Abstract

One theory concerning the invasiveness of exotic plants suggests that they exude allelopathic compounds that are novel in areas being invaded. Here, I tested for allelopathic effects of root exudates of the invasive plant *Heracleum mantegazzianum* (giant hogweed) in a series of experiments both *in vitro* and in the garden, and compared them with effects of its native congener *H. sphondylium* (common hogweed) and two less related native species. Moreover, I addressed intraspecific variability of allelopathy by comparing effects of 41 different maternal lines of *H. mantegazzianum* sampled from several areas and populations within the Czech Republic. Not only the effects, but also the identity of allelopathic compounds was investigated. In order to test also for the interaction of allelochemicals with soil microorganisms, I analysed the composition of soil microbial communities expressed as phospholipid and neutral lipid fatty acids (PLFA and NLFA, respectively) together with nutrient conditions and light availability at invaded sites in the Czech Republic. The results show that *H. mantegazzianum* is able to exert phytotoxic effects *in vitro* as well as in the garden experiment; however, its effects did not differ from the inhibition caused by the native species tested. Variation partitioning among areas, populations within areas and maternal lines within populations revealed that the highest variance in allelopathic effects lies among maternal lines. Allelopathic effects in the bioassay were predicted by metabolic profiles of different maternal lines and compounds associated with allelopathy were tentatively identified. The composition of soil microbial communities did not change either as a consequence of the invasion event or during the invasion procedure. On the other hand, the invasion event significantly reduced red/far-red light ratios and increased soil pH. The observed ecosystem changes at sites invaded by *H. mantegazzianum* predicted variation in native species richness and productivity as well as the performance of hogweed itself. Overall, although root exudates of the invader *H. mantegazzianum* are able to inhibit its native plant competitors, I found these effects to be comparable with the same effects of native species. Moreover, the composition of soil microbial communities was not substantially altered at sites invaded by the species. I therefore suggest that allelopathy through the production of unique and novel compounds, as predicted by the novel weapons hypothesis, is not very likely to be a principal driver of the invasion success of *H. mantegazzianum*.