

Vector-Borne Diseases: Impact of Climate Change on Vectors and Rodent Reservoirs
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Impact of climate change on insect vector populations and the occurrence and prevalence of insect-transmitted plant viruses in major crop plants of Germany

Katja R. Richert-Pöggeler¹⁾, Reinhard Götz¹⁾, Kerstin Lindner¹⁾, Volker Zahn²⁾ Heinrich-Josef Vetten¹⁾, Stephan Busche¹⁾, Udo Heimbach¹⁾ and Günther Deml¹⁾

¹⁾ Federal Biological Research Centre for Agriculture and Forestry (BBA), Messeweg 11-12, D-38104 Braunschweig, Germany

²⁾ Plant Protection Service Hannover, Wunstorfer Landstraße 9, D-30453 Hannover, Germany

In recent years the impact of climate change on our ecosystem and all its participants has become obvious. The average temperature has increased by 0.7 °C within the last hundred years globally and an average temperature rise of 6.3 °C by the year 2100 has been predicted (Randall et al., 2007). This will dramatically affect both mobile (fauna) and immobile (flora) organisms, resulting in both altered and novel forms of interactions between host plants, plant pathogens and their vectors. Unlike animal viruses, many of which can depend upon host mobility for transmission, most plant viruses are transmitted by vectors, the majority by insects (Power, 2000). Particularly aphids are expected to react strongly to environmental changes because of their short generation time, low developmental threshold temperatures (Harrington et al., 2007) and ability to survive mild winters without winter forms. An increase in the numbers of insect vectors will inevitably lead to a higher risk for viral infection of plants.

The aphid transmissible complex of barley yellow dwarf viruses (BYDV, Luteoviridae) in cereals and potato virus Y (PVY, Potyvirus) in potato were selected to illustrate a climate dependent scenario for vector-borne diseases in plants and its potential effects on the prevalence (incidence) of virus infection and yields. Both viruses cause severe yield and quality losses in their respective host plants and are transmitted by a number of different aphid species. However, the vector-virus interactions are distinct: BYDV is transmitted by aphids in the persistent (circulative) manner, whereas PVY is transmitted non-persistently.

A correlation between mild winters, high intensity of aphid movement during spring and a high frequency of PVY-infected potatoes will be discussed. Studies are in progress to investigate the observed climatic conditions and their impact on BYDV epidemiology in cereals.

Power AG (2000). Insect transmission of plant viruses: a constraint on virus variability. *Curr. Op. Plant Biol.* 3, 336-340.

Harrington R et al. (2007). *Global Change Biology* 13, 1550-1564.

Randall DA et al. (2007): *Climate Models and Their Evaluation*. In: *Climate Change 2007: The Physical Science Basis*. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon S, D Qin, M Manning, Z Chen, M Marquis, KB Averyt, M Tignor and HL Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and NewYork, NY, USA.

