

Medicinal Metabolites Identified in Japanese Knotweed, *Fallopia japonica*

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Abstract

The discovery and research of endophytic species has made great strides in allowing scientists to create a wide variety of new medications. For this research three endophytic species from *Fallopia japonica*, also known as Japanese Knotweed, were isolated and examined to determine if they are responsible for its medicinal antibacterial, antioxidant, and anti-carcinogenic properties.

Introduction

The practice of herbal medicine has been done for hundreds of years across many different cultures all over the world, who use plants native to their regions for various remedies and treatments. *Fallopia japonica* is a bamboo-like plant indigenous to Eastern Asia but can now be found all over the world, as it is now one of the top 100 invasive species. However, for centuries it has been used in Chinese herbal medicine for a variety of uses ranging from being a powerful antioxidant, treating infections, treating inflammation, and even having anti-carcinogenic properties. It's possible that these properties are due to endophytes, microorganisms that co-exist in a symbiotic relationship found in the plant.

Procedure

Sampling/Plating

Small pieces of the stem and part of the root were gathered and grown on agar plates and in potato dextrose broth.

Extraction of Endophyte Metabolites

After a month of growth metabolites were extracted from endophyte broth.

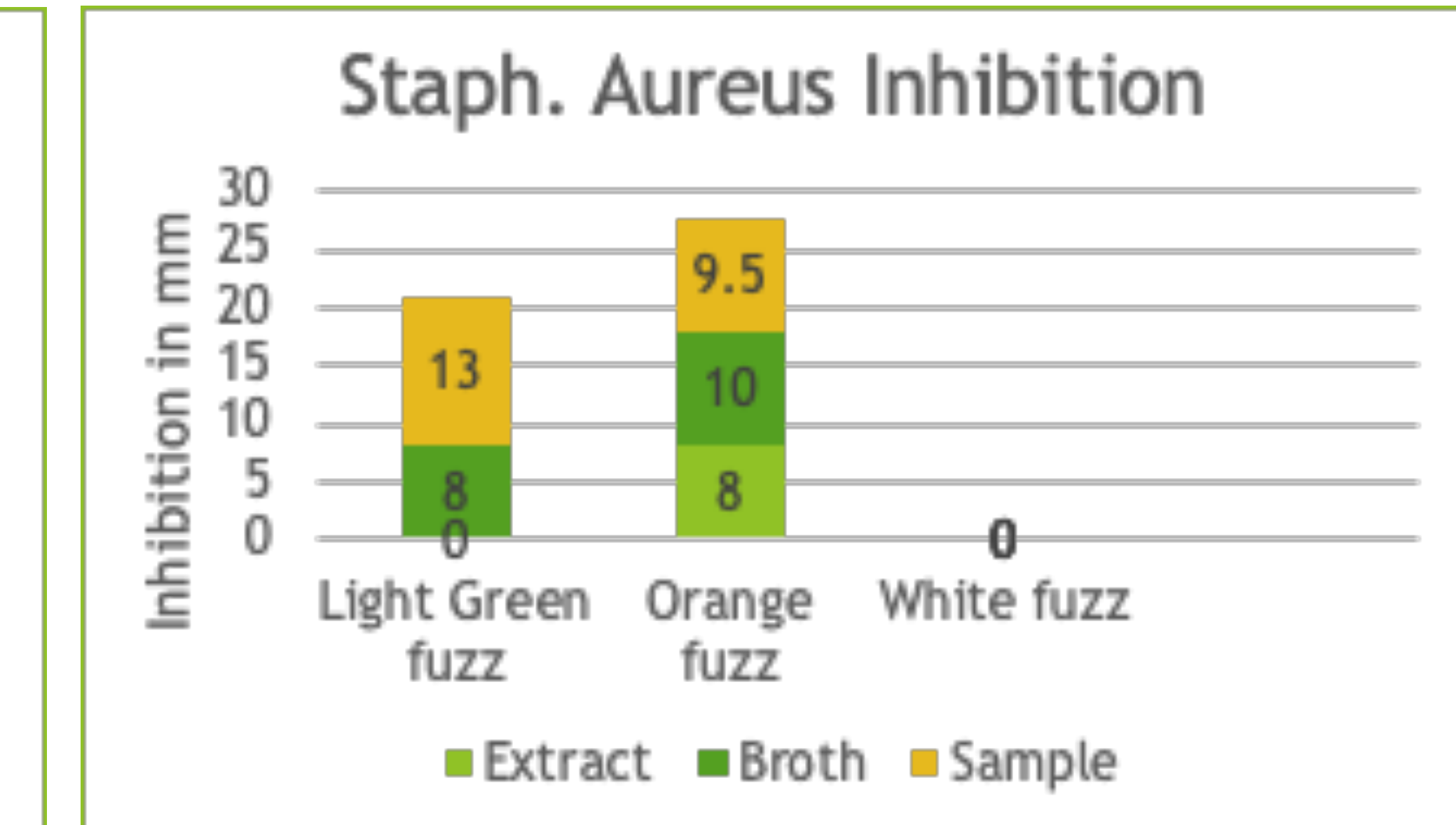
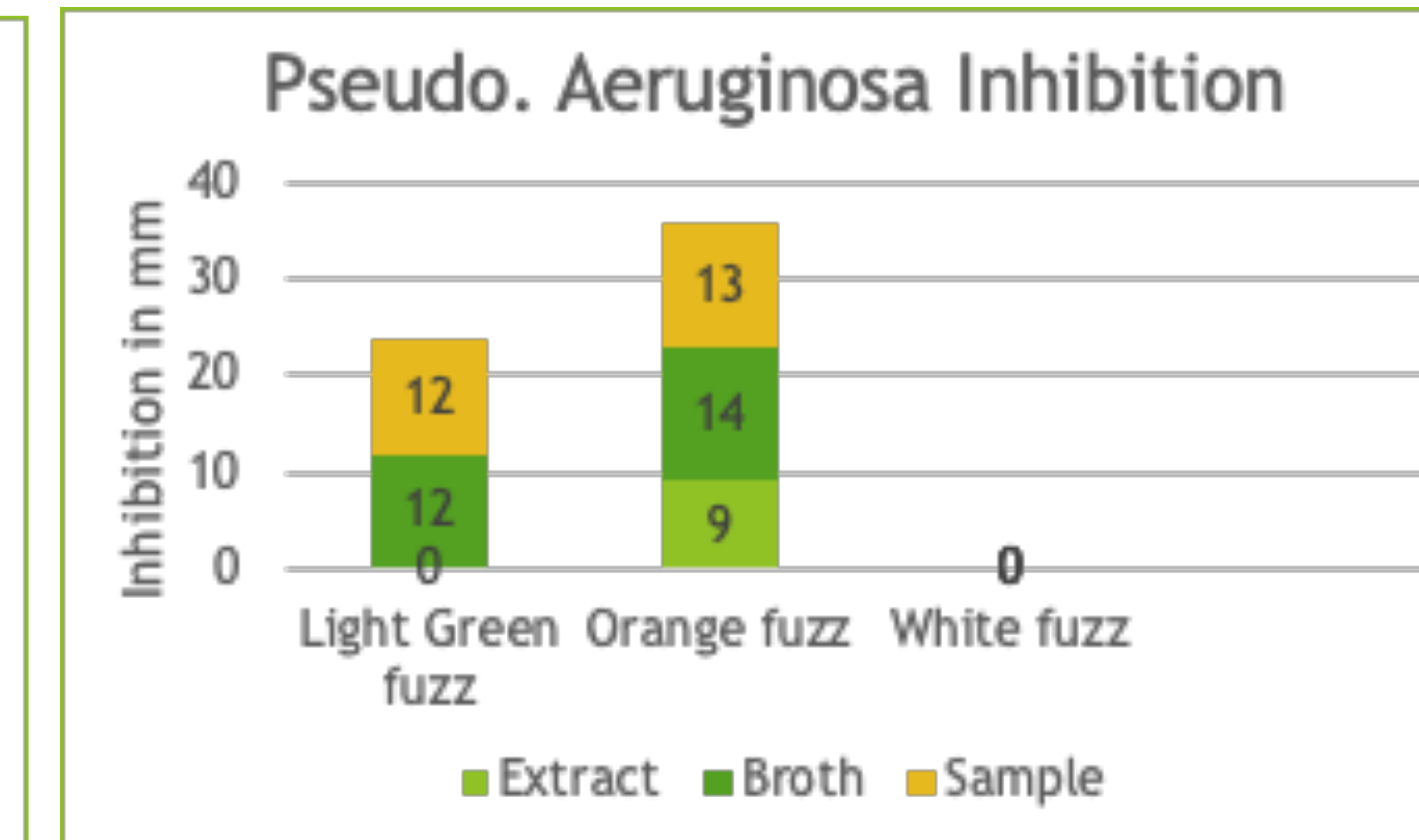
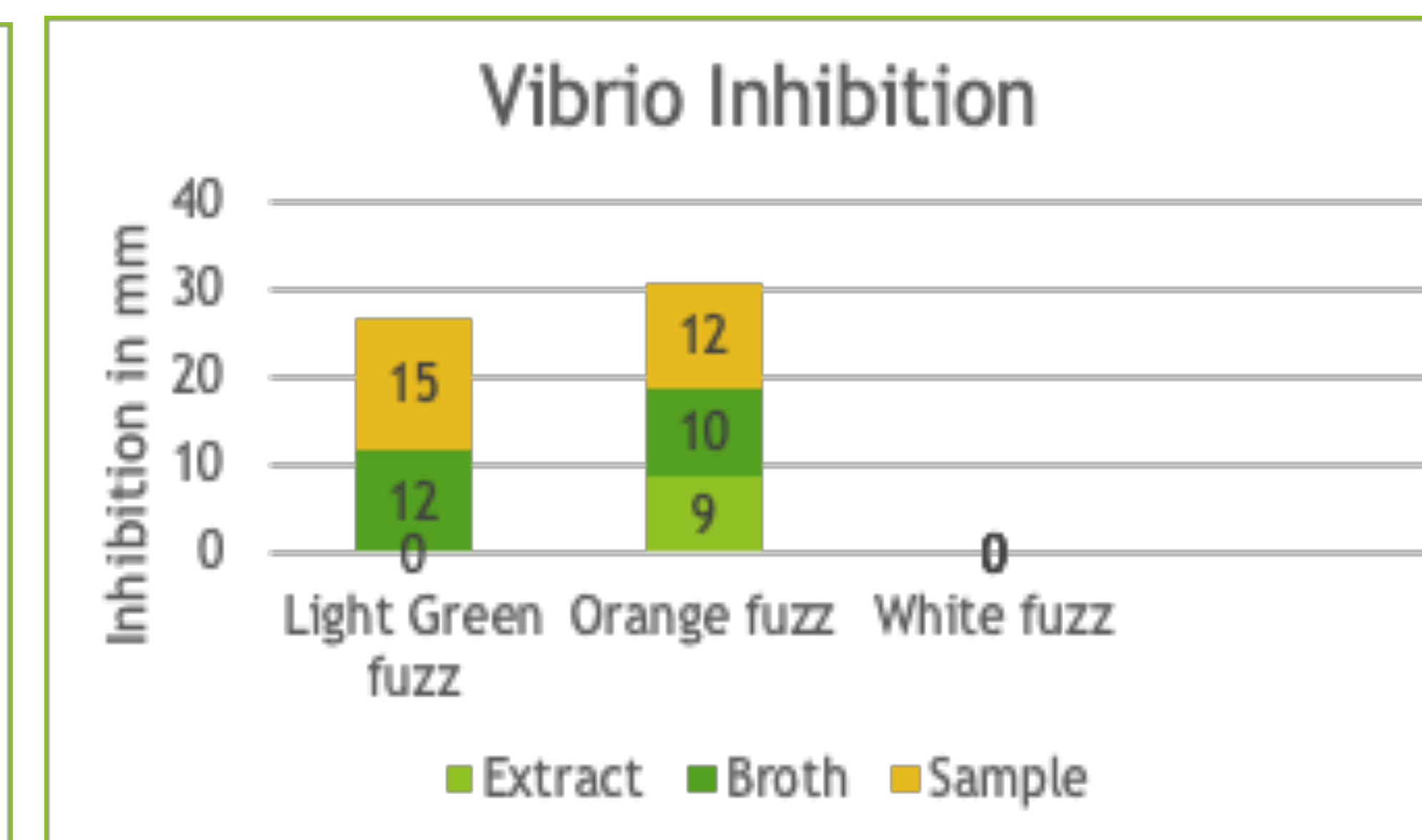
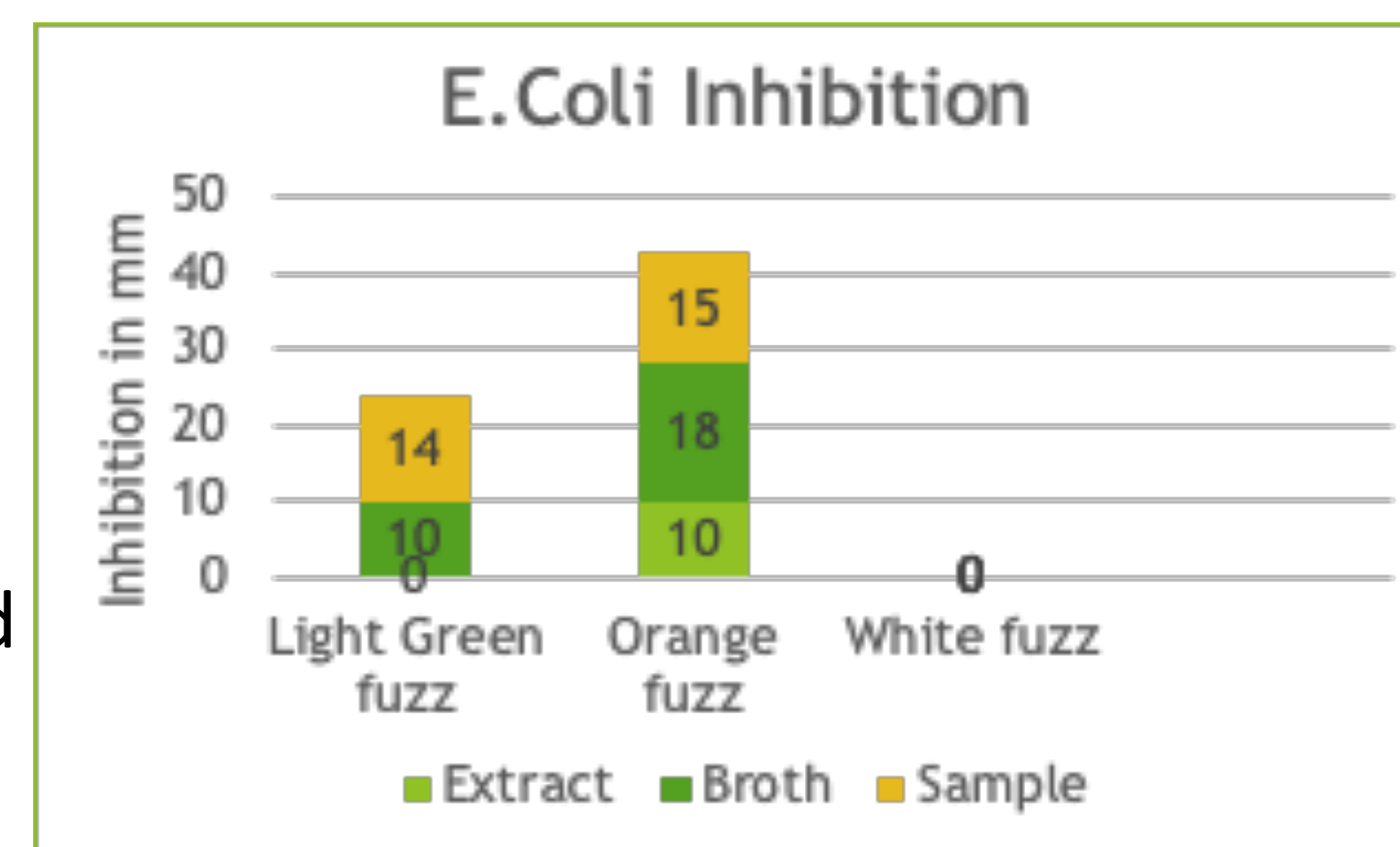
Inhibition Against Bacteria

Samples were placed on bacteria plates and rings of inhibition were measured.

Metabolite Identification Using LC-MS

Compounds in each endophyte were identified using LC-MS

Bacterial Inhibition



LC-MS Data

Antibacterial/Anti-cancer/Anti-oxidant

Common Name	Samples Present	Uses	Chemical Structure
Propylthiouracil	Orange fuzz	-Anti-thyroid medication	
Dipyridamole	Orange and White fuzz	-Treats blood clots through platelet aggregation	
Succimer	Orange and White fuzz	-Binds to heavy metals in the body to treat metal poisoning	
Norgestimate	Orange and Light Green fuzz	-Used to prevent pregnancy	
Mefloquine	Orange fuzz	-Anti-malarial medication	
Metaescaline	All samples	-A psychedelic drug that can potentially treat depression	

Vitamins/Supplements

Common Name	Samples Present	Uses	Chemical Structure
Trimegestone	All samples	-Progestin supplement	
Tretinoin	Orange and Light Green fuzz	-Vitamin A, promotes clear skin	
Biotin	All samples	-Vitamin B-12 for hair/skin/nails	
Ximenic Acid	Orange and Light Green fuzz	-A human metabolite	

Antihistamine

Common Name	Samples Present	Uses	Chemical Structure
Chlorpheniramine	Orange fuzz	-Relieves allergies and asthma	
Doxylamine	Light Green fuzz	-A sleep aid and relieves allergies	
Cetirizine	All Samples	-Decreases natural histamine	

Miscellaneous

Common Name	Samples Present	Uses	Chemical Structure
Grepafloxacin	Orange Fuzz	-Antibacterial against gram negative bacteria	
Mercaptopurine	Orange fuzz	-Used to treat leukemia and is an immunosuppressant	
Cysteine	Light Green fuzz	-Creates antioxidant in the body	
Protocatechuic Acid	Orange and Light Green fuzz	-An antioxidant and anti-inflammatory	
Imiquimod	All samples	-Used to treat cutaneous cancers	

Discussion/Conclusion

Based on the twenty metabolites found through this research, *Fallopia japonica* shows to have antioxidant, anti-cancer, and antibacterial properties from its endophytes that it has been used for in herbal medicine. Something unexpected that has not been listed in literature yet found in abundance during this study is this plants' use as an antihistamine, which is something that should be further examined. In addition, it is possible that the endophytes of *Fallopia japonica* can be used to prevent parasitic diseases such as malaria, as in previous studies another one of its endophytes, Emodin, was used in a similar way. Overall, plants with a history of medicinal properties should be studied more to determine if endophytes are the source of these effects.

References

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