

172-Chelal, J.; Hau, B.

Leibniz Universität Hannover

Temporal dynamics of powdery mildew and its relationship to host growth, defoliation and yield of tomato

Tomato powdery mildew caused by *Oidium neolycopersici* is a disease of worldwide occurrence in glasshouse-grown tomatoes but is also of increasing importance on field-grown tomato crops. Typical symptoms include powdery white lesions on leaf blades but the fungus can as well infect petioles and the calyx. Heavily mildewed leaves become chlorotic and prematurely senescent so that the disease results in considerable defoliation. However, except few reports, little research has been undertaken to quantify the epidemics of tomato powdery mildew and its effects on the host's growth dynamics. Such information would help fill critical knowledge gaps and act as a basis for modelling the interaction between host and disease dynamics. Accordingly, controlled glasshouse experiments were conducted to investigate the progress of powdery mildew epidemics and its effects on host growth, defoliation and yield of tomato (*Solanum lycopersicum* L.), without and with one fungicide spray. Artificial inoculation of the experimental plants with powdery mildew proceeded from a fan-equipped inoculation chamber. Fully established tomato transplants (6 weeks old) of the susceptible cultivar Hildares F1 with an average of 7 leaves per plant were placed in the inoculation chamber, then an additionally heavily diseased tomato plant was put in the middle at a raised position (~ 40 cm) above the rest of the plants to form the inoculum source. A ceiling fan was then used to disperse the conidia and hence induce a random distribution of the disease on the healthy plants. Germination and infectivity of the conidia was maximized by creating optimal favorability at temperatures of $25 \pm 3^\circ\text{C}$ and relative humidity of $70 \pm 15\%$. In the fungicide sprayed treatment, plants received a single application of Bayfidan® 250 EC (Triadimenol 250 g L^{-1}) at the rate of 400 ml ha^{-1} , 20 days after inoculation. Disease progress as well as host growth were monitored in both fungicide sprayed and non-sprayed plants and compared with non-inoculated plants. Fruits were harvested at the mature green stage and their respective weights were determined.

Initial symptoms of powdery mildew on inoculated plants were observed 6 to 10 days after inoculation. Actual disease severity on a plant basis increased progressively in non-sprayed plants reaching a maximum severity of 0.53 (in proportion) and was subsequently followed by a gradual decline in the proportion of disease severity due to defoliation of severely diseased leaves. One fungicide spray significantly reduced the severity of powdery mildew resulting in a 2-fold reduction in maximum disease severity of fungicide sprayed plants when compared to non-sprayed plants. On a leaf basis, final disease severity as well as area under disease progress curve (AUDPC) values were negatively correlated with individual leaf position on the canopy implying that leaves on the lower parts of the plant canopy were more severely infected with powdery mildew whereas leaves in the upper parts of the canopy either remained disease free or had significantly low levels of powdery mildew. Progress curves of cumulative total leaf area were well described by the Gompertz function ($R^2 > 0.98$). Whereas the estimated growth rates of diseased plants ($rG = 0.069/\text{day}$) were comparably lower than that of healthy plants ($rG = 0.084/\text{day}$), no significant differences were observed in the maximum leaf area formed of inoculated and non-inoculated plants ($H_{\text{max}} = 7932.3 \pm 214.2$ and $8250.3 \pm 128.3 \text{ cm}^2 \text{ plant}^{-1}$, respectively) implying that growth of the host with regard to total leaf area formed was not substantially affected by the powdery mildew disease. A considerable effect of the powdery mildew epidemics was manifested through hastened shriveling and defoliation of diseased leaves within the canopy. Defoliation of affected leaves commenced around 20 days after inoculation with the mature fully expanded leaves at the lower plant canopy layers and proceeded upwards resulting in a progressive increase in the proportion of abscised leaves on a plant basis. An average of 29 % and 40 % of leaves had abscised from the plant canopy at the last date of assessment in sprayed and non-sprayed plants, respectively, correspondingly accounting for 33.3 % and 58.3 % losses in leaf area. Additionally, the epidemics of powdery mildew significantly reduced the duration of healthy leaf area (HLAD) and the yield per plant particularly when inoculated and non-inoculated plants are compared.

173-Kraul, J.; Hau, B.

Leibniz Universität Hannover

Dynamik von Gradienten des Echten Gurkenmehltaus im Gewächshaus

Dynamics of gradients of Powdery Mildew of Cucurbitaceae in Greenhouses

Der Echte Gurkenmehltau ist eine der häufigsten Krankheiten an Kürbisgewächsen und insbesondere im Gewächshaus aufgrund der optimalen Bedingungen für Pflanze und Krankheit ein großes Problem im Anbau. Angepasste Strategien zur Bekämpfung erfordern genaue Kenntnisse über Befallsverläufe sowohl an einzelnen Pflanzen als auch im Bestand.