



Controlling wireworms in potato production

Austrian Operational Group looking for alternative, environmentally friendly control methods



Wireworms, the larvae of click beetles, cause major losses in potato production across Europe. The situation in recent years seems to be worsening due to climate change as Johannes Mayer, Austrian potato farmer explains: "Wireworm damage is more significant in drier soils as the wireworms search for moisture, as well as food." An Operational Group in Austria has been carrying out trials to find alternative control measures without using synthetic pesticides.

Wireworms spend up to 5 years in the soil, feeding on plant roots as well as tubers at several periods during the year. This means that they affect crops from planting through to harvest. The larvae tunnel through the potatoes, usually making them unfit for sale as

table or seed potatoes, also making them unsuitable for storage and allowing diseases to take hold more easily. This has significant economic impact for potato farmers each year. In Austria, wireworms cause about 10% loss of table potatoes, meaning 30,000 tons, amounting to several million euros. Eduard Paminger, another Austrian potato farmer interviewed during the project: "50% of my last harvest were damaged by wireworms, and this is actually equal to a total loss because it's almost impossible to sort out the un-damaged potatoes."

Explanations for the rise in wireworm damage can be linked to warmer global temperatures and drought which support their development and encourages the spread of this type of pest from other regions. The reduction in numbers of farm bird populations also means they have fewer predators than before. Claudia Meixner from the project adds "Furthermore, we have found that unfortunately, reduced tillage and the practice of growing cover crops, in addition to having many advantages, also mean that the soil is undisturbed and this favours the development of eggs and young larvae. This may already have also played a role in their increase."

In organic farming, wireworm damage has been controlled previously by avoiding potato cultivation in infested soils, but this is proving more and more difficult as their numbers are growing. In conventional farming insecticides are increasingly ineffective against wireworms, not to mention the fact that many are already banned.

The urgency of the situation led Global 2000, an independent environmental NGO from Austria, to set up an Operational Group 'ARGE Drahtwurm' in 2016 gathering farmers, researchers and environmental specialists together to work on the possibility of new control options under Austrian conditions of production. Claudia Meixner explains "We aimed to look into measures which have not yet been field-validated but which would be compatible with organic and conventional production and would be both more environmentally friendly, efficient and sustainable."

In lab trials, the species-specific virulence of various strains of the insect pathogenic fungus *Metarhizium brunneum* was characterised to obtain a set of strains that were effective against all agronomically important wireworm species in Austrian potato production. Field trials were carried out on 7 farms with a documented heavy wireworm pressure in the main potato production regions in Austria, applying a set of measures within common potato crop rotations. Partners worked closely with farmers to ensure the measures were applicable and feasible in a field context.

The measures included:

- **Insect pathogenic fungus** (*Metarhizium brunneum*): analysis of area-specific application of this fungus which infect and kill the wireworms. Testing of carrier substrates and application techniques in different climatic conditions.
- **Trap cropping**: Growing plants which are particularly attractive to the pest in order to draw them away from the main crop. Combinations of trap cropping were applied in the year prior to potato cultivation and insect pathogenic fungus or rotary cultivator treatments.

At the same time, project researchers carried out surveys on wireworms across the main potato production regions in Austria as well as in more detail on the experimental plots for species identification and large- and small-scale distribution. They analysed the biology of the wireworm, such as fluctuations in their activity during the year, the correlation between soil temperature, moisture and the presence of the wireworms in the top layer of the soil.

“We found that a reduction in the wireworm population can be achieved through the use of site-specific, multi-annual strategies using a combination of these measures,” says Claudia Meixner, “For example, through the use of attractive plants, wireworms gather in a specific areas of the field and they can be dealt with in a targeted manner. Soil-damaging effects of tillage can therefore be limited and the amount of fungus applied reduced.”



The field trials and scientific analyses enabled partners to better understand the life-cycles and periods of activity of the wireworms, which are dependent on climatic conditions, cultivation and specific characteristics of the given site. Taking this into account, the project has contributed to the development of forecast models to support the decision-making for the application of the different measures to control wireworm damage. These models have been widely shared amongst farmers and farm advisors in Austria.

The partnership has carried out dissemination activities to share the techniques with farmers, researchers and other stakeholders through events and publications. This also contributes to maintaining discussions and further research on this topic in the future.

Wireworms also affect other crops including maize, asparagus, carrots, turnips. The results of this project can therefore also be considered in other production contexts. Claudia concludes “This Operational Group has provided farmers in Austria with support in tackling a major issue in potato production, which contributes to the EU’s ‘Farm to Fork’ strategy to reduce the use of pesticides by 50% by 2030. We will continue to look deeper into this issue and optimise further the recommended measures.”

Project information

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More information:

- [Information on EIP-AGRI website](#)
- <https://www.zukunftsraumland.at/index.php?inc=project&id=1478>
- <https://www.global2000.at/arge-drahtwurm>
- Video: <https://www.youtube.com/watch?v=iOX2x0rpyNs>
- Presentations: [Präsentation GLOBAL 2000](#), [Präsentationen MELES](#), [Präsentation Bio Forschung Austria](#)

Photos from the project