Cluster project VITIFIT: Current results on copper reduction from vineyard and greenhouse trials

Way forward in organic plant health care strategies

Online Conference – November 17, 2022

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Bundesministerium für Ernährung und Landwirtschaft

BÖL Bundesprogramm Ökologischer Landbau

aufgrund eines Beschlusses des Deutschen Bundestages

Efficacy of CuCaps against *Plasmopara viticola*

Ottmar Baus

17.11.2022

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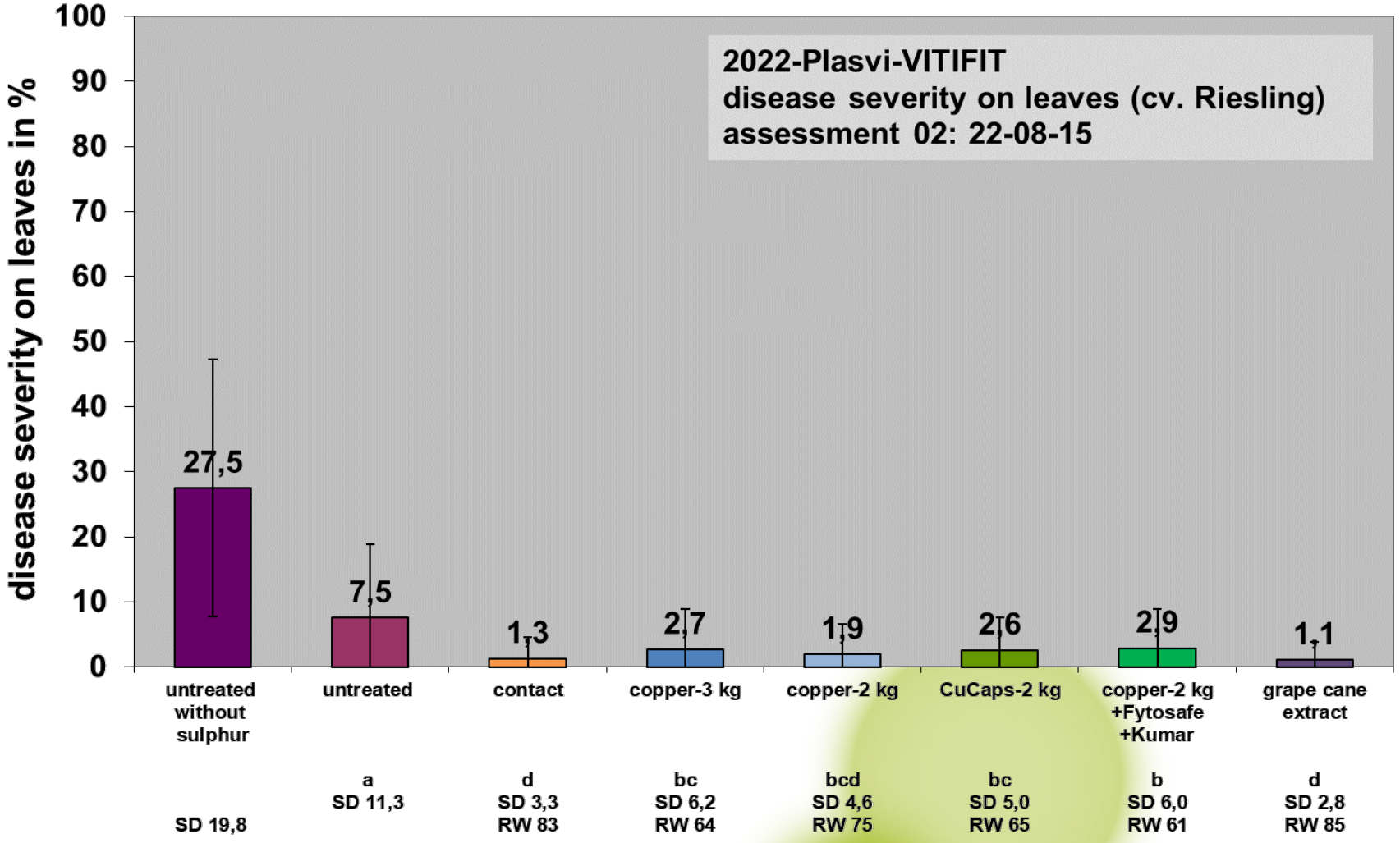
Trial data

applications	8 (24 May to 04 August 2022)
interval	10 days
inoculation date	23 May 2022
cultivar	Riesling
disease pressure	low
assessment dates	12 July 2022, 15 August 2022

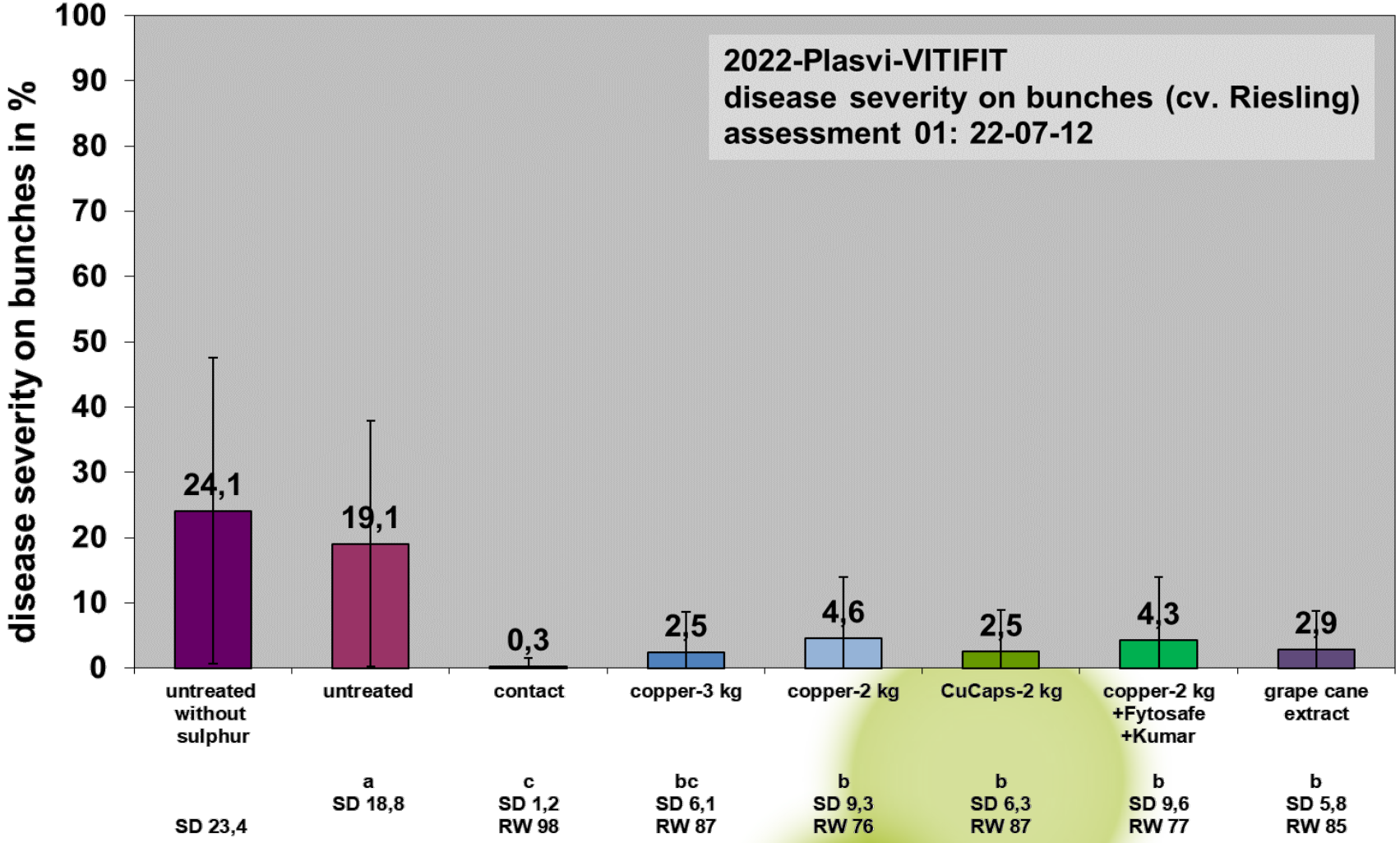
Application gear

All applications with
a pneumatic application gear
(by Schachtner©)

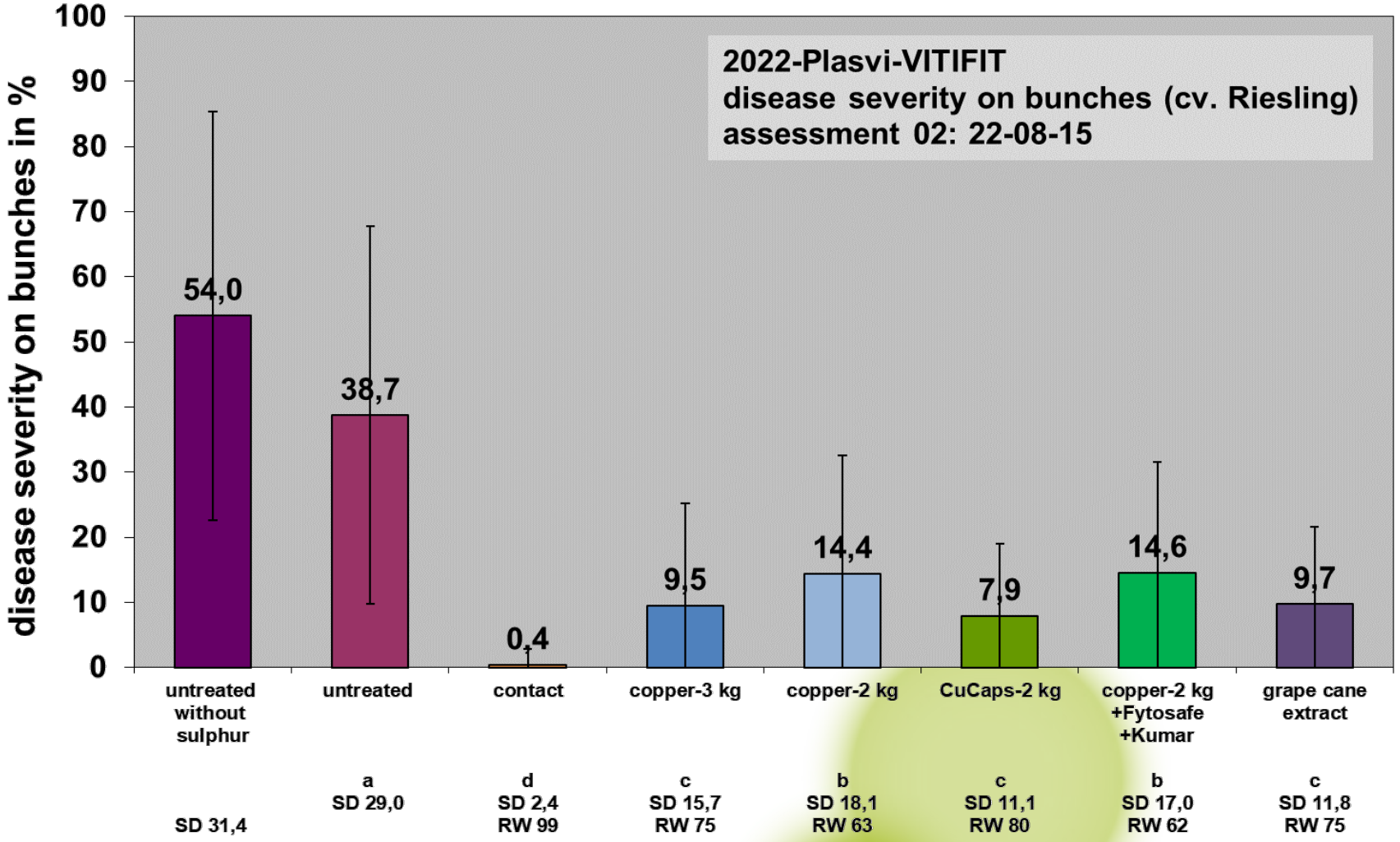
Disease severity on leaves – Assessment 02



Disease severity on bunches – Assessment 01



Disease severity on bunches – Assessment 02



CuCaps – microencapsulated copper salts for improved efficacy against grapevine downy mildew

Dr. Stefan Schwab

17.11.2022

www.fau.de

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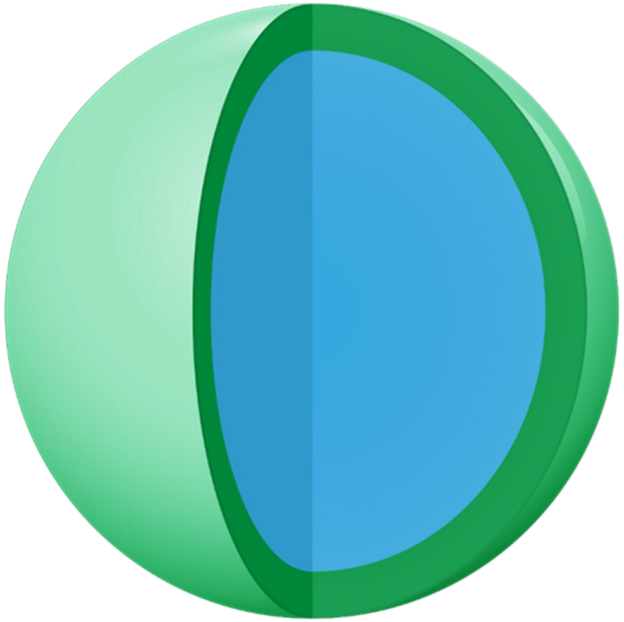
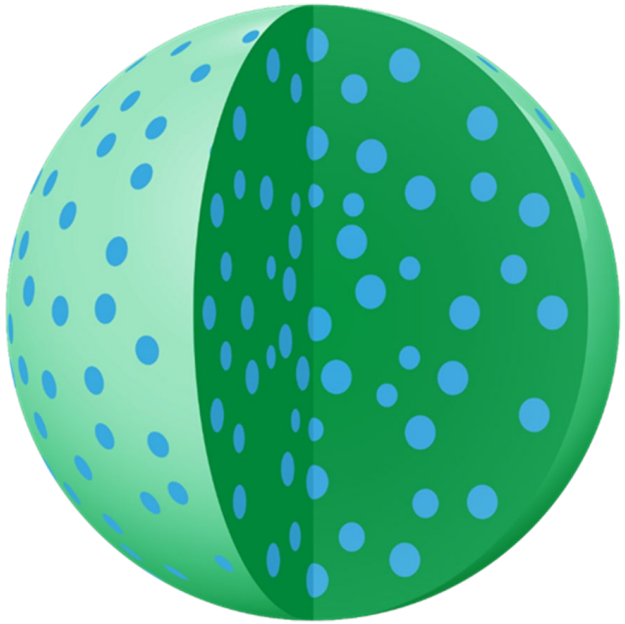
Basic structures of microcapsules

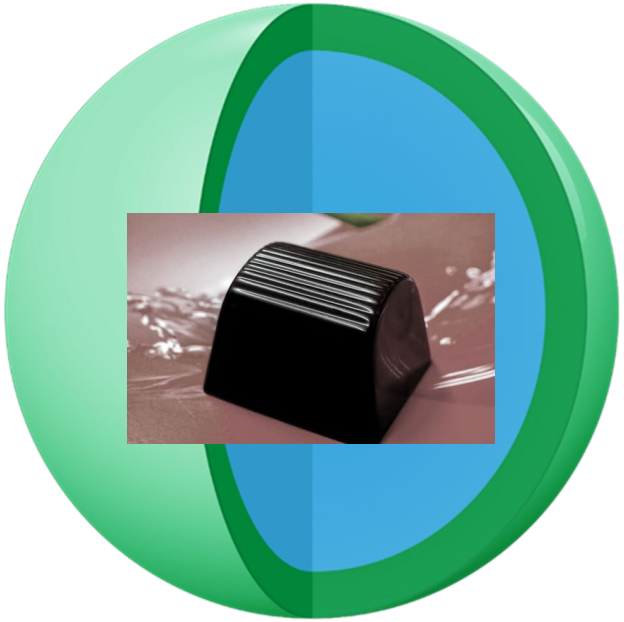


Core-shell capsule

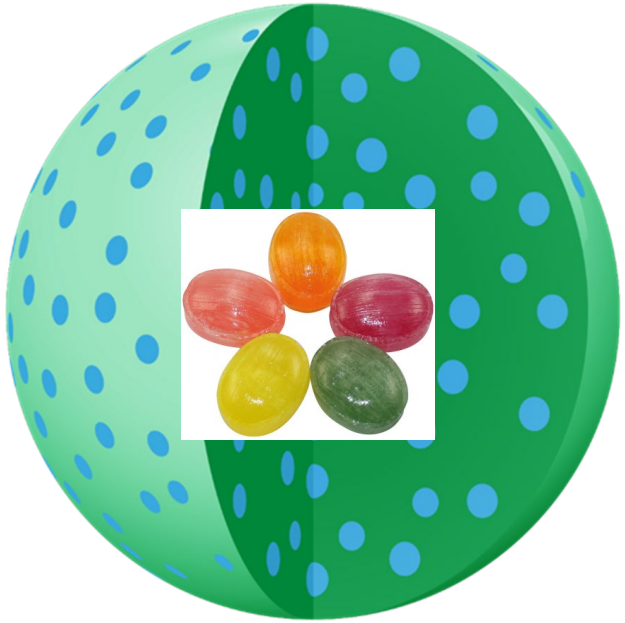


Matrix capsule

Basic structures of microcapsules

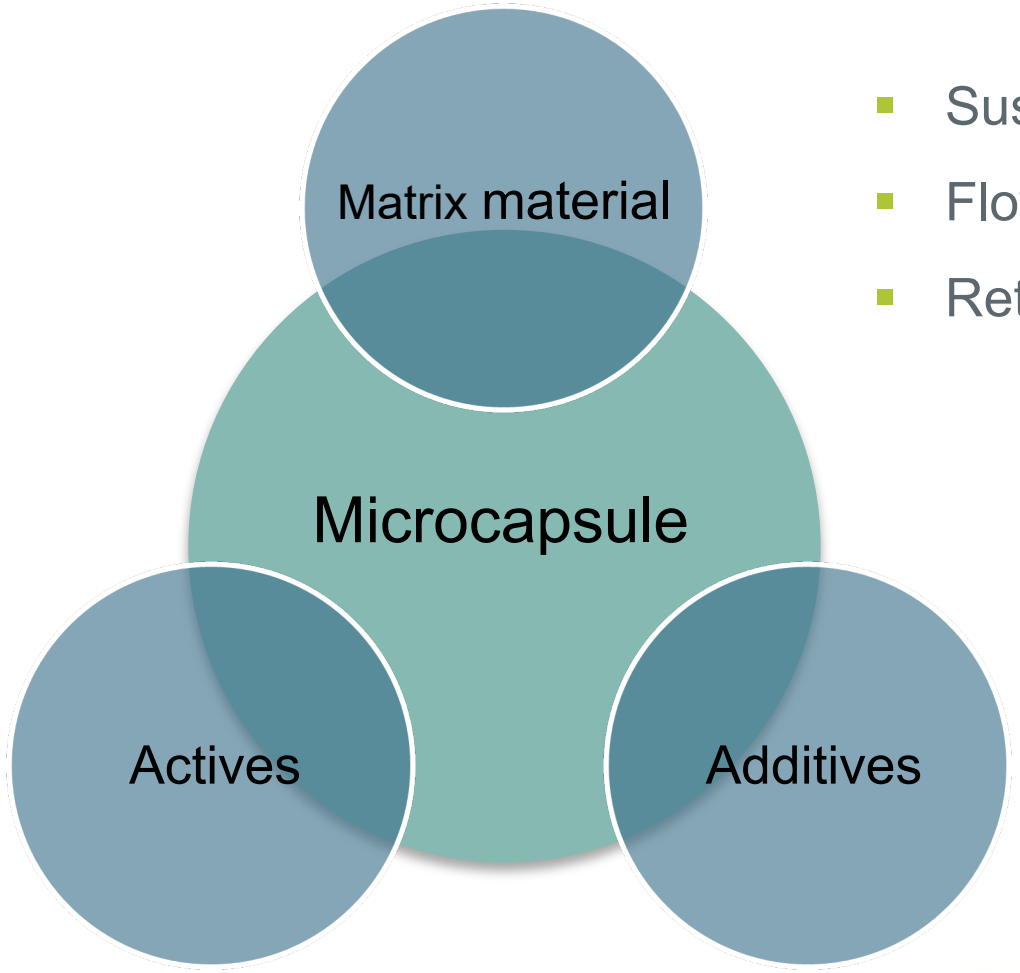


Core-shell capsule



Matrix capsule

What are microcapsules made of?



- Suspension stability
- Flowability
- Retention on the plant

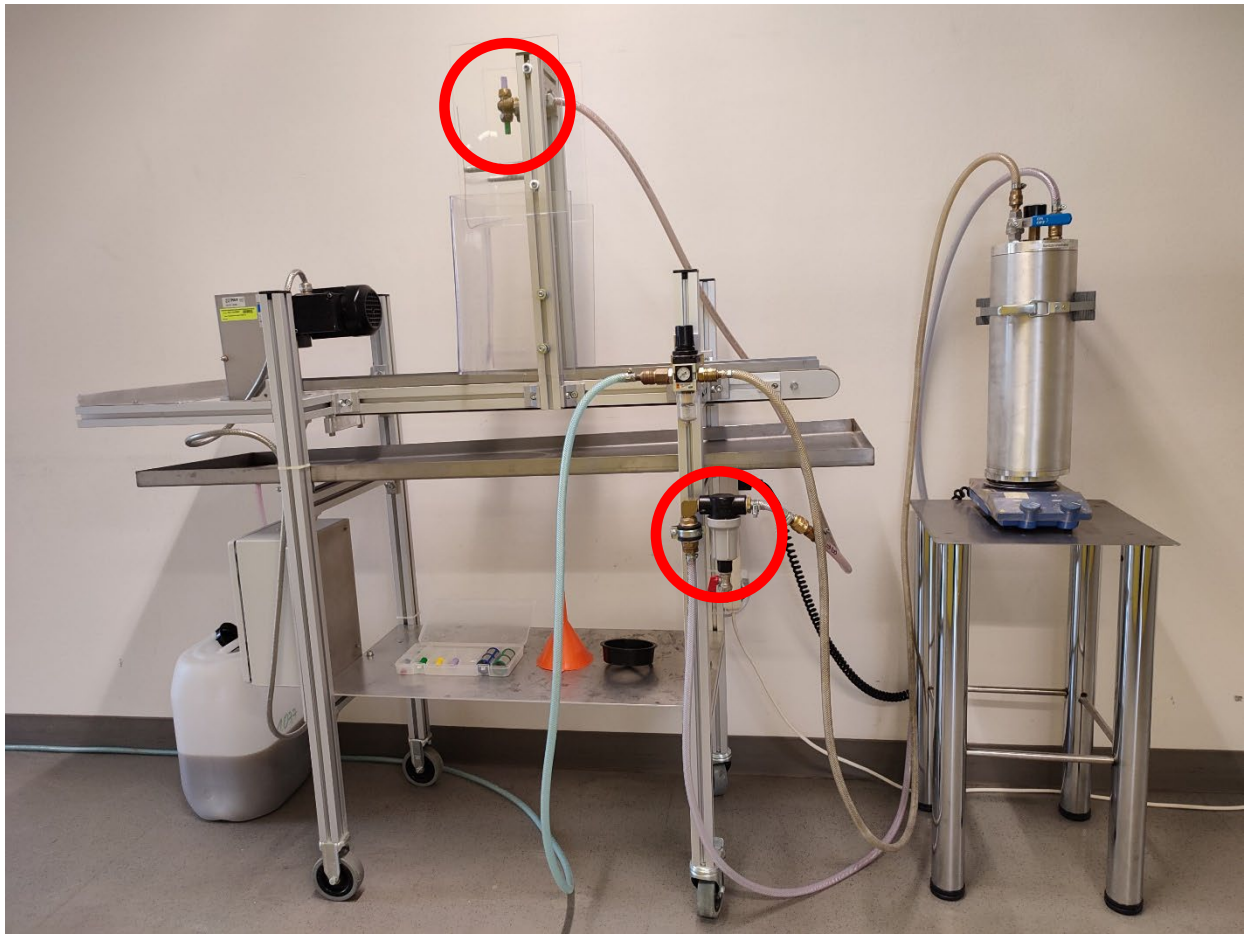
- Biological activity
- Release kinetics
- Suspensibility
- Flowability

- Suspensibility
- Release kinetics
- Bioavailability
- UV protection / antioxidation
- Particle size, morphology

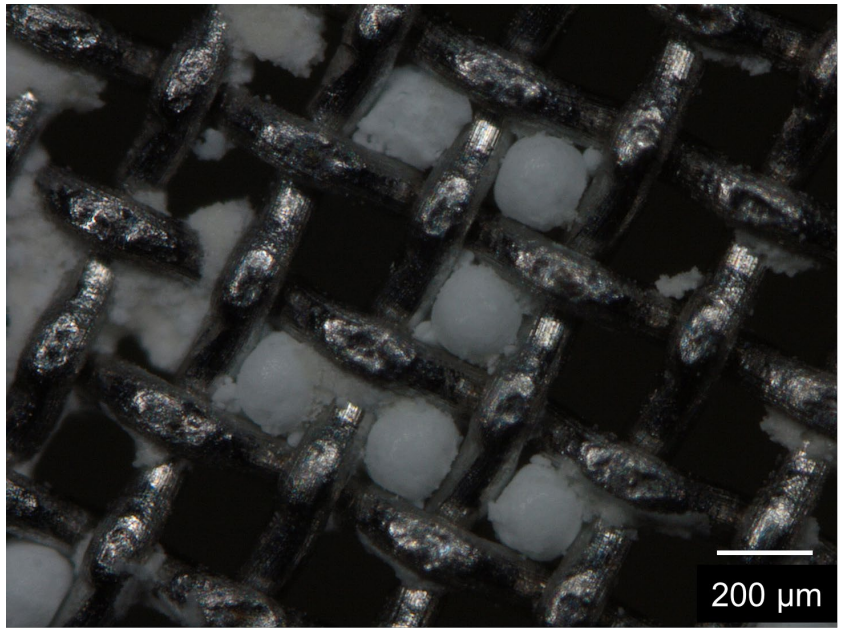
Chemical composition of the CuCaps

- Matrix material
  - Hydrogenated vegetable oil
- Additives
  - Confidential
- Actives
  - Copper sulfate
  - (Copper phosphate)

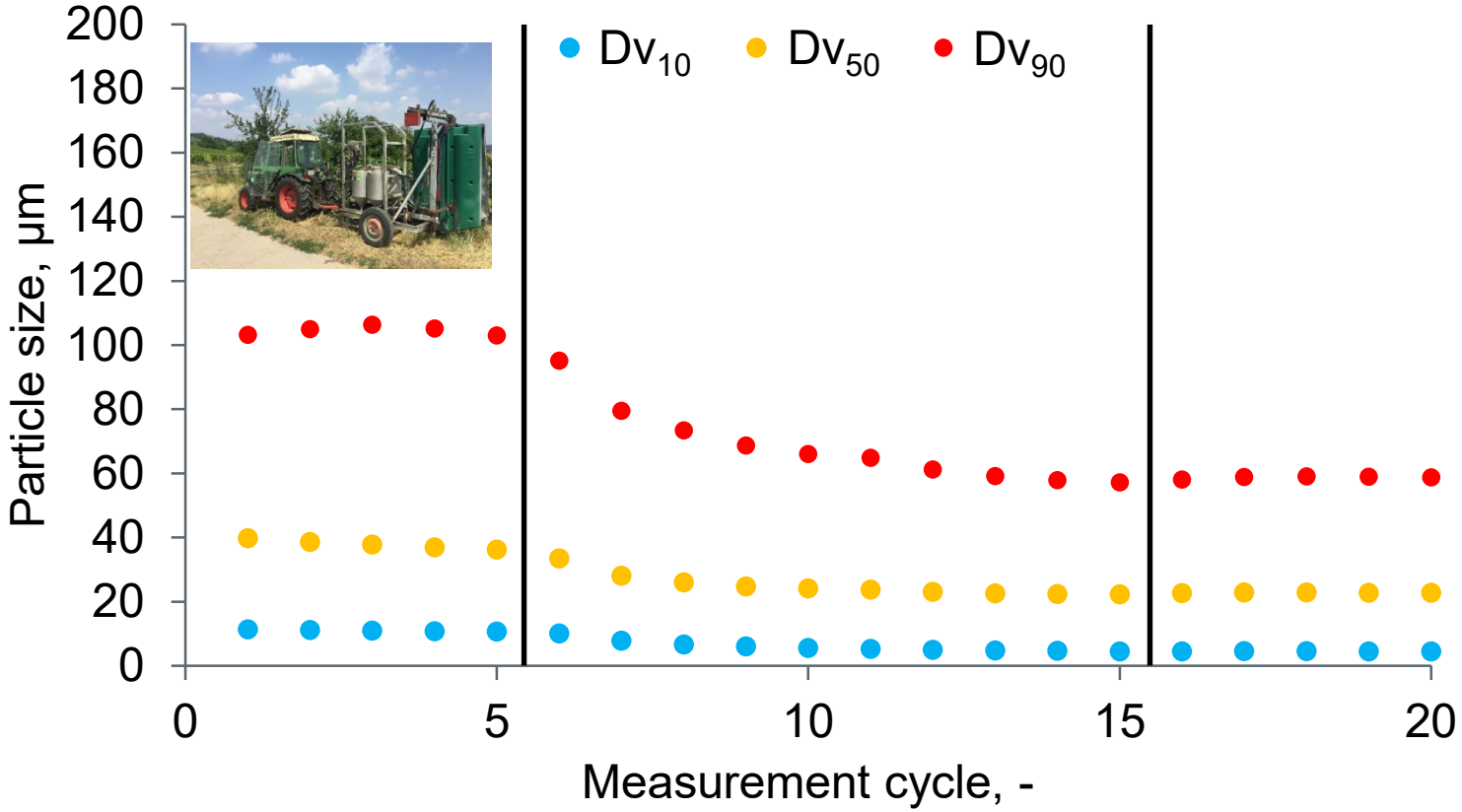
Test rig for spray solutions



- Validation of the applicability of the spray solution



Particle size analysis



All particles are less than 150 µm in size ⇒ CuCaps applicable in field sprayers

Release kinetics of the CuCaps on potted vines

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Conclusion

- CuCaps are matrix capsules produced by spray cooling
- CuCaps are mainly made of hydrogenated vegetable oils
- Copper sulfat and copper phosphate are the active ingredients
- CuCaps are water dispersible powders
- The particle size distribution allows the application in field sprayers
  - Recommendations: 50 mesh pressure filter, 25 mesh nozzle filter, (flat fan venturi nozzle)
  - Stirring the tank mix before application
- CuCaps release the active ingredients over time

Results of nonanal application against *Plasmopara viticola* on potted vines

Prof. Dr. Beate Berkelmann-Löhnertz

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www.hs-geisenheim.de

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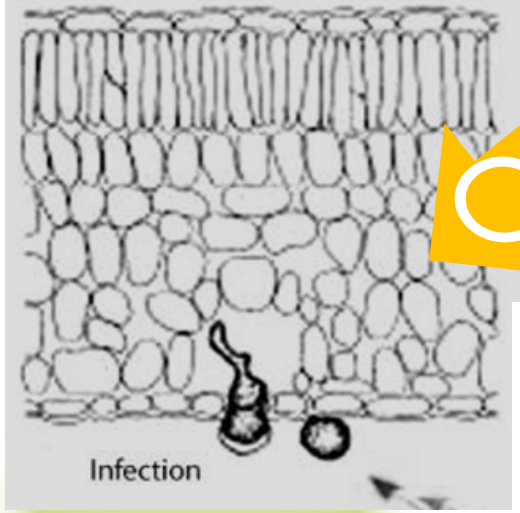
Role of nonanal in host finding

- Zoospores orient themselves towards the stomata on the basis of a nonanal gradient released via the stomata.
- External application of nonanal disturbed the gradient on the leaf surface so that zoospores could not find the stomata. This led to decreased infection rates on cv. Müller-Thurgau (Schröder 2010).



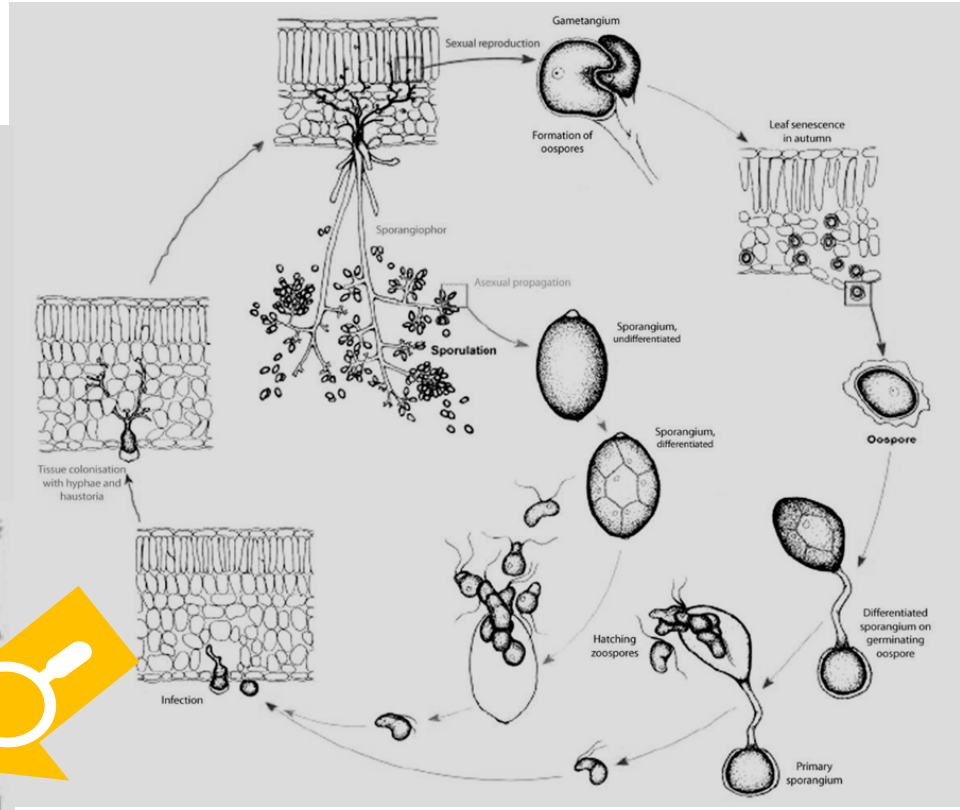
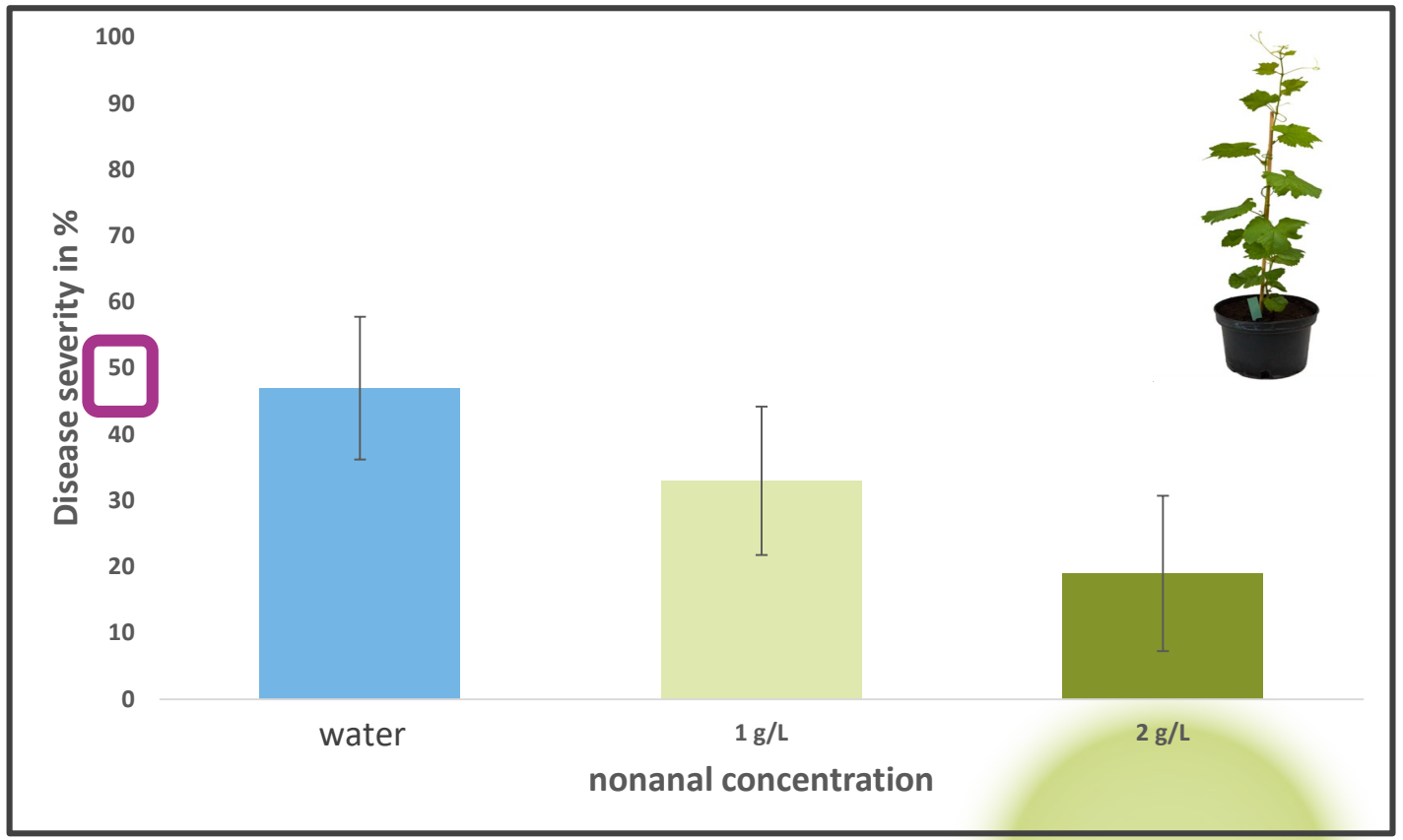


Figure: Syngenta Agro GmbH

PhD Thesis Stephan Schröder (2010):
Plant immunity as a result of co-evolution – using the pair grapevine / downy mildew as a model (KIT Karlsruhe)

Efficacy of nonanal against *Plasmopara viticola* on potted vines – **Experiment 1**

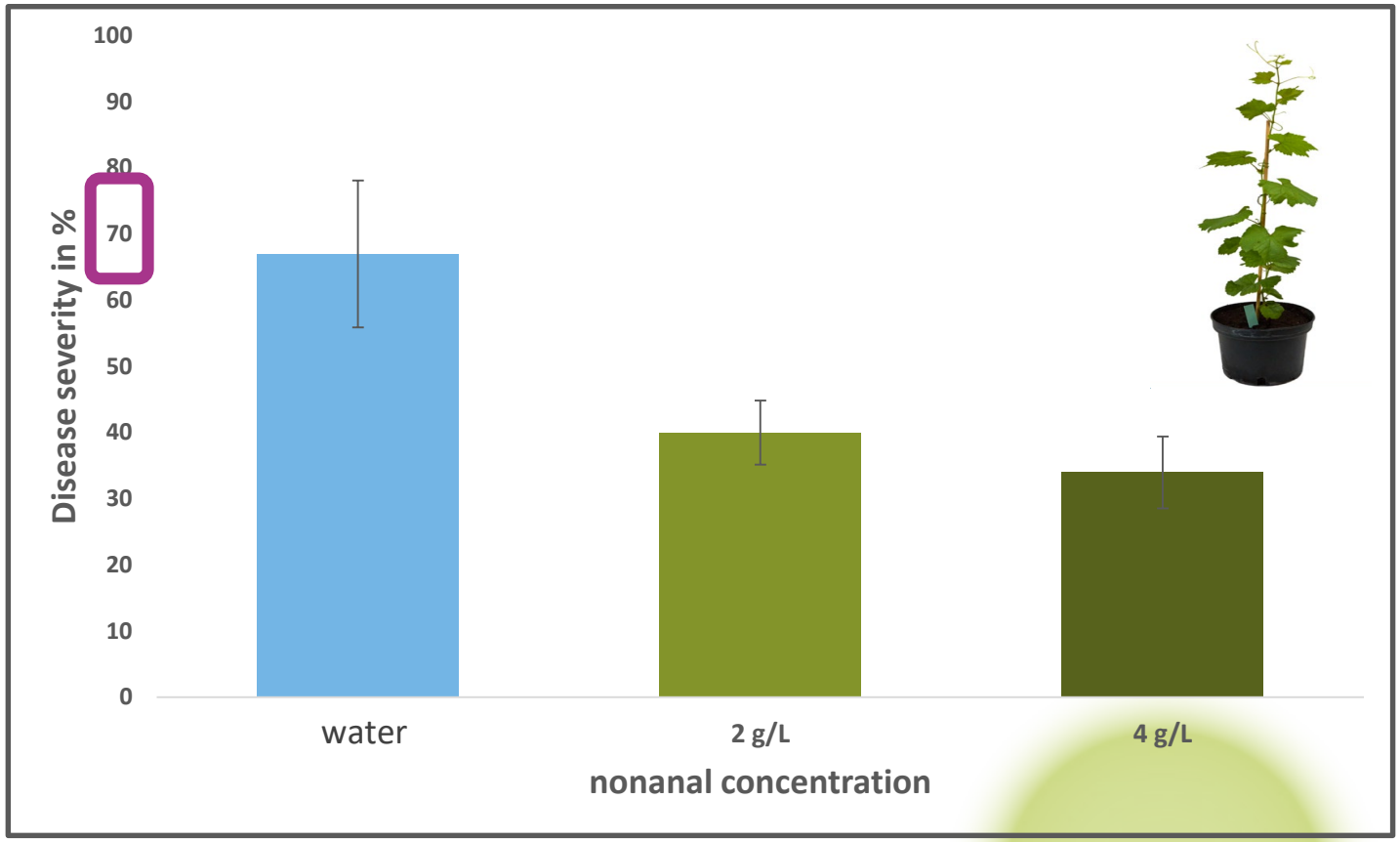


Data: B.Sc. Thesis Felix Leon Klaus, Geisenheim University

Lessons learnt:

- Protective application of nonanal led to a reduced downy mildew infection.
- A clear dose-response effect was evident.

Efficacy of nonanal against *Plasmopara viticola* on potted vines – **Experiment 2**

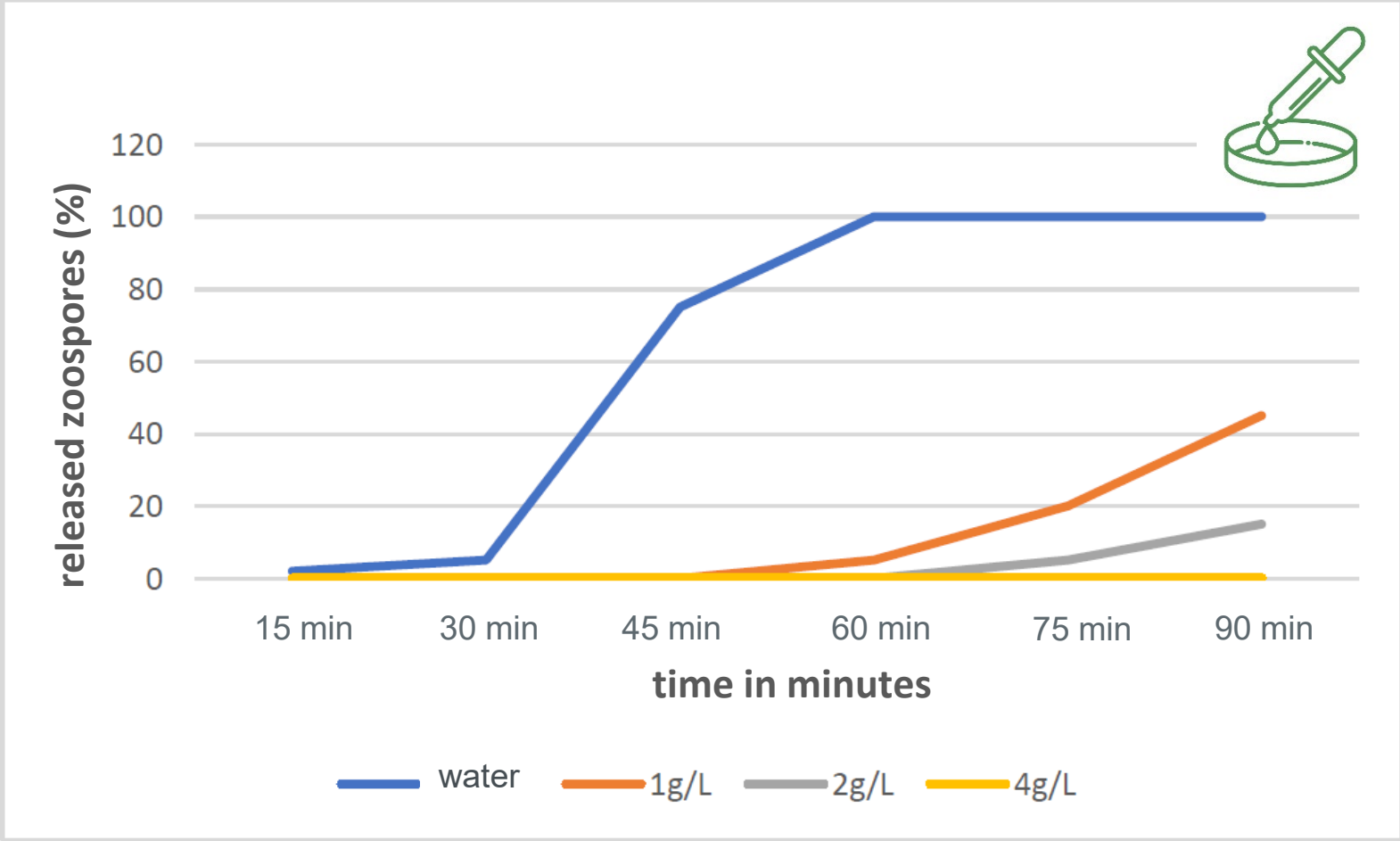


Data: B.Sc. Thesis Felix Leon Klaus, Geisenheim University

Lessons learnt:

- At higher infection level, the efficiency of nonanal decreases (67% vs. 47% disease severity).
- Even a higher nonanal concentration (4 g/L) could only reduce the infestation to half.

Zoospore release under nonanal exposure

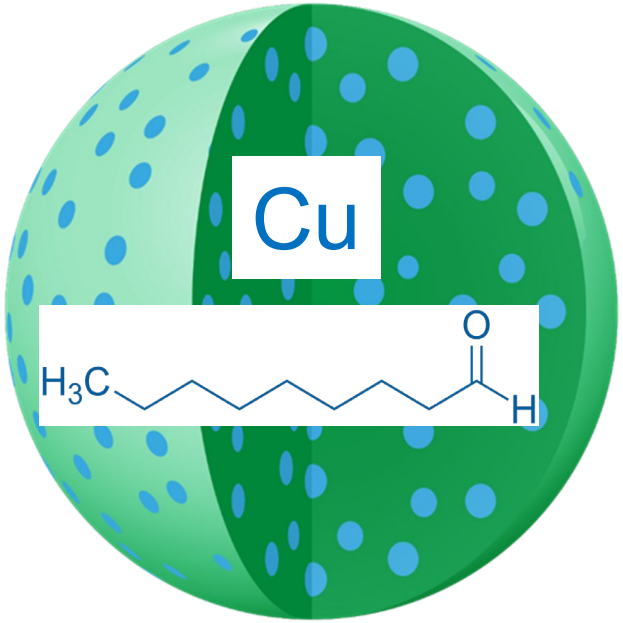


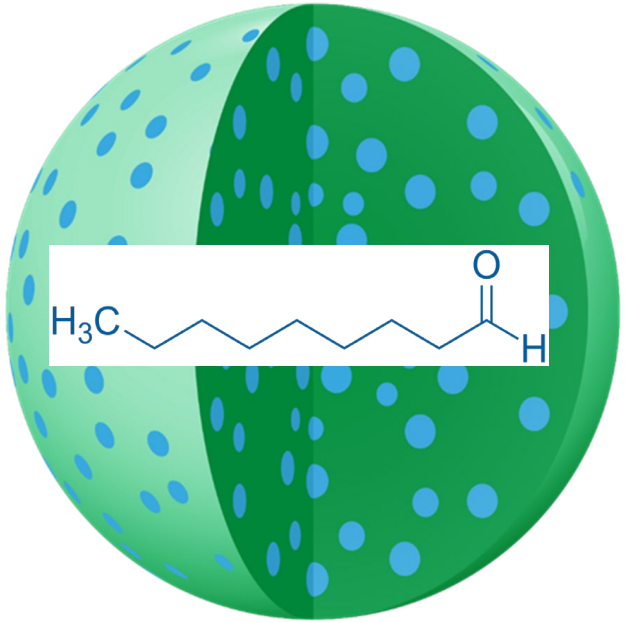
Data: B.Sc. Thesis Felix Leon Klaus, Geisenheim University

Lesson learnt:

In addition to the alteration of the natural nonanal gradient by an external application of nonanal, there also appears to be a direct effect of the substance against *P. viticola*.

Next steps and Outlook – Nonanal





Matrix capsule with

low copper concentration + Nonanal

Matrix capsule with

Nonanal alone

Wissenstransfer VITIFIT

Project funding

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Thank you for your attention!

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