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HYOSCINE EXTRACTION FROM *DATURA INNOXIA* BIOMASS AND ANALYSIS BY SPECTROPHOTOMETRIC AND FLUORESCENCE METHODS

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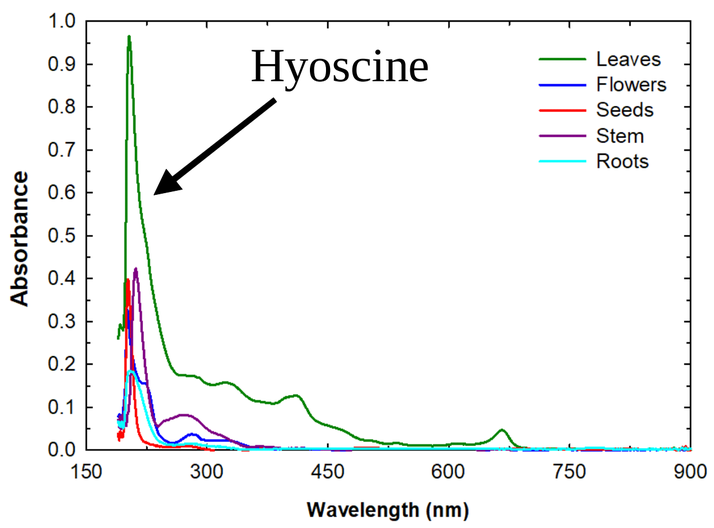
Introduction and study objective

Nowadays, the **literature presents studies** on **investigation** for route of a **specific drug carrier system**, by **combining pharmaceutical drug design**, **nanotechnology** and the **principles of biomedical technology** [1]. **Novel technologies** have been used to **extract bioactive compounds** from **natural biomass**. ***Datura* species** (*Datura innoxia*) belongs to the **Solanaceae family** and have become **important**, especially for **medicine** due to their rich **content** of **tropane alkaloids**, mainly for **hyoscine** [2]. **Hyoscine** is an **important tropane alkaloid** with wide **applications** in the **pharmaceutical industry** mainly due to its **antimuscarinic**, **antispasmodic**, **anticholinergic activity** [3].

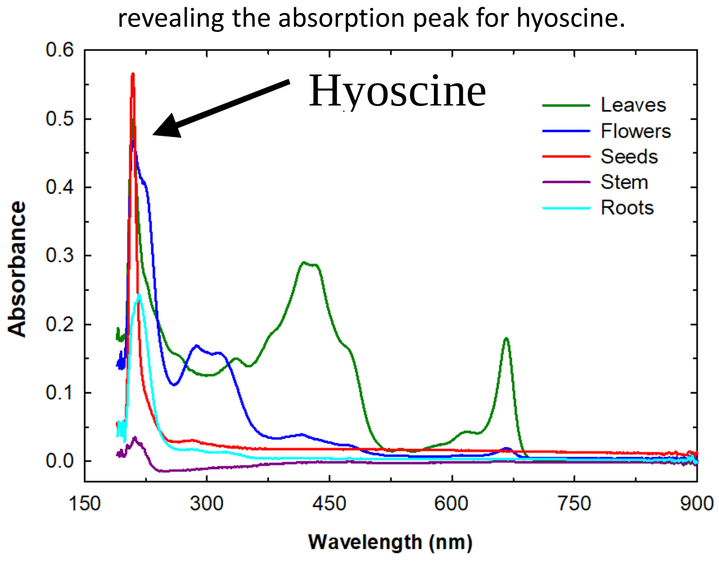
Ultrasound-assisted extraction (UAE) **application** has been **considered** by **researchers** an **alternative** or **auxiliary method** for **extraction** of **biocompounds** from **plants**. Moreover, **application** of **ultrasound** in **extraction** of different vegetable biomass **is considered a clean and green technology** [4]. **The main objective** of this work was the **extraction of the hyoscine** using **ultrasound-assisted extraction** from **different organs of *Datura innoxia* dry biomass** (leaves, flowers, seeds, stem and root) from **Romania**. The **quantitative analysis** of **hyoscine** was performed using **UV-VIS** and **fluorescence** methods.

Hyoscine quantification

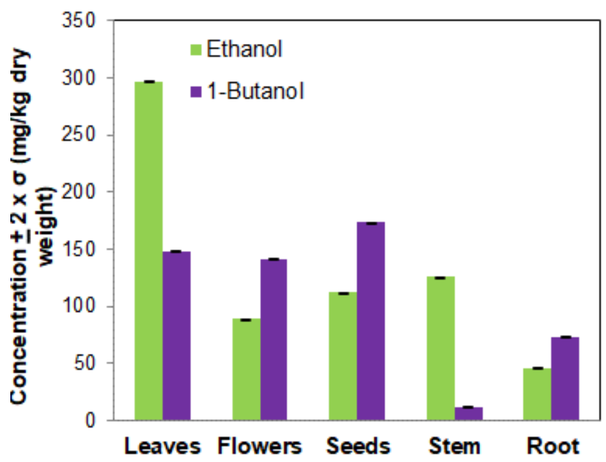
UV-VIS



UV-VIS total spectra of *Datura innoxia* leaves, flowers, seeds, stem and root matrix extracts <u>in ethanol</u> revealing the absorption peak for hyoscine.



UV-VIS total spectra of *Datura innoxia* leaves, flowers, seeds, stem and root matrix extracts in <u>1-butanol</u> revealing the absorption peak for hyoscine.



Average concentration for Hyoscine in dry biomass of different *Datura innoxia* structural units in ethanol and 1-butanol solvents using UV-VIS analysis.
(error bars given as ± 2x standard deviation for 4 replicate measurements at the 95% confidence interval) .

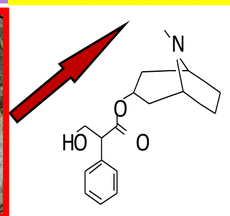
Vegetal biomass

from Romania


Datura ceratocaula


Datura discolor

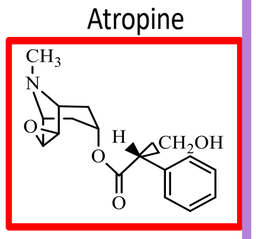

Datura innoxia


Atropine


Datura leichhardtii


Datura metel

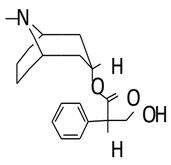

Datura quercifolia


Scopolamine

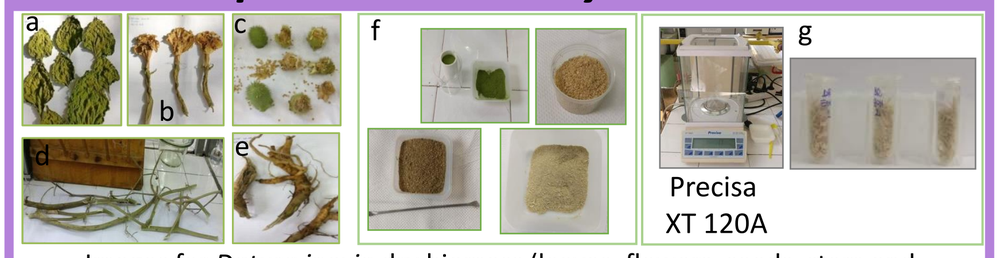

Datura stramonium


Datura ferox


Datura wrightii


Hyoscyamine

Experimental - Dry biomass



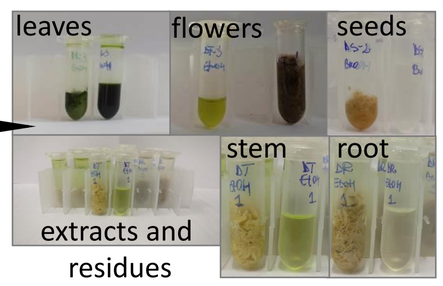
Images for *Datura inoxia* dry biomass (leaves, flowers, seeds, stem and root before (a-e) and after grinding (f) and weighting (g)

Ultrasound-Assisted Extraction

After macerating 24 h


Ultrasound bath Bandelin Sonorex (P = 80/320W; f = 35 kHz)

2 mL EtOH 96%

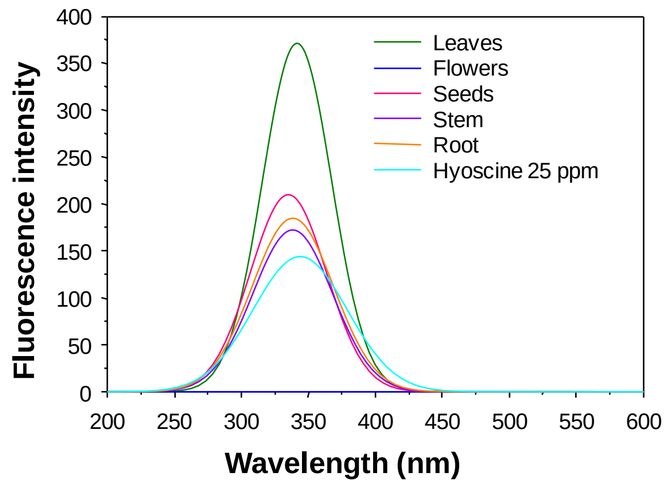


Instrumentations

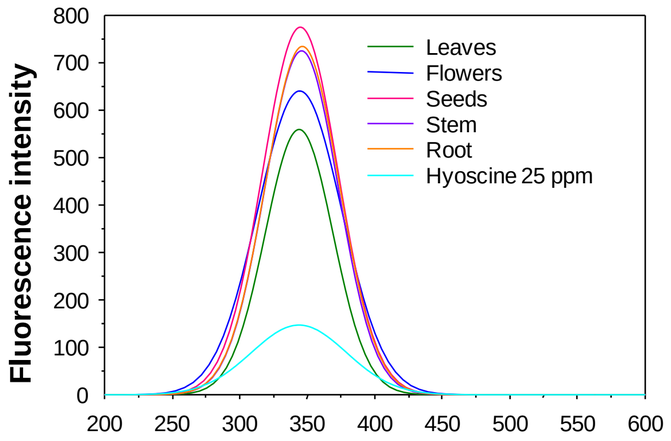
Perkin Elmer LS50B Luminescence Spectrometer

UV-VIS Spectrophotometer Jasco V-550

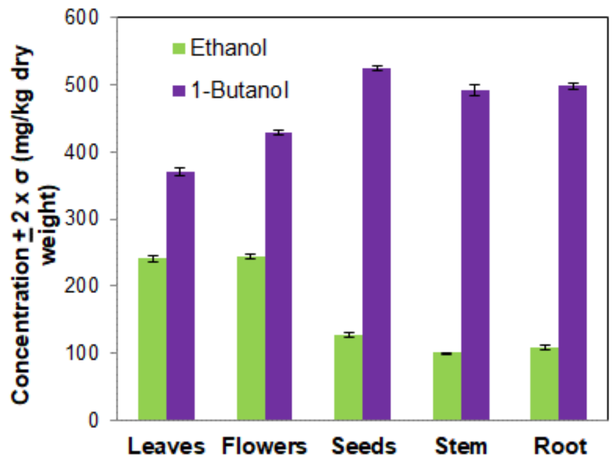
Fluorescence



Fluorescence spectra of hyoscine from *Datura innoxia* leaves, flowers, seeds, stem and root matrix extracts <u>in ethanol</u> (using deconvolution to identify the best Gaussian peaks for matching experimental data).



Fluorescence spectra of hyoscine from *Datura innoxia* leaves, flowers, seeds, stem and root matrix extracts in <u>1-butanol</u> (using deconvolution to identify the best Gaussian peaks for matching experimental data).



Average concentration for Hyoscine in dry biomass of different *Datura innoxia* structural units in ethanol and 1-butanol solvents using fluorescence analysis.
(error bars given as ± 2x standard deviation for 4 replicate measurements at the 95% confidence interval)

Conclusions

- In this study the dry biomass of ***Datura innoxia*** plant was investigated for their **alkaloid content**, especially **for hyoscine**. The present **results** revealed that **hyoscine** has been identified from **ethanolic** or **1-butanol** extracts in **dry biomass** of different ***Datura innoxia*** structural units using **ultrasound-assisted extraction** method fallowed by **spectrophotometric and fluorescence** analysis, with the **highest efficiency extraction** in **1-butanol**.
- **Quantitative analysis** of **hyoscine** using **spectrophotometric** and **fluorescence** methods revealed **potential tools** that can be used **as an acceptable** and validated methods for the analysis of this tropane alkaloid.
- The **experimental** results obtained , and, are in accordance with the **degree of lipophilicity** of **hyoscine**, so a higher **efficiency** is achieved using the **less polar**, in this study, **1-butanol**.
- **Spectrophotometric analysis results** confirmed the presence of **higher** content of **hyoscine** in **leaves** (297.19 ± 0.01 mg/kg) and **lowest** content in **root** (45.89 ± 0.01 mg/kg) for **ethanol**, and for **1-butanol** extracts (173.33 ± 0.02 mg/kg) in **seeds** and (12.08 ± 0.01 mg/kg) in **stem**, respectively, and, **fluorescence analysis results** , the **higher** content of **hyoscine** in **ethanol** extracts was found in **leaves** (244.56 ± 2.99 mg/kg) and **lowest** content in **root** (101.01 ± 0.57 mg/kg), and for **1-butanol** extracts (524.59 ± 2.81 mg/kg) in **seeds** and (370.09 ± 6.01 mg/kg) in **leaves**, respectively.

References

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4. Ullrich S.F., Hagels, H., Kayser, O., (2017), Scopolamine: a journey from the field to clinics, *Phytochemistry Reviews*, **16**, 333-353.