

## Comparative study of the allelopathic effects of hydrosols and essential oil of *Juniperus phoenicea* L and *Artemisia herba-alba* on selected weeds

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**Abstract** – Herbicides are chemical substances designed to control unwanted plants or weeds. Then overused; they can cause problems for the environment and human health. There is also an increasing number of resistant weeds; which is why a new generation of herbicides is needed.

Allelochemicals have been found to have herbicidal properties and can be used as natural alternatives to synthetic herbicides for weed control.

The aim of this study is to investigate the allelopathic effect of essential oils and hydrosols (Hds) of *Juniperus phoenicea* L and *Artemisia herba-alba*; in order to determine which one has the best inhibitory effects on the germination of selected weed seeds.

which are spontaneous aromatic plants of the Aures region (east of Algeria). The two plant species were collected from the Aures region in eastern Algeria; and essential oils (EOs) were extracted from their aerial parts using hydro-distillation. Hydrosols, on the other hand, were obtained through steam-distillation. The allelopathic properties of the essential oils and hydrosols were evaluated by conducting experiments on the germination and seedling growth of *Ampelodesmos mauritanica*, *Cynodon dactylon* and *Poa annua*.

The results indicated that higher concentrations of *A. herba-alba* hydrosols (Hds) (100% and 50%) were highly effective in completely inhibiting germination and seedling growth of *Ampelodesmos mauritanica* while lower concentrations (25% and 10%) were not effective. In contrast, *J. phoenicea* L essential oils (EOs) suppressed seedling growth in all targeted weeds, and *A. herba-alba* essential oils were highly effective in inhibiting seed germination of *P. annua*. The major probability of *A. herba-alba* hydrosols and essential oils was found to be effective in suppressing seed germination and seedling growth of several weed species. The study provides evidence that *A. herba-alba* hydrosols and essential oils, as well as *J. phoenicea* essential oils, have potential as natural herbicides for controlling weed growth. However, the efficacy of these natural herbicides varies depending on the concentration and weed species. Therefore, further research is needed to optimize the concentration and application of these natural herbicides to achieve maximum weed control efficacy while minimizing any negative impacts on the environment.

**Keywords** – Weeds; Essential Oils; Allelopathic potential; Seed germination; *Artemisia herba-alba*; *Juniperus phoenicea* L; Hydrosols; Aromatic plants; Bioherbicide, Inhibitory effect, Sustainable crop production.