

Biomedical Properties of Medicinal Plants Used by the Chumash Tribe

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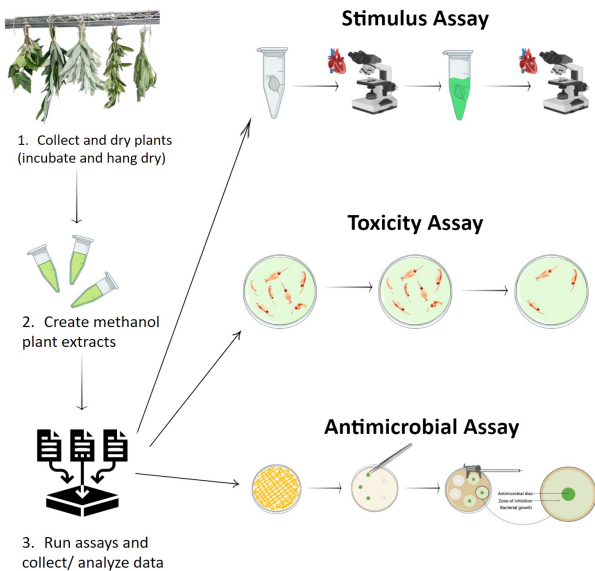
Introduction

- For the last 13,000 years the Southern California Chumash has successfully used medicinal plants for their therapeutic properties (Adams *et al.*, 2004).
- Healthcare is often not accessible to many people in the United States and medicinal plants have the potential to help people (Nyakudya, *et al.*, 2020).
- Studying medicinal plants used by the Chumash could help make medicine more accessible.

Objective

Examine biomedical properties of four medicinal plants used by the Chumash: *Salvia apiana* (white sage), *Salix lasiolepis* (arroyo willow), *Datura wrightii* (California jimson weed), and *Salvia mellifera* (black sage). Additionally, the well-researched *Salvia officinalis* (common sage) was studied.

Methods



Results

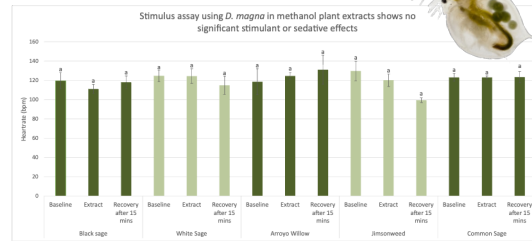


Figure 1. Stimulus Assay exposing *Daphnia magna* (n=3) to methanol plant extracts. ANOVA determined there was no significant difference within and across plants. (Black sage: df=2, F=.456, P=.658; white sage: df=2, F=.523, P=.617; California jimsonweed: df=2, F=4.732, P=.0584; common sage: df=2, F=.002, P=.998; across all extracts: df=14, F=1.179, P=.346).

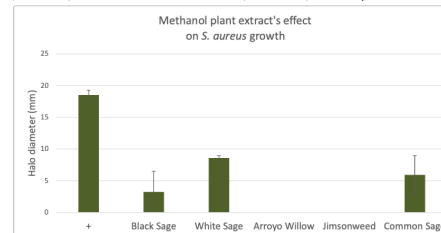


Figure 2. Antimicrobial Assay using *Staphylococcus aureus* showed that black sage, white sage, and common sage exhibit antimicrobial properties against this gram-positive bacteria. (n=3)

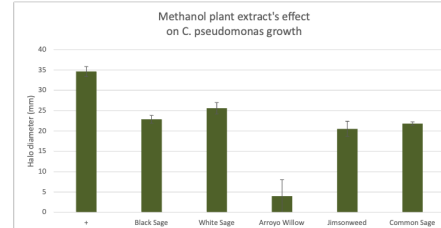


Figure 3. Antimicrobial Assay using *C. pseudomonas* showed that black sage, white sage, arroyo willow, California jimsonweed, and common sage exhibit antimicrobial properties against this gram-negative bacteria. (n=3)

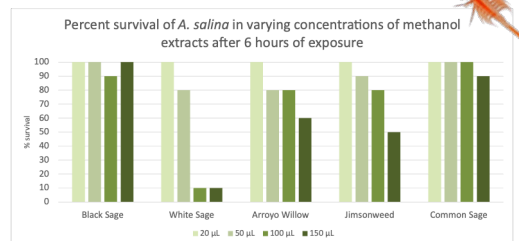


Figure 4: In the toxicity assay, *Artemia franciscana* (n=10) showed the highest mortality rate in white sage, California jimsonweed, and arroyo willow.

Discussion

- White sage was used by the Chumash people as a ritual and medicinal plant: a calmative, a diuretic, and a remedy for the common cold (Krol, *et al.*, 2021). The cytotoxic, and antimicrobial properties we found support these practices.
- The Chumash people used black sage to treat pain and chronic pain (Adams, *et al.*, 2019). We found black sage to be antimicrobial, which can aid healing of injuries and prevent infection.
- California jimsonweed is used by sucking on part of a leaf to protect the spirit, breathing it in to help with stress, and soaking feet in a solution to relax. Additionally, the plant has been consumed to cause dreams and hallucinations, however, this has also led to hospitalizations as it inhibits breathing (Adams, *et al.*, 2005). We found California jimsonweed to have cytotoxic, and antimicrobial properties.
- Arroyo willow has been used as pain relief (Vlachojannis, *et al.*, 2009). We found arroyo willow to have cytotoxic properties.
- Though it may not have been used by the Chumash people, common sage is a treatment for many ailments including pain, diarrhea, and metabolic disorders (Sharma, *et al.* 2019). We found that common sage is antimicrobial.
- These findings provide valuable insight into the medicinal properties of these plants.
- Results underscore the value of traditional medicines and indigenous medicinal practices.

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Acknowledgements

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