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Weather Effects on Crop Diseases in Eastern Germany

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Since the 1970s there are several long-term monitoring programmes for plant diseases and pests in Germany. Within the framework of a national research project, some otherwise confidential databases comprising 77 111 samples from numerous sites accross Eastern Germany could be accessed and analysed.

The pest data covered leaf rust (*Puccinia triticina*) and powdery mildew (*Blumeria graminis*) in winter wheat, aphids (*Aphididae*, four genera) on wheat and other cereal crops, late blight (*Phytophthora infestans*) in potatoes, and pollen beetles (*Brassicogethes aeneus*) on rape. These data were complemented by daily weather observations from the German Weather Service (DWD).

In a first step, Pearson correlations between weather variables and pest frequencies were calculated for seasonal time periods of different start months and durations and ordered into so-called correlograms. This revealed principal weather effects on disease spread – e. g. that wind is favourable for mildew throughout the year or that rape pollen beetles like it warm, but not during wintertime.

Secondly, the pest frequency samples were found to resemble gamma distributions, and a generalised linear model was fitted to describe their parameter shift depending on end-of-winter temperatures for aphids on cereals. The method clearly shows potential for systematic pest risk assessments regarding climate change.