

RNA-(Spray)-basierter Pflanzenschutz

GENE
EDITING



GENE
SILENCING

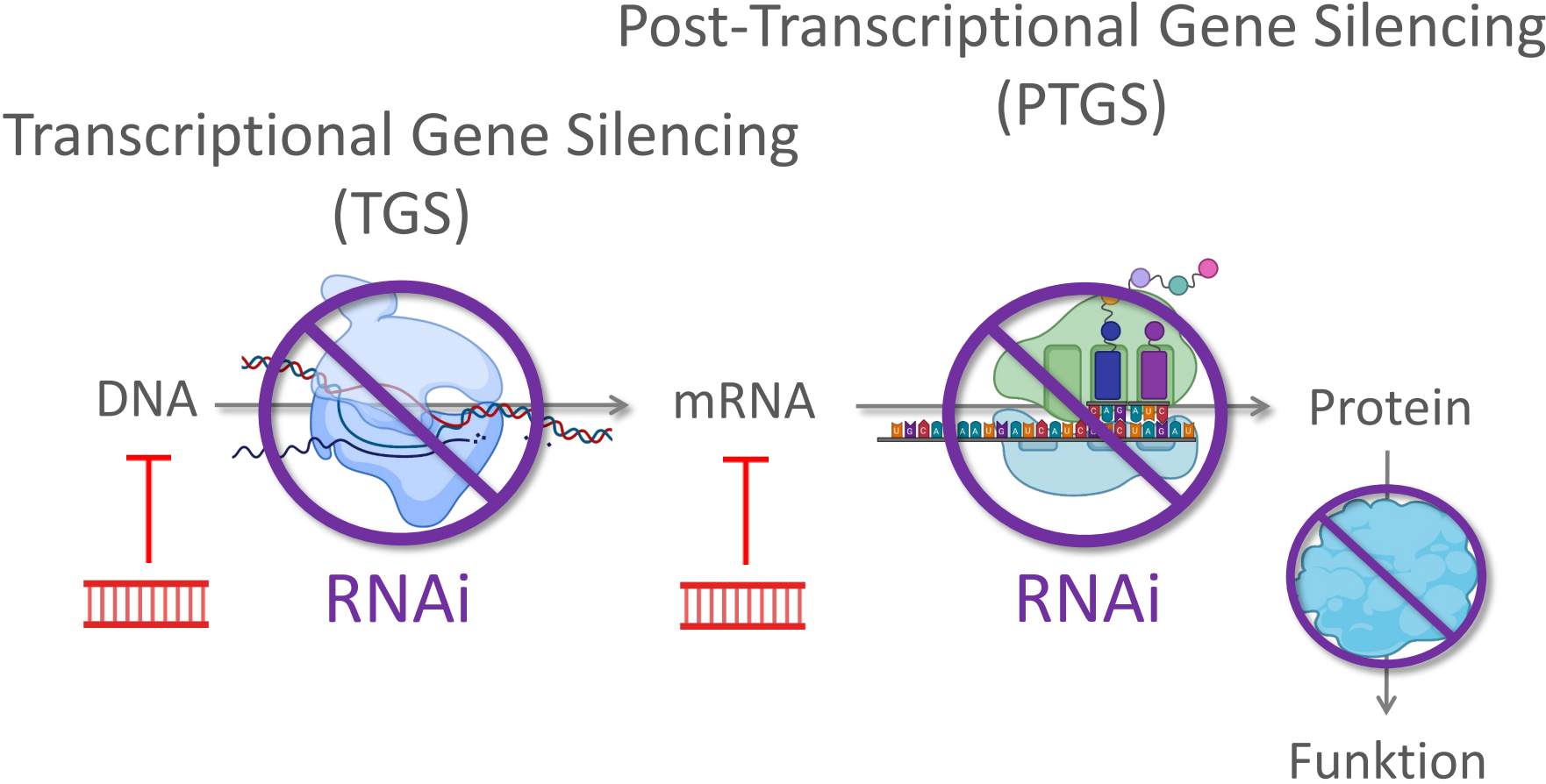


GENE
EXPRESSION



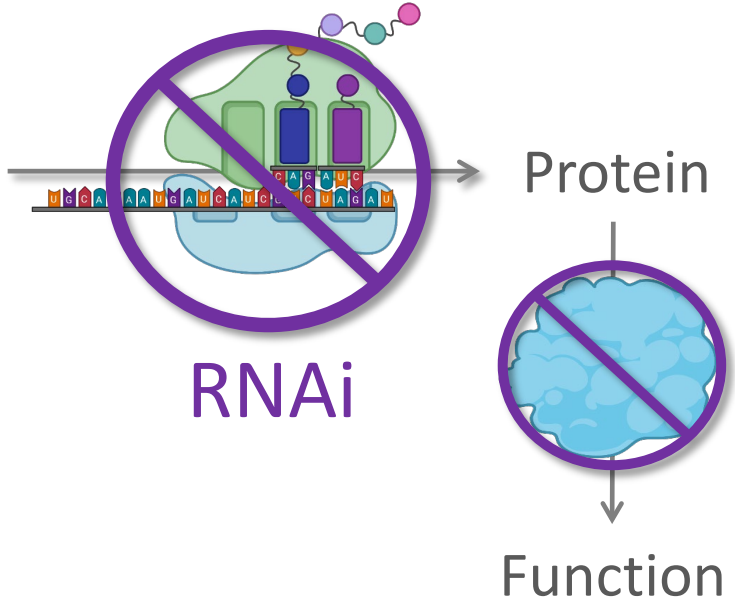
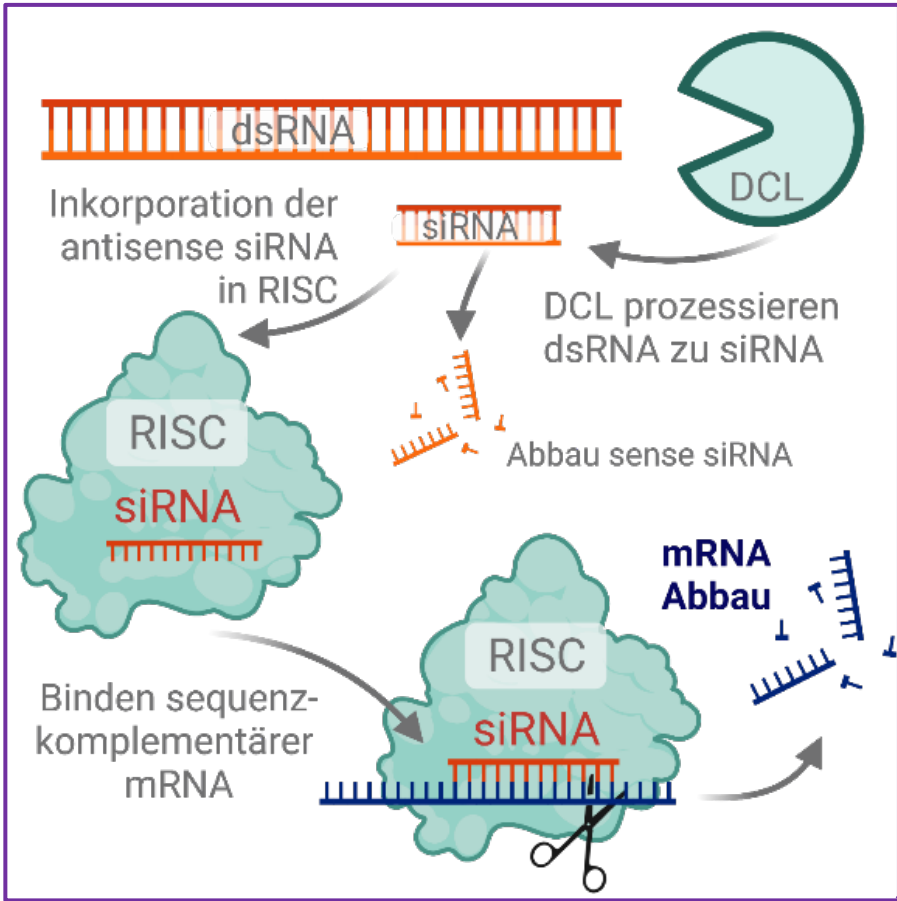
RNA Interferenz (RNAi) & Pflanzenschutz

Genregulation durch **kleine RNAs**

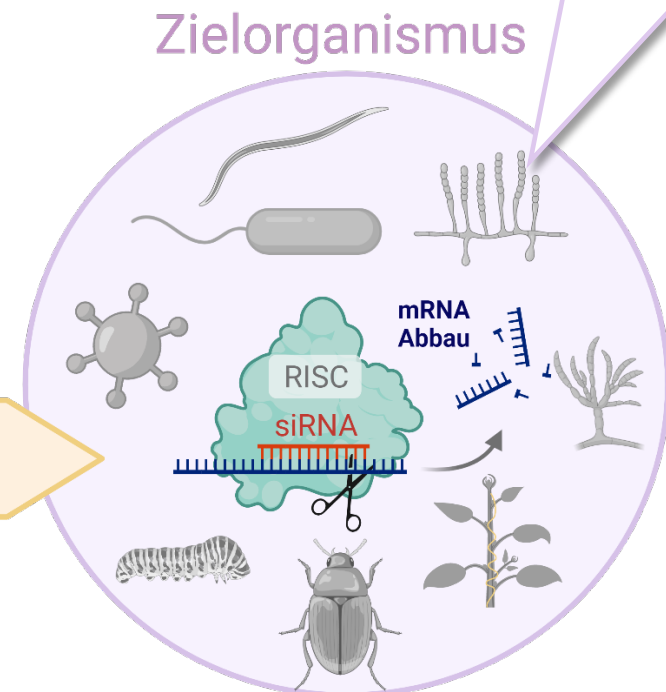
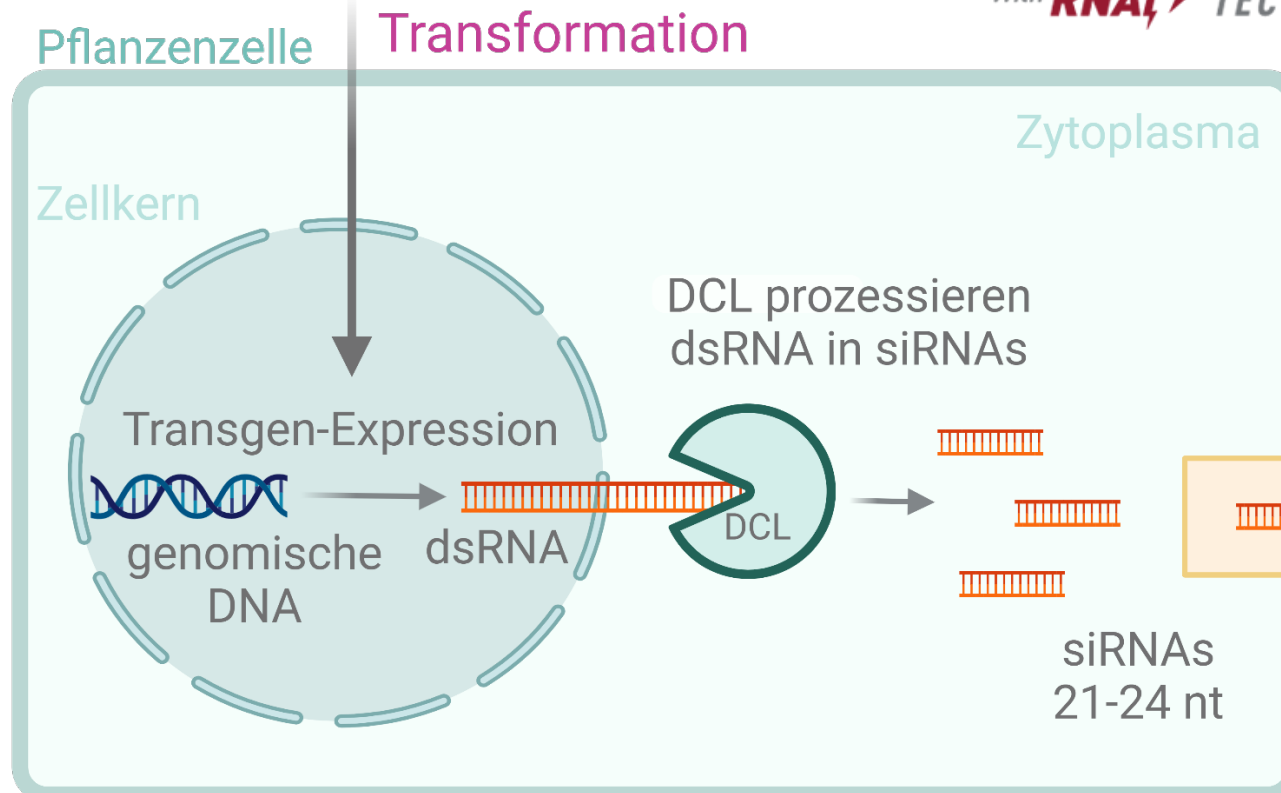
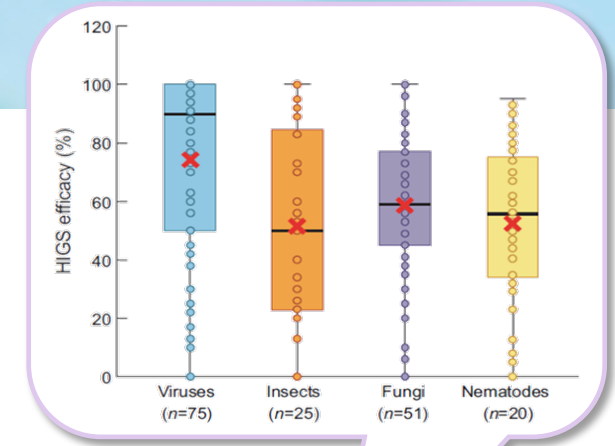


RNA Interferenz (RNAi) & Pflanzenschutz

Post-Transcriptional Gene Silencing (PTGS)



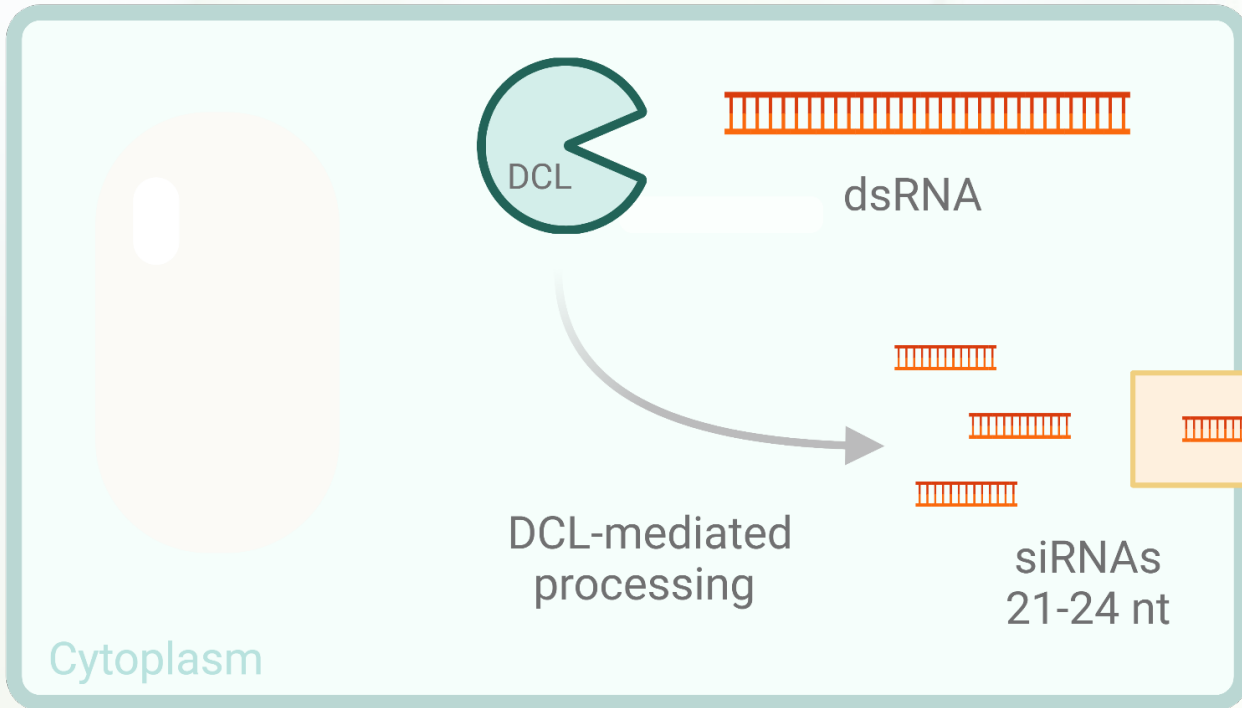
Host-induced gene silencing (HIGS)



Spray-induced gene silencing (SIGS)



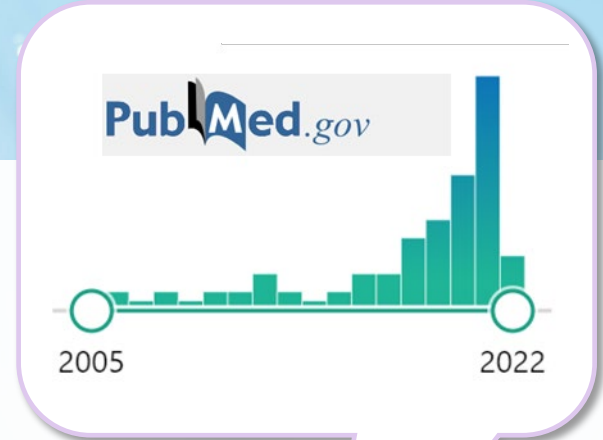
Plant cell



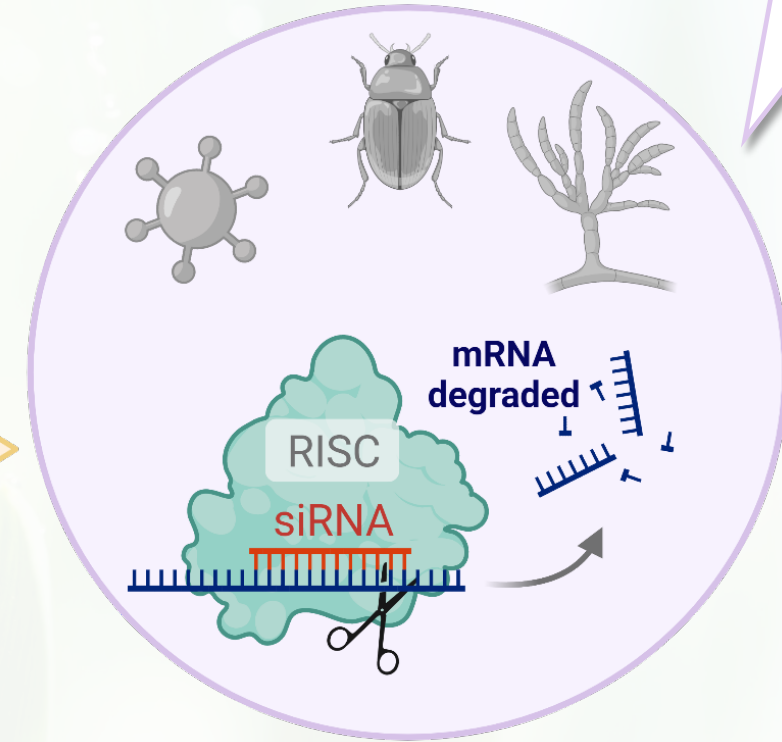
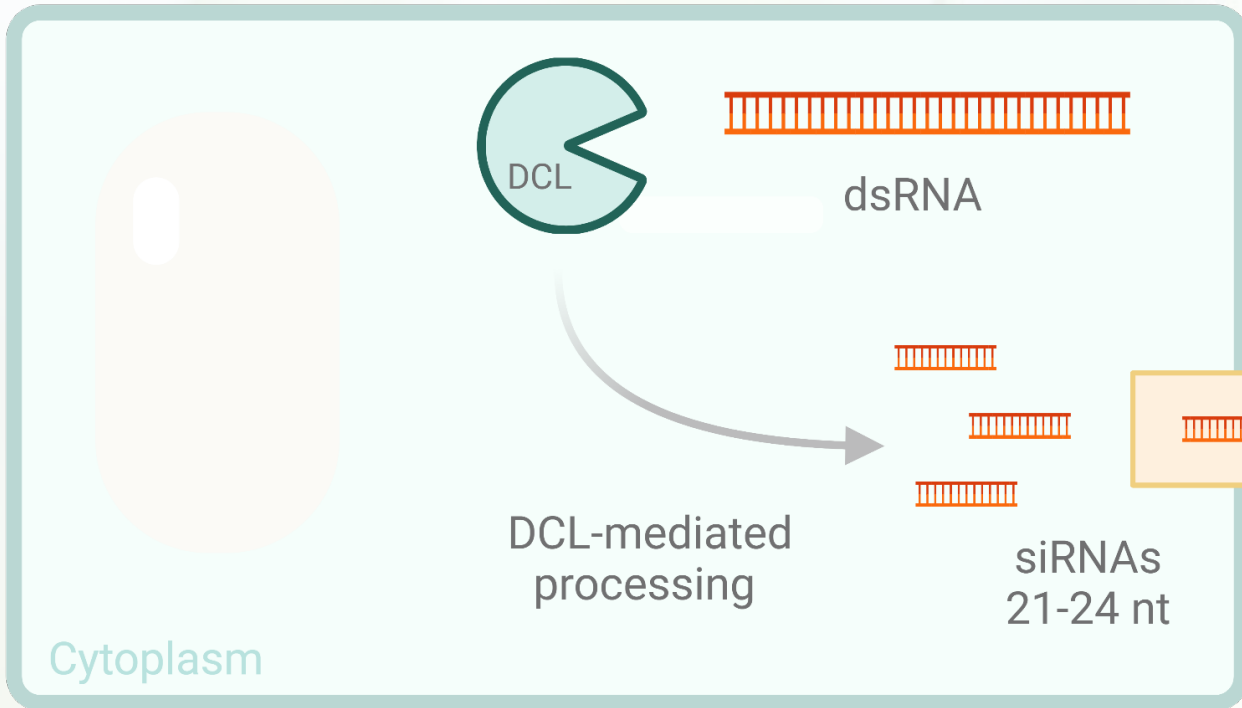
Spray-induced gene silencing (SIGS)



Plant cell



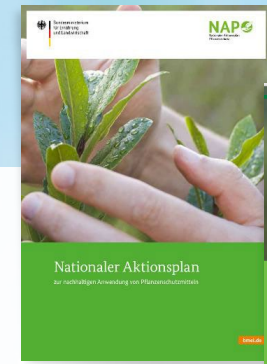
Target organism





Vom Labor ins Freiland
Kontrollierte versus unkontrollierbare Bedingungen

Mikroverkapselung – Verbundprojekt ho[RtikulturNA]

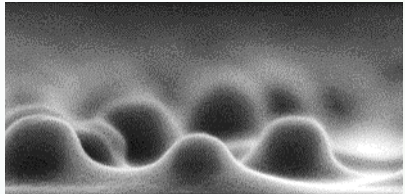


Bundesministerium
für Ernährung
und Landwirtschaft

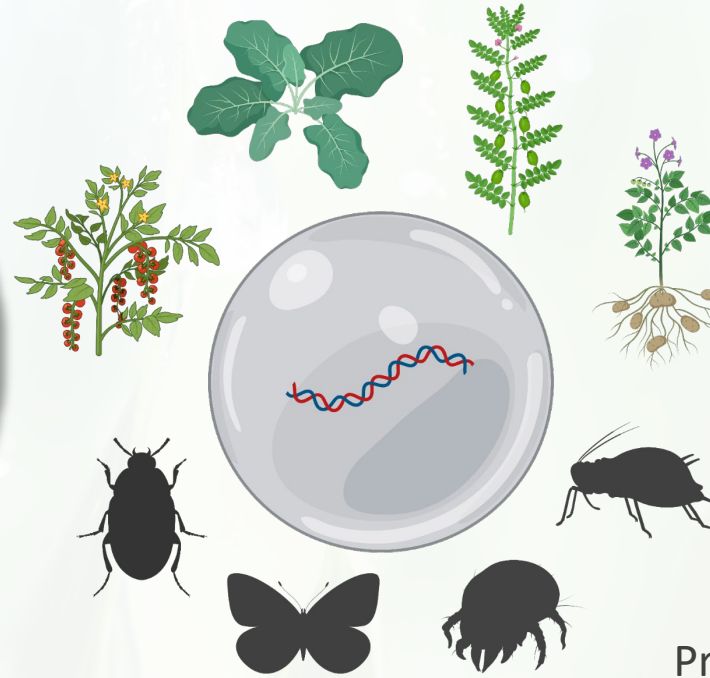
10/2021 – 09/2024

- National Action Plan on the Sustainable Use of Plant Protection Products
 - Förderung von Innovationen nicht-chemischer Pflanzenschutzmittel

Microgel-Container mediated delivery and release



Meurer,..., Pich (2017), Angewandte Chemie



DWI Leibniz-Institut
für Interaktive Materialien

Prof. Pich
Functional and Interactive Polymers



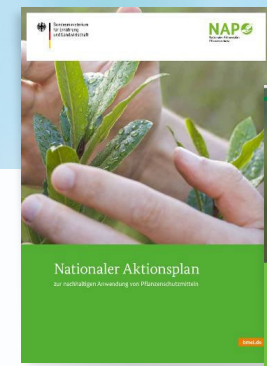
UNIVERSITÄT
HOHENHEIM

Prof. Petschenka
Applied Entomology

RWTHAACHEN
UNIVERSITY

Prof. Conrath
Biochemistry and Molecular Biology of Plants

Mikroverkapselung – Verbundprojekt ho[RtikulturNA]



Bundesministerium
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und Landwirtschaft

- National Action Plan on the Sustainable Use of Plant Protection Products
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10/2021 – 09/2024

Microgel-Container mediated delivery and release



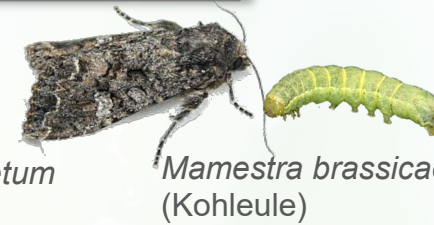
Plutella xylostella
(Kohlschabe)



Spodoptera exigua
(Zuckerrübeneule)



Agrotis segetum
(Saateule)



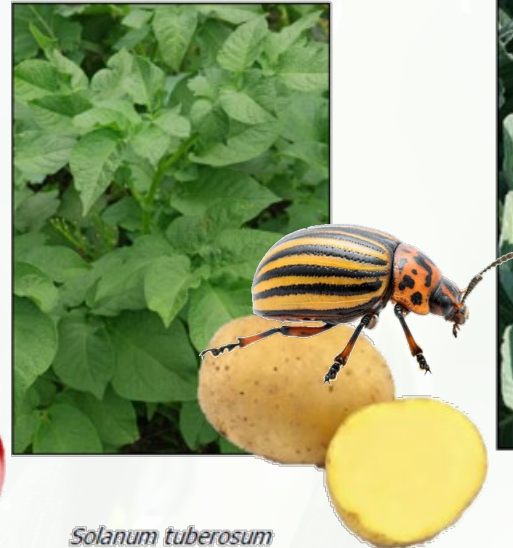
Mamestra brassicae
(Kohleule)



Phaseolus vulgaris



Solanum lycopersicum



Solanum tuberosum



Brassica oleracea

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Makroverkapselung – Verbundprojekt SAFEbugBeads



Baden-Württemberg

MINISTERIUM FÜR LÄNDLICHEN RAUM
UND VERBRAUCHERSCHUTZ

12/2020 – 12/2023

Bioökonomie
Baden-Württemberg



KATZ BIOTECH AG



UNIVERSITÄT
HOHENHEIM

Prof. Petschenka
Applied Entomology



Makroverkapselung – Verbundprojekt SAFEbugBeads



Baden-Württemberg

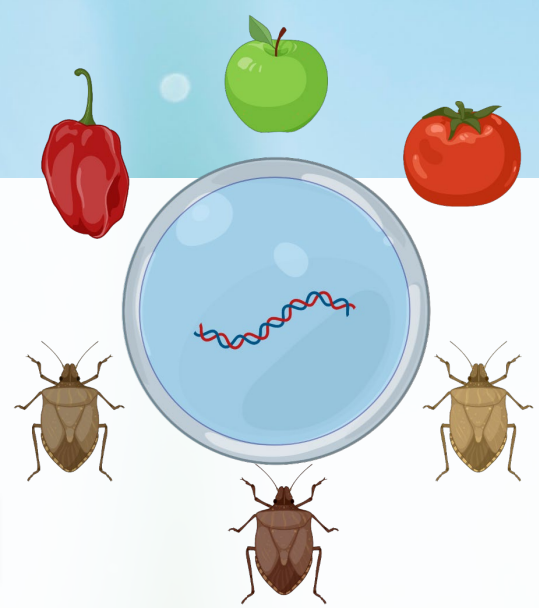
STATE MINISTRY FOR RURAL AREAS,
NUTRITION AND CONSUMER PROTECTION

Bioökonomie
Baden-Württemberg



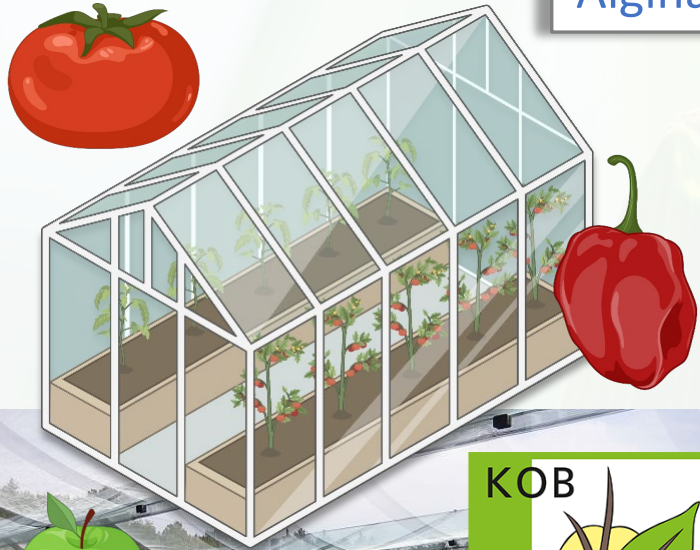
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Prof. Petschenka
Applied Entomology

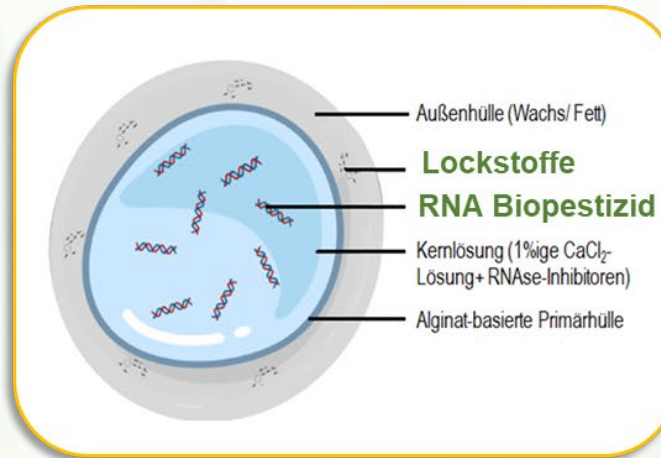


12/2020 – 12/2023

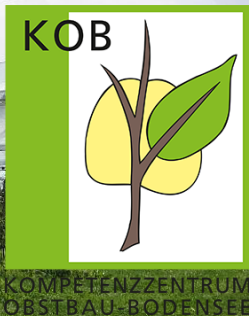
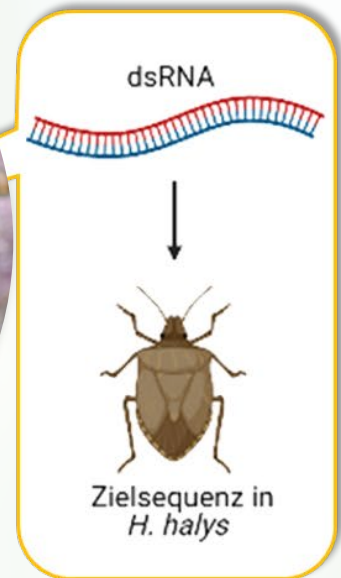
Alginate-based capsule shell with species-specific attractants



Alginatbasierte 'Attract and Kill'-Kapsel



RNAi Wirkweise



RNA-(Spray)-basierter Pflanzenschutz

GENE
EDITING



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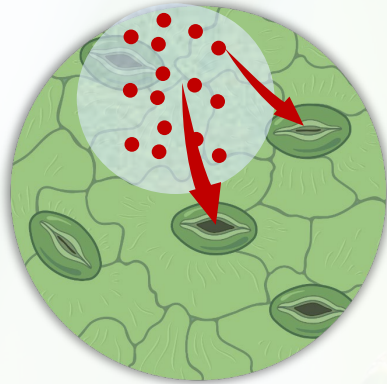


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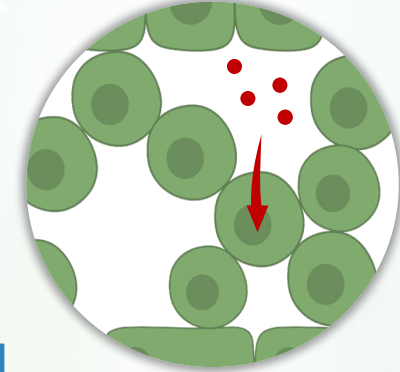




CUTICULAR UPTAKE



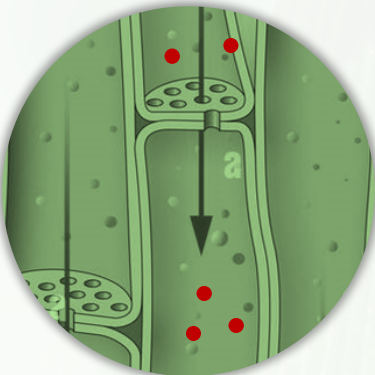
CELLULAR UPTAKE



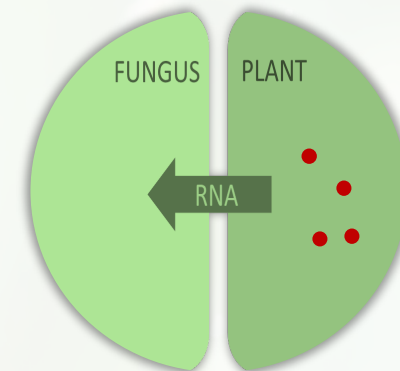
FORMULIERUNGEN



SYSTEMIC TRANSPORT



INTER-SPECIES TRANSPORT



Danke für Ihre Aufmerksamkeit!

Prof. Dr. Ralf T. Vögele



UNIVERSITÄT
HOHENHEIM

Koch lab

Timo Schlemmer
Ann-Kathrin Hinrichs
Alexandra Schmidt
Anna-Maria Göbel
Aline Pereira Rank
Venkata Amineni
Naveed Anjum
Anja Kühne
Andreas Zimmermann
Maxi Riedel



Bundesministerium
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und Landwirtschaft



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VECTOR
STIFTUNG

DWI Leibniz-Institut
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RWTHAACHEN
UNIVERSITY



Bayer CropScience

syngenta



KOMPETENZZENTRUM
OBSTBAU-BODENSEE



KATZ BIOTECH AG

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Rheinhard Dammann

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Annette Becker
Katrin Ehlers

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Uwe Conrath
Patrick Schwinges

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Ralph Panstruga
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Plant Physiology (Jena)

Alexandra Furch

Microbiology

Lennart Weber

DMI Leibniz (Aachen)

Andrji Pich

MPI Jena

Axel Mithöfer

Bioinformatics

Alexander Goesmann

Lukas Jelonek

RNA-Seq (Bielefeld)

Tobias Busche

Jörn Kalinovski

Electron Microscopy

Martin Hardt

JKI Quedlinburg

Torsten Will

Adam Schikora

>>RNA STATT CHEMISCHEN PFLANZENSCHUTZ<<



>>RNA-SPRAYS GEGEN SCHÄDLINGE –
DER BIOLOGISCHE PFLANZENSCHUTZ DER ZUKUNFT?<<



>>EXOGENE ANWENDUNG VON RNA ZUR UMWELTFREUNDLICHEN BEKÄMPFUNG VON SCHADINSEKTEN<<

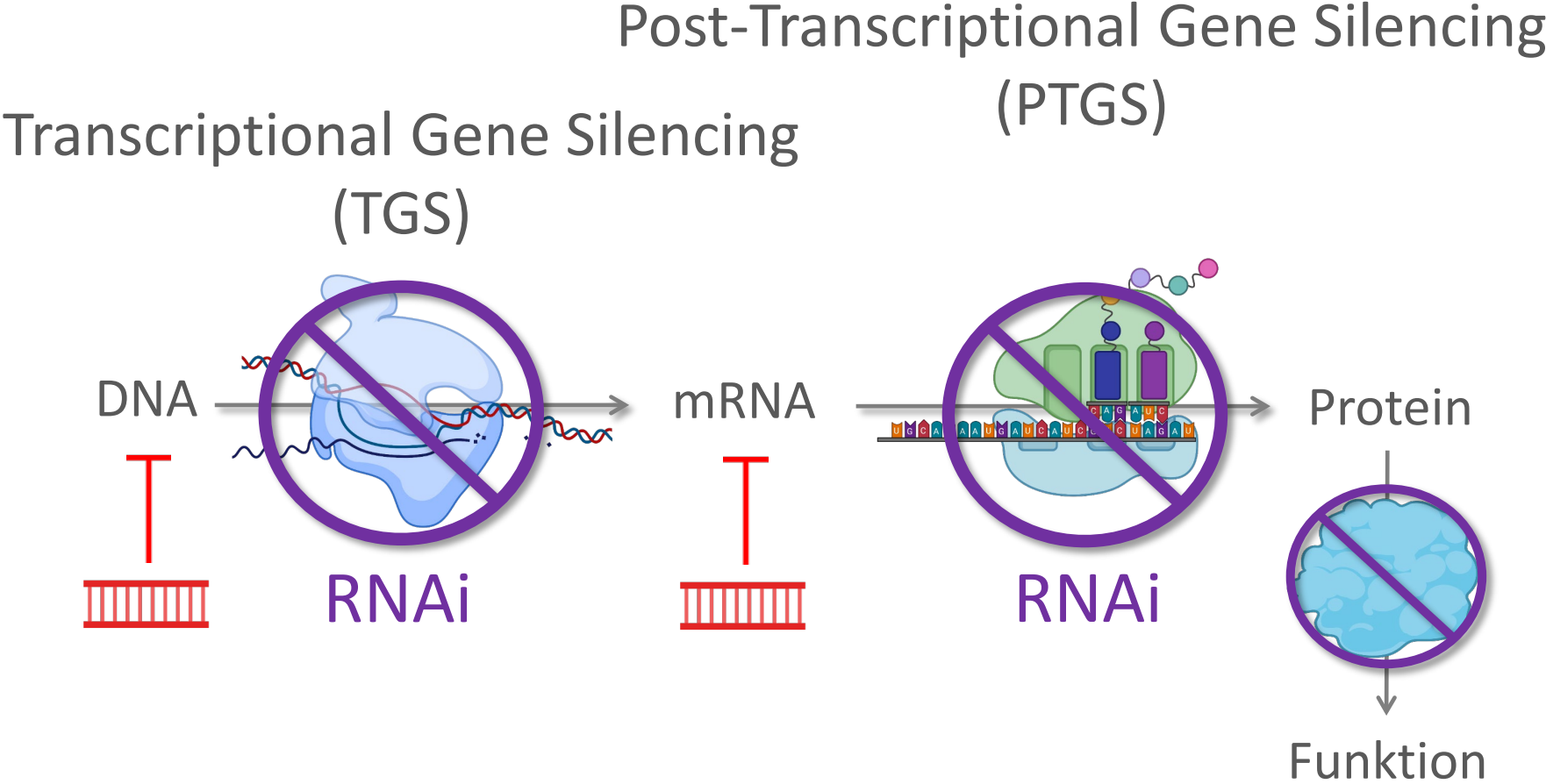


>>RNA ALS NATÜRLICHE ALTERNATIVE ZU CHEMISCHEM PFLANZENSCHUTZ<<



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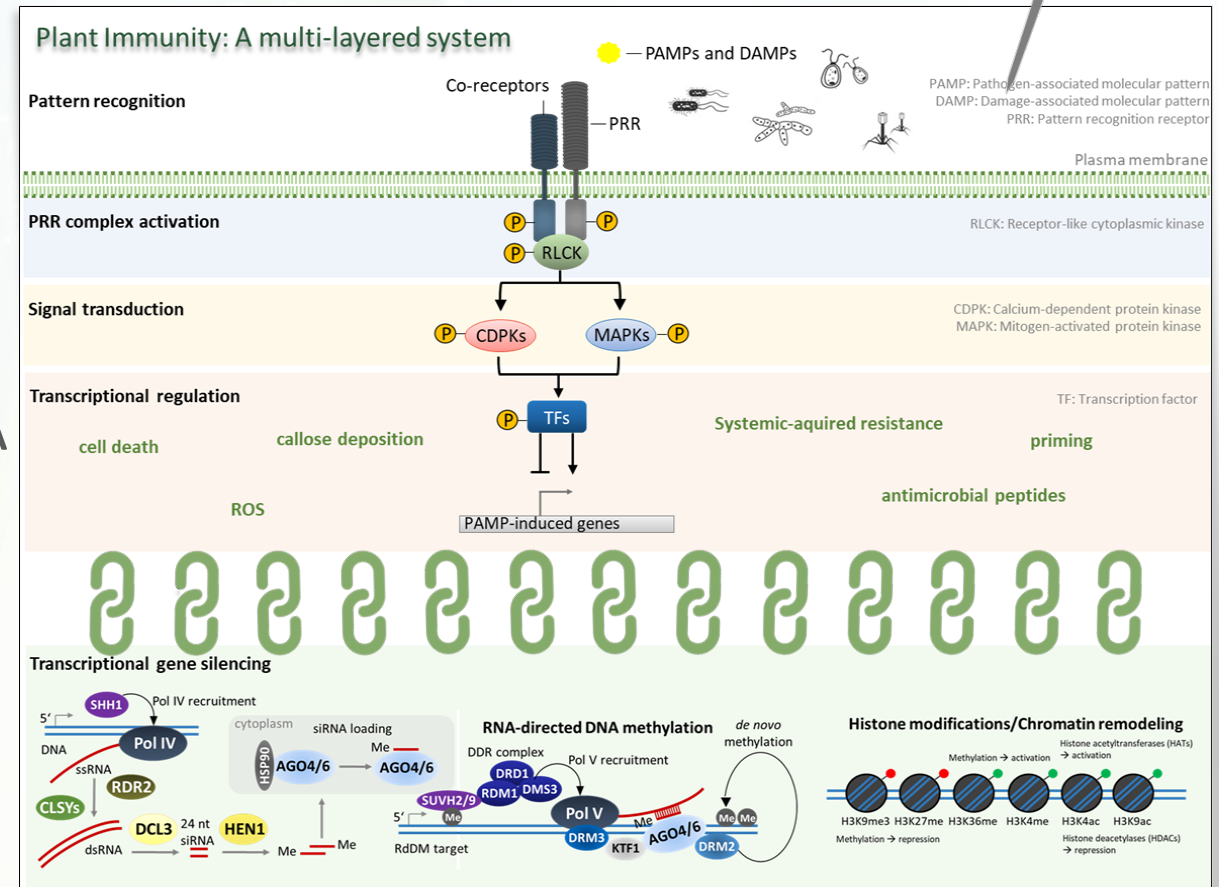
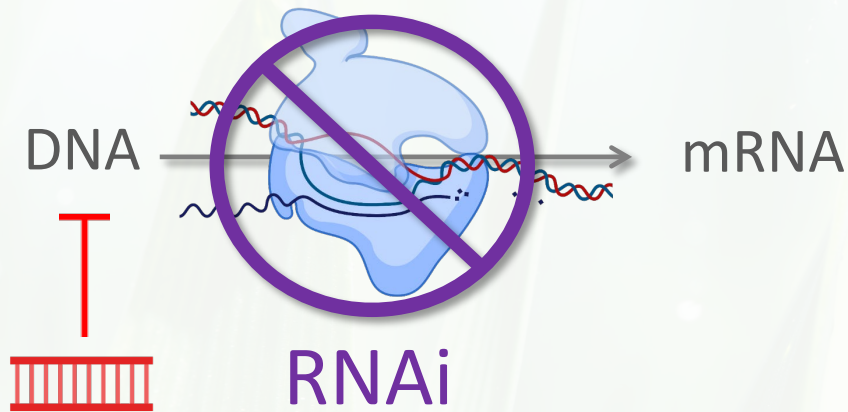


Epigenetische Regulation pflanzlicher Immunreaktionen

Genregulation durch **kleine RNAs**

exploit the molecular mechanism of TGS...using a modified CRISPR-Cas9 technology

Transcriptional Gene Silencing (TGS)



Verbundprojekt: BarEpiEdit



Bundesministerium für Bildung und Forschung ➤ Förderung von Forschungsvorhaben in der Bioökonomie zu „Epigenetik – Chancen für die Pflanzenforschung“

07/2022 – 06/2025

nature methods

Article | Published: 02 August 2021

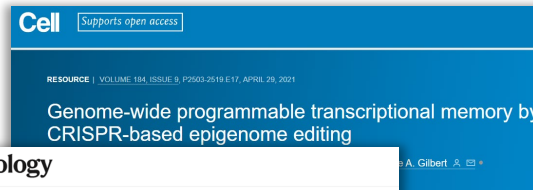
Transgenic mice for in vivo epigenome editing with CRISPR-based systems

Matthew P. Gemberling, Keith Siklenka, Erica Rodriguez, Katherine R. Tonn-Eisinger, Alejandro Barrera



Engineered CRISPR-Cas12a variants with increased activities and improved targeting ranges for gene, epigenetic and base editing

Benjamin P. Kleinstiver, Alexander A. Sousa, Russell T. Walton, Y. Esther T. Jonathan Y. Hsu, Kendall Clement, Moira M. Welch, Joy E. Horng, Jose Malagon-Logez, Irene Scarff, Marcela V. Maus, Luca Pinello, Martin J. Aryee and J. Keith Joung



Genome-wide programmable transcriptional memory by CRISPR-based epigenome editing

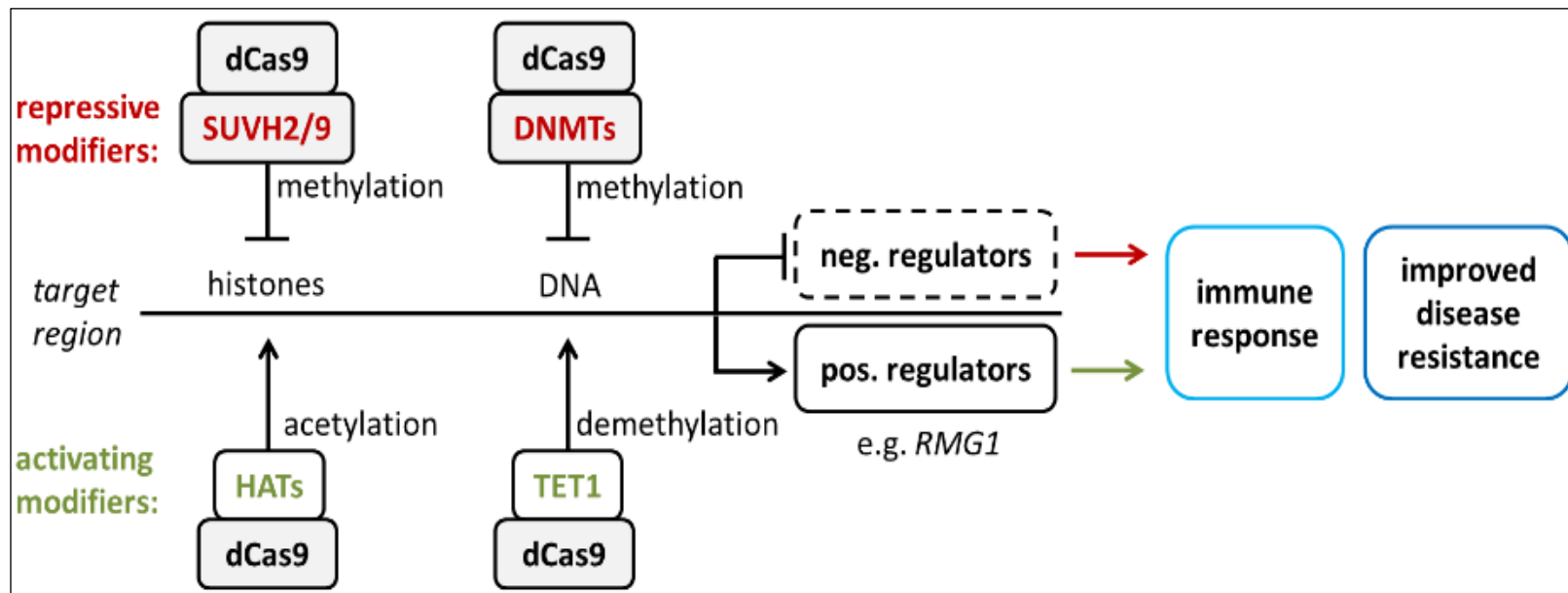
nature cell biology

Review Article | Published: 08 January 2021

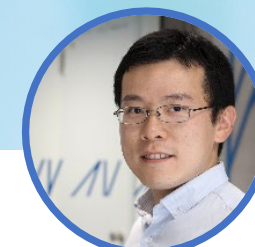
CRISPR technologies for precise epigenome editing

Muneaki Nakamura, Yuchen Gao, Antonia A. Dominguez & Lei S. Qi

Epigenetic Editing of Immunity Genes to Enhance Disease Resistance of Crops



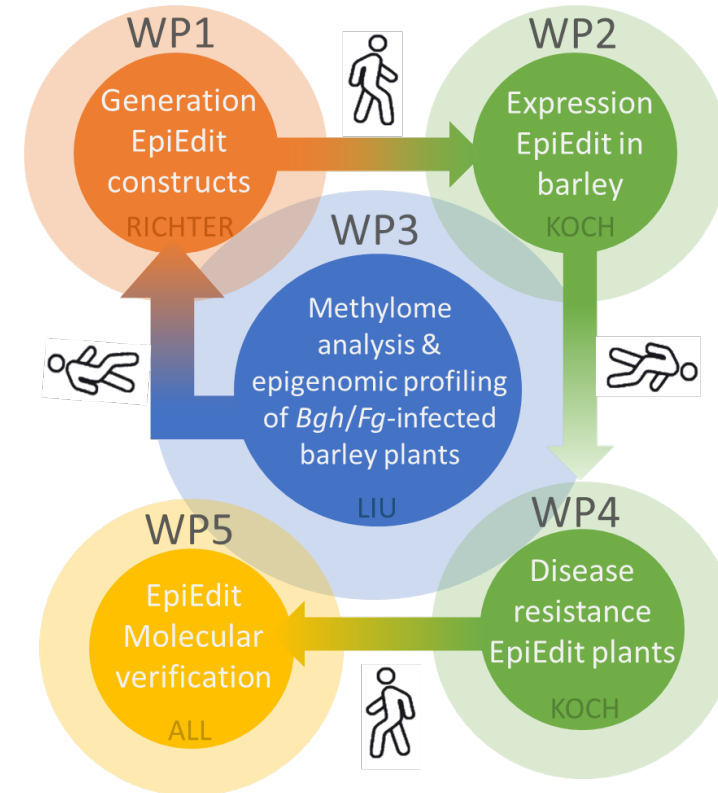
Antje Richter
Genetics



Prof. Chang Liu
Epigenetics



UNIVERSITÄT HOHENHEIM



mRNA spray – Rethinking gene expression



“high-risk/high-gain research”

Vector-funded : towards CRISPR/Cas-spray (barley/*mlo*)

