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SAS/AF-Anwendung RESI 2 für die Planung und Auswertung von Versuchen zur Resistenz von Getreidesortimenten

SAS/AF application RESI 2 for construction of experimental design and analysis of experiments for assessing resistance in cereal cultivars

Vorgestellt werden die Wahlmöglichkeiten auf der grafischen Nutzeroberfläche der SAS/AF-Anwendung RESI 2:

- Schadbilder (Veranschaulichung der Symptome, Schätzen des Befalls, Befallsverlauf)
- Konstruktion eines randomisierten Lageplans (Blockanlage, Alpha-Anlage)
- Auswertung eines Einzelversuchs
- Auswertung einer Versuchsserie.

064 - Schubert, J.[1)]; Habekuß, A.[1)]; Qian, Y.[2)]; Zhou, X.[2)]
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Agroinfektion von Getreide mit Geminiviren – eine Alternative zur konventionellen Resistenztestung?

Agroinfection of cereals with geminiviruses – an alternative for conventional resistance testing?

In addition to several RNA viruses, cereal crops can be infected also by DNA viruses. Most important representatives belong to the genus Mastrevirus with the type member *Maize streak virus* (MSV). MSV causes heavy yield losses, especially in Africa. Mastreviruses are transmitted exclusively by plant leafhoppers. Intensive evaluation work was undertaken to identify resources of resistance to the viruses but success was limited so far to some genes conferring tolerance. Since the last two decades in Central Europe the occurrence of cereal dwarf viruses has increased significantly. It is expected that global warming will extend the problems caused by these viruses. Effective insecticides are not available until now. So far, three cereal dwarf viruses are known: *Barley*, *Wheat* and *Oat dwarf viruses*. While under natural conditions *Barley* and *Oat dwarf viruses* are restricted to barley and oat respectively, *Wheat dwarf virus* also infects barley, rye, triticale and several grasses. The only known vector is the plant leafhopper *Psammotettix alienus*. It is expected that some other leafhopper species might transmit the virus, too.

Evaluation of natural sources of resistance using gene bank accessions is labour-intensive as plants have to be inoculated by plant leafhoppers. The aim of our work was to test whether this inoculation procedure can be improved by agroinfection with the corresponding viral constructs. For MSV as well as other DNA viruses it is known that tandem sense dimers of the virus, also incomplete tandems comprising two "Large Intergenic Regions", can be efficiently for agroinfection. All three viruses were amplified by means of "Rolling circle amplification", and the restricted and cloned products were sequenced. Based on the sequence data, incomplete tandems were produced in binary *Agrobacterium tumefaciens* vectors. For each virus two constructs were prepared: one in which the viral sequence was under the control of 35S-CaMV promoter, and one without the 35S-promoter. The binary vectors were transformed into *A. tumefaciens* EHA105.

For agroinoculation, several approaches were tested with oat, barley and wheat. First, the plants (at least 50 per variant) were injected with a bacterial suspension (with or without induction with acetosyringone). In another experiment, vacuum infiltration via roots or leaves was performed. Several plant developmental stages were tested spanning from just germinating until second true leaf. Inoculated plants were incubated overnight at 28 °C and planted the next day into soil. Plants were grown for 4-8 weeks in a greenhouse. Infection status was tested by ELISA using a polyclonal antiserum specific for the three viruses. None of the tested plants became infected when the described methods were applied. Using the “vascular puncture” method described for maize kernels by Redinbaugh et al. (2001), a limited number of plants became infected. From 60 inoculated plants of the cultivars 'Borenos' (wheat), 'Rubina' (barley), 'Cost Black' and 'Jumbo' (both oat) approximately 55 survived the inoculation procedure. One infected plant was obtained for each cultivar (2 %). Transmission of ODV to wheat or barley failed, as well as of BDV to wheat. This might be due to the limited number of inoculated plants. For ODV it was tested whether it can be transmitted by *P. alienus* from the agroinoculated plants back to oat. The transmission was successful; sequencing of the genome of the transmitted virus demonstrated that it was complete and that only minor changes had appeared.