The ability of plant essential oils to inhibit detoxifying enzymes in *Aedes aegypti*

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### Objectives

1. Determine which plant essential oils are capable of inhibiting detoxification enzymes
2. Explore each major enzyme-dependent detoxification pathway available to *Aedes aegypti* mosquitoes

### Results

- Each enzyme inhibitor (positive controls) successfully inhibited enzyme activity in all detoxification enzyme systems
- Broad majority of oils capable of inhibiting one or multiple detoxification enzyme systems
- Basil (Egyptian type) was the most potent cytochromes p450 inhibitor
- Geranium (bourbon type) was the most potent GST inhibitor
- Cedarwood Texas (CWT) was the most potent Esterase inhibitor
- Multiple oils seemingly increased enzyme activity, especially in the esterase system

### Conclusions

- Plant essential oils are capable of inhibiting all three major detoxification enzyme systems in *Aedes aegypti*
- Interaction between oils and enzymes provides insight into mechanism of enhancement in *Aedes aegypti*
- This study highlights the importance of considering detoxification pathways in insecticide resistance
- Oils such as basil (Egyptian type) or geranium (bourbon type) may have strong effects on some, but not all detoxification enzyme systems
- Plant essential oils have the potential to act synergistically with synthetic insecticides to counter insecticide-resistant mosquito populations
- Oils that increase enzyme activity may suggest enzyme induction, and may be relevant in enhancing other insecticidal active ingredients

### Future Studies

- Continue screening plant essential oils for inhibition of detoxification enzymes
- Assess IC$_{50}$ of plant essential oils in various detoxification enzyme systems
- Investigate individual plant essential oil constituent chemicals for inhibitory properties
- Compare enzyme inhibition by plant essential oils in insecticide-resistant strains

### References


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