

# Antibacterial properties of Devil's Walking Stick and Winged Sumac extracts

Raven Turner, Kayla Medina, \*Suparna Chatterjee and \*Suresh Subedi

Department of Biological Sciences, Arkansas Tech University

## Abstract

Many native plants are used for the treatment of various diseases. Mainly those species in high chemical compound plant families can have antimicrobial properties. We selected two native plants in Arkansas, Devil's walking stick (*Aralia spinosa*), and Winged sumac (*Rhus copallinum*), and tested them for antibacterial properties. We used three gram-positive bacteria (*Bacillus cereus*, *Bacillus subtilis*, and *Staphylococcus epidermidis*) and three gram-negative bacteria (*Alcaligenes faecalis*, *Escherichia coli*, and *Serratia marcescens*). The disc diffusion method is employed to identify any potential antibacterial properties for the two plant species. For this experiment, 6.50 g of dehydrated plant material (leaves of each plant species) was combined with 50 mL of 75% ethanol creating their respective tinctures which were processed to remove alcohol and make powder samples. The antibacterial activity of the powders in sterile Milli-Q water was tested against 75% ethanol and hydrogen peroxide controls. After 24 and 48 hours of incubation at 37° C, the zones of inhibition were measured for each bacteria/plant sample combination. The plant samples were tested for inhibition of each bacterial species. We used nested ANOVA (analysis of variance) to examine the effect of different concentrations of plant samples and two different incubation times (24h and 48h) of each plant species on zones of inhibition for six different bacteria. Preliminary investigations showed antibacterial properties in the samples. This indicates that native plant species can have potential medicinal properties.

## Introduction

-Incidence of antibiotic resistance in bacteria is increasing rapidly warranting new and effective therapeutic agents (Bhavnani and Ballow, 2000).

-Numerous biologically active compounds in plants have antimicrobial properties (Cowan, 1999).

- Plant parts such as leaves, roots, bark, and seeds are known to possess bioactive secondary metabolites, resulting in several activities such as antipyretic, laxative, analgesic, anti-fungal, antibacterial, etc. (Samatha et al. 2012).

- Devil's walking stick, and Winged sumac are native plants of Arkansas well-known for treatment of inflammation, rheumatism, nutrient-rich foods.

## Research Purpose

To test antibacterial properties of two Arkansas native plant species, and to examine the phytochemical and biological aspects of the plant parts for those species.

Figure 1- Plant collection locations- Mt. Nebo and Arkansas River Valley area nearby Russellville and in Ozark area

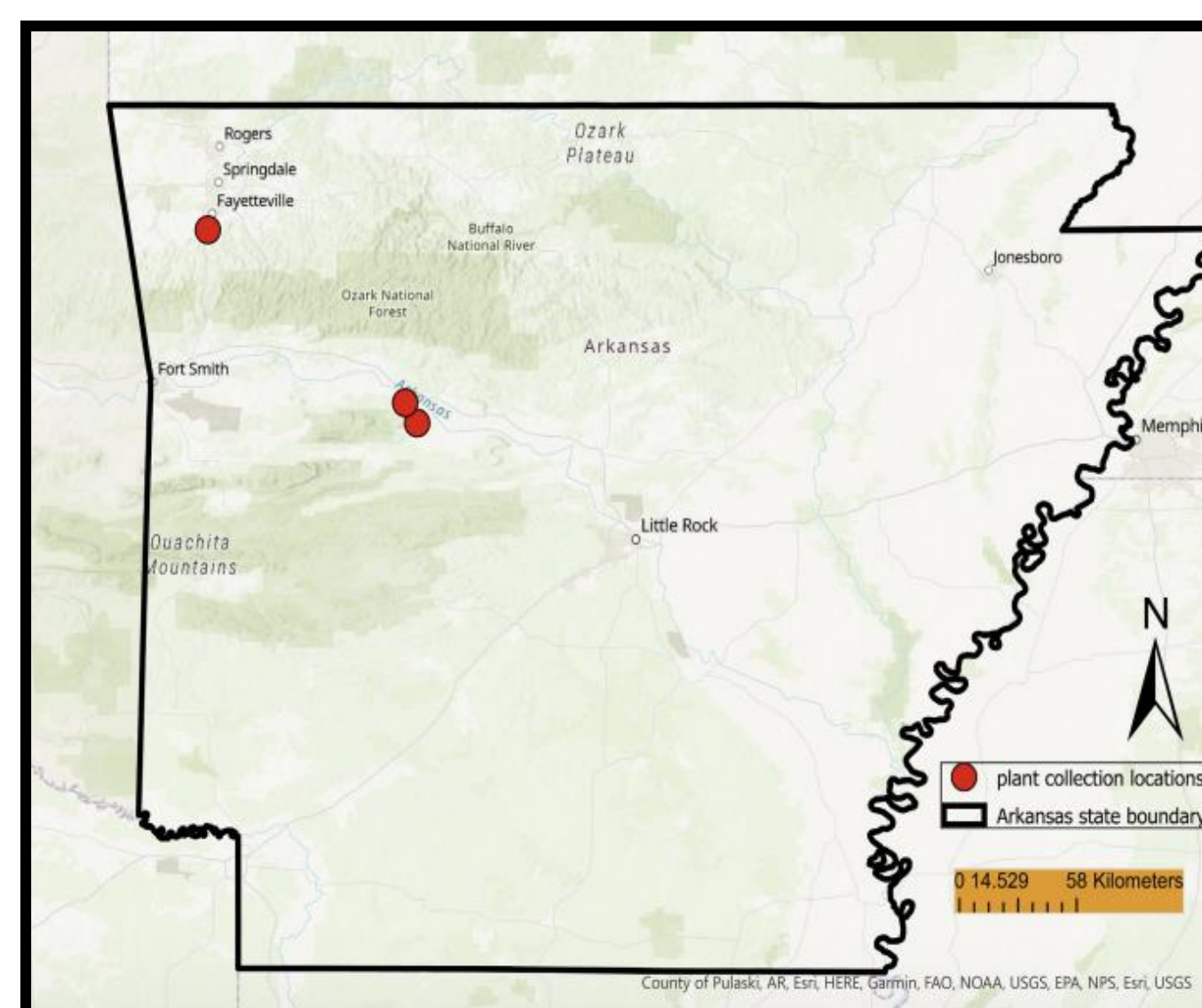


Figure 2A. Devil's Walking Stick (*Callicarpa americana*)

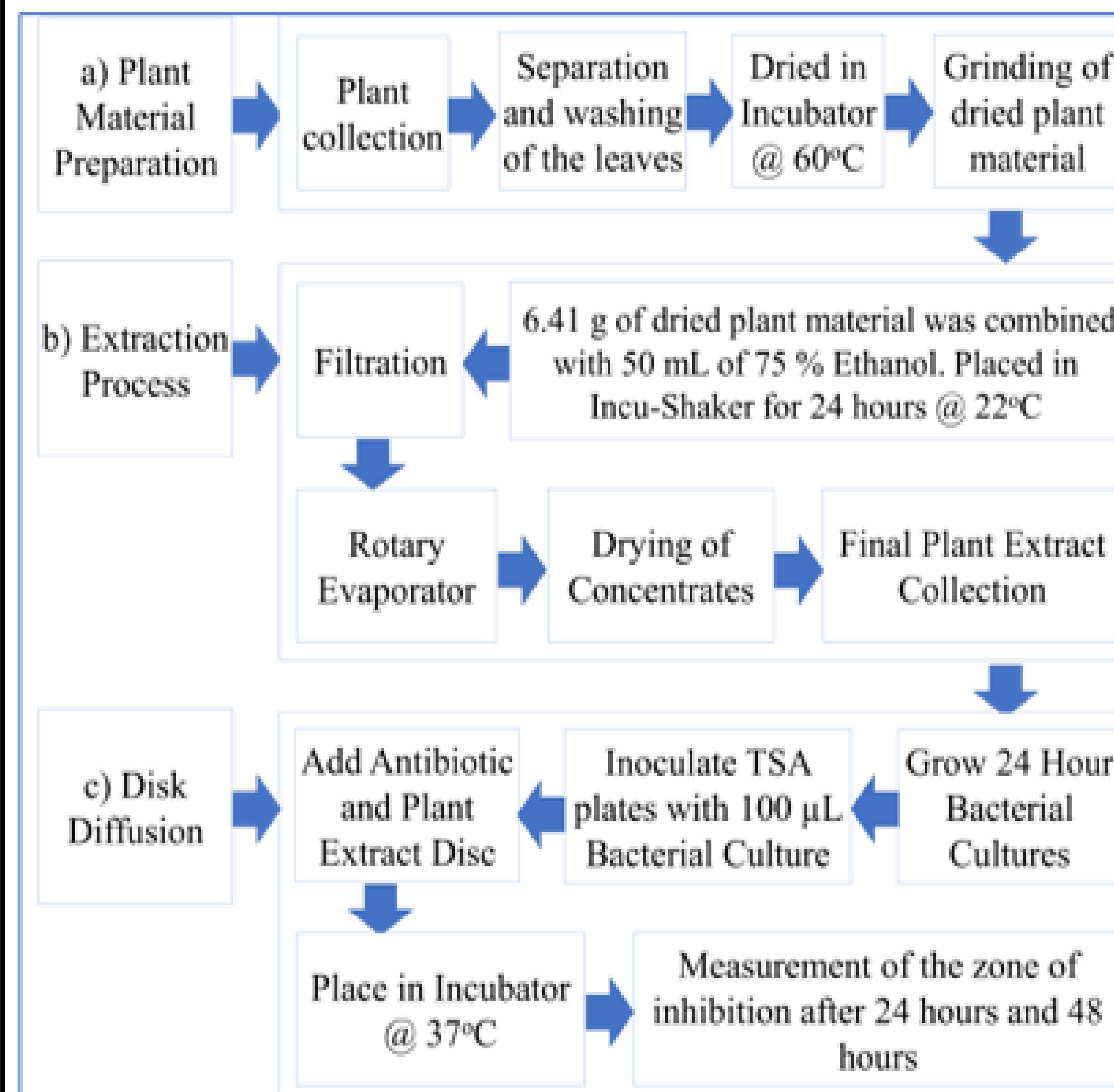


Figure 3A. Winged Sumac (*Aesculus pavia*)

**Figure A. Winged Sumac** – Anacardiaceae (Cashew, Sumac or Poison Ivy Family)- Use for uses for skin rashes, dysentery, mouth sores and sunburn.

**Figure B. Devil's Walking Stick**- Araliaceae (Ginseng family)- Toothaches and Rheumatic pain.

## Methods



## Results

- Treatment (2 species leaf extracts, Erythromycin, NA30, Water) effect was analyzed on bacterial growth.
- One-way ANOVA results showed that the two plant species have some antibacterial effects.
- Winged Sumac and Devil's Walking Stick have antibacterial effects comparable to commercial antibiotics.
- These two species leaf extracts did not differ on their antibacterial properties on gram positive and gram-negative bacteria.

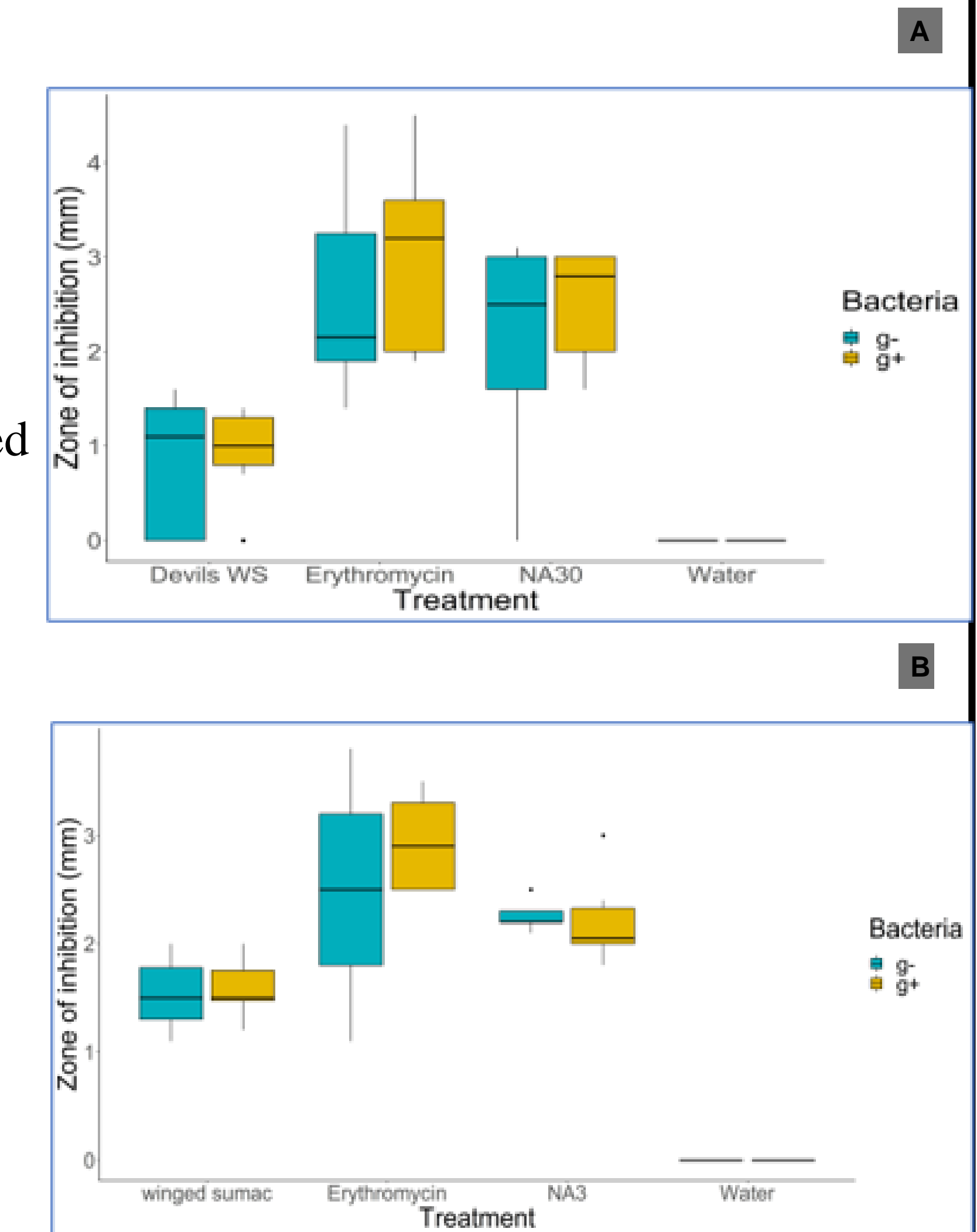


Fig. 3. Box plots showing variation in zone of inhibition of different treatments, A. Devil's Walking Stick, B. Winged Sumac

## Conclusions

- Native plant species showed promising antibacterial properties.
- Antibacterial properties of bark, fruits, and seeds of the two species are currently under study.
- We will also examine the phytochemical and biological properties of the two plant species extracts in the future.

## References

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