Influence of CO_2 and temperature on the *Blumeria graminis* f. sp. *tritici*/wheat pathosystem

S. Matić[1], M.A. Cucu[1], A. Garibaldi[1], M.L. Gullino[1,2]

[1]Università degli Studi di Torino, Centro AGROINNOVA, Largo Braccini 2, 10095 Grugliasco (TO), Italy; [2]Università degli Studi di Torino, DISAFA, Largo Braccini 2, 10095 Grugliasco (TO), Italy. E-mail: slavica.matic@unito.it

The combined effect of different temperatures and CO_2 levels was estimated on the *Blumeria graminis* f. sp. *tritici* (*Bgt*)/wheat pathosystem. *Bgt*-inoculated and healthy plants were exposed under phytotron conditions to six CO_2 and temperature combinations: (1) 450 ppm CO_2 (ambient CO_2) + 18-22 °C (low temperature), (2) 850 ppm CO_2 (elevated CO_2) + 18-22 °C (low temperature), (3) 450 ppm CO_2 (ambient CO_2) + 22-26 °C (medium temperature), (4) 850 ppm CO_2 (elevated CO_2) + 22-26 °C (medium temperature), (5) 450 ppm CO_2 (ambient CO_2) + 26-30 °C (high temperature), and (6) 850 ppm CO_2 (elevated CO_2) + 26-30 °C (high temperature). *Bgt*/wheat pathosystem was evaluated by measurement of different fungal and plant parameters such as disease index, fungal DNA quantity, pathogenesis-related (PR) gene expression, plant death incidence, chlorophyll and carbohydrate content. Powdery mildew progress was influenced significantly by both CO_2 and temperature, and their interaction. The most favorable conditions for the powdery mildew development on wheat were low temperature and ambient CO_2. Although high CO_2 did not favor disease development, it affected the plant vitality. Pathogen growth was strongly inhibited by elevated temperatures with both CO_2 conditions, and typical disease symptoms could not be observed. The PR transcripts showed different levels of expression between six phytotron conditions. Real-time PCR quantification permitted a sensitive pathogen detection at the early stages of the disease. This study suggested that Mediterranean area with average warming increase might result in lower incidence of wheat powdery mildew, unless the pathogen would adapt to elevated temperatures.

The research that has led to these results has received funding from the European Union Horizon 2020 research and innovation program under grant agreement number 634179 "Effective Management of Pests and Harmful Alien Species-Integrated Solutions" (EMPHASIS).