Influence of weather periods on plant diseases: a case study for *Puccinia triticina* and *Blumeria graminis* f.sp. *tritici* on winter wheat in Saxony-Anhalt

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Leaf rust (*Puccinia triticina*) and powdery mildew (*Blumeria graminis* f.sp. *tritici*) are two of the most important plant diseases of winter wheat in Germany. It is already known that both pathogens are influenced by weather, but detailed studies under field conditions regarding the temporal dimension of those influences are missing. Hence, the aim of our study was to detect timeframes during the course of the epidemic year, where weather variables have significant influence on disease severity of leaf rust and powdery mildew of winter wheat.

Randomly sampled monitoring data of 34 years of more than 20 monitoring fields per year between anthesis and early ripening were available for both diseases. The data were collected by the federal plant protection service of Saxony-Anhalt. Weather data for 11 variables at 61 stations were provided by the German Weather Service and missing or inhomogeneous data on specific variables were substituted and corrected using interpolation by the Potsdam Institute for Climate Impact Research. Further climatic variables like freezing days and days with precipitation were calculated by using the original weather variables.

To identify influential periods we used a "window pane" algorithm presented in recent literature. The algorithm calculated Kendall correlation coefficients for each time window between monitoring date and sowing of the crop with a minimum window length of 5 days. Thus approximately 90.000 correlations per weather variable and pathogen were calculated and analyzed. Correlograms as introduced by Goldwin were used to map those correlations.

Both pathogens showed strongly differing structures comparing the correlation maps for different weather variables. Regarding leaf rust severity temperature during the whole vegetation period seemed to be an important influence. Powdery mildew severity showed the highest correlation coefficients with mean values of sunshine duration during the last month before the monitoring date. The results were compared to the relevant literature and discussed with regard to estimating future disease potentials under climate change.