

Spreading predictions of the western corn rootworm in Germany until 2021

Ausbreitung des Westlichen Maiswurzelbohrers in Deutschland bis 2021

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The western corn rootworm (*Diabrotica virgifera virgifera*) is one of the most important pests of maize in the world and endemic to North America. In 1992, the first beetles of the western corn rootworm were first detected in Europe close to the Airport of Belgrade. Since then the beetle has actively spread through Europe. In 2007, first beetles were caught in pheromone traps in southern Germany (Bavaria and Baden-Württemberg). By now, the western corn rootworm has also been detected in North Rhine-Westphalia (only in 2010), Hesse (only in 2011) as well as in Rhineland-Palatinate (2011 and 2012). In future, it is expected, that the beetle will spread further in Germany.

The previous spread of *Diabrotica* in Europe as well as in North America has varied from year to year and from region to region and ranged from a couple of kilometers up to 80 km per year. This shows that dispersal is effected by regional conditions. Hence, a dispersal model was developed which integrates all relevant regional conditions.

The model consists of the following four components: situation of *Diabrotica*, regional spread, long distance flights and global spread.

The model component "situation of *Diabrotica*" includes the population development of the western corn rootworm under regional conditions. The second component of the model, "regional spread", contains all flights over short distances. The direction of the flights depends on corn growing because the western corn rootworm follows maize over short distances. Additionally, barrier cells, like cities and forests, are integrated into this component. The western corn rootworm, however, does not follow maize directly when the beetle flies over long distances and no barriers exist. This behavior is considered in the component "long distance flights".

Furthermore, the western corn rootworm was detected far away behind the established spread line because of hitchhiking on various means of transport. This fact is taken into account in the component "global spread".

Several scenarios of the western corn rootworm spread without control measures as well as considering different control measures were presented and discussed.

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