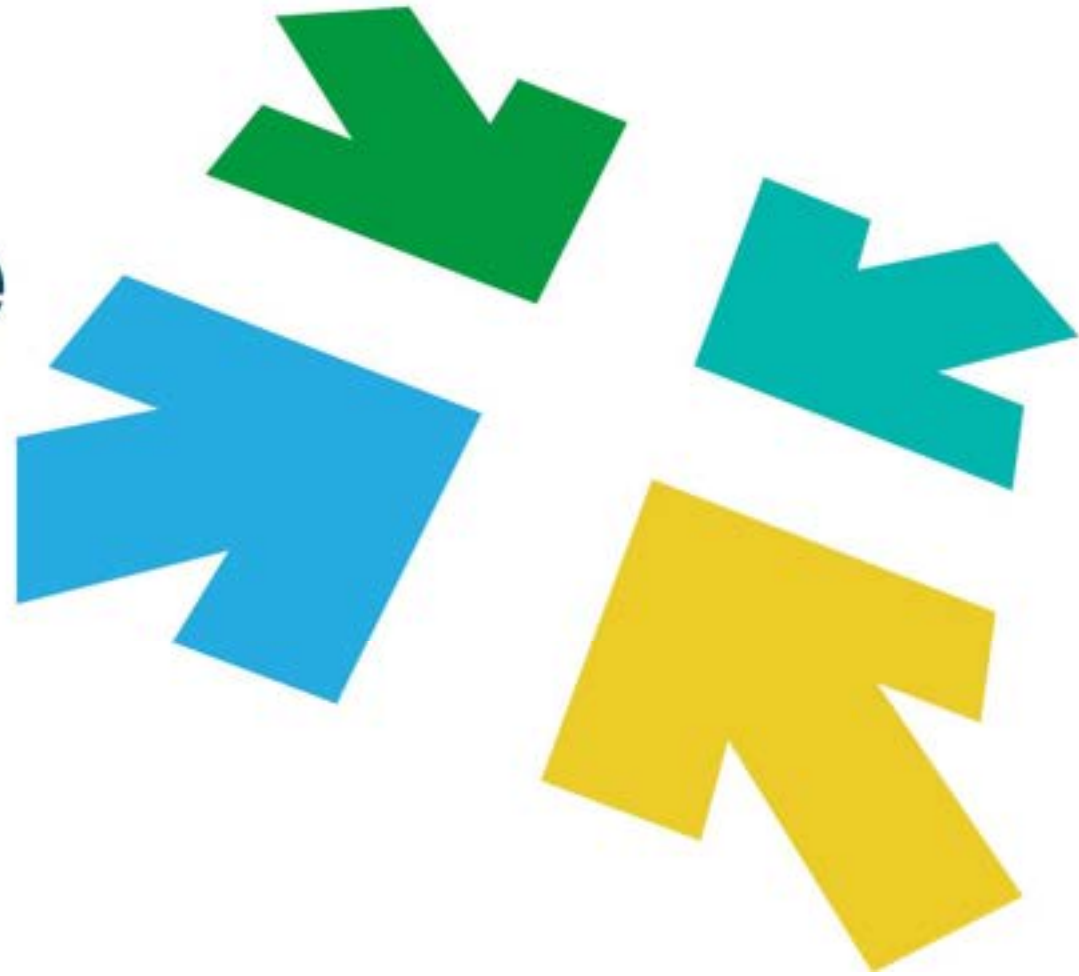
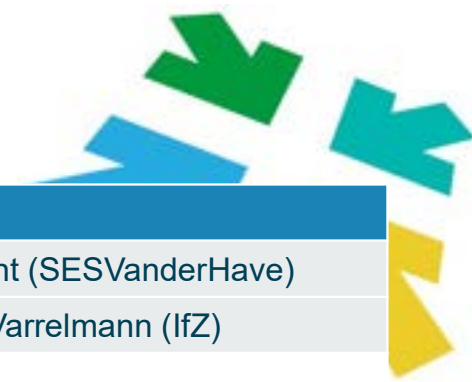


SV Seminar: a collaborative approach to counter SBR/RTD



#TogetherWeGrow

PROGRAM



Part 1	CURRENT INSIGHTS	
16u30	Insects: a growing threat for the viability of the EU beet sugar sector	Dr. Niels Wynant (SESVanderHave)
16u45	SBR & RTD: what we know today	Prof. Dr. Mark Varrelmann (IfZ)
17u00	<i>Questions</i>	
Part 2	PRACTICAL EXPERIENCES: INDUSTRY AND FARMER PERSPECTIVES	
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18u00	Bacterial Tuber Wilt (BTW) in Potato	Helen Pfitzner (Verband der Hessisch-Pfälzischen Zuckerrübenanbauer)
18u15	<i>Questions</i>	
Part 2	WORKING TOGETHER TO DELIVER SOLUTIONS	
18u15	Breeding for SBR & RTD solutions	Pierre Longerstay (SESVanderHave)
18u30	R&D collaboration between SV and IfZ	Prof. Dr. Mark Varrelmann (IfZ)
18u45	<i>Questions</i>	
19u00	RECEPTION	
20u00	Closing	



SV SEMINAR

A COLLABORATIVE APPROACH TO COUNTER SBR/RTD



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INSECTS

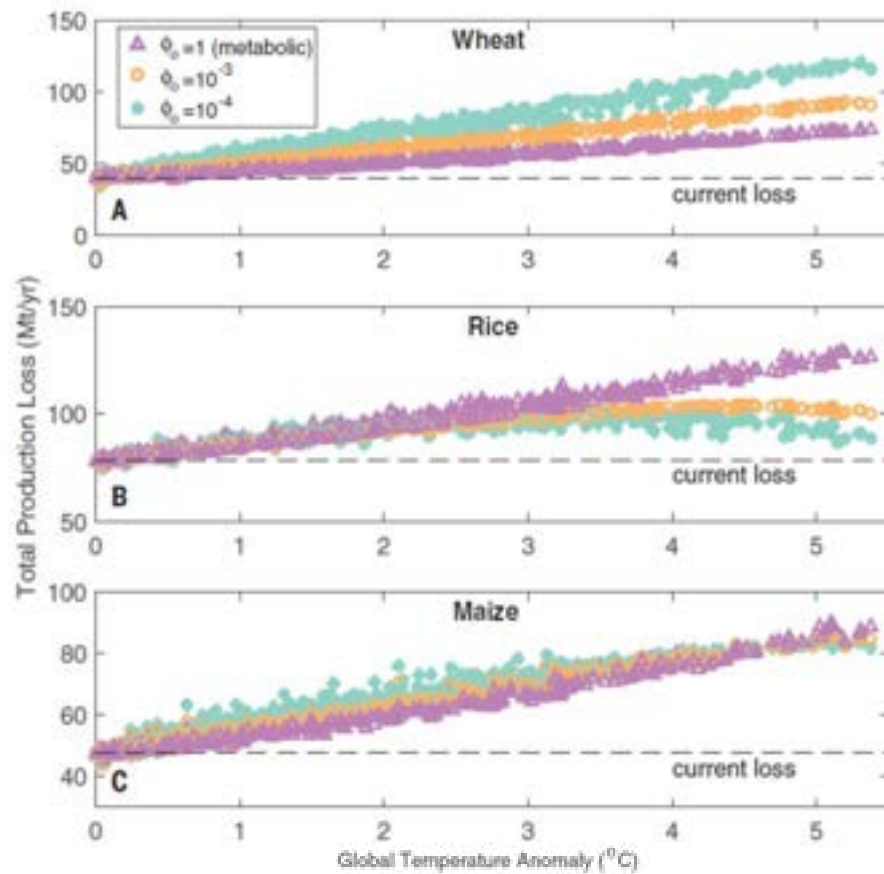
A GROWING THREAT FOR THE EU BEET SUGAR SECTOR



#TogetherWeGrow

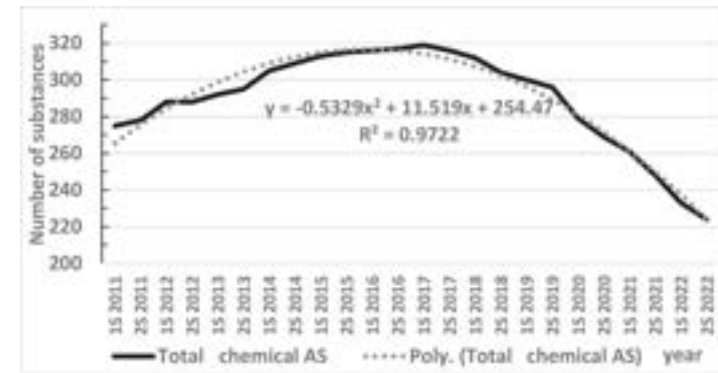
INCREASED INSECT PRESSURE

INCREASE IN CROP LOSSES TO INSECT PESTS IN A WARMER CLIMATE



Source: Deutsch et al., Science, 2018

REDUCTION IN PESTICIDE AVAILABILITY AND USAGE

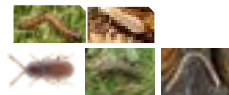


Legend: Semesters (1S, 2S) of each year

Source: Marchand, ESPR, 2022



HUGE DIVERSITY OF EUROPEAN SUGAR BEET PESTS



SOIL SEEDLING PESTS



FLEA BEETLES



PYGMEE BEETLE



EAST-EUROPEAN SB WEEVIL



LEAF MINER



GREEN PEACH APHID; YELLOWING COMPLEX and BtMV



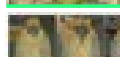
BLACK BEAN APHID; BYV and BtMV



LIXUS WEEVIL



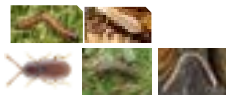
BEET MOTH









CIXIID HOPPERS; SBR and RTD

HUGE DIVERSITY OF EUROPEAN SUGAR BEET PESTS

REDUCTION IN INSECTICIDES AND CLIMATE WARMING



SOIL SEEDLING PESTS

-  **FLEA BEETLES**
-  **PYGMEE BEETLE**
-  **EAST-EUROPEAN SB WEEVIL**
-  **LEAF MINER**
-  **GREEN PEACH APHID; YELLOWING COMPLEX and BtMV**
-  **BLACK BEAN APHID; BYV and BtMV**

 **LIXUS WEEVIL**

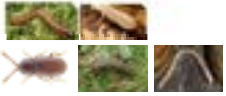
 **BEET MOTH**

 **CIXIID HOPPERS; SBR and RTD**









HUGE DIVERSITY OF EUROPEAN SUGAR BEET PESTS

REDUCTION IN INSECTICIDES AND CLIMATE WARMING



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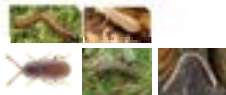
 BEET MOTH

 CIXIID HOPPERS; SBR and RTD












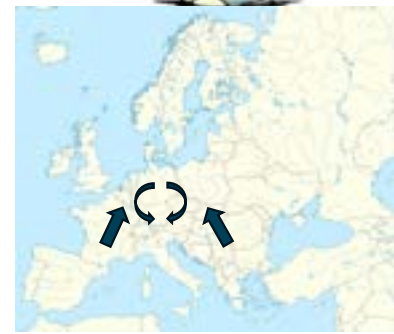
HUGE DIVERSITY OF EUROPEAN SUGAR BEET PESTS

REDUCTION IN INSECTICIDES AND CLIMATE WARMING



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-  **LIXUS WEEVIL**
-  **BEET MOTH**
-  **CIXIID HOPPERS; SBR and RTD**



HUGE DIVERSITY OF EUROPEAN SUGAR BEET PESTS

PRIORITISATION



European-wide trial network
and Monitoring

Alignment with scientific
community



Priority list:

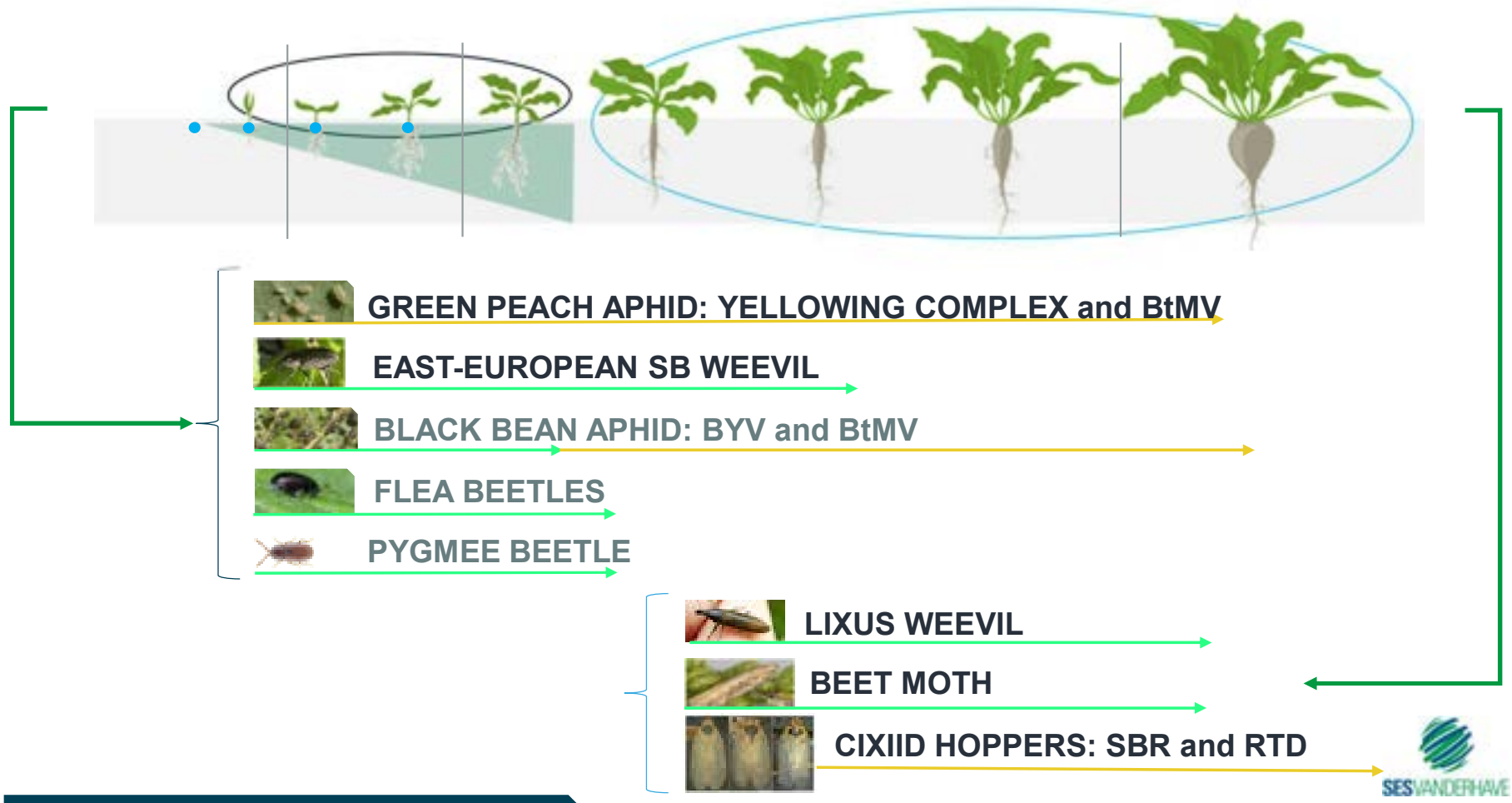


Where?
Which?
Damage?
Biology?

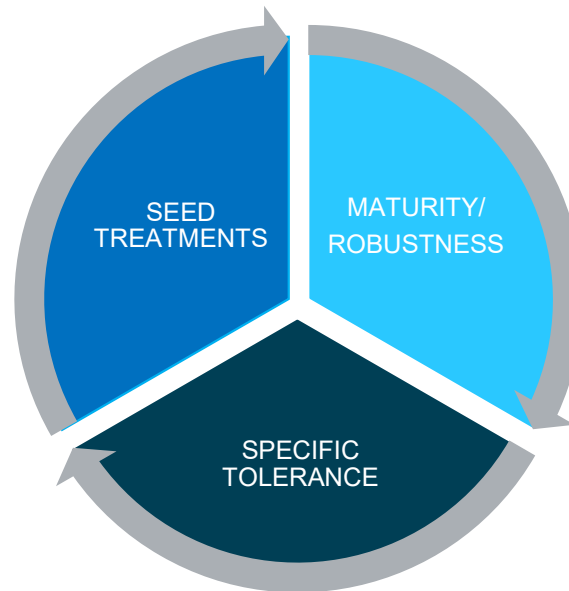


HUGE DIVERSITY OF EUROPEAN SUGAR BEET PESTS

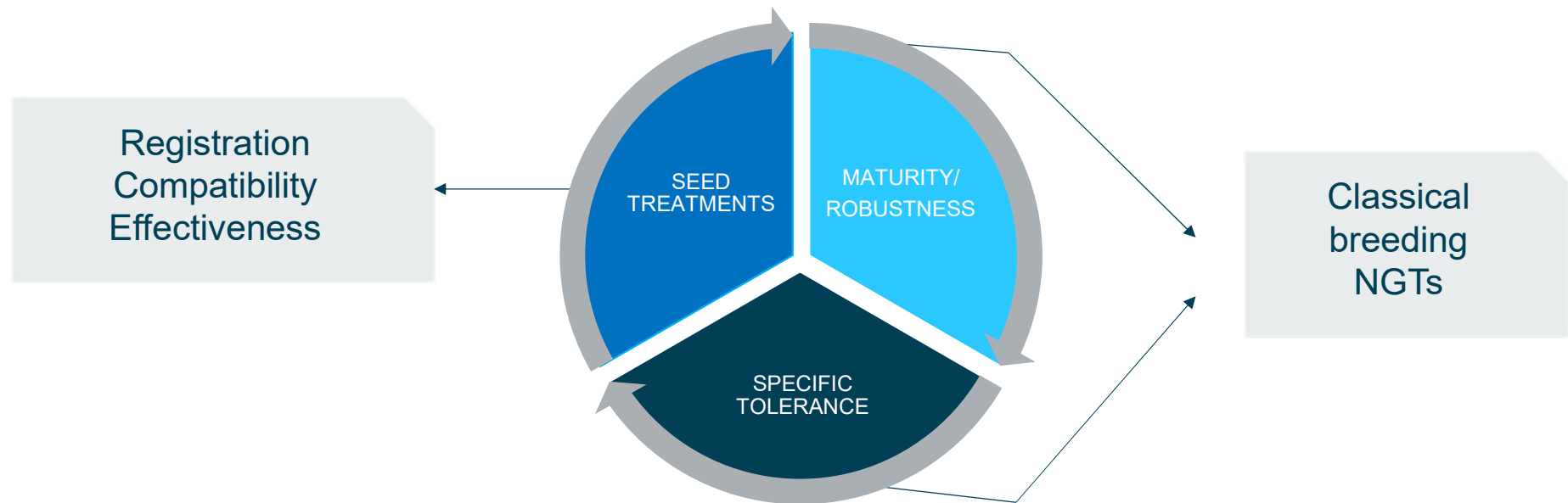
PRIORITISATION



INTEGRATED APPROACH OF SV TO CONTROL INSECT DAMAGE



INTEGRATED APPROACH OF SV TO CONTROL INSECT DAMAGE



SCREENING PLATFORMS FOR PRIORITY INSECTS

SEEDLING PESTS



FLEA BEETLES



LEATHERJACKETS:



and collaborate with:



Soil pest
working group



SCREENING PLATFORMS FOR PRIORITY INSECTS

SUGAR BEET WEEVIL

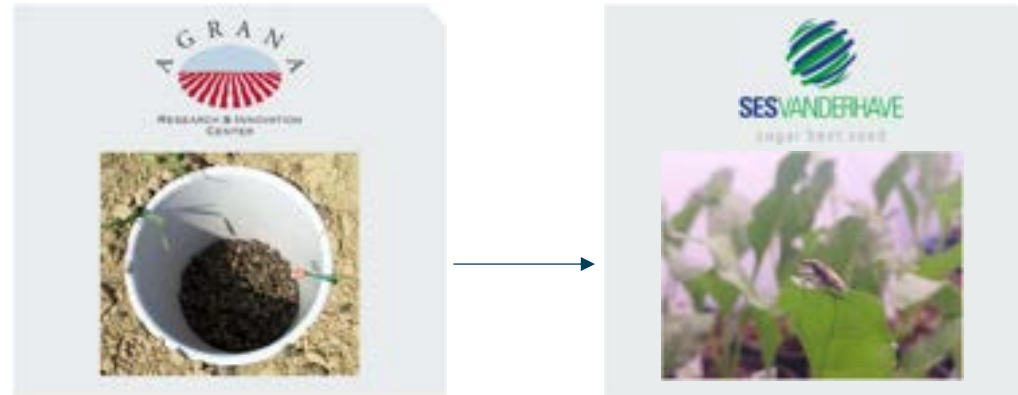


2-weeks post-infestation:



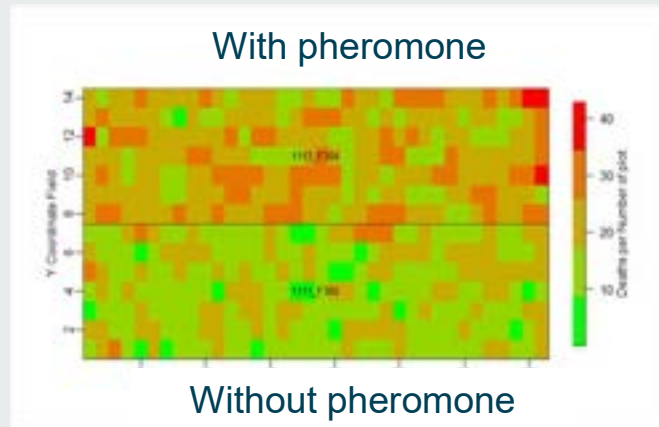
SCREENING PLATFORMS FOR PRIORITY INSECTS

SUGAR BEET WEEVIL



SCREENING PLATFORMS FOR PRIORITY INSECTS

BEET MOTH



SCREENING PLATFORMS FOR PRIORITY INSECTS

LIXUS WEEVIL

FIELD TRIALS



INDOOR TESTS



SCREENING PLATFORMS FOR PRIORITY INSECTS

GREEN-PEACH APHID

Indoor assays



- Inoculate each plant
- Count n° aphids

Field trials

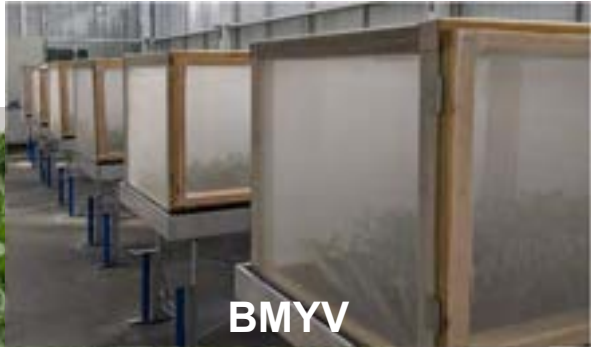
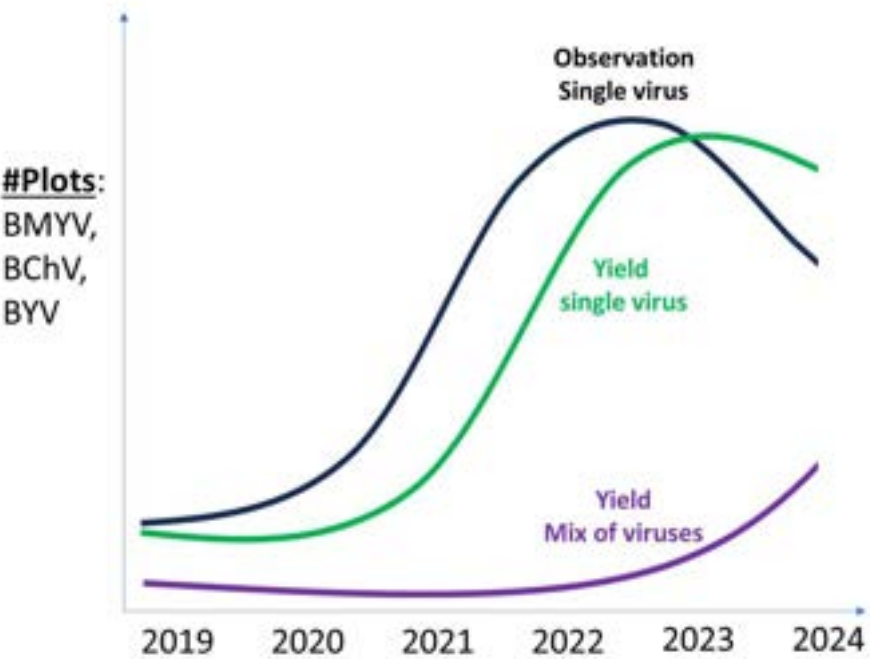


X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X
X	X	X

- Inoculate % of plants per plot with VY
- Count number of yellowing plants per plot

SCREENING PLATFORMS FOR PRIORITY INSECTS

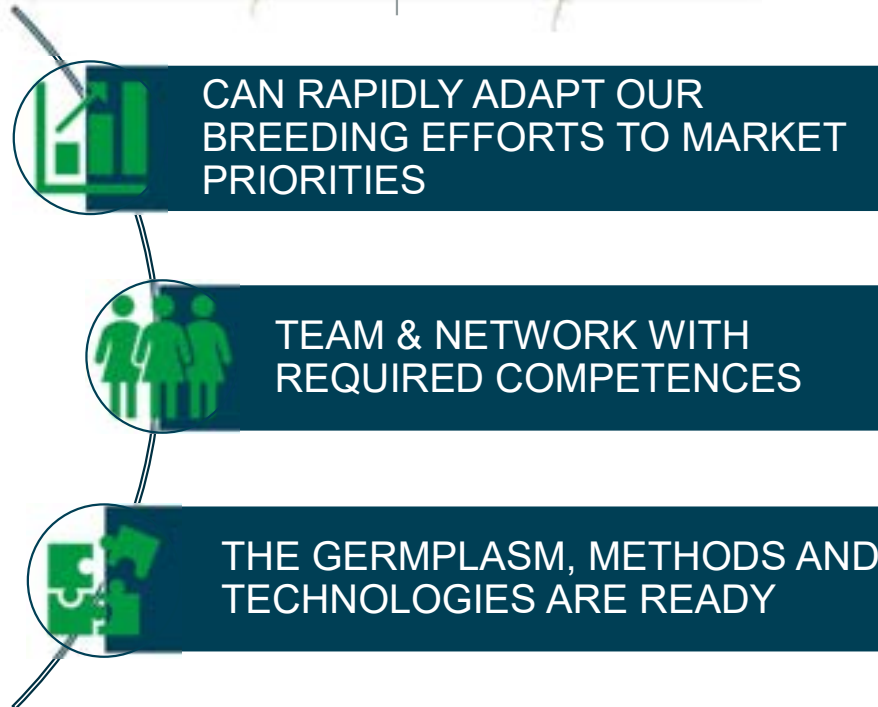
YELLOWING COMPLEX



ADAPT OUR PRIORITIES TO A CHANGING REALITY



**INSECTS AND THE
SBR/RTD COMPLEX
A TOP PRIORITY
FOR SESVanderHave**



THANK YOU!

Niels Wynant



+32 479 248 036



niels.wynant@sesvanderhave.com



www.sesvanderhave.com



#TogetherWeGrow

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18u15	<i>Questions</i>	

SBR - new founded Task Force in Southern Germany

28/02/2024

Dr. Georg Vierling

Together as Südzucker Sugar Division, we exploit the full potential of new beet solutions.

SÜDZUCKER



SÜDZUCKER
MOLDOVA

SAINT LOUIS SUCRE

SÜDZUCKER
POLSKA

MAXI

SÜDZUCKER
HELLAS

FELIX KOCH OFFENBACH
Erbsen und Kornmalz GmbH & Co.

SÜDZUCKER
UNITED KINGDOM

SÜDZUCKER
IBÉRICA

bullet points

SBR - new founded Task Force in Southern Germany

- The spread of SBR (syndrome basses richesses) with 2 types (SBR proteobacterium and Stolbur phytoplasma as bacterial infection) is transmitted to sugar beets by cicadas (especially „Schilfglasflügelzikade). Our estimation for Germany is an affected area approx. 50-60.000 ha most of it in southern Germany.
- In autumn 2023 the „SBR task force“ was founded. Members are the concerned growers' associations, the IFZ (Institute for beet research, Göttingen) and Südzucker. In addition of the already ongoing research we want thus bundle and accelerate all activities to SBR.
- For 2024 we have planned different model regions with beet growers. Target is to analyse the impact of crop rotation, deep labour of soil and the use of different insecticides/repellents/bio-stimulants priming substances to the population of the cicadas and the nymphs. Furthermore we have planned additional stripe trials that includes the test of substances that stimulate the sugar beets defences.
- Meanwhile the “SBR task force” had meetings with all beet breeders. For proteobacterium the first robust varieties are already available, whereas the breeders have not yet a solution for phytoplasma.
- Basis research/cooperations: we already do not enough about the cicadas and the 2 pathogens. Therefore we are planning different co-operations/projects with federal institutions and universities.
- By dealing intensively with SBR we are convinced that we will find a solution in the medium term. We already don't know enough at the moment.

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SBR Seminar Overview Switzerland

Schweizerische Fachstelle für Zuckerrübenbau

Luzi Schneider

CEO Sugerbeet Research Switzerland

l.schneider@zuckerruebe.ch / luzi.schneider@strickhof.ch

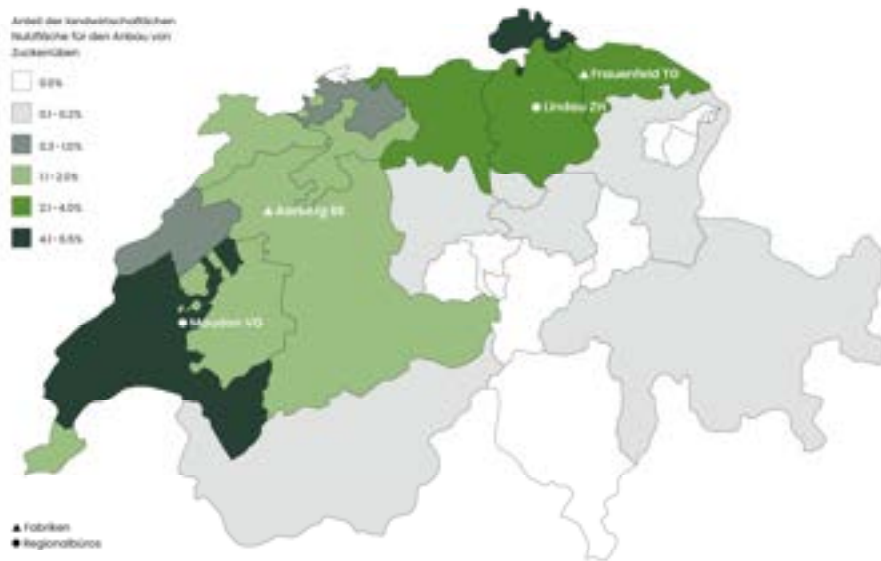
Mob: 0041 (0)79 403 06 97

Tel: 0041 (0)58 105 98 78

Overview Switzerland



- 16'000ha Sugarbeet
- 2 Factories



SBR Overview



- Since 2017 SBR
- 8000ha affected
- Westernpart of Switzerland
- Yearly expansion of 15-20km



Decline in Sugarbeet area

Surface de betteraves à sucre suisses en ha conventionnel & IP-SUISSE





Research activities

- Different Field Trials
 - Nematodes after Sugarbeets
 - Shadow with corn (2023)
- Crop Rotation
 - 2 year project at Chablais
- Variety testing
 - 1-row pre testing
 - More than 36 «places» for new Varieties each year
 - 3-row regular variety testing

Crop Rotation Project

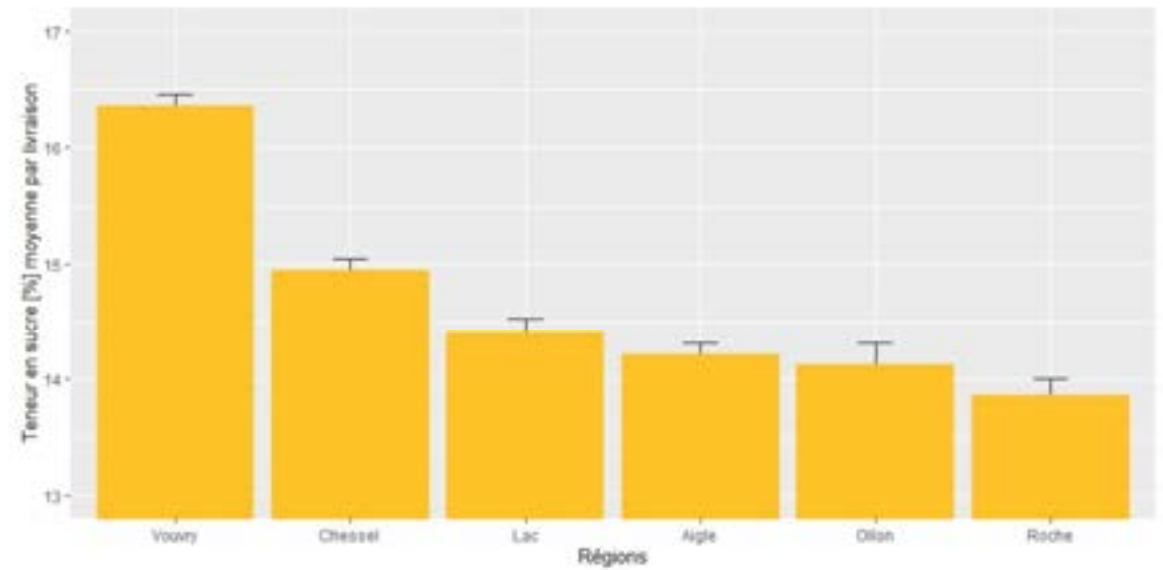
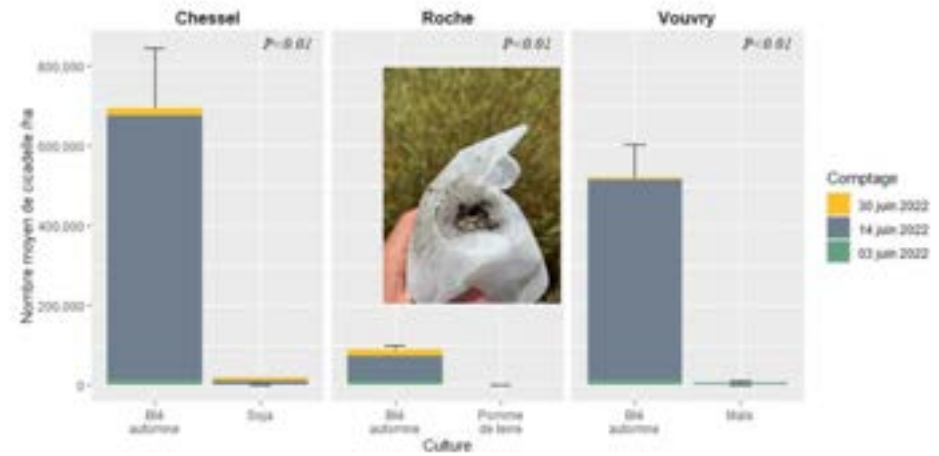
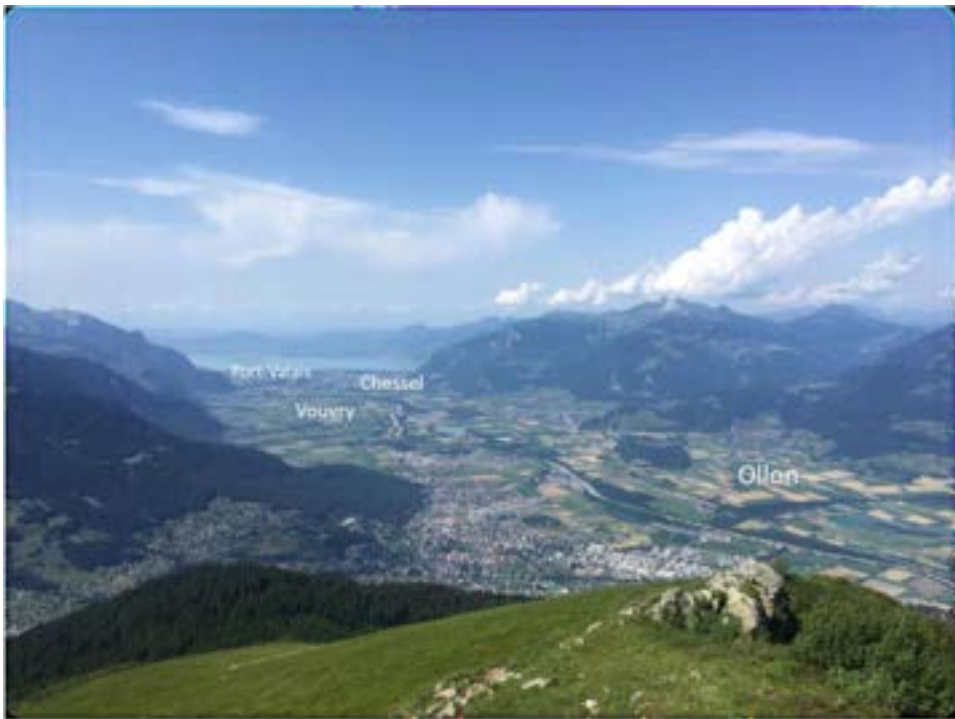


Fig. 10 Teneur en sucre (%) moyenne des betteraves sucrières récoltées en 2021 par région betteravière du Chablais.

Shadow effect



- A Farmers attempt
- Sugar content 1% higher
- Feels like there were fewer cicadas
 - No evaluation

SBR Variety Switzerland



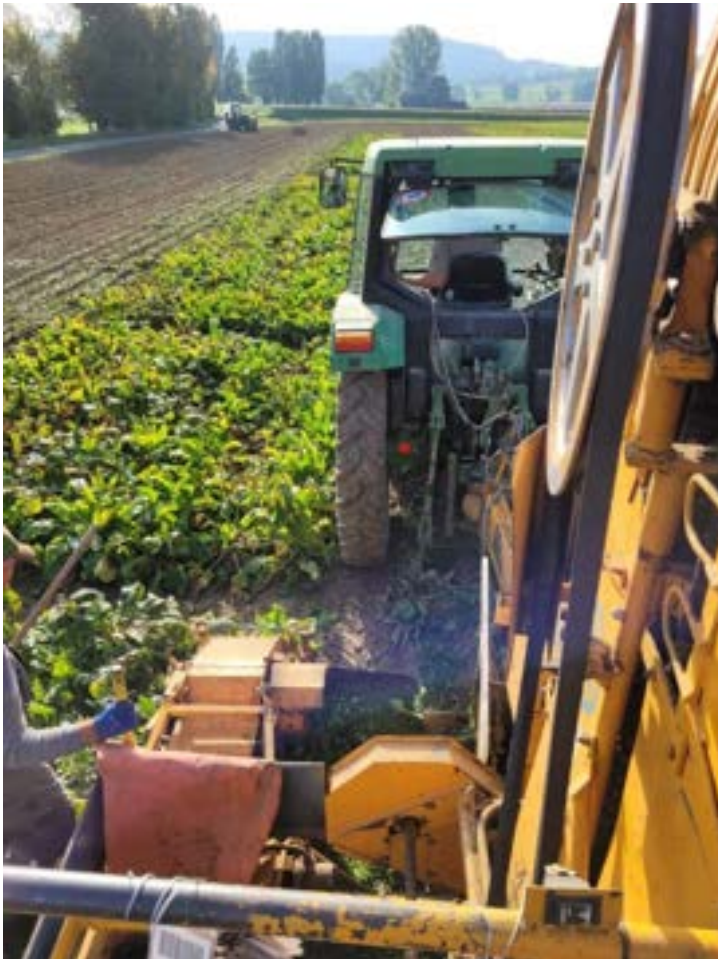
SBR Sortenangebot 2024

Sorte	Züchter	Feldaufgang (%)	Rüben- ertrag relativ ¹	Zucker- gehalt relativ ¹	Zucker- ertrag ^a relativ ¹	Ausbeute relativ ¹	Gelderlös (Fr./ha) ^b	Blattpilze ^c Cercospora		Bio- Eignung
								unbehandelt	behandelt	
XERUS	SV	90.5	103.5	101.8	106.6	100.8	7357	5.0	3.0	
BTS 1740	Betaseed	90.2	104.9	95.3	100.2	100.0	7232	2.6	1.8	
INTERESSA KWS	KWS	86.3	103.7	97.4	100.8	99.7	7222	1.6	1.4	Ja
FITIS	SV	89.2	107.2	102.7	111.4	101.0	7587	5.0	3.1	
MICHELANGELO	Strube	86.3	111.8	98.8	111.4	100.7	7709	4.9	2.3	

Variety progress



Advantages Switzerland



1	12001 Klamma	10	13004 IK097	19	13028 B3340	28	14029 ST Kair (ST15110)
2	10001 Xerus	11	14004 Michelangelo	20	13029 B3342	29	14030 ST15155 (Steblo)
3	11011 BTS 1740	12	13009 B2516	21	13027 B3332	30	15008 SV2844
4	13004 Interessa KWS	13	13002 Smart Belania	22	13030 3K404	31	15009 SV2845
5	14007 Saie	14	13001 Smart Arosa 3	23	13031 3K444	32	15007 FD21B2136
6	13007 Escadia KWS	15	13010 BTS SMART	24	13032 3K458	33	12020 HI1585
7	13006 Novalis KWS	16	14018 ST13152	25	13034 3K475	34	14025 STRE 23340
8	14005 Danant	17	13026 2K365	26	14031 STRE 23312	35	12021 HI1586
9	11014 B1267	18	13026 B3330	27	14028 ST23335	36	13055 3K486

Versuchsanlage : Blockanlage in 4 Wiederholungen
Parzellennummer: 1 - 144

Randomisierungsplan : Beachtung an: _____

	17	11	5	10	33	24	26	23	7	28	22	16	27	18	31	19	1	4
IV	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144
	35	18	30	3	29	2	13	12	6	8	14	36	9	32	28	23	34	20
	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126
	20	29	7	30	28	4	5	11	17	24	21	34	13	10	31	3	19	38
III	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108
	33	6	14	8	2	18	32	9	18	27	12	22	16	25	36	1	26	24
	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90
	12	23	4	26	8	22	14	27	32	2	6	19	21	15	18	25	16	7
II	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72
	28	29	13	34	17	20	35	24	11	30	31	5	10	3	33	1	9	36
	17	18	38	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
	31	14	2	29	8	5	29	38	23	4	16	34	21	28	24	39	3	7
I	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
	22	1	13	12	15	10	33	36	26	25	27	17	19	11	32	18	6	9
[W4a]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18

[W4a]

[W4a]



Summary

- No solutions
- No chemical possibilities
- No Stolbur till now

- We believe, it's a mix of variety and crop rotation

- We are testing a lot of variety and hope to find somethings revolutionary

Thanks for your attention



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RUBBERY TAPROOT DISEASE (RTD)

-situation in Serbia


Živko Ćurčić, Olivera Popov, Ivana Bajić

Bojan Duduk, Andrea Kosovac, Emil Rekanović, Jelena Stepanović, Miloš Stepanović

Nataša Duduk, Ivana Vico, Nina Vučković

Table of content



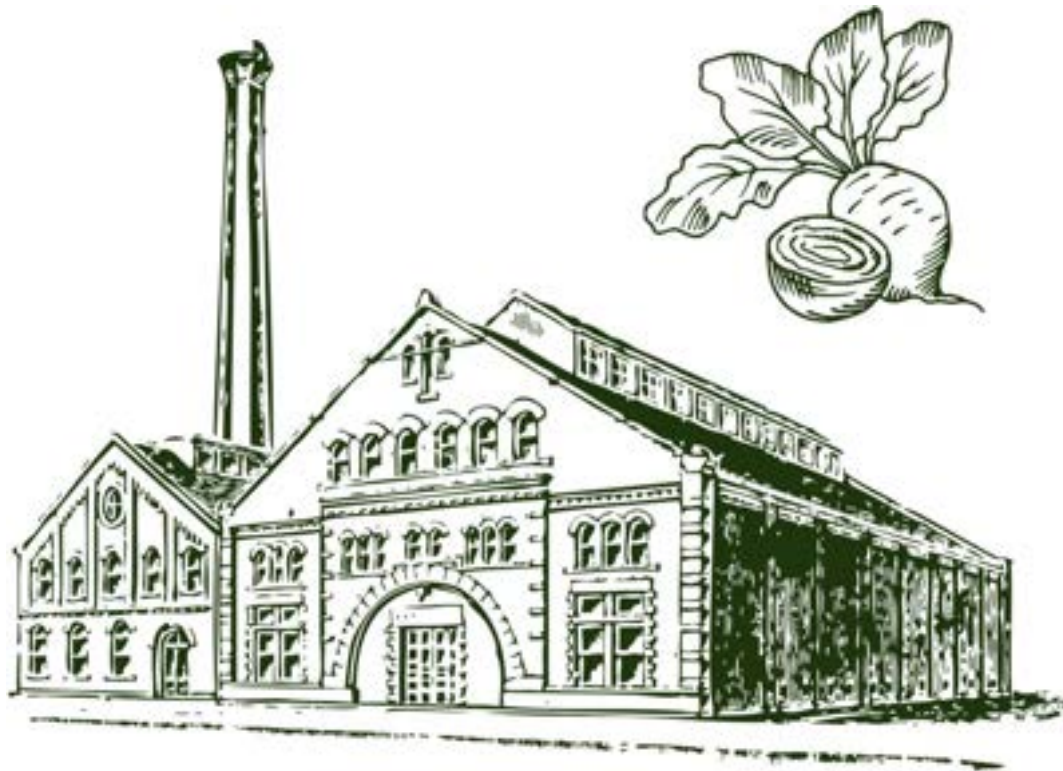
Slide title		Source
• History & significance	1,2	
• RTD Symptoms	3, 4	
• ' <i>Ca. P. solani</i> ' associated with RTD	5, 6	
• RTD vectors	7, 8, 9	
• <i>Macrophomina phaseolina</i>	10	
• Comparison 2022 vs. 2023	11	
• Field impressions	12, 13, 14	
• Field trial evaluation of RTD susceptibility in Serbia	15	
• Possible measures for controlling the RTD	16, 17	



History & significance

RTD in our region

1960 Present



- The Rubbery Taproot Disease (RTD) of sugar beet was reported in Serbia and neighboring countries in the 1960s
- After epidemic phase during the late 1960s, the disease abated but remained present in the 1970s, when it was sporadically observed across the region
- In 2018, RTD occurred in epidemic scale and has caused serious damage in all sugar beet production regions in Serbia (Ćurčić *et al.* 2020)



History & significance



- The causal agent of RTD is phytoplasma '*Candidatus* Phytoplasma solani' ('Ca. P. solani') and was revealed in experimental RTD-affected sugar beet field

(Ćurčić *et al.* 2020)

- So far, '*Ca. P. solani*' was found in sugar beet across the Pannonian Plain along with typical symptoms of the root ruberiness; also detected in Germany

(Ćurčić *et al.* 2021)



RTD Symptoms



- Typical above-ground RTD symptoms - yellowing and wilting of the oldest leaves - first appear on the borders and edges of sugar beet fields
- The initial symptoms can be observed the earliest in the first half of July, but most commonly during August (A-B)
- Subsequently, necrosis spreads on the leaves, and the plants completely wither (C)



Rimski Šančevi, Serbia, 2023

RTD Symptoms

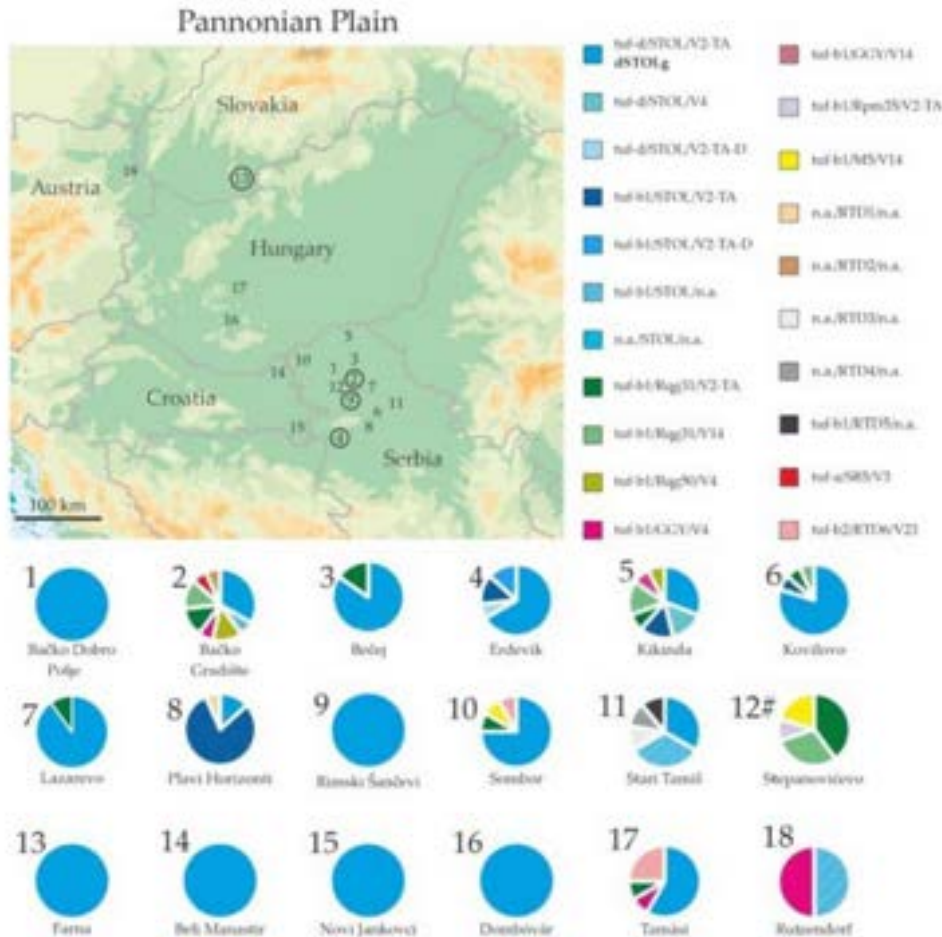
- Initially, no visible changes on the roots of chlorotic and wilted plants
- Infected plant root growth lags, progressively softening from tail to taproot, eventually becoming rubbery
- Cross-section of rubbery roots shows no visible changes in vascular bundles
- In the last stage of the RTD, roots of infected sugar beets plants start rotting in significant numbers and rapidly dying in the field



Rimski Šančevi, Serbia, 2023



'*Ca. P. solani*' associated with RTD

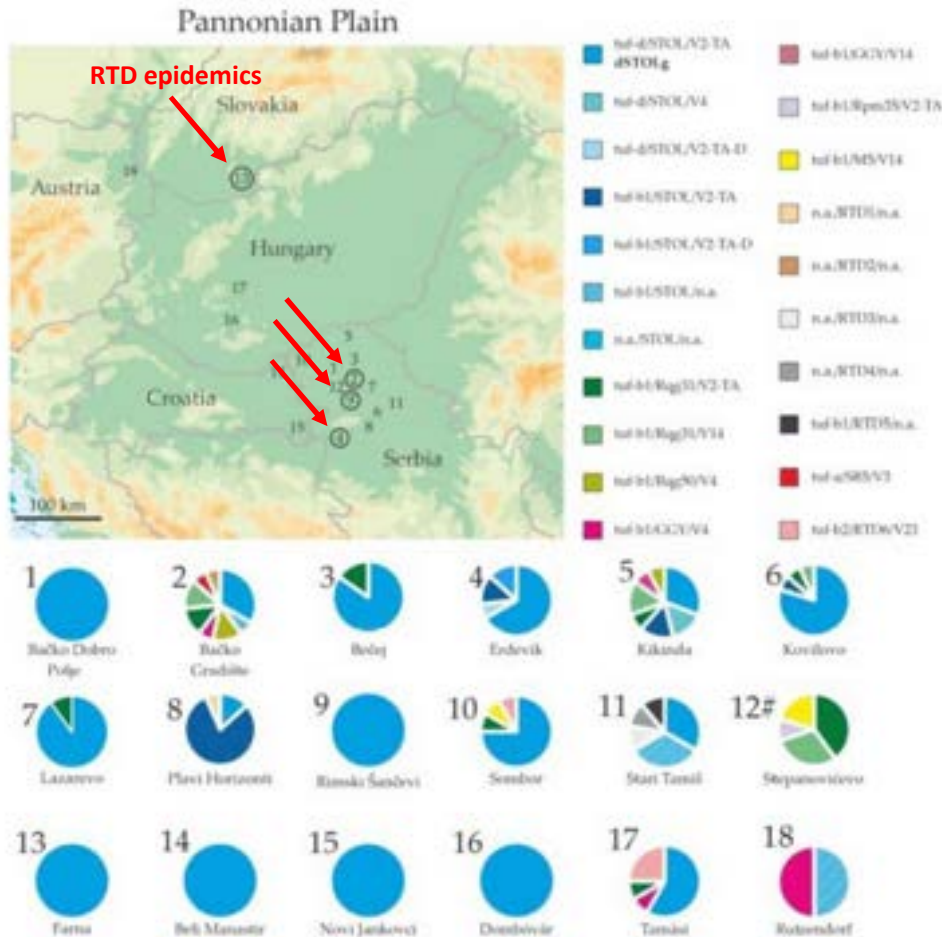


- RTD appeared in 2020 on an epidemic scale in northern Serbia and southern Slovakia, situated at opposite edges of the Pannonian Plain
- Symptomatic sugar beets from other countries of the Pannonian Plain (Croatia, Hungary and Austria), one sample from Germany, and red beets from Serbia were included in the stolbur phytoplasma analyses
- '*Ca. P. solani*' was detected in sugar beet in all assessed countries, as well as in red beet
- Molecular analyses revealed the high genetic variability of stolbur phytoplasma with several new genotypes

Map of the RTD-affected sugar beet fields across Pannonian Plain (Ćurčić *et al.* 2021)



'Ca. P. solani' associated with RTD



- The most common stolbur genotype in RTD sugar beet was dSTOLg (tuf-d/STOL/V2-TA).
- It was dominant on sites with epidemic RTD outbreaks in the Pannonian Plain and in several sugar beet fields with non-epidemic RTD occurrence suggesting the prevalence of a particular epidemiological pathway during the epidemic's phases (Ćurčić *et al.* 2021)

Map of the RTD-affected sugar beet fields across Pannonian Plain (Ćurčić *et al.* 2021)



RTD vectors (Hemiptera: Auchenorrhyncha: Cixiidae)



- The vector responsible for the epidemic RTD outbreak in Serbia in experimental case study in 2020 was a planthopper) *Reptalus quinquecostatus* (Dufour)



- *Hyalesthes obsoletus* ex *Convolvus arvensis* and ex *Urtica dioica* also experimentally confirmed as vectors of 'Ca. P. solani' to sugar beet



- *Reptalus cuspidatus* for the first time experimentally confirmed as vector of 'Ca. P. solani', but irrelevant in 2020/21 RTD case study (Kosovac et al. 2023)



a Epidemic RTD occurrence in experimental sugar beet plot-1 in 2020



Development of RTD symptoms in sugar beets experimentally infected with CaPsol by *R. quinquecostatus* in 2020



RTD vector

Reptalus quinquecostatus

Semi-field cage experiments set up on the experimental sugar beet plot-2 in 2021.



(Kosovac et al. 2023)



RTD vectors

Reptalus quinquecostatus (Dufour)

- Adult insects appear during the month of June
- Their flight lasts about a three weeks
- One month after infecting sugar beet plants, the first symptoms appear

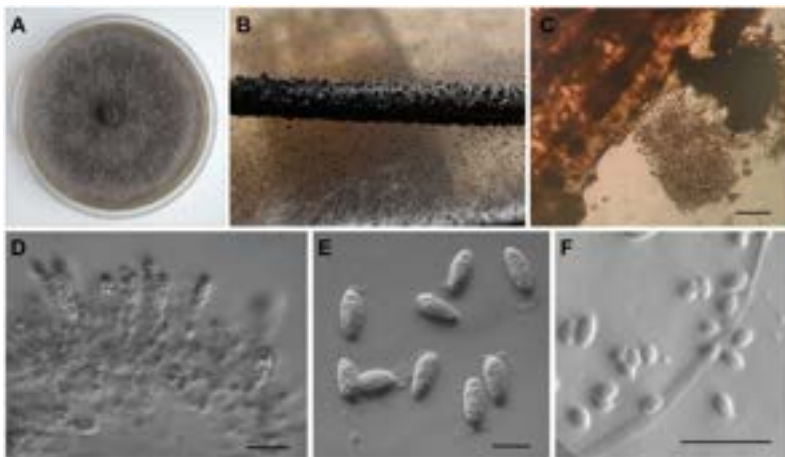


Macrophomina phaseolina

- RTD-affected sugar beets are prone to rotting
- *Macrophomina phaseolina* is considered the most important root rot pathogen of sugar beet in Serbia
- *Macrophomina phaseolina* root rot was exclusively present in 'Ca. P. solani'-infected sugar beet in both the semi-field experiment and naturally infected sugar beet; and that (iii) even under environmental conditions favorable to the pathogen, *M. phaseolina* did not infect sugar beet, unless the plants had been previously infected with phytoplasma Duduk et al. 2023a



Cross section of sugar beet infected with 'Ca. P. solani' & *M. phaseolina*



Macrophomina phaseolina isolated from sugar beet in Serbia.





Comparison



2022 season

- ↑ -drought
- ↑ -high temperatures
- vector appearance early June
- symptoms appear in early July
- harvesting campaign in late September
- losses in Serbia around 5 million € due to RTD

- no handpicking of infected beets
- 2% of the beet was rotten

TO SUM UP



2023 season

- ↓ -drought
- ↓ -high temperatures
- vector appears at the end of June
- symptoms appear at the end July
- harvesting campaign in early September
- losses in Serbia around 50 million € due to RTD

- large labor force was hired to remove rubbery and rotten beets
- 3,000 ha of beet were left unharvested due to RTD in 2023

TO SUM UP



*Unpublished results



Field impressions



Mitrosrem A.D., Serbia, 2023



Field impressions



Slovakia, 2023

Field impressions



**Rimski Šančevi,
Serbia, 2023**



Banat, Serbia, 2023



Rimski Šančevi, Serbia, 2023



Field trial evaluation of sugar beet susceptibility/tolerance to RTD in Serbia

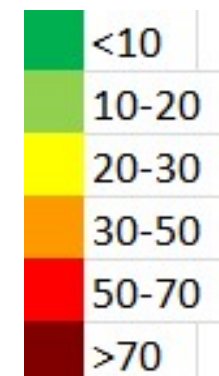
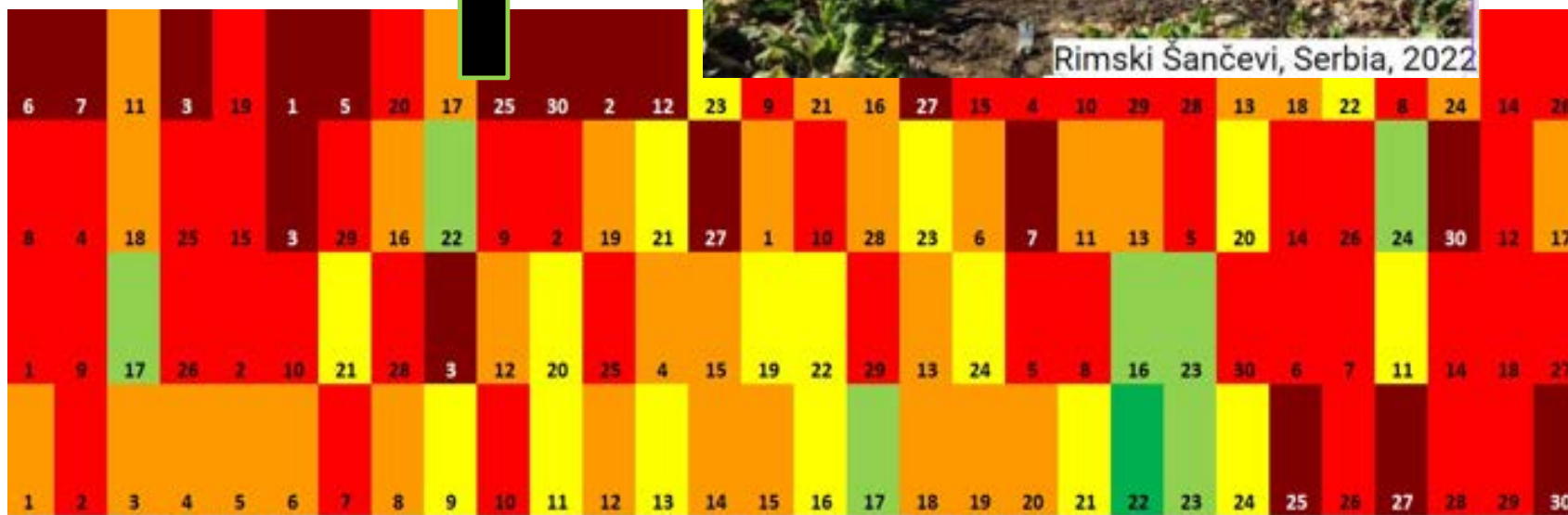


Open field trials with 30 sugar beet varieties in 4 replications were conducted in 2022 & 2023 season

- 7 varieties from KWS
- 8 varieties from SESVanderHave
- 9 varieties from DLF Seeds
- 6 varieties from Strube



Rimski Šančevi, Serbia, 2022



*IIRB poster, 2024



Possible measures for controlling the RTD

- In cages, both the most "tolerant" and the most "sensitive" varieties were completely infected
- Therefore, we use the term "attractiveness" to describe this phenomenon

*Unpublished results



VEGETATION INDEX



Possible measures for controlling the RTD

- In 2023, we conducted a trial to assess the effectiveness of insecticide (Lambda-cyhalothrin) treatment for the disease control
- Results showed a significant difference between the plots treated with insecticide and those without the treatment
- Lambda-cyhalothrin 0,2l/ha
1st application when vector appeared in June
2nd application 10 days after the 1st application



*Unpublished results

✓ Insecticide treatment
✗ Insecticide treatment

Legend
Vegetation index
Bad
Acceptable
Good
Very good
Excellent

0 10 20 30 40 50 m



Further plans

- Further research on the vector's biology
- Further research on the solutions for the effective disease control
- Monitoring the vector occurrence during June and July
- Making a timely decision on the start of the campaign by tracking the onset of initial symptoms and conducting rapid analyses for the presence of phytoplasma



THANK YOU FOR YOUR ATTENTION



Business card



Poster, IIRB 2024



Literature



SV SEMINAR

A COLLABORATIVE APPROACH TO COUNTER SBR/RTD

Part 2	PRACTICAL EXPERIENCES: INDUSTRY AND FARMER PERSPECTIVES	
17u15	Germany - SBR - new founded Task Force in Southern Germany	Dr. Georg Vierling (Südzucker)
17u30	Situation in Switzerland	Luzi Schneider (SFZ)
17u45	Situation in Serbia	Dr. Zivko Curcic (IFVCNS)
18u00	Bacterial Tuber Wilt (BTW) in Potato	Helen Pfitzner (Verband der Hessisch-Pfälzischen Zuckerrübenanbauer)
18u15	<i>Questions</i>	



BETA-SOL

BACTERIAL TUBER WILT IN POTATO

28.02.2024

Helen Pfitzner, Dr. Christian Lang



HOW OUR **SUGAR BEET GROWERS ASSOCIATION** CAME UP WITH THE **POTATO**



2017

Founding of the
"Virus and Bacteria
Working Group "

2018 & 2019

Monitoring of Virus
and Bacteria



2020

Start
NIKIZ-Project



2021

Founding of the
„Research
Association Sugar
Beet Southwest "



2022

Start BETA-SOL discovery of „
Bacterial Tuber Wilt in Potato“
and propagation of pentastiridius
leporinus on potato

SOFT / RUBBERY TUBERS



shoot formation
(left without/right
with)



Bulbous
thickened stinky
shoots



Red leaves



yellowish
discolored
shoots/leaves



Withering/dying of symptoms /air
tubers



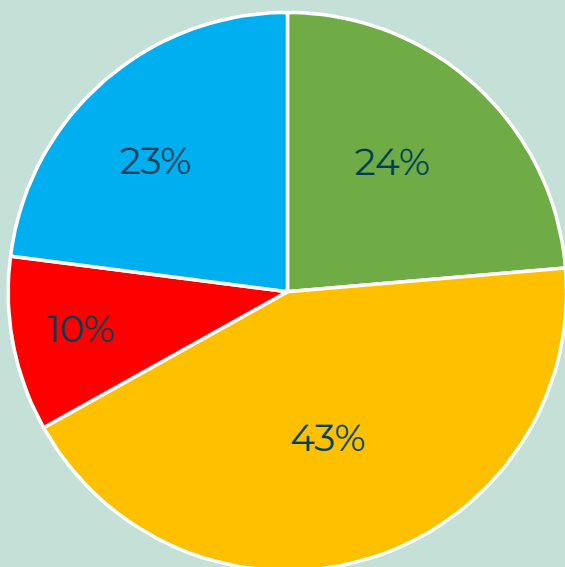
NYMPHS ON POTATO



Göllheim, 21.09.23

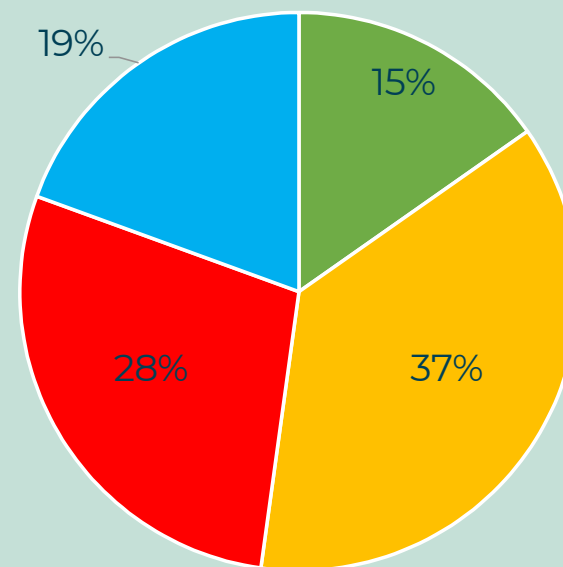
PATHOGEN LOAD OF SUGAR BEET AND POTATO 2022

Sugar beet (n = 148)



First detection of the
proteobacterium
Candidatus
Arsenophonus
Phytopathogenicus
in potatoes

Potato (n = 550)



■ Gesund ■ Proteob. ■ Stolbur ■ Doppelt

■ Gesund ■ Proteob. ■ Stolbur ■ Doppelt

HOW OUR **SUGAR BEET GROWERS ASSOCIATION** CAME UP WITH THE **POTATO**



2022

Start BETA-SOL
discovery of „ Bacterial
Tuber Wilt in Potato“
and propagation of
pentastiridius leporinus
on potato

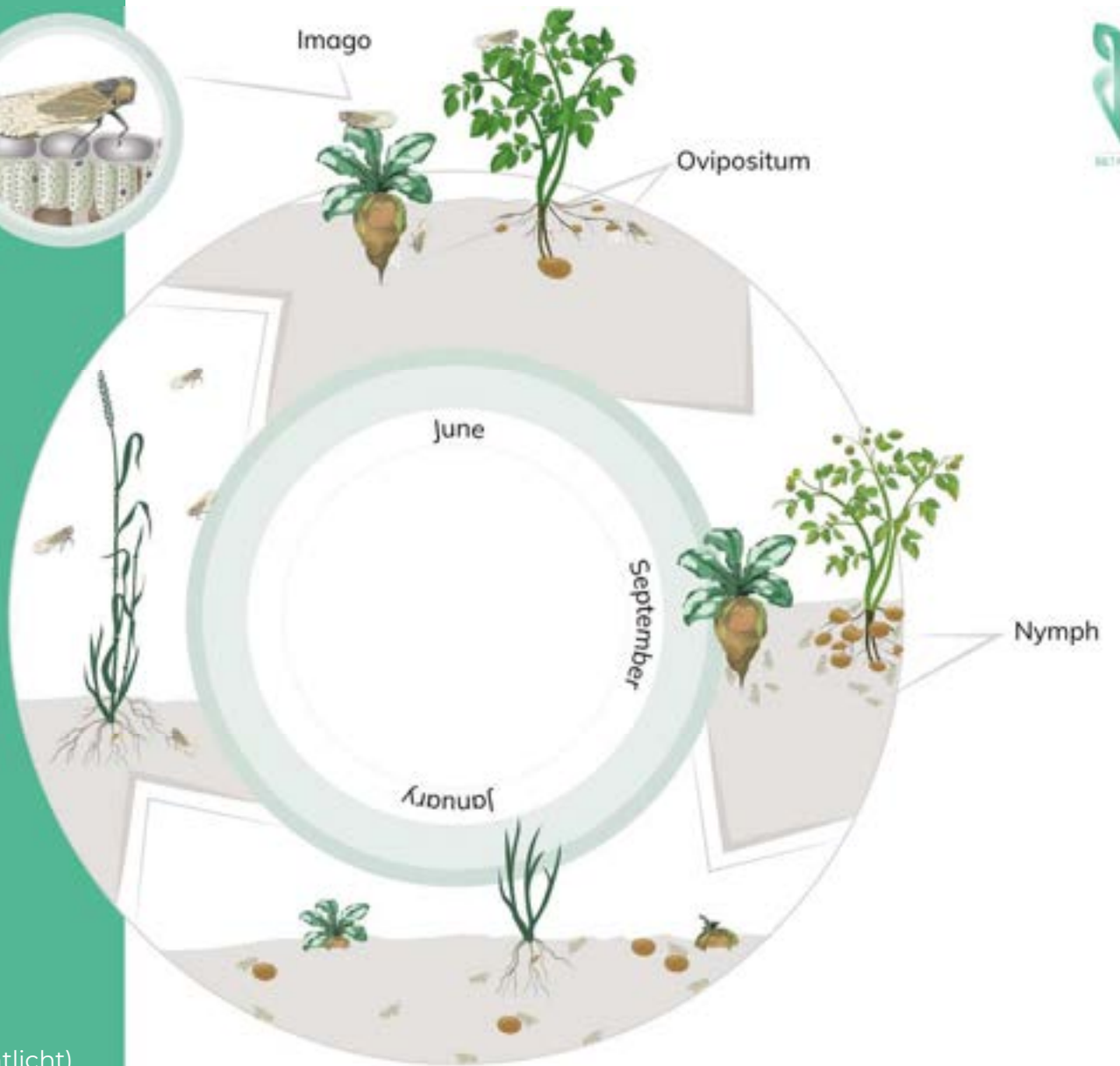
2023

BETA-SOL-
Conference and
Field day in
Worms – Start
SIKAZIKA

2024

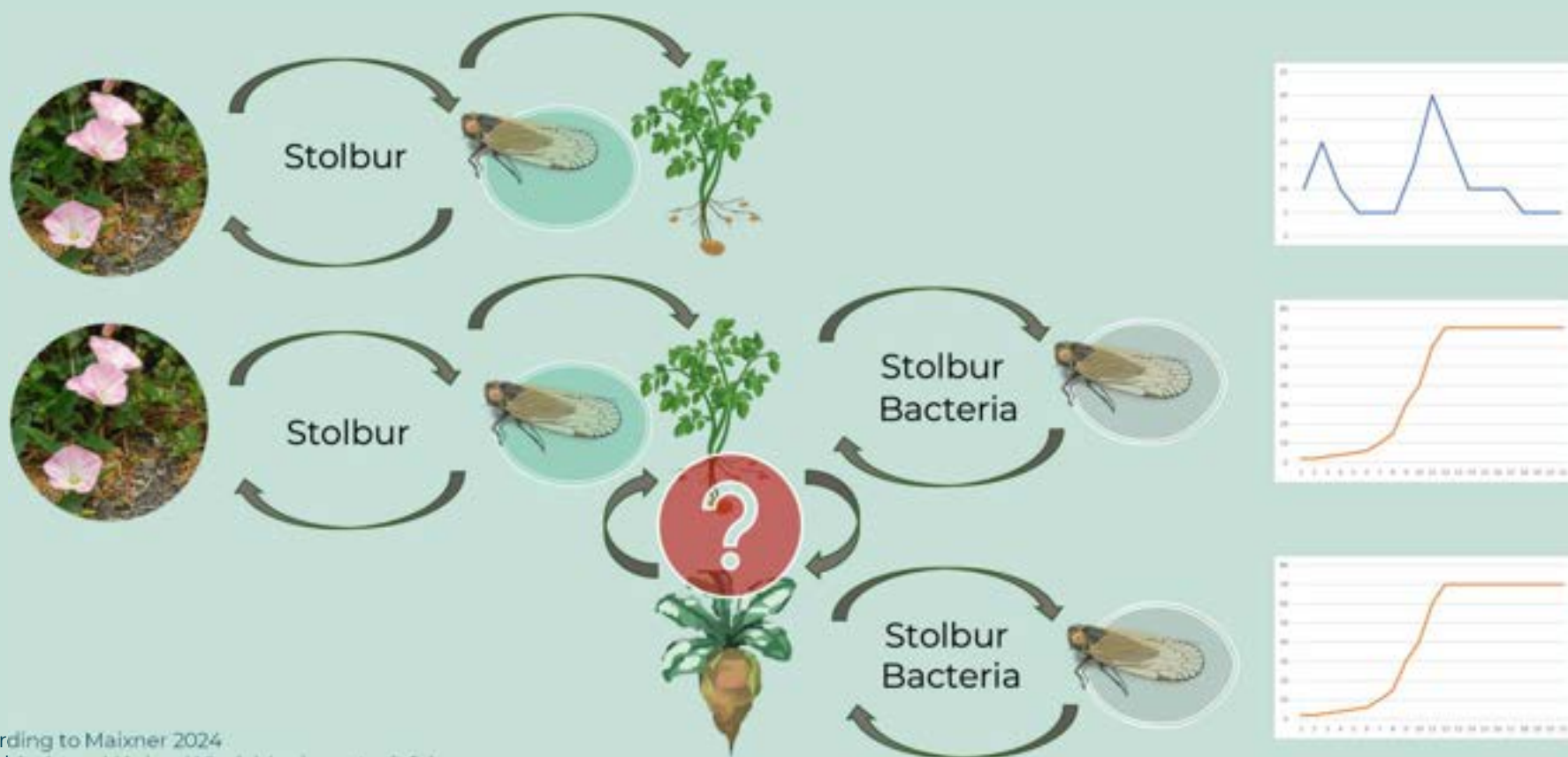
Start KARTOZIK
– Forum BETA
SOL 3.+ 4.
September

CHANGED LIFE CYCLE OF *pentastiridius leporinus*



Quelle: Lang, Pfitzner, Dettweiler, Kreimer, 2024 (unveröffentlicht)

POSSIBLE SCENARIOS FOR BTW IN COMPARISON TO THE SCENARIO SBR



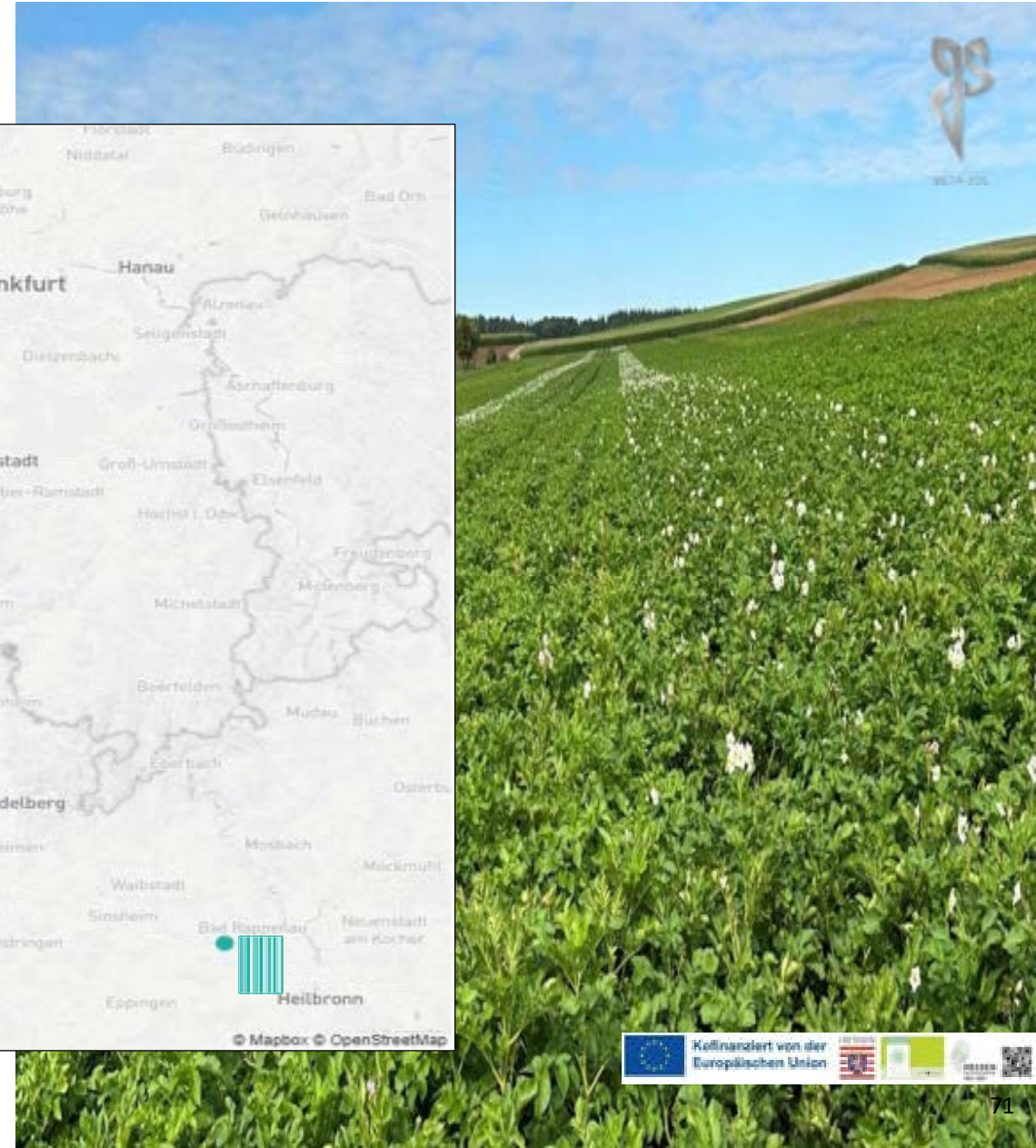
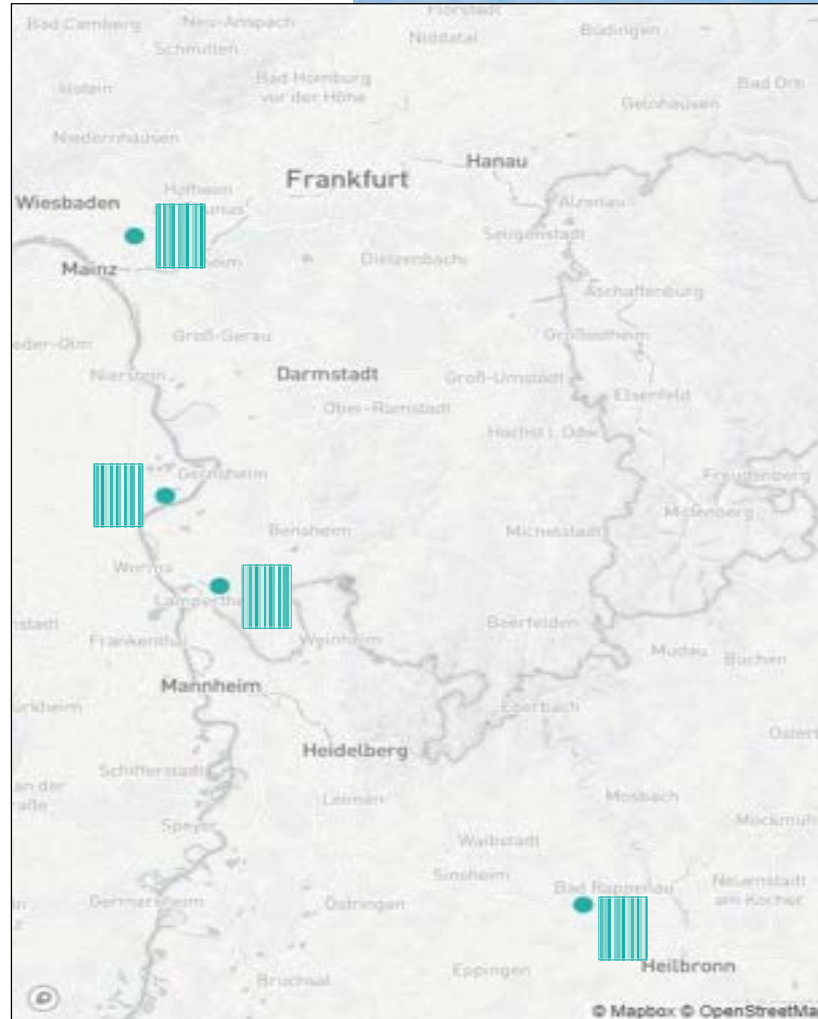
Changed according to Maixner 2024
 Picture of field bindweed (Acker-Winde) (unkraeuter.info)

PROJEKT SIKA-ZIKA

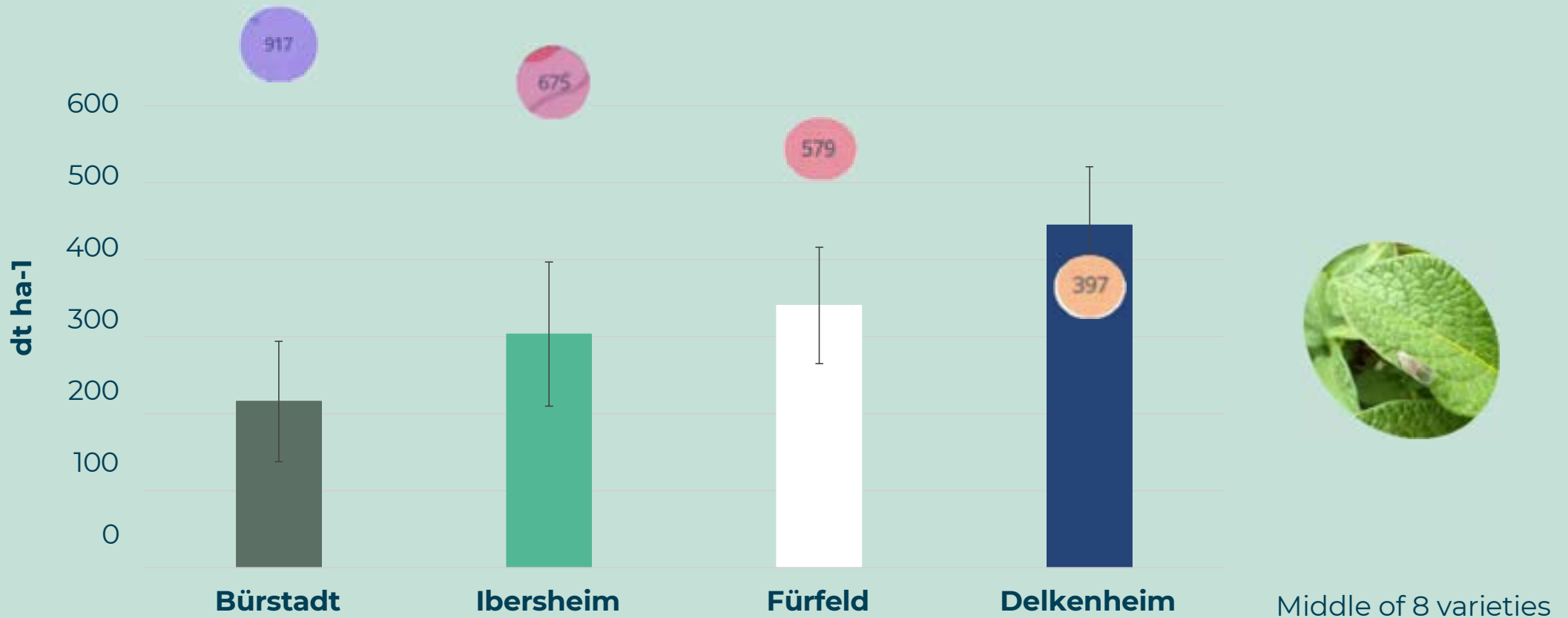
A FIRST INITIATIVE
AGAINST BTW IN HESSE

Experiment sites and setup

Location	Planting date
Worms- Ibersheim	19.05.2023
Bürstadt	16.05.2023
Wiesbaden- Delkenheim	23.05.2023
Fürfeld	19.05.2023



HARVEST RESULTS 2023 – SIKAZIKA STRIP EXPERIMENTS



EXCLUSION OF PLANTHOPPER



EXCLUSION OF PLANTHOPPER

SIKAZIKA 14.09.23



Without planthopper

With planthopper



SAMPLING SIKAZIKA

TENT- EXCLUDED POTATOES, NO TENT: EXPOSED POTATOES





TAKE HOME

1. Bacterial potato tuber wilt known since 2022, discovered by Betasol working group and NIKIZ team.
2. Pathogen and vector in sugar beets and potatoes are genetically largely identical
3. The occurrence and proliferation of the vector *Pentastiridius leporinus* in potatoes has been demonstrated
4. The impacts of the disease in potatoes are even more significant than in sugar beet
5. Many potato projects (Geka Pent, SIKAZIKA (EIP), EpiStol, Kartzik (EIP)) have already been initiated, totaling 3 million euros



BUT



THE
PLANTHOPPER IS
FORMIDABLE



more **AGRICULTURAL**
DIRECTLY RELEVANT

knowledge → better protect
other regions

THANK YOU!

We invite you to Worms to come to the

FORUM BETA-SOL 2024.



September 3rd: Field Day
September 4th: Conference

Contact: Helen Pfitzner
forschungsgemeinschaft@ruebe.info
0049-6241-921920



KARTOFFEL-PROJEKTE ZU DIESEM THEMA

2023 Beta Sol Feldversuche:
2 Standorte mit jeweils 39
Sorten, 6-fach wiederholt
(234 Parzellen)
Koordination über die
UNIKA und Agrarservice

Julius-Kühn-Institut
Dossenheim:

Geka Pent

Dr. Jürgen Gross

Eva Therhaag

Julius-Kühn-Institut
Siebeldingen:

EpiStol

Dr. Michael Maixner

Natasha Witczak

EiP KARTOZIK: Start 2024

Leadpartner: Prof. Dr.
Elmar Schulte-
Geldermann

Dorothee Kreimer

EiP SIKAZIKA: Start 2023

Ansprechpartner: Res
Naturae QSV GmbH,
Mareike Schwind, David
Löffler (Vertretung
Dorothee Kreimer)

Ab 2023 Monitoring der
Schilfglasflügelzikade und
Windenglasflügelzikade in
Hessen vom Regierungs-
präsidium (RP) und in
Rheinland-Pfalz über das
Dienstleistungszentrum
ländlicher Raum (DLR)

Koordination der Projekte über die Agrarservice Hessen-Pfalz GmbH

SV SEMINAR

A COLLABORATIVE APPROACH TO COUNTER SBR/RTD

Part 2	WORKING TOGETHER TO DELIVER SOLUTIONS	
18u15	Breeding for SBR & RTD solutions	Pierre Longerstay (SESVanderHave)
18u30	R&D collaboration between SV and IfZ	Prof. Dr. Mark Varrelmann (IfZ)
18u45	<i>Questions</i>	



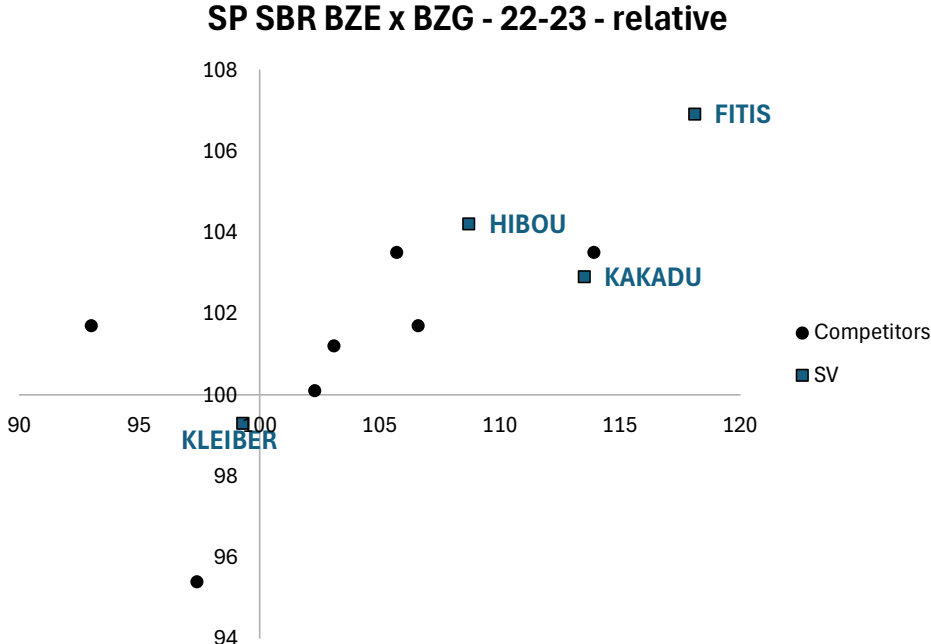
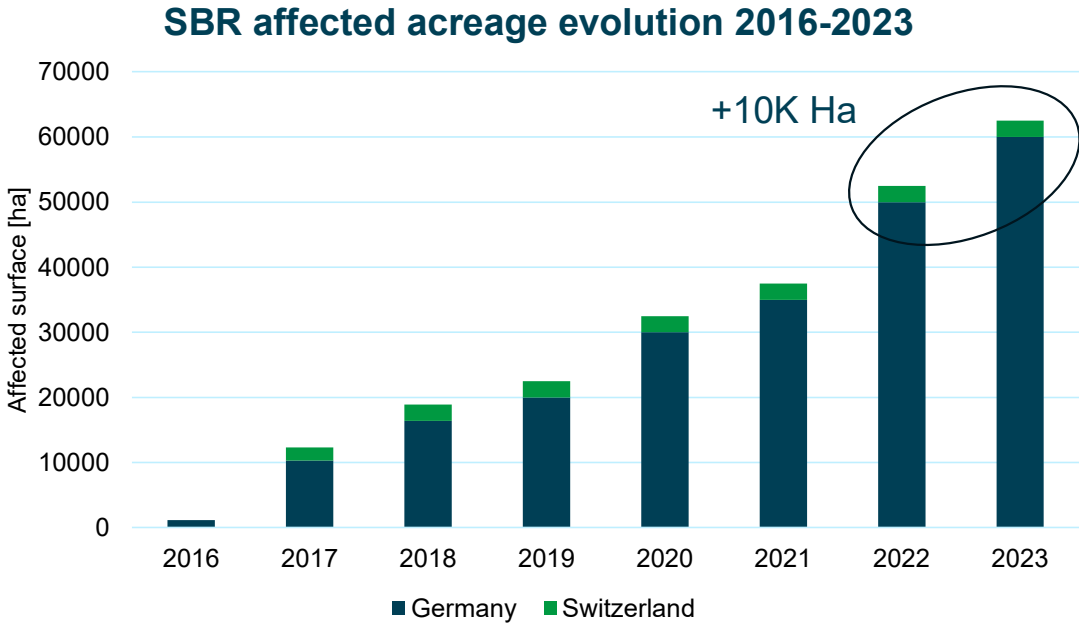
Breeding for SBR and RTD solutions



#TogetherWeGrow

SBR AFFECTED AREA IN 2023

INCREASE OF RTD OCCURRENCE IN SBR AFFECTED AREAS



Very early appearance of SBR symptoms and further spread
 Rapid and widespread appearance of RTD symptoms
 → **Strong impact on sugar beet growing**



SBR - RTD DISTRIBUTION

TWO DIFFERENT *PHYTOPLASMA* STRAINS PRESENT, PARTLY OVERLAPPING, BUT NOT ALWAYS CAUSING SIGNIFICANT DAMAGES.



Source: SESVanderHave
DIAG Center.

C. phytoplasma
12P

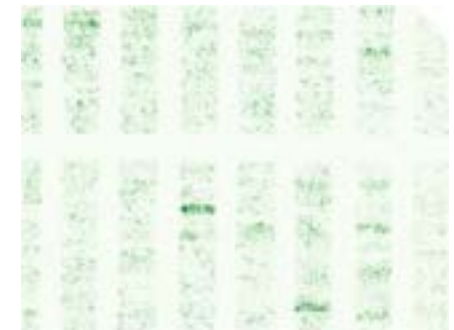
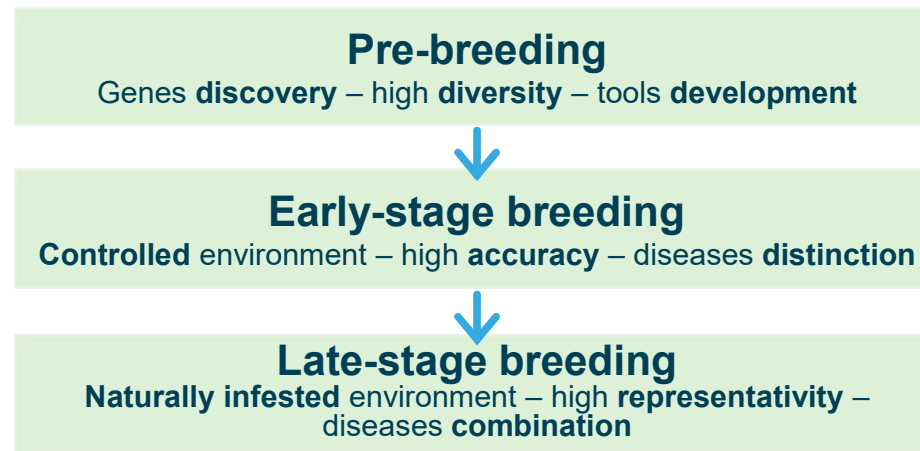
A. phytopathogenicus

C. phytoplasma
12A

- SBR mostly restricted to **Germany and Switzerland**, few other positive samples
- RTD-pathogen found all over Europe, but often **without widespread disease symptoms**
- Two dominant strains of *Candidatus Phytoplasma solani* causing RTD:
 - **Western Europe:** strain 12P
 - **Eastern Europe:** strain 12A

OUR BREEDING APPROACH

AN INTEGRATED APPROACH STARTING FROM SCREENING A LARGE GENETIC DIVERSITY AND USING PHENOTYPIC AND MOLECULAR TOOLS WILL INCREASE THE PROBABILITY OF IDENTIFICATION OF VARIETAL SOLUTIONS.



Tolerance sources
Breeding for **SBR-RTD complex**
– combination of tolerance genes
– plasticity and sustainability

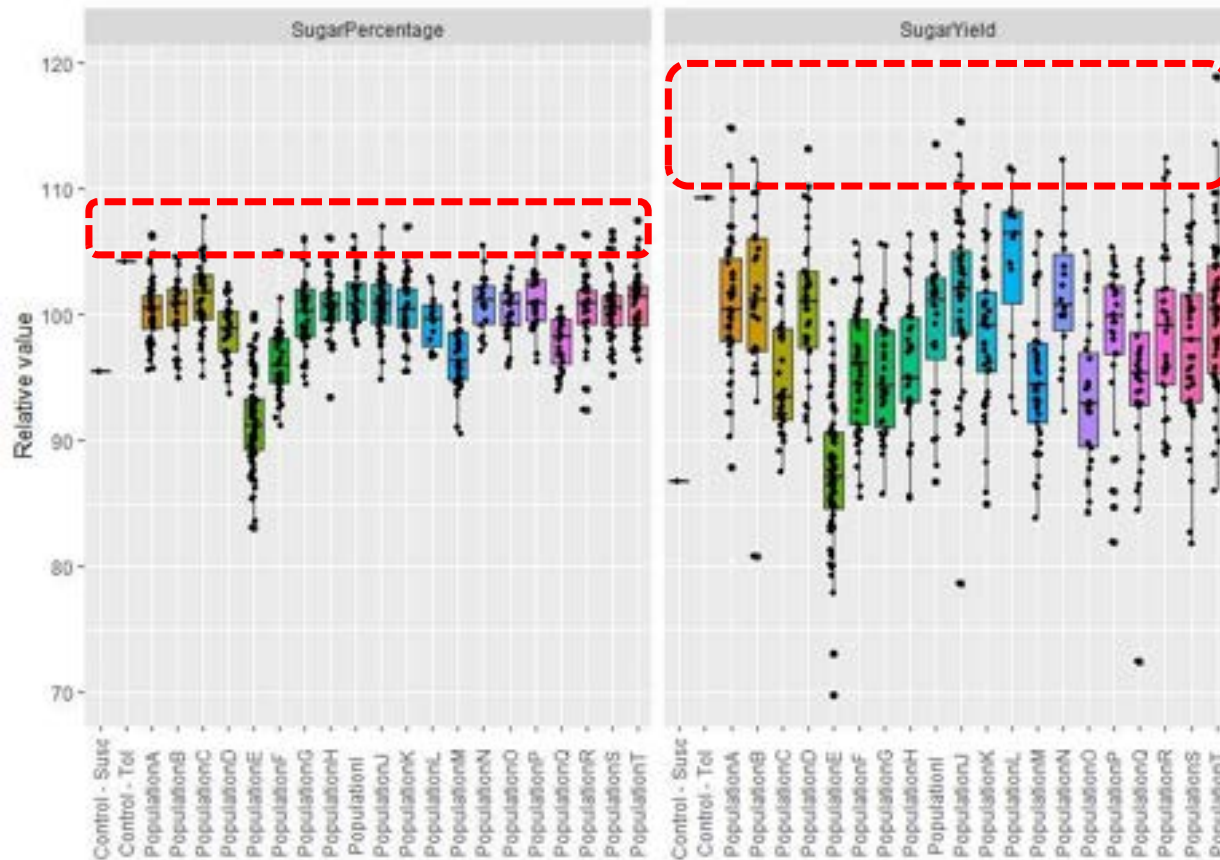


Traits combination
Visual phenotypic traits and agronomic traits
– sugar yield prioritisation
– additional traits of interest

EARLY-STAGE BREEDING RESULTS

ACTIVE SCREENING ALLOWED IDENTIFICATION OF LARGE GENETIC DIVERSITY.

S/HA and %S distribution under SBR-RTD infestation – inbred lines populations

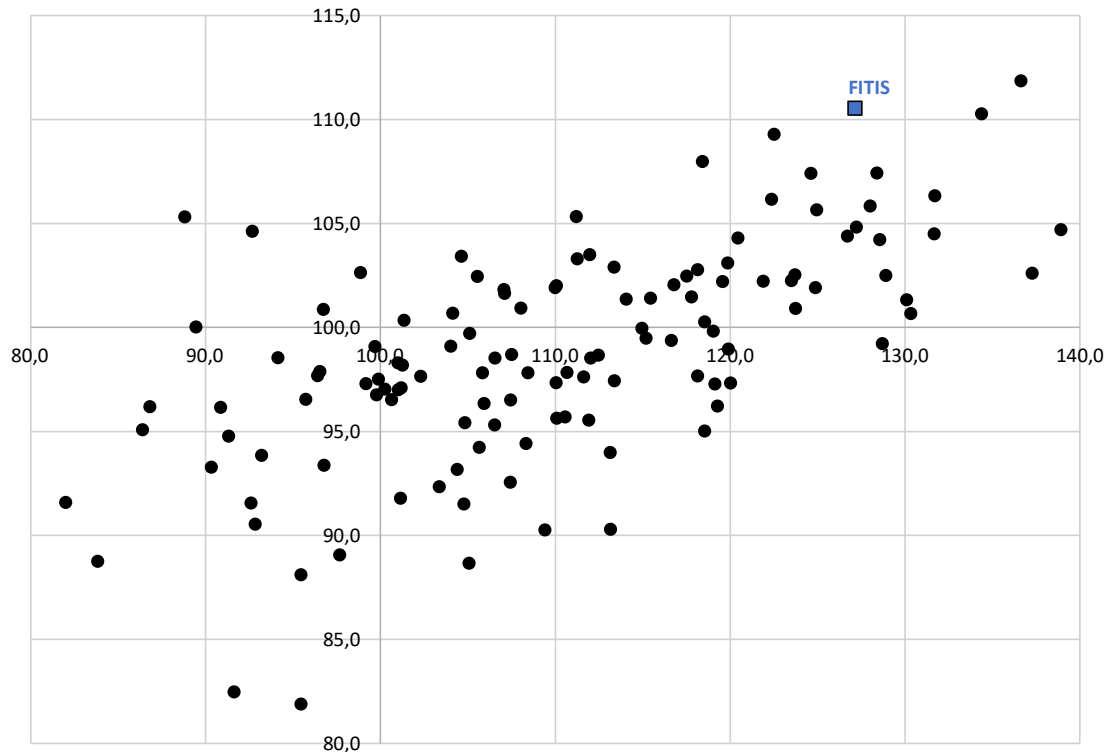


- Screening of **20 populations** composed of **60 lines**
- **Deeper understanding of existing variability** in the breeding germplasm
- Potential for highly tolerant lines **selection and recombination**

LATE-STAGE BREEDING RESULTS

LARGE-SCALE TRIALING ALLOWS IDENTIFICATION OF HYBRIDS WITH IMPROVED PERFORMANCE UNDER SBR & RTD INFESTATION.

S/HA vs %S pre-commercial hybrids - 2023 internal trials – SBR-RTD co-infestation



- Internal trials with co-infestation SBR-RTD
- Significantly **better performing new hybrids** compared to leading commercial varieties
→ potential for short-term delivery of new improved varieties

DRONE BASED PHENOTYPING

DRONE PHENOTYPING IS A POWERFUL TOOL FOR SUPPORTING THE BREEDING OF SBR-RTD TOLERANT VARIETIES.



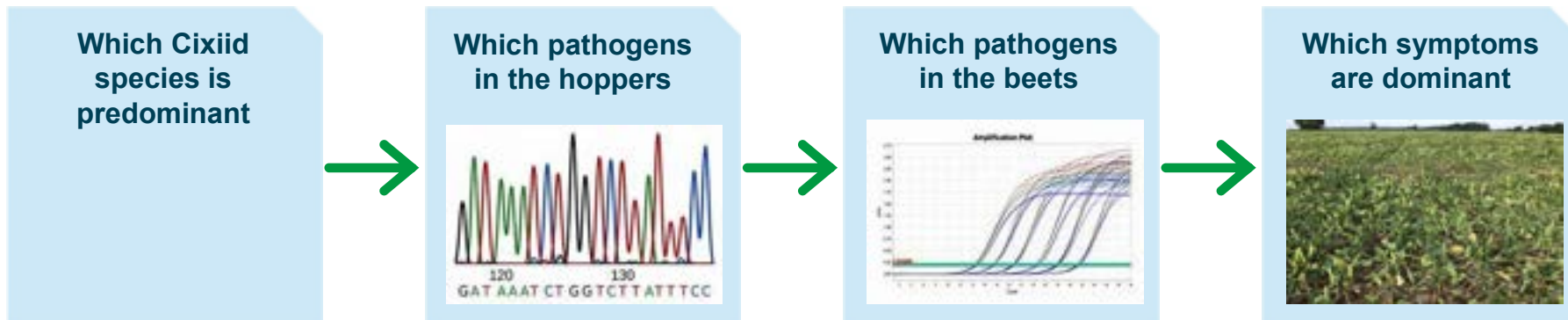
- **Late season drone flight** above one highly infested field in Franconia
→ quantitative measure of defoliation
- **Quick and precise** identification of **visually** more tolerant hybrids
- Partly correlated to **yield potential** in infested conditions and **yield loss** compared to healthy conditions

DETAILED MONITORING ACTIVITIES PLANNED IN 2024

GOAL: CONFIRM THE PREDOMINANT VECTOR AND MONITOR THE SPREAD AND DIVERSITY OF THE PATHOGENS CAUSING SBR/RTD.

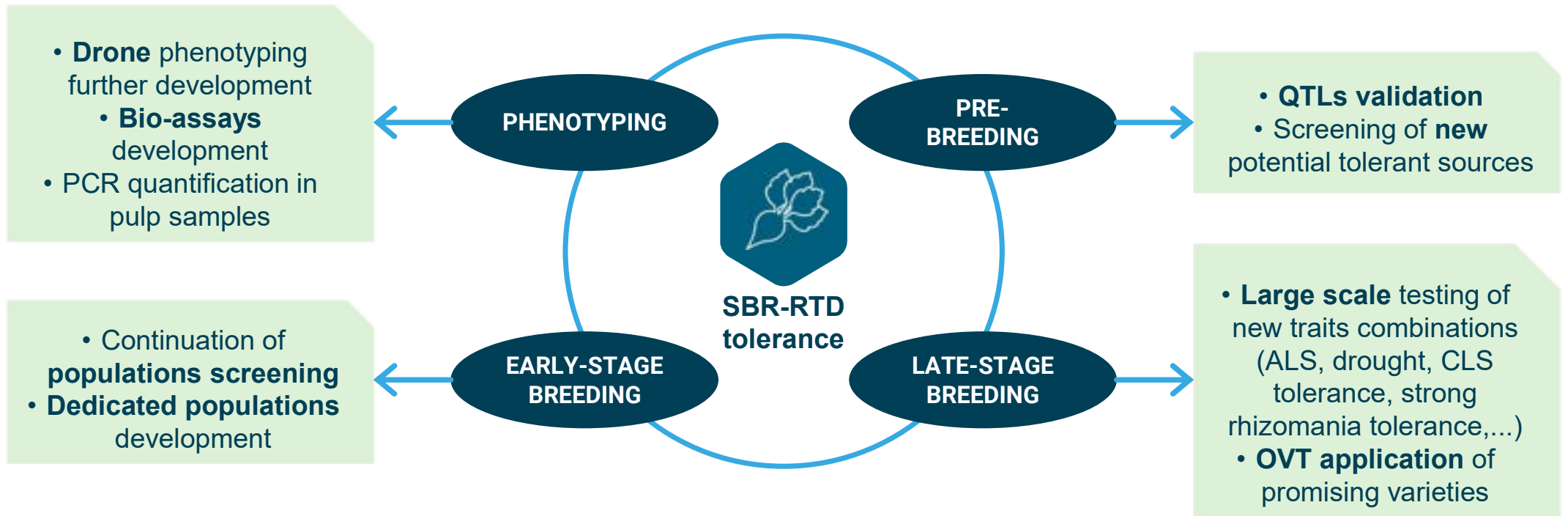


Monitoring 2024



BREEDING ACTIVITIES 2024

A COORDINATED ACTION PLAN COVERING ALL ASPECTS OF SUGAR BEET BREEDING FOR SBR-RTD TOLERANT VARIETIES DEVELOPMENT.



A COLLABORATIVE EFFORT

ONLY A COMBINATION OF FUNDAMENTAL & APPLIED RESEARCH INVOLVING MULTIPLE STAKEHOLDERS WILL LEAD TO SUCCESS.

Breeding can help fight the SBR-RTD complex, which is a very challenging issue

- An **integrated** approach involving all stakeholders is needed
- **Combining** agronomic and genetic solutions

SESVanderHave has set up several collaborations

- **Fundamental** research for a **better understanding of the disease complex**
- **Applied** research to bring as soon as possible **sustainable solutions** to affected farmers
- Close collaboration with the SBR Task Force initiated in Germany and active contribution to trials conducted in 2024

CONCLUSIONS

FULL COMMITMENT TO DEVELOP SUSTAINABLE VARIETAL SOLUTIONS.

- **SBR and RTD form one disease complex** with multiple complex interactions between pathogens, vectors, sugar beet and other crops involved
- 2023 allowed us to take **major steps** forward in:
 - Better **understanding the underlying tolerance genes** present
 - Increasing the **knowledge about our germplasm**
 - Developing **high-throughput tools** to support our breeding activities
- Our breeding approach focuses on a **global answer to both SBR and RTD combined with other traits required** for sustainable beet growing in affected regions
- We collaborate with all stakeholders to find **agronomic and genetic solutions to this new challenge**



→ **We are fully engaged in finding solutions to the challenges caused by the SBR – RTD complex and are confident we can offer sustainable solutions for the future of sugar beet growing in affected areas**



Thank you for your attention



#TogetherWeGrow