

Anabasine Intoxication and Its Relation to Plant Development Stages

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Abstract : *Nicotiana glauca*, commonly known as wild tobacco or tobacco bush, belongs to the Solanaceae family. It is native to South America but has become naturalized in various regions, including Australia, California, Africa, and the Mediterranean. *N. glauca* is listed in the Global Invasive Species Database (GISD) and the Invasive Species Compendium (CABI). It is known for producing pyridine alkaloids, including anabasine, which is highly toxic. Anabasine is predominantly found in the leaves and can cause severe health issues such as neuromuscular blockade, respiratory arrest, and cardiovascular problems when ingested. Mistaken identity with edible plants like spinach has resulted in food poisoning cases in Israel and Brazil. Anabasine, a minor alkaloid constituent of tobacco, may contribute to tobacco addiction by mimicking or enhancing the effects of nicotine. Therefore, it is essential to investigate the production pattern of anabasine and its relationship to the developmental stages of the plant. This study aimed to establish the relationship between the phenological plant age, cultivation place, and the increase in anabasine concentration, which can lead to human intoxication cases. In this study, *N. glauca* plants were collected from three different rural areas in Brazil during a year to examine leaves at various stages of development. Samples were also obtained from cultivated plants in Marilândia, Minas Gerais, Brazil, as well as from Divinópolis, Minas Gerais, Brazil, and Arraial do Cabo, Rio de Janeiro, Brazil. In vitro cultivated plants on MS medium were included in the study. The collected leaves were dried, powdered, and stored. Alkaloid extraction was performed using a methanol and water mixture, followed by liquid-liquid extraction with chloroform. The anabasine content was determined using HPLC-DAD analysis with nicotine as a standard. The results indicated that anabasine production increases with the plant's development, peaking in adult leaves during the reproduction phase and declining afterward. In vitro, plants showed similar anabasine production to young leaves. The successful adaptation of *N. glauca* in new environments poses a global problem, and the correlation between anabasine production and the plant's developmental stages has been understudied. The presence of substances produced by the plant can pose a risk to other species, especially when mistaken for edible plants. The findings from this study shed light on the pattern of anabasine production and its association with plant development, contributing to a better understanding of the potential risks associated with *N. glauca* and the importance of accurate identification.

Keywords : alkaloid production, invasive species, *nicotiana glauca*, plant phenology

Conference Title : ICB 2024 : International Conference on Botany

Conference Location : Miami, United States

Conference Dates : March 11-12, 2024