

SBR and RTD - A new threat challenging breeding and agronomy in sugarbeet cultivation in Europe

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Introduction

Two new sugar beet diseases, 'Syndrome des Basses Richesses' (SBR) and 'Rubbery Taproot Disease' (RTD), are associated with the proteobacterium '*Candidatus Arsenophonus phytopathogenicus*' and/or the phytoplasma '*Candidatus Phytoplasma solani*', respectively. Both are transmitted by planthoppers like *Pentastiridius leporinus*. SBR-infected sugarbeet plants have a loss of sugar content of up to 5% (absolute) and yield losses of up to 25%. RTD-infected sugarbeet can have rubbery tissue that affects storage and processing besides a severe yield reduction.

To find solutions to combat both diseases, KWS intensified work on the following approaches:

Breeding for resistance/tolerance

The development of genetic resistance is a major element for the control of the SBR-RTD disease complex. Breeding programs are being established, that include the screening of wild beet accessions in the field as well as in the greenhouse as genetic resources for SBR and RTD tolerance. For the moment, better differentiation can be observed for SBR (Fig. 1) than RTD.

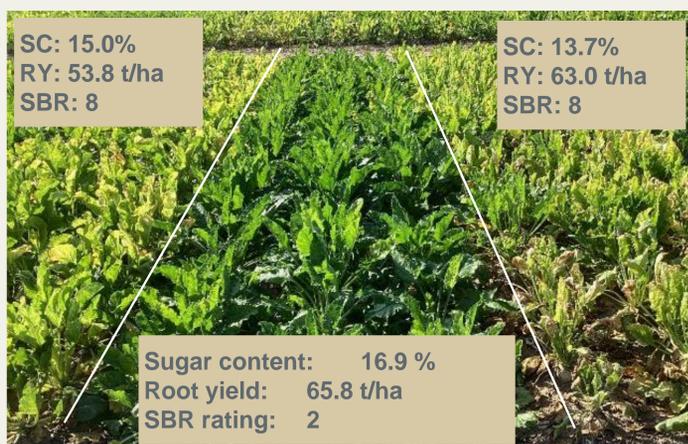


Fig. 1: Differentiation of sugarbeet genetics in SBR field trial, GER, 2023

Monitoring

A large-scale monitoring program is in place to monitor the spread and composition of pathogens and flight activities of planthoppers (Fig. 2). SBR is monitored in Switzerland, whereas RTD occurs in South-East Europe (e.g. Serbia). Both diseases are found in Germany.

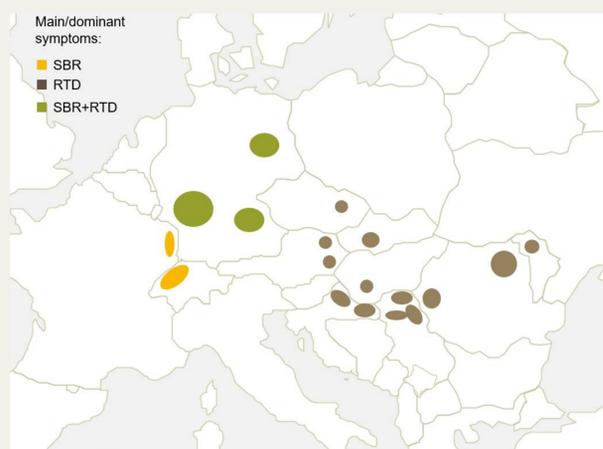


Fig. 2: SBR/RTD distribution in Europe, as of 10/2024.

Timepoint of planthopper immigration

Field blocks were covered with a net against planthopper immigration and opened early (June), medium (July) and late (August). A permanently opened infested as well as a closed healthy check were also included (Fig. 3). Besides the infested check, the highest yield loss was measured with an exposure starting in June (about -10%), which was during the peak of planthopper immigration.



Fig. 3: Field trial set up with field blocks showing the healthy and infested checks as well as the exposed blocks at different time intervals (Picture: C. Stibbe, KWS)

Seed treatment in winter wheat

The lifecycle of the planthopper is well adapted to the common sugarbeet – winter wheat crop rotation (Fig. 4). This crop rotation enables the planthopper to continue their life cycle as nymphs on winter wheat after the sugarbeet harvest. In a field trial, winter wheat was sown with insecticide seed treatments in autumn 2024 with the aim to measure their efficacy in reducing the nymph population. This will be done by installing emergence traps in spring 2025 to assess the adult planthopper populations.



Fig. 4: Field trial set up of emergence trap and planthopper life cycle

Planthopper rearing

An insect culture of planthoppers is being established to enable year-round studies under controlled conditions (Fig. 5).



Fig. 5: Planthopper rearing (left) and a *P. leporinus* planthopper in rearing (right)

Conclusion & Outlook

Climate change is expected to favor further spread of planthoppers and thus the spread of both diseases. Research into agronomic and phytopathological aspects is helping to increase knowledge that will support the development of control strategies. For long-term control, besides tolerant varieties, agronomic measures are needed as part of an integrated management approach to control the SBR-RTD disease complex.