

Vector-Borne Diseases: Impact of Climate Change on Vectors and Rodent Reservoirs
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Incidence and epidemiology of gramineous viruses transmitted by insects and eriophyid mites in Germany

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Approximately 90 different viruses of *Poaceae* are described of which about 60 are present in Europe. In Germany almost 23 viruses of grasses and cereals are known of which only some are of economic importance. Besides the soil-borne viruses economically important yield losses are caused by several other vector borne viruses as the luteoviruses *Barley yellow dwarf virus* (BYDV) and *Cereal yellow dwarf virus*, which are transmitted in a persistent manner by different aphid species and the geminivirus *Wheat dwarf virus* (WDV), which is transmitted persistently by a leafhopper. An infection of wheat and barley in autumn by these viruses reduces frost hardiness and yield losses can be decreased up to 95%.

Analyses have shown that the infection of winter cereals by BYDV and WDV is varying considerably between years. In 2001, 2002 and 2005 members of the BYDV group dominated while in 1998, 1999 und 2000 WDV was detected more frequently. In 2006 and 2007 both viruses appeared in similar frequencies. The strain BYDV-PAV and mixed infections with BYDV-MAV were dominating. Concerning the WDV complex, phylogenetic analyses have revealed that the “wheat”-, “barley”- and “oat”-strains may be considered as different viruses of the genus *Mastrevirus*. In Germany the “barley strain” is most frequent.

The epidemiology of these viruses is mainly influenced by climatic conditions and agricultural practice. The prolongation of the growing period in autumn stimulates the activity of aphids and leaf hoppers. Therefore, in years with a high incidence of BYDV and WDV temperatures are normally > 10 °C for a longer period. With respect to the transmission efficiency of luteoviruses, differences between aphid clones were detected. The minimum temperature for an efficient transmission is 10 °C and transmission efficiency rises with growing temperature.

Wheat streak mosaic virus, which in the US causes periodically losses up to 100%, is not yet found in Germany. However, this virus transmitted by the mite species *Aceria tosichella* has been detected in south east Europe and was recently isolated by us from wheat in France. The impact of climate change on further gramineous viruses will be discussed.

