

Understanding the ecology of wireworms and improving their control: a special issue

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Wireworms, the larvae of click beetles (Coleoptera: Elateridae), are an important group of soil dwelling pests which attack the subterranean parts of a wide range of crop plants. They are found in arable soils all over the world and comprise many species. For example, in the Holarctic there are more than 100 species of economic importance to arable crops (Vernon and van Herk 2013). Aside from directly damaging or killing the crop plants, wireworm damage also often paves the way for other plant pathogens such as fungi which indirectly harm the crop. Both direct and indirect damage can inflict considerable price reductions for crops such as potatoes (Keiser et al. 2012). Currently, there are thousands of hectares of cropland which are threatened by these pests, hence effective control measures need to be brought in place.

However, the control of wireworms is challenging: the opaque environment, the patchy distribution of the larvae and their seasonal movements in the soil column make it hard to monitor wireworm populations and the damage level is, therefore, difficult to predict. New monitoring approaches, including the assessment of adult populations using pheromones, are thus needed. The identification of wireworms to species level is a prerequisite to develop successful control measures, but it is challenging and represents an area where

new techniques are needed to allow for reliable and rapid taxonomic assignment of larvae (Staudacher et al. 2011). The search for effective biological control agents such as entomopathogenic fungi is another important aspect to develop new measures for wireworm regulation. Aside from natural enemies, resistant crop varieties or within field measures such as trap crops (Vernon et al. 2000) have shown their potential to reduce wireworm damage. Moreover, the worldwide demand to significantly reduce the use of pesticides calls for new tactics to control wireworms using a minimum of insecticides, e.g. attract and kill approaches which also include a thorough assessment of wireworm behaviour. Finally, wireworm control does not stop at the field margin but needs to consider the spatial ecology of the pest and the impact of the landscape and climate to successfully manage agrobiont click beetle populations (Benefer et al. 2012).

This special issue on the ecology and control of wireworms addresses all of the topics mentioned above. It is the product of a wireworm symposium held within the 13th European meeting of the IOBC/WPRS working group ‘Insect Pathogens and Insect Parasitic Nematodes’, in Innsbruck Austria from June 23–24, 2011. We wish to thank the participants of this inspiring symposium where the latest advances in click beetle research were presented and discussed. Particularly, we are grateful to those who provided us with papers for this special issue.

This issue also links up with the long standing tradition of *Journal of Pest Science* in publishing research on wireworm control: in fact the very first paper published within this journal, the formerly named ‘Anzeiger für Schaedlingskunde’, dealt with the risk of introducing wireworms into arable fields by forest litter (Escherich 1925). Now, 88 years later, we re-connect with this early work by presenting a whole issue dedicated to wireworm ecology and control. We hope that the knowledge

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assembled within these pages will provide important inputs to develop new control tactics for pestiferous click beetles in arable land.

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