

2023-08-01

# Environmental factors and non-chemical methods to suppress growth of the invasive plant *Gutenbergia cordifolia*

Mero, Sarah

Elsevier

---

Keywords *Artemisia annua* Glyphosate Fire Shade Invasive

*Provided with love from The Nelson Mandela African Institution of Science and Technology*

# Environmental factors and non-chemical methods to suppress growth of the invasive plant *Gutenbergia cordifolia*

Sarah Mero, Issakwisa Ngondya, Anna Treydte

To download the complete text, click that link.

DOI: <https://doi.org/10.1016/j.actao.2023.103913>

## Abstract

Little is known about preferred environmental conditions and non-chemical control of invasive *Gutenbergia cordifolia*. We assessed the effects of different *A. annua* crude extract concentrations, synthetic herbicide (glyphosate), fire regime and shade to *G. cordifolia* germination, shoot and root dry biomass, seedling height and leaf chlorophyll. High concentrations (75%) of *A. annua* crude extracts significantly reduced germination percentage of *G. cordifolia* by 25% ( $F_{2,4}=77.2, p < 0.001$ ), and suppressed shoot and root dry biomass ( $F_{2,4} = 80.3, p < 0.001$ ;  $F_{2,4}=46.104, p < 0.001$ , respectively) as well as seedling height and leaf chlorophyll ( $F_{2,4} = 12.02, p < 0.002$ ;  $F_{2,4} = 15.9, p < 0.001$ ), respectively. Medium temperature (60 °C) and long exposure time (5 min) significantly increased *G. cordifolia* germination percentage ( $F_{2,7} = 32.6, p < 0.001$ ) while extreme temperatures ( $\geq 150$  °C) at both (1 min) short and (5 min) long exposure time completely suppressed germination of *G. cordifolia*. Under high shade, while germination percentage was a third that of other treatments ( $F_{2,4} = 20.9, p = 0.008$ ), mean germination took twice as long ( $F_{2,4} = 17.9, p = 0.010$ ) and shoot fresh biomass was reduced by half ( $F_{2,4} = 16.92, p = 0.004$ ). Shoot and root dry biomass were reduced to more than a third under high shade, seedling height reduced to half but leaf chlorophyll content was not affected ( $F_{2,4} = 6.3, p = 0.030$ ;  $F_{2,4} = 9.1, p = 0.020$ ;  $F_{2,4} = 18.3, p = 0.003$ ;  $F_{2,4} = 3.02, p = 0.120$ , respectively). We suggest using *A. annua* as a potential bio-herbicide and highlight considering fire and shade as suppressor tools to control *G. cordifolia*, but first include in-situ trials to assess their impacts to both native plants and animals

**Keywords,** *Artemisia annua*, Glyphosate, Fire, Shade, Invasive