

Medicinal Properties of Oriental Bittersweet Endophytes

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Abstract

Oriental Bittersweet Is an invasive plant that is native to China. A sample of bitterweet was collected from Pickman Park for further analysis. This research examines the medicinal properties of endophyte metabolites located in the plant.



Intro

Chinese medicine has used this plant for years against cancer and inflammatory disease. Along with this, previous studies have shown the plant contains other medicinal properties: anti-inflammatory, antirheumatic, pain reliever, anti-cancer, antibacterial, antihistamine, antifungal (1,2,3).

Experimental

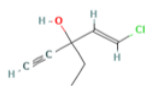
The leaf, stem and berry were separated from the plant and plated to discover potential endophytes. The endophytes were then isolated and grown in a broth. Metabolites were extracted from the broth and tested for antibacterial properties against *E. coli*, *Vibrio*, *Staphylococcus*, and *Pseudomonas*. Extracts were collected and run through the LC-MS.

Liquid Chromatography – Mass Spectrometry Data

Sedative

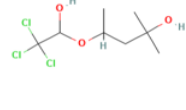
Etclorvinol
C₇H₉ClO

-Treats insomnia
-Sedative



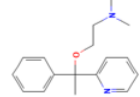
Chloralodol
C₈H₁₅Cl₃O₃

-Sedative
-Hypnotic



Doxylamine
C₁₇H₂₂N₂O

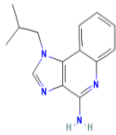
-Treats common cold
-Antihistamine
-Short acting sedative
-Sleep aid



Cancer

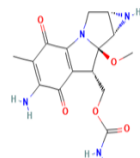
Imiquimod
C₁₄H₁₆N₄

-Treat warts
-Skin Cancer



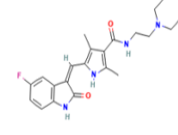
Mitomycin
C₁₅H₁₈N₄O₅

-Urothelial Cancer
-Tumors located in lip, mouth, pharynx, digestive organs, abdomen, and bladder



Sunitinib
C₂₂H₂₇FN₄O₂

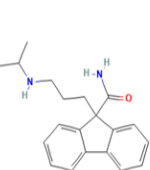
-Kidney cancer
-Stomach and pancreatic tumors



Heart

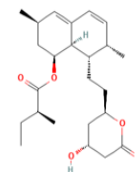
Indecainide
C₂₀H₂₄N₂O

-Antiarrhythmic
-Irregular heartbeats



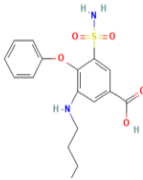
Lovastatin
C₂₄H₃₆O₅

-High cholesterol
-Reduces risk of heart attack



Bumetanide
C₁₇H₂₀N₂O₅S

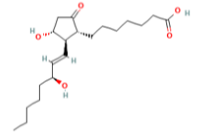
-Treats heart failure, liver disease and Autism



Muscular

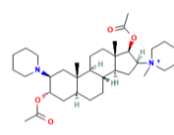
Alprostadiil
C₂₀H₃₄O₅

-Increases artery flow
-Maintains artery size until surgery



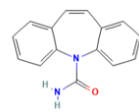
Vecuronium bromide
C₃₄H₅₇BrN₂O₄

-Treats convulsions
-Prevents muscle contractions
-Neuromuscular blocker



Carbamazepine
C₁₅H₁₂N₂O

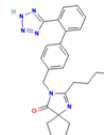
-Treats epilepsy
-Anticonvulsant



Miscellaneous

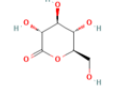
Irbesartan
C₂₅H₂₈N₆O

-Treats hypertension
-Diabetes



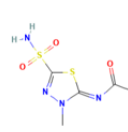
Gluconolactone
C₆H₁₀O₆

-Cleaning product
-Coagulant for tofu
-Can prevent UT stones



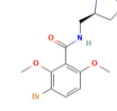
Methazolamide
C₅H₈N₄O₃S₂

-Treats Glaucoma
-Topical



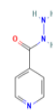
Remoxipride
C₁₆H₂₃BrN₂O₃

-Antipsychotic (used to treat schizophrenia)



Isoniazid
C₆H₇N₃O

-Antibacterial (gram +) against M. tuberculosis, M. bovis, M. kansasii.



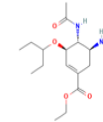
Nitrobenzene
C₆H₅NO₂

-Used in manufacturing oils, dyes, pesticides, synthetic rubber



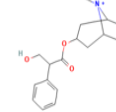
Oseltamivir
C₁₆H₂₈N₂O₄

-Used against influenza A and B



Atrovent Hfa
C₂₀H₃₀N₃O₃+

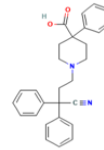
-Treats Bronchitis



Pain relief (Analgesic)

Difenoxin
C₂₈H₂₈N₂O₂

-Pain reliever
-Weak sedative
-Slows intestinal movement



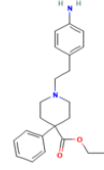
Dimethyl sulfoxide
C₂H₆OS

-Anti-inflammatory
-Antioxidant
-Pain reliever



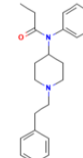
Anileridine
C₂₂H₂₈N₂O₂

-Moderate to severe pain reliever
-General anesthetic



Fentanyl
C₂₂H₂₈N₂O

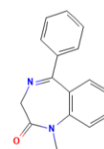
-Pain reliever
-Opioid
-Sedative



Anxiety

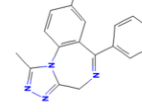
Diazepam
C₁₆H₁₃ClN₂O

-Treats Anxiety caused by fear, tension, excitation, stress etc.



Alprazolam
C₁₇H₁₃ClN₄

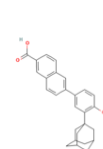
- Generalized Anxiety
- Panic disorder
- Insomnia
- Depression



Skin

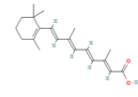
Adapalene
C₂₈H₂₈O₃

-Reduce inflammation
-Prevents inflammatory lesions



Tretinoin
C₂₀H₂₈O₂

-Treats skin conditions
-Acne
-Helps with cell reproduction
-Acute leukemia (APL)
-Warts

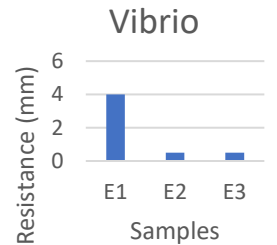
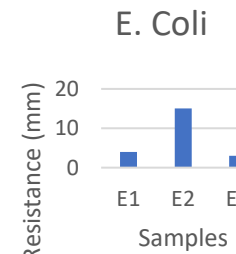
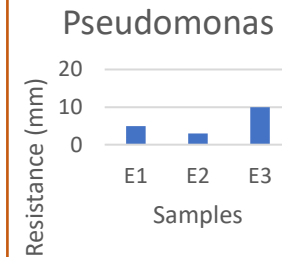


Bioactivity

Resistance results from bacterial plates. Staph Showed no resistance.

Endophyte Key:

E1= Leaf: White/ Green top, Black/Dark Green bottom
E2= Leaf: Green/Brown White dots top, Red/Black bottom
E3= Berry: White/Green top, yellow bottom



Conclusion

Molecules like mitomycin and dimethyl sulfoxide, among others, support traditional uses for bitterweet as an anti-cancer and anti-inflammatory. While the plant mostly is used for cancer medications its endophytes should be assessed for their other medicinal properties. Specifically for its antiarrhythmic, sedative, and analgesic properties, which were found in indecainide, etclorvinol, and anileridine. Endophytes can be grown quickly, efficiently and in abundance, which give access to molecules that otherwise would be hard to produce.

References

1. Na Yang, N. Yang, Han Wang Comprehensive metabolomics analysis based on UPLC-Q/TOF-MS² and the anti-COPD effect of different parts of *Celastrus orbiculatus* Thunb. *RSC advances*, 10, 8396-8420. doi: 10.1039/c9ra09965d
2. Dwivedi, V., & Maurya, H. (2018). A Comprehensive Overview of *Celastrus paniculatus* Seed Oil Intended for the Management of Human Ailments. *Indian Journal of Pharmaceutical and Biological Research*, 6(02), 37-42. https://doi.org/10.30750/ijpb.6.2.7
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4. Kim, S., Chen, J., Cheng, T., Gindulyte, A., He, J., He, S., Li, Q., Shoemaker, B. A., Thiessen, P. A., Yu, B., Zaslavsky, L., Zhang, J., & Bolton, E. E. (2019). PubChem in 2021: new data content and improved web interfaces. *Nucleic Acids Res.*, 49(D1), D1388–D1395. https://doi.org/10.1093/nar/gkaa971