Effects of *Diabrotica*-resistant corn cultivars on the larval development in lab-based studies

Udo Heimbach
Kristin Schwabe
Andreas Müller
Tests with resistant maize varieties to reduce larval development of *Diabrotica*

- Resistant cultivars may reduce plant damage as well as *Diabrotica* population development, thus providing relevant tools for IPM and quarantine regulations.

- The aim was to prove relevant differences of *Diabrotica* resistant maize cultivars of the Sunrise (SUM) group compared to other cultivars in laboratory screening experiments.

- First experiments indicate, that there are differences between Sunrise cultivars regarding resistance against *Diabrotica* (reduced damage and larval development of Sunrise cultivars in field tests in Hungary).

- During 2009 – 2011 laboratory trials with resistant Sunrise cultivars and non-resistant ones were conducted at JKI under quarantine conditions.
 Methods

• Three Sunrise cultivars (No. 4, 6 and 7) and four non-resistant cultivars (No. 1, 2, 3 and 5) were planted at 25° C, 60% humidity, 16 h light in a climatic chamber with up to 15 replicates and two controls.

• At BBCH 13 up to 10 freshly hatched *Diabrotica* larvae (L1) were transferred in to pots and after 21 days surviving larvae of *Diabrotica* were separated from soil and roots, counted, and weighed.

• Plant weight and length was determined
Methods
Heavy infection with *Fusarium* example cultivar No 1 and 4 *(Sunrise)* photos taken shortly before the end of the experiment
Results of a 1st trial, 23. March - 30. April 2010

Mean plant length [cm]

Mean plant weight [g]

Larvae recovered [%]

Mean larval weight [mg]

Cultivar 1 2 3 4 5 6 7

n= 8  n= 4  n= 7  n= 4  n= 6  n= 6  n= 12
Results of a 3rd trial: only Ronaldinio planted with 3 days distance (A, B, C, D), larvae released to all pots 10 d after sowing of D
Mean mortality of larvae for different maize cultivars after 14 and 21 days in lab trials
(Data by Thomas Thieme, BTL Sagerheide, maize lines from G&S Crop Services L.L.C, Altoona, Iowa, USA)
Conclusions

• Mainly Sunrise cultivars showed clear symptoms of a heavy infection with *Fusarium* and had clearly reduced plant growth and plant weight

• Resistance of the Sunrise cultivars No. 4, 6 and 7 could not be confirmed by our results

• For the non-resistant varieties No. 1, 2, 3 and 5, no significant differences in larval size and weight were found

• In the 3rd experiment larvae were released at different plant stages of a non-resistant cultivar (Ronaldinio): lowest larval mortality and highest weight was found, when released to youngest and smallest plants

• Only limited interpretations are possible because all trials were strongly influenced by *Fusarium* infections. The influence of fungal infections and the stage of the plants on larval development of *Diabrotica* is still unclear

• Uninfected seed batches are essential for resistance screening
Thanks for financial support and laboratory stuff of the JKI

Diabrotica Research Program

funded by the German Federal Ministry of Food, Agriculture and Consumer Protection and the Bavarian State Ministry of Food, Agriculture and Forestry