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The influence of climate changes on BYDV infection and *Rhopalosiphum padi* development

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Statement of the problem: Climate change is of global concern due to its predicted impacts on the environment and agriculture. The third IPCC report predicts that global-average surface temperature will increase further by 1.4-5.8°C by 2100 with atmospheric carbon dioxide (CO_2) concentrations expected to rise between 540 and 970 ppm over the same period. The potential impact of elevated CO_2 and temperature on the barley yellow dwarf virus (BYDV) infection was exploited.

Methodology & Theoretical Orientation: Barley and wheat plants were cultivated in normal and elevated temperature and CO_2 level conditions. *Rhopalosiphum padi* aphids carrying BYDV were allowed to feed on the plants for a limited amount of time. The infectivity rate was recorded. Furthermore, aphid (*R. padi*) development and fecundity was studied in normal and elevated temperature and CO_2 level conditions. The influence of the presence of the BYDV in the vector was taken into account.

Findings: The BYDV transmission efficiency increased significantly in the elevated CO_2 and temperature conditions. Furthermore, the aphids took less time to develop and produced significantly more progeny in the elevated CO_2 and temperature conditions when compared to normal conditions. The presence of the barley yellow dwarf virus in the vectors increased the longevity in the case of aphids under normal conditions. However, in the elevated CO_2 and temperature conditions, life of the aphids carrying BYDV was shorter.

Conclusion & Significance: The elevated CO_2 and temperature conditions have significant influence on BYDV transmission efficiency of *Rhopalosiphum padi* as well as on the *R. padi* development and fecundity. This might lead to higher BYDV infection rates in cereal stands in the future.

Recent Publications

1. Polak J, Kundu J K, Krška B, Beoni E, Komínek P, Pívalova J and Jarošová J (2017) Transgenic plum *Prunus domestica* L., clone C5 (cv. HoneySweet) for protection against sharka disease. Journal of Integrative Agriculture 16(3):516-522.
2. Jarošová J, Beoni E and Kundu J K (2016) Barley yellow dwarf virus resistance in cereals: approaches, strategies and prospects. Field Crops Research 198:200-214.
3. Beoni E, Chrpová J, Jarošová J and Kundu J K (2016) Survey of barley yellow dwarf virus incidence in winter cereal crops, and assessment of wheat and barley resistance to the virus. Crop and Pasture Science 67(10):1054-1063.
4. Dráb T, Svobodová E, Ripl J, Jarošová J, Rabenstein F, Melcher U and Kundu J K (2014) SYBR green I based RT-qPCR assays for the detection of RNA viruses of cereals and grasses. Crop and Pasture Science 65(12):1323-1328.
5. Jarošová J, Chrpová J, Šíp V and Kundu J K (2013) A comparative study of the barley yellow dwarf virus species PAV and PAS: distribution, accumulation and host resistance. Plant Pathology 62(2):436-443.

Biography

Jana Jarosova has her expertise in Plant Virology. She has been focusing on study of stone fruit viruses and cereal viruses since 2007. Her main topics of research are virus-vector-plant interactions; cereal virus occurrence prediction; current molecular biology methods of virus characterization and detection.

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