



Effects of earthworms and rainfall patterns on the efficacy of control measures against an invasive slug species

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The Spanish slug (*Arion vulgaris*) is an invasive agricultural and horticultural pest species that causes great damages in many parts of Europe. Studies have shown that earthworms might help plants to better protect themselves against herbivores. However, little is known whether slug control measures interfere with earthworms. Nowadays several options to control slugs are on the market. Probably the most common chemical control measures are slug pellets (active ingredients: metaldehyde and iron-III-phosphate); an important biological control agent is the use of parasitic nematodes (*Phasmarhadditis hermaphrodita*). These control measures potentially also have detrimental effects on non-target organisms like earthworms, which themselves can have a direct and indirect effect on these slug control measures or on the fitness and performance of slugs. Moreover, slugs, earthworms or the efficacy of slug control measures can be altered by different rainfall patterns. In our greenhouse experiment we investigated the influence of changing rainfall patterns predicted for Austria due to climate change on (i) slug herbivory on lettuce, (ii) slug control efficacy and (iii) interactions with the earthworm *Lumbricus terrestris*. Results showed that earthworms influenced the control efficacy of the parasitic nematodes but those of the chemical slug control measures. Future rainfall patterns reduced the activity of earthworms but did not alter slug herbivory or the control efficacy. We conclude that the influence of earthworms on slug herbivory or the efficacy of slug control measures appears to be little altered by future rainfall patterns and that slug pellets will also play an important role in future slug control.