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Área: Fertilizers, Pesticides and Plant Protection Products: Environmental Chemistry, Fate and Transport, Toxicity, and Risk Assessment.

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Título: Development of Herbicidal Cyclopeptides and Their Impact on Cyanobacterial Growth: Acute Toxicity Assessment in Aquatic Environments

Abstract (max 2500 caracteres, espacios incluidos):

The rise in agricultural production has led to a greater use of pesticides, including herbicides. Most herbicides currently in use exhibit ecotoxicity in both terrestrial and aquatic environments. Moreover, the rising occurrence of herbicide-resistant weeds poses a major challenge for agriculture. These herbicides reaching water bodies, several hydrological alterations and global warming promote cyanobacterial blooms and limit their use for both human consumption and recreational activities.

Products originating from living organisms and natural metabolites, have emerged as an alternative for sustainable agriculture. A significant number of natural products derived from amino acids, among them, cyclopeptides, have been described with herbicidal activity. For example, tentoxin, a cyclotetrapeptide isolated from the fungus *Alternaria alternata*, produces chlorosis on a variety of soybean and corn weeds.

In this context, our work aims to develop new potential eco-friendly herbicides that selectively control weeds in economically relevant crops while minimizing the risk of promoting cyanobacterial blooms. To achieve this, we proposed the synthesis of tetra- and penta- cyclopeptides analogous to natural products with herbicidal activity.

In this study, these peptides were synthesized through solid-phase peptide synthesis (SPPS), followed by solution-phase macrocyclization to obtain the corresponding tetra- and penta-cyclopeptides. Additionally, their herbicidal efficacy was evaluated against selected weeds including *Lollium multiflorum* and *Conyza spp.*, as well as three crops: wheat, canola and soybean. Furthermore, their activity against cyanobacteria (*Microcystis aeruginosa*) and ecotoxicity assessments involving a eukaryotic alga, *Daphnia magna* and *Vibrio fisheri* will be presented.