

Haseeb Ur Rehman (Georg-August-Universität Göttingen)

Behavioral and Chemical Profiling of Novel Attracorn Formulations against Wireworms (Coleoptera: Elateridae)

Wireworm larvae (*Agriotes* spp., Coleoptera: Elateridae) are a major soil-borne pest of maize in Germany, causing seedling mortality and yield losses of up to 85% in heavily infested fields. Following the European Commission's restriction of neonicotinoid seed treatments in 2013, environmentally sustainable biocontrol alternatives are urgently required. Attracap, a registered bait combining carbon dioxide-releasing yeast (*Saccharomyces cerevisiae*) with the entomopathogenic fungus *Metarhizium brunneum*, provides a promising attract-and-kill strategy but is constrained by variable attractiveness and elevated production costs.

This study evaluated a novel formulation family, Attracorn, based on a cost-effective extrusion process and incorporating plant-derived volatile organic compounds from an alternative wireworm host crop to enhance olfactory attraction. Five formulation variants were assessed in soil choice-arena bioassays with *Agriotes obscurus*: a base extrusion formulation (Attract), a conventional granulation equivalent (Attract Granular), a volatile-enriched variant (Attract Plus), and two fungal delivery variants incorporating *M. brunneum* either internally (Attract Plus & Kill) or as an external surface coating (Attract Plus & Coating). Volatile profiles of all formulations were characterised by gas chromatography–mass spectrometry.

Attract significantly outperformed the untreated control, confirming the efficacy of the extrusion approach. Attract and Attract Granular showed equivalent attractiveness, validating extrusion as a cost-effective alternative to conventional granulation. Target volatile compounds were successfully detected in both the raw plant substrate and the Attract Plus formulation. Attract Plus attracted 66% of wireworms versus 33% for Attract, indicating a biologically meaningful trend. Attract Plus & Kill significantly outperformed Attract Plus & Coating, and there was no statistical difference in the performance of Attract Plus & Kill to the registered product Attracap, demonstrating competitive biocontrol efficacy at substantially reduced production cost. Volatile profiling further revealed distinct chemical profiles between the two fungal delivery variants, suggesting that incorporation method influences the chemical composition of the bait.