Cultivation of Mikania laevigata in vitro: Searching for Higher Levels of Coumarin for the Treatment of Asthma

Stefani, Lara (School: Colegio Dante Alighieri)

Asthma is a chronic inflammatory disease caused by the interaction of inflammatory and structural airway cells with allergic mediators. In 2007, the WHO estimated that 300 million people worldwide are asthmatic, potentially causing up to 250,000 deaths per year. Therefore, several treatments are searched, like the use of coumarins. These abundant secondary metabolites of the Mikania laevigata or Guaco species inhibit pro-inflammatory transcription cell signaling and modulate lymphocyte function. To increase coumarin rates and make the medicinal application of each plant more economical and sustainable I created a methodology with 7 interdependent steps: I selected in vitro protocols; standardized in vitro culture of the species by micropropagation and calogenesis; researched potential coumarin stressors; formulated experimental cultivation protocol; quantified coumarins; analyzed results and performed molecular tests and genetic engineering. I inoculated meristems of five Guaco individuals in vitro by the selected techniques. I tested in different culture media supplemented with different substances (BAP, sucrose and activated charcoal). I monitored the explants for a month and analyzed them for viability, contamination and necrosis. Unsupplemented culture media were most effective for anti-necrosis but subject to contamination. The percentage of necrotic buds is related to the position in the culture medium and/or injuries caused during cutting. Contamination, on the other hand, is explained by the presence of endophytic fungi in Guaco. I continued the experiments through calogenesis to perform the other steps, since it is a technique specific to analyze secondary metabolites. Keywords: asthma, Mikania laevigata, phytotherapy, guaco, coumarins, in vitro

Awards Won: