

## Insights in aquaculture and biotechnology



Insights into the herbicide activities of cinammon and citronnella essential oils using molecular biophysics tools.

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Essential oils (EOs) are used in an increasingly number of sectors like medicine, cosmetics, food industry and more recently in agronomy. In agronomy, EOs are used as bio-pesticides for their insecticidal, antifungal or bactericidal effects but also as bio-herbicides. Owing to the current attraction for natural products, a better understanding of their mode of biological action for new and optimal applications is of importance. It has been shown that EOs antimicrobial activity, quite well described in the literature, is at least partly due to their interaction with the plasma membrane. They notably change the lipid composition, altering fluidity, leading to various effects which can induce cell lysis, apoptosis or necrosis. We are currently working on the development of a bioherbicide made from *Cinnamomum zeylanicum* Blume (cinnamon) and *Cymbogognon winterianus* Jowitt (citronella) EOs. We have shown that the application of the whole EOs and their major individual compounds on the leaves and cotyledons of *A. thaliana* appears to be promising: when applied on cotyledons or leaves, EOs induce damages that are as important as those observed for commercial herbicides. Since EOs are small amphiphilic molecules, they can cross the mesh of cell wall and interact directly with the plant plasma membrane (PPM). Modifying the lipid organization could lead to crucial cellular effects, notably on protein function.



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