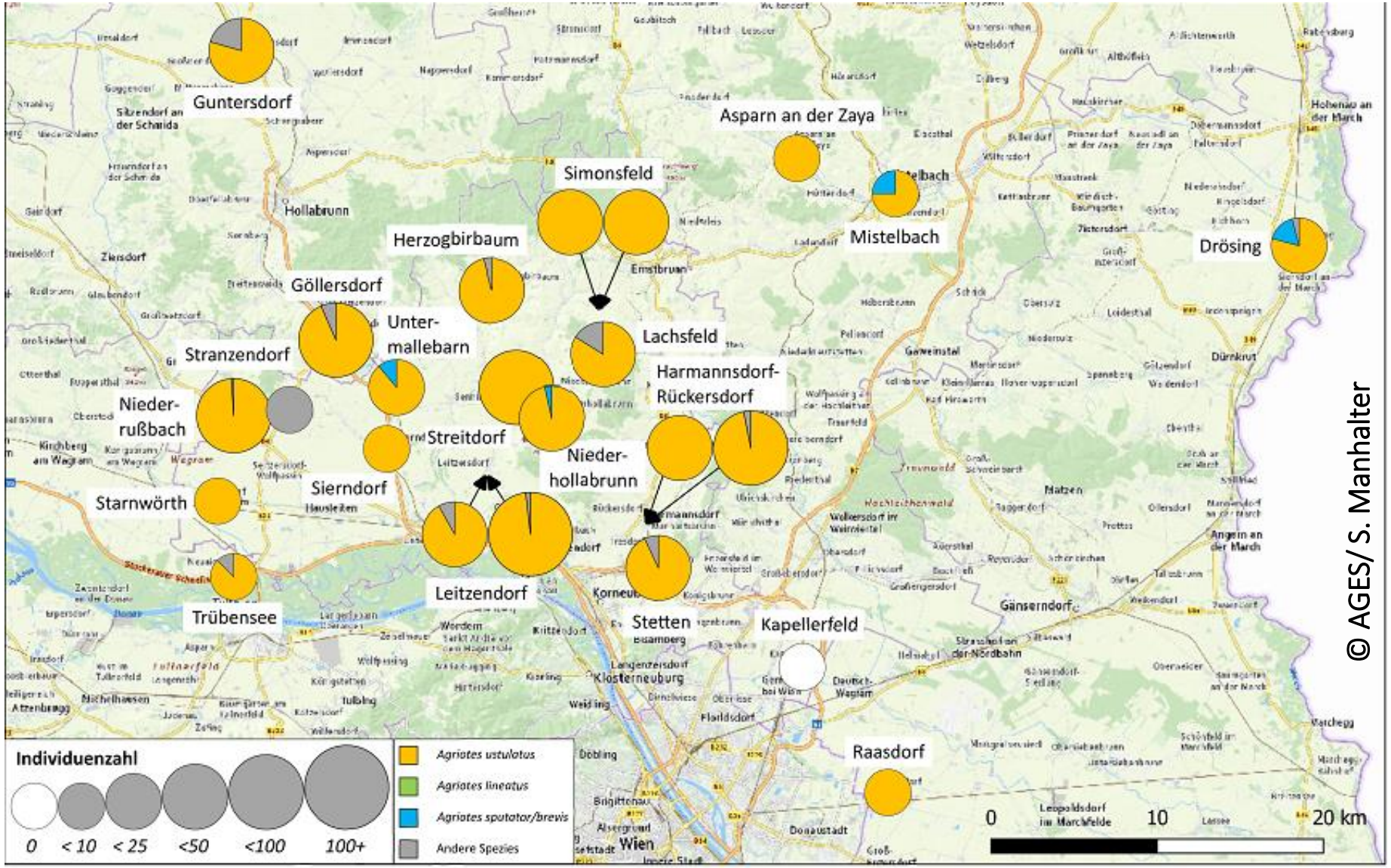
Predominant wireworm pest species in Austria

Which species of wireworms damage potatoes the most?

Wireworm survey during potato harvest

Wireworm survey during potato harvest 2020

Weinviertel - dry continental-Pannonian climate

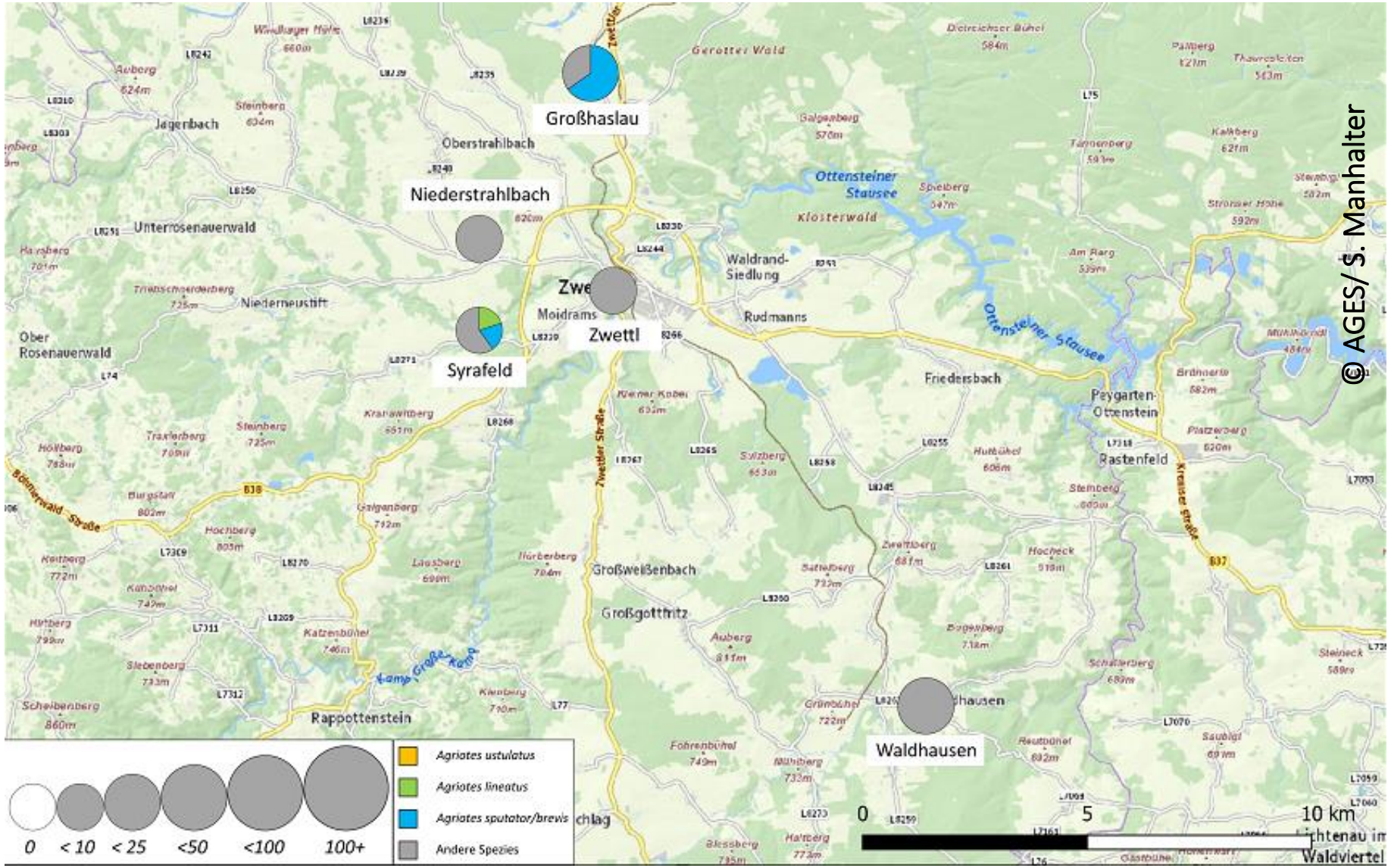


© AGES/ S. Manhalter

- *Agriotes ustulatus*
- *Agriotes lineatus*
- *Agriotes sputator/brevis*
- Other click-beetle genera

Wireworm survey during potato harvest 2020

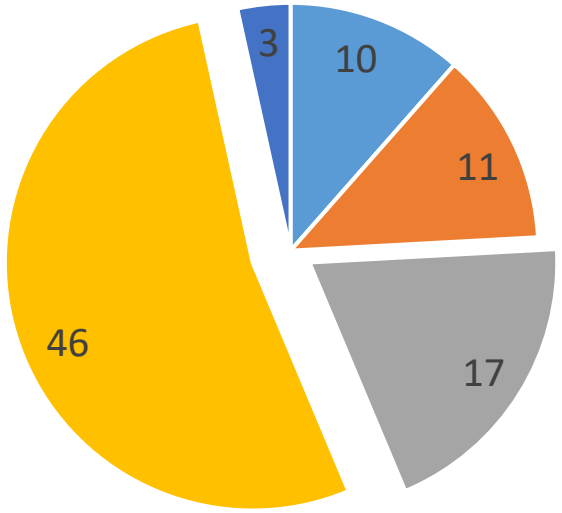
Waldviertel - Pannonian highland climate



© AGES/ S. Manhalter

- *Agriotes ustulatus*
- *Agriotes lineatus*
- *Agriotes sputator/brevis*
- Other click-beetle genera

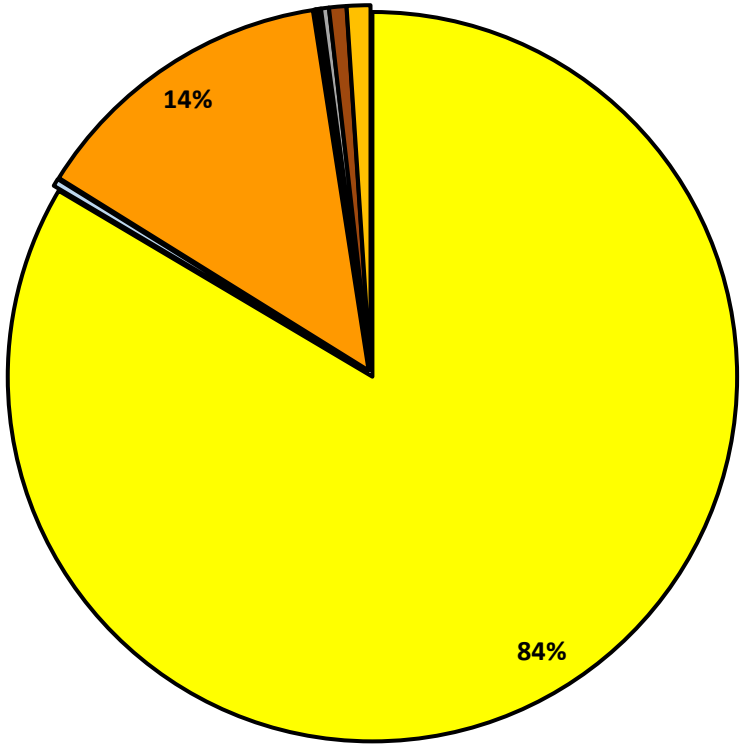
Wireworm survey in table potatoes (% by species); Waldviertel, 2022



- *Agriotes obscurus*
- *Agriotes sputator/ brevis*
- *Selatosomus aeneus*
- *Hemicrepidius niger*
- *Agriotes lineatus*

Survey 2020	Waldviertel
Number of sites	7
Total numbers wireworms	87

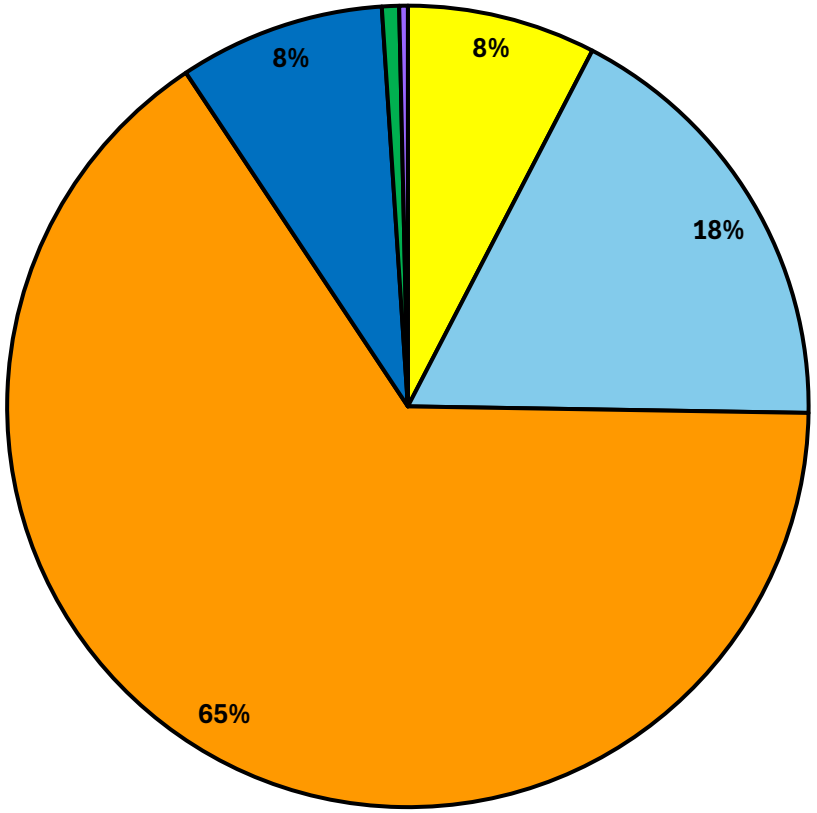
Wireworm survey in table potatoes (% by species); Austria, 2020 - 2023



Survey in potatoes 2020-23	Austria
Number of sites	113
Total number wireworms	10.997

Agriotes ustulatus
Agriotes obscurus
Agriotes sputator/ brevis
Agriotes lineatus
Melanotus tenebrosus
Melanotus brunnipes
Selatosomus aeneus
Hemicrepidius hirtus
Hemicrepidius niger

Wireworm survey in maize (% by species); Austria, 2020 - 2023



Survey in maize 2020-23	Austria
Number of sites	16
Total number wireworms	289

Agriotes ustulatus *Agriotes obscurus* *Agriotes sputator/ brevis*

Agriotes lineatus *Melanotus brunnipes* *Selatosomus aeneus*

Survey in maize 2020 - 2023	Austria

Current wireworm research in Austria

Click-beetle monitoring in Austria

Project „ElatMon“ (since 2019)

"Wireworm monitoring for the Austrian plant protection warning service“

Partner:

Austrian Chamber of Agriculture (DI Dr. Vitore Shala-Mayrhofer, **Lead**)

Agricultural Chamber of Lower Austria (DI Anita Kamptner)

Agricultural Chamber of Upper Austria (Dr. Marion Seiter, Jakob Angerer)

MELES GmbH (Dr. Patrick Hann)

BOKU-University (Prof. Dr. Josef Eitzinger)

AGES GmbH (Mag. Katharina Wechselberger, DI Matthias Wernicke)

Mit Unterstützung von Bund, Ländern und Europäischer Union

Bundesministerium
Land- und Forstwirtschaft,
Regionen und Wasserwirtschaft

LE 14-20
Entwicklung für den Ländlichen Raum

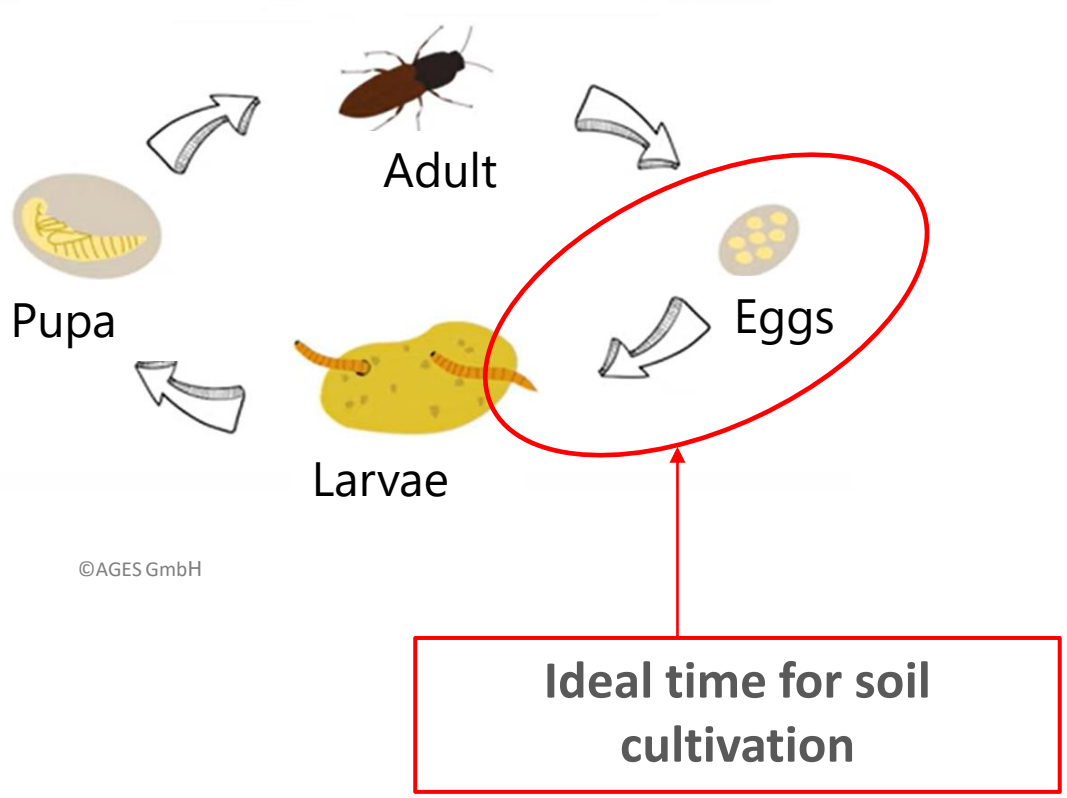
Europäischer Landwirtschaftsfonds für die Entwicklung des ländlichen Raums: Hier investiert Europa in die ländlichen Gebiete.

Click-beetle monitoring in Austria

Project „ElatMon“ (since 2019)

Project Objectives:

- Survey on the distribution and activity periods of the most important click beetle species in Austria
- Decision support for tillage at the time of peak click beetle activity



Mit Unterstützung von Bund, Ländern und Europäischer Union

Bundesministerium
Land- und Forstwirtschaft,
Regionen und Wasserwirtschaft

LE 14-20
Entwicklung für den Ländlichen Raum

Europäischer Landwirtschaftsfonds für die Entwicklung des ländlichen Raums: Hier investiert Europa in die ländlichen Gebiete.

ELATMON Methodology - Monitoring click beetle activity

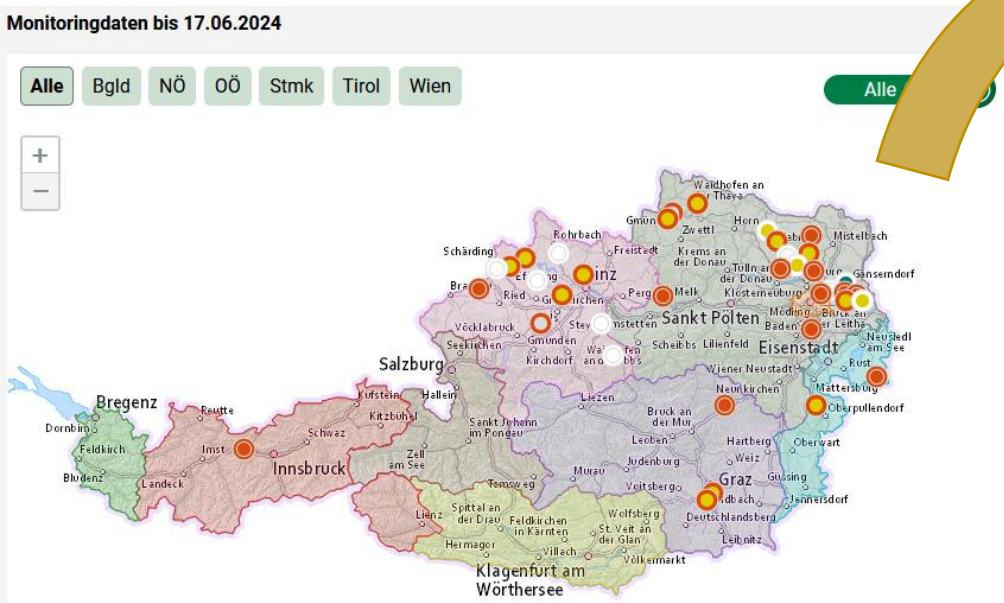
Species specific pheromone traps: 6 traps/species per site, emptied approx. weekly

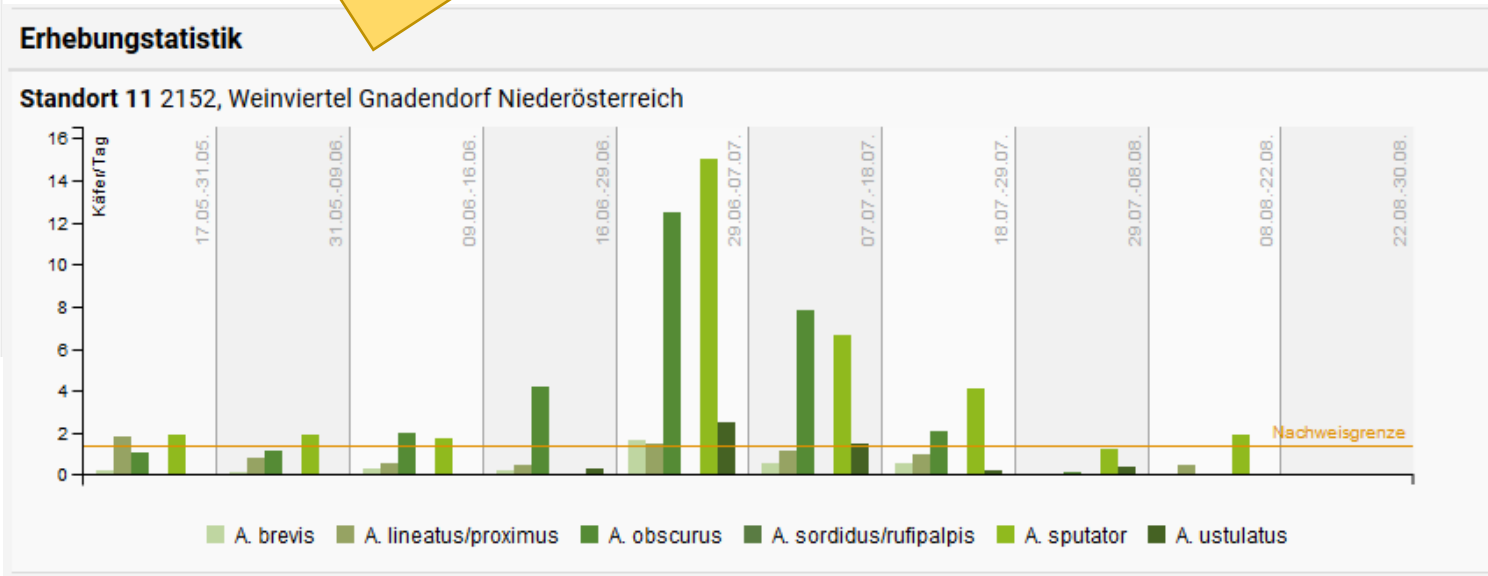
Data transfer via APP since 2022!

Ingenieurbüro für Biologie
MELES

Click-beetle monitoring in Austria

https://warndienst.lko.at/drahtwurm





Mit Unterstützung von Bund, Ländern und Europäischer Union

Bundesministerium
Land- und Forstwirtschaft,
Regionen und Wasserwirtschaft

LE 14-20
Entwicklung für den Ländlichen Raum

Europäischer Landwirtschaftsfonds für die Entwicklung des ländlichen Raums: Hier investiert Europa in die ländlichen Gebiete.

Wireworm-Control: „Practice-based and sustainable regulation of wireworms”

Funded by the Federal Ministry of Agriculture, Forestry, Regions and Water Management (BML), as well as by the provinces of Austria.

Project duration: 5 years (2021 -2025)

Project partners:

Federal Ministry
Republic of Austria
Agriculture, Forestry, Regions
and Water Management

AGES
Österreichische Agentur für Gesundheit und Ernährungssicherheit GmbH

Land-Impulse
am PULS der Bildung!

AGRO innovation
Sektion des Landesverbandes der Absolventen landwirtschaftlicher Lehranstalten in NÖ

bioforschung austria

das individuelle erlebnis
www.diefachschule.at
die fachschule

Landwirtschaftskammer Oberösterreich

Landwirtschaftskammer Niederösterreich

Interessengemeinschaft Erdäpfelbau IGE

BOKU UNIVERSITY
Met

MELES

universität innsbruck

Wireworm-Control

Testing measures in the laboratory and under practical conditions

- **Implementation in practice?**

- **Effectiveness of the measures?**

- **Cost-effectiveness?**

- **Sustainability?**

Wireworm-Control

A key aim of the research is to validate and improve the effectiveness of available wireworm control measures by taking into account the biology of the pest when applying them.

- **Module 1: Optimization of the use of insect pathogenic fungi**
  - Variability of different *Agriotes* populations
  - Optimization of carrier materials and formulations
  - Optimization through the addition of hydrogel
  - *M. brunneum* combined with attractant plants
- **Module 2: Evaluation and practical implementation of a regulation approach for potato and maize production**
  - Optimization of lure plants and attractants
  - Optimization of tillage intensity and tillage timing for wireworm control
  - Trials to reduce egg laying by female click beetles
  - Efficacy trials with insecticides and soil additives
- **Module 3: Wireworm regulation in organic maize cultivation using attractant & repellent strategies and pre-crop effects**
  - Pre-crop effect of soya on wireworm reduction in maize
  - Oilseed press residues for wireworm reduction
- **Module 4: Practical support and development of a catalogue of recommendations**

Wireworm-Control

Will be presented in the lecture at the EAPR in Session 3

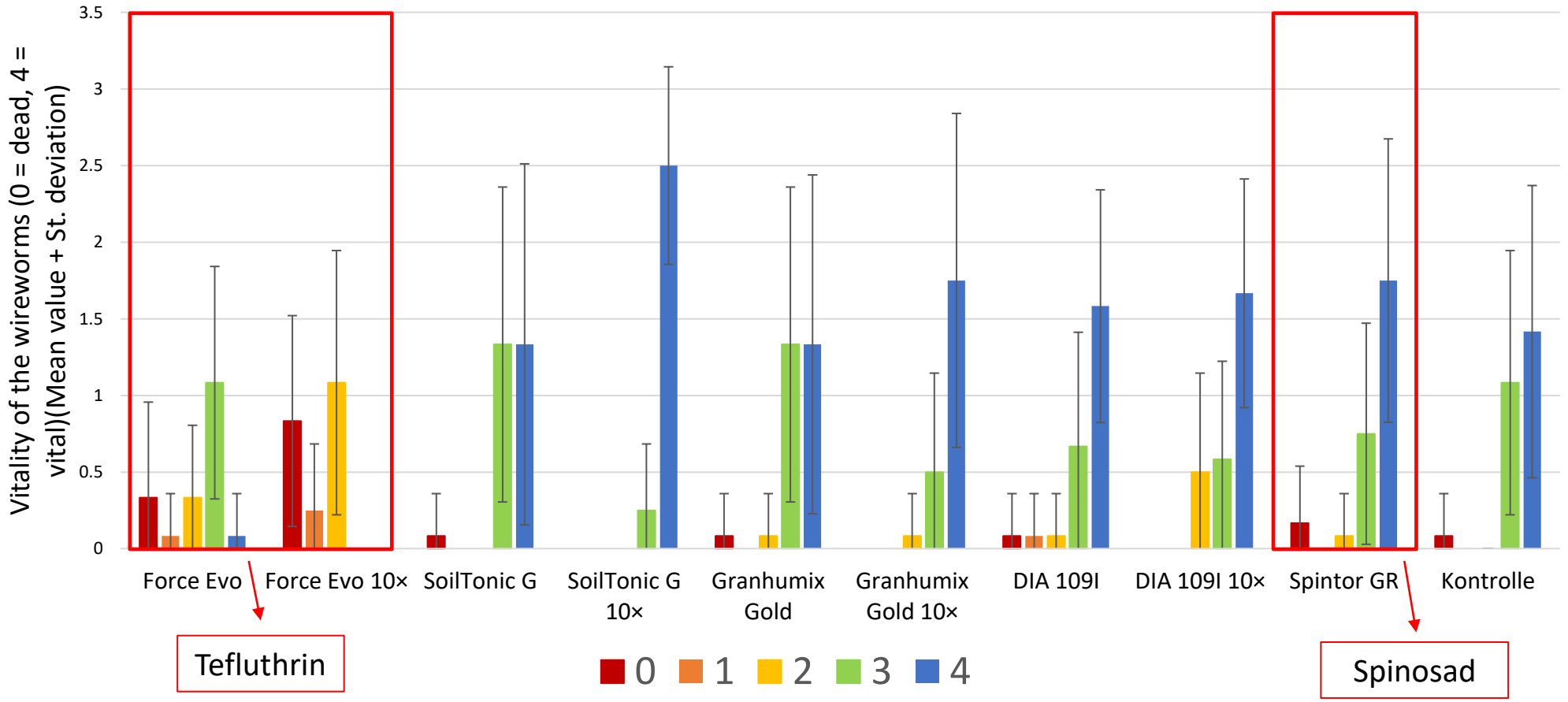
Briefly introduced in this presentation

- **Module 1: Optimization of the use of insect pathogenic fungi**
  - Variability of different *Agriotes* populations
  - Optimization of carrier materials and formulations
  - Optimization through the addition of hydrogel
  - *M. brunneum* combined with attractant plants
- **Module 2: Evaluation and practical implementation of a regulation approach for potato and maize production**
  - Optimization of lure plants and attractants
  - Optimization of tillage intensity and tillage timing for wireworm control
  - Trials to reduce egg laying by female click beetles
  - Efficacy trials with insecticides and soil additives
- **Module 3: Wireworm regulation in organic maize cultivation using attractant & repellent strategies and pre-crop effects**
  - Pre-crop effect of soya on wireworm reduction in maize
  - Oilseed press residues for wireworm reduction
- **Module 4: Practical support and development of a catalogue of recommendations**

Insecticides and plant/soil additives

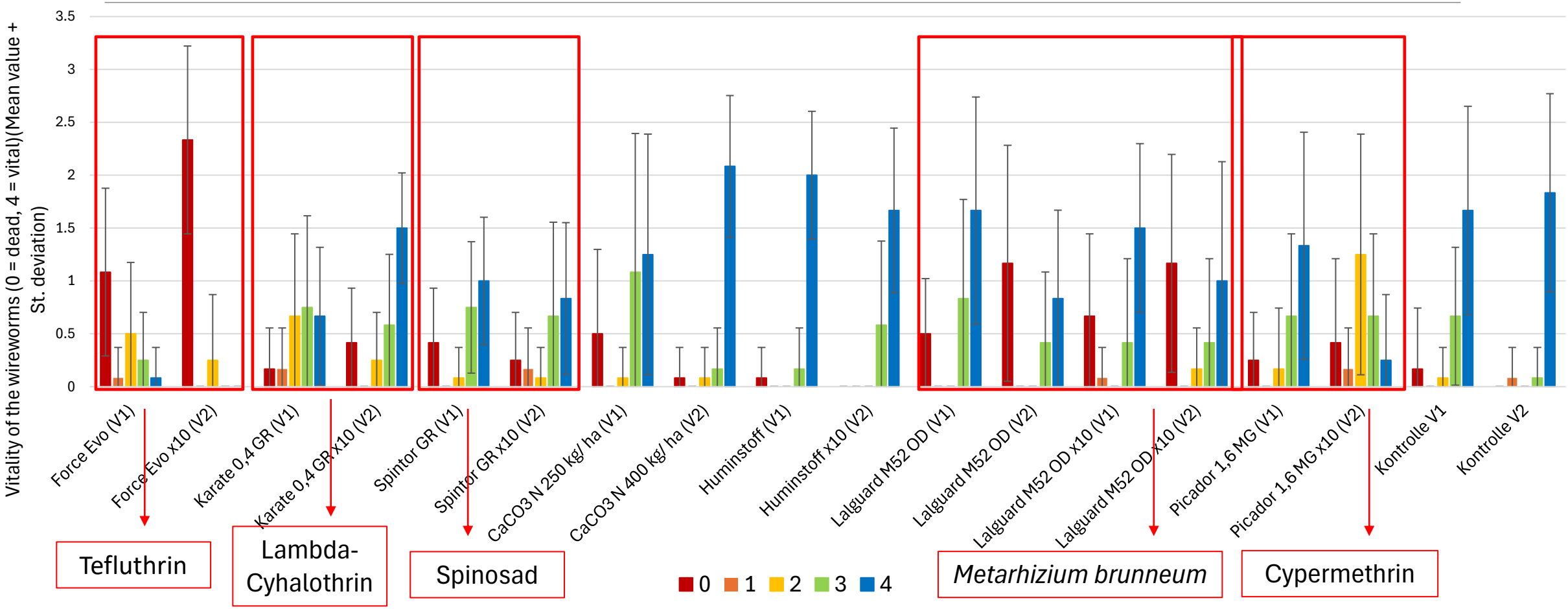
Insecticides and plant/soil additives

Impact of the tested substances on the vitality of wireworms



Insecticides and plant/soil additives

Impact of the tested substances on the vitality of wireworms



Project RIMPEST

„The effect of changing climate on potential **r**isks from **im**portant insect **pest**s on plant production in Austria and related adaptation options”

(Leadpartner AGES)

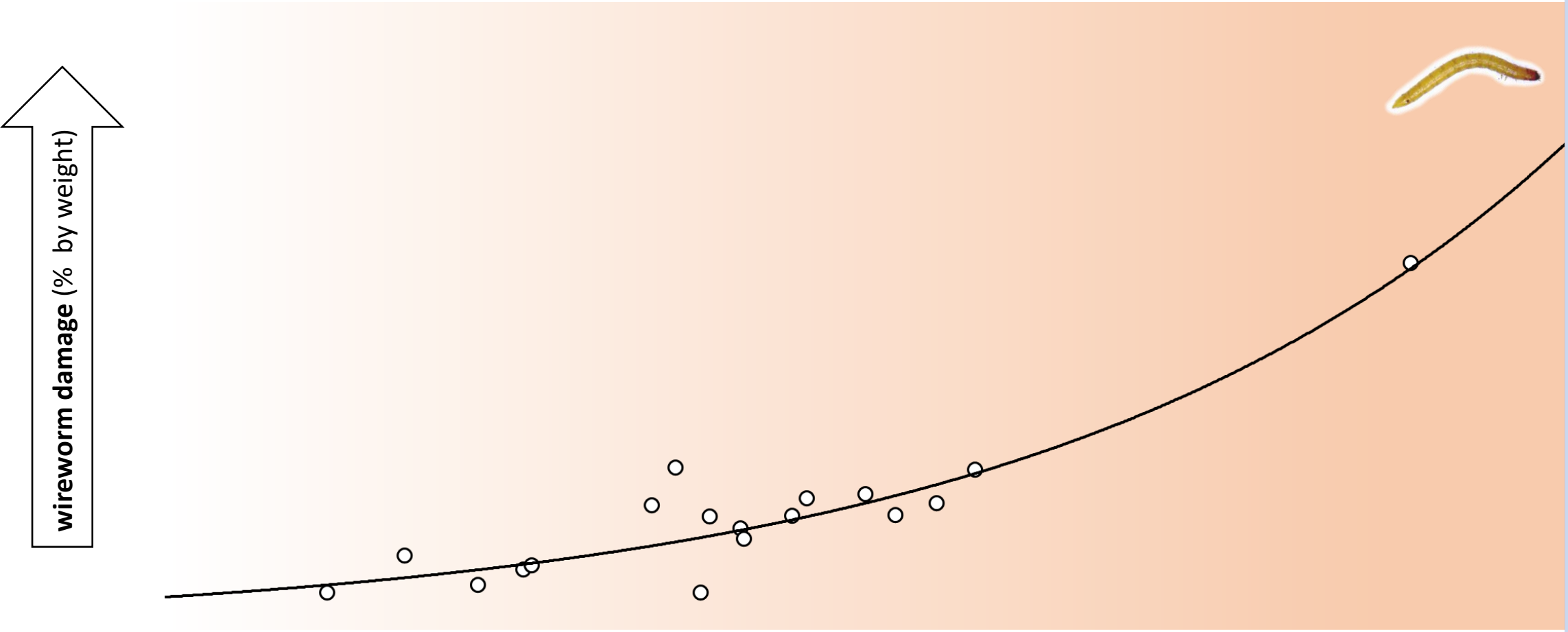
Funded by:

Project duration: 2021 – 2024

Project objective with **regard to wireworms**:
Regional loss forecast

Modelling approach: Meles GmbH & BOKU University Met

Wireworm damage in potatoes (early - medium-early varieties)
valid for region: "Weinviertel" (especially district Korneuburg)



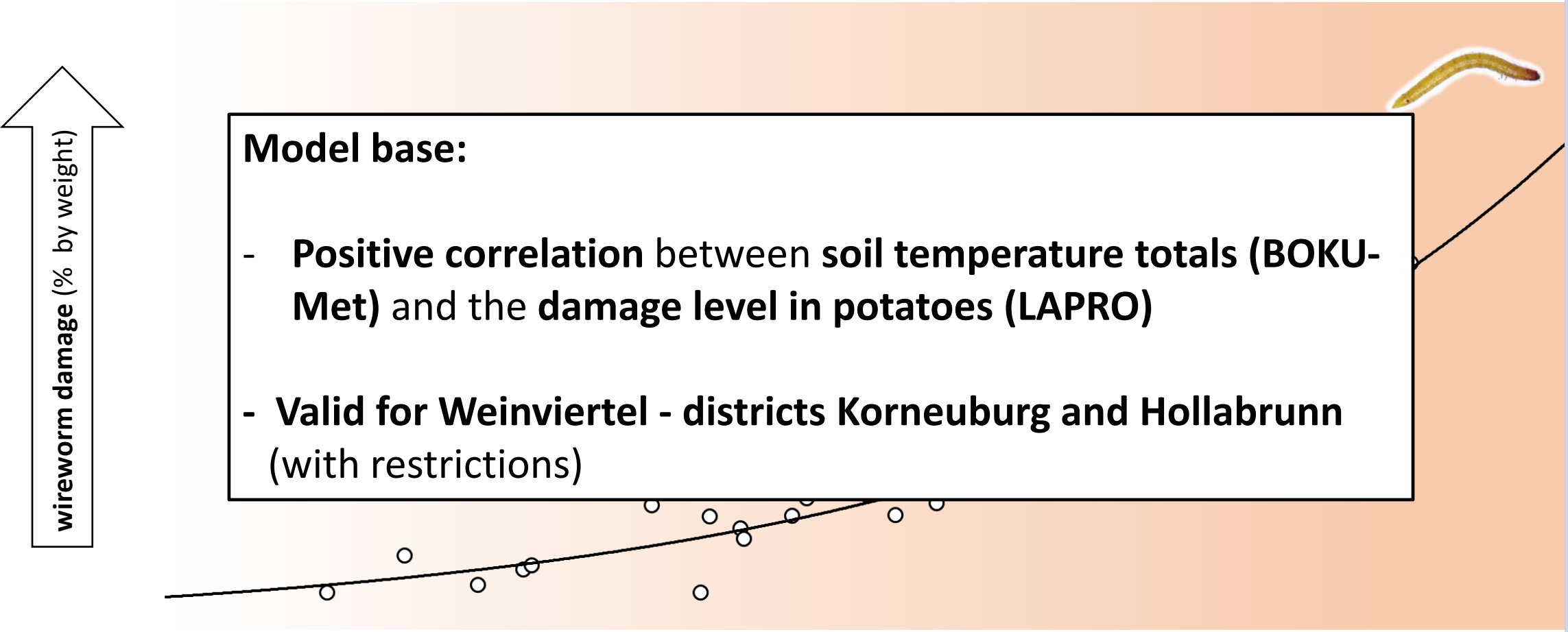
Damage data: LAPRO (anonymised database)

Ingenieurbüro für Biologie MELES

BOKU UNIVERSITY Met

klima+ energie fonds

Wireworm damage in potatoes (early - medium-early varieties)
valid for region: "Weinviertel" (especially district Korneuburg)

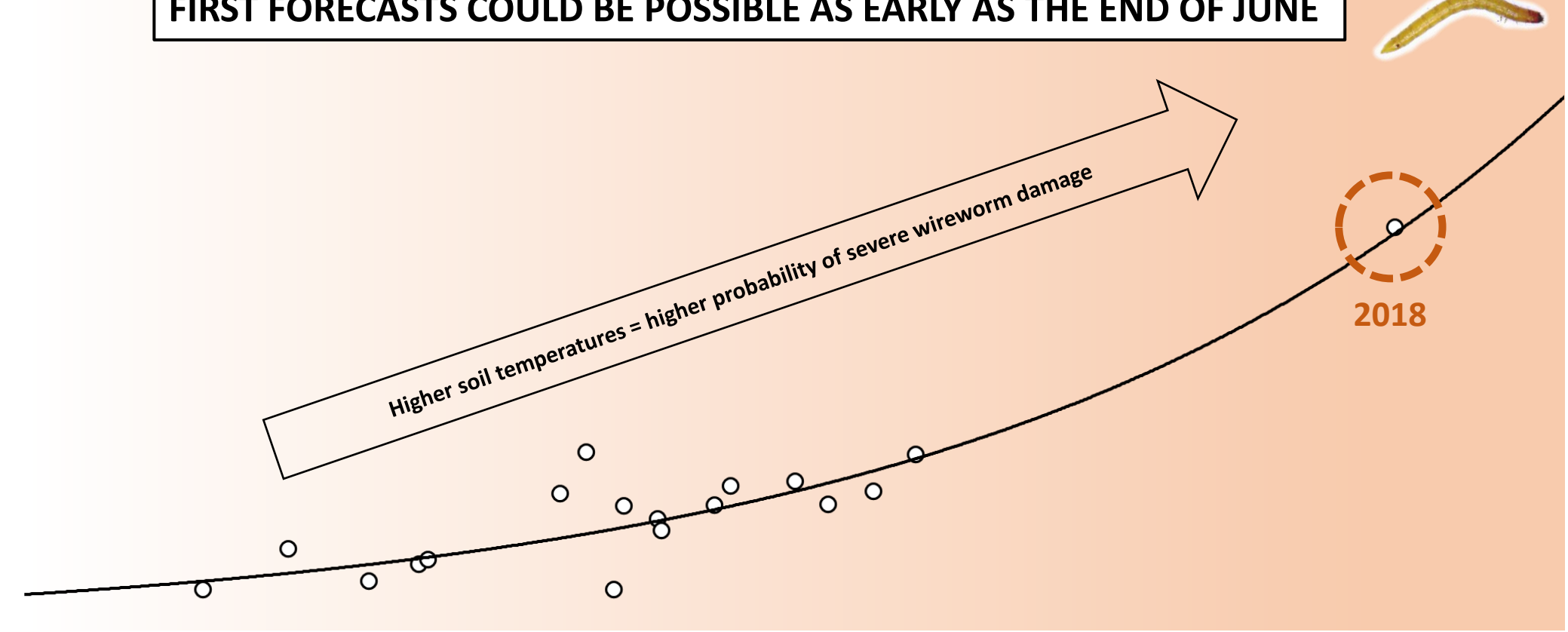


Damage data: LAPRO (anonymised database)

Sum of soil temperature (30 cm) from the beginning of January to the end of October (°C)

Wireworm damage in potatoes (early - medium-early varieties)
valid for region: "Weinviertel" (especially district Korneuburg)

FIRST FORECASTS COULD BE POSSIBLE AS EARLY AS THE END OF JUNE



Damage data: LAPRO (anonymised database)

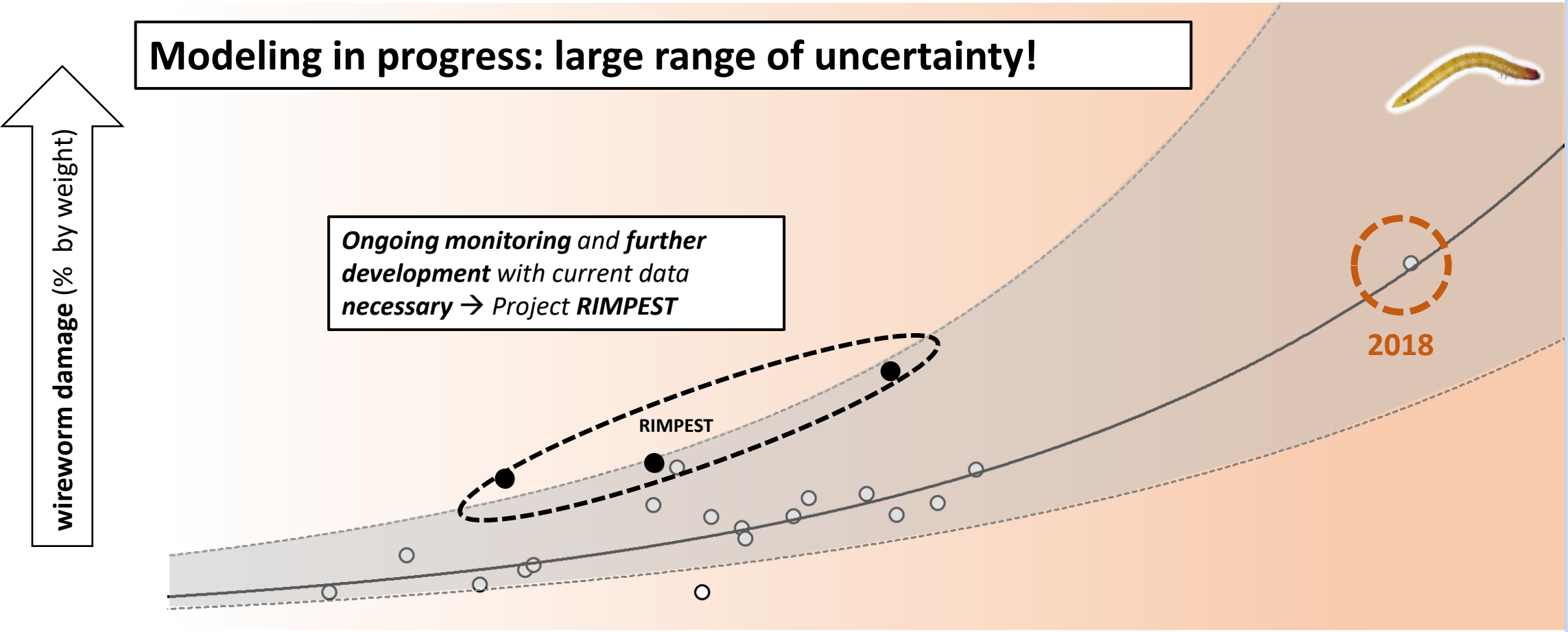
Ingenieurbüro für Biologie MELES

BOKU UNIVERSITY Met

klima+ energie fonds

Wireworm damage in potatoes (early - medium-early varieties)
valid for region: "Weinviertel" (especially district Korneuburg)

Modeling in progress: large range of uncertainty!



Ingenieurbüro für Biologie MELES

BOKU UNIVERSITY Met

klima+ energie fonds




Thank you!



Austrian Agency for Health
and Food Safety

Mag. Katharina WECHSELBERGER
Senior Expert

Spargelfeldstraße 191
A-1220 Vienna
T +43 (0) 505 55 33327
katharina.wechselberger@ages.at

www.ages.at