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Impacts of Climate Change on Insect Pests; A Case Study of Effects of High Temperature Pulses and Drought Stress on *Plutella xylostella*

JAMES ROBERT WACHIRA, HANS-MICHAEL POEHLING, RAINER MEYHOEFER

Leibniz Universität Hannover, Institute of Plant Diseases and Plant Protection, Germany

Abstract

Climatic changes have a great impact on plant-pest interactions. These changes include among others the rise in global temperatures, rise in carbon dioxide concentration and a rise in drought-stress due to increased evapo-transpiration brought about by a rise in temperatures. More specifically, there will be notably seasonal extremes in weather changes in different regions. It is therefore expected that these seasonal changes brought about by a dynamic climate will consequently affect range distribution, development and behaviour of various insect pests and their effects on the agro-ecosystems.

We investigated effects of seasonal extremes in high temperature pulses coupled with drought stress on the lepidopteron pest species i.e., *Plutella xylostella* on Brussels sprouts plants. Half of the plants were drought stressed while the rest were normally watered. This was done in four climate chambers maintained at 24, 28, 32 and 36 °C respectively.

Contrary to other studies done in constant temperatures, which have recorded hardly any egg hatch at high constant temperatures, we found that at the above extremes in temperatures, more than 50 % hatchability was experienced. Likewise, at extreme temperatures, there was significantly faster development from egg to pupation. Additionally, there was a trend for faster larval development on intermittently drought stressed plants as compared to regularly watered plants. With high temperatures and drought stress there was further an accumulation of L3 and L4 larval instars at the apex part of the plants. This is critical for the quality of the crop.

These results give a starting point on the outlook to investigate further the impact of extreme temperatures and drought stress under field conditions. Should these results be reproducible under field conditions, they will open new fields of study of the effects of climate change even on other insect herbivores pests and their respective natural enemies.

Keywords: Climate change, developmental rate, drought stress, extreme temperatures, oviposition, *Plutella xylostella*