

Performance of leaf wetness sensor used in winter wheat disease management

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Wetness on crop leaves has particular epidemiological significance because many fungal diseases affect plants only when free moisture is present on leaves. The leaf wetness sensor detects the presence of wetness on a leaf's surface, enabling researchers and producers to forecast disease and protect plant canopies, and consequently to optimize fungicide application and often reduce environmental load. This research project aimed at better understanding the leaf wetness duration and its influence in winter wheat disease.

Measurement of surface wetness duration by three electronic flat-plate sensors (Model 237-Campbell Scientific, Inc) in wheat fields were compared with tactile and visual observations in replicated field experiments at the site of Arlon (Belgium) during the period May-July 2006 and April-July 2007. Performances of the sensor were evaluated against SWEB model outputs and visual observations of disease symptoms.

On the field, dew-onset and dry-off of wetness on leaves were observed visually (with a flash light for dew-onset) at 15-minute intervals. Each sensor was placed close the flag leaf. For the three sensors, the two dew-onset and dry-off times measured in both 2006 and 2007 crop seasons gave a leaf wetness duration (LWD) which was on average one hour less than visual observations. In order to establish a relationship between the surface wetness periods and wheat foliar diseases, LWD was compared with the Septoria leaf blotch (SLB) development risk (main winter wheat disease). A minimal surface wetness duration favourable to infection for SLB was established.

Keywords: sensors, free moisture, measurement method, surface wetness, plant protection, agricultural warning system