



# Effect of Selected Essential Oils on Brown Recluse Spider Control

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**Abstract**  
*Loxosceles reclusa* is considered a pest throughout its range in the US due mostly to the effects of its venomous bite (Sandidge and Hopwood, 2005). Management techniques include the use of pesticides to target this dangerous synanthropic organism. Essential oils, commonly used for various health benefits, have been previously used as a method of pest control (Koul *et al.*, 2008). Studies have shown varying results when tested on different insects and pests (Regnault-Roger *et al.*, 2011). Their effect on *L. reclusa* is still undetermined. Thus, we tested the potential of essential oils as an effective method of control for *L. reclusa*. Results from our experiment indicated that the selected essential oils had a varied effect with overall low mortality.



## Purpose

Determine if selected essential oils were effective as a method of control for brown recluse spiders (*Loxosceles reclusa*)

## Objectives

**Question:** Are essential oils effective as a tool against *L. reclusa*?

Are oils selected from citric sources more effective than oils from non-citric sources on *L. reclusa*?

**Hypothesis:** Wild orange oil would be more effective than both the lemon and the lemongrass oils

Additionally, citrus oils would both have more of an effect on *L. reclusa* than the lemongrass oil

## Methods & Materials

Cardboard Treatment	<i>L. reclusa</i> Treatment	
	Inhalation (Screened cup)	Inhalation and Contact (Unscreened cups)
Lemon	5 Male & 5 Female	5 Male & 5 Female
Wild Orange	5 Male & 5 Female	5 Male & 5 Female
Lemongrass	5 Male & 5 Female	5 Male & 5 Female
Untreated	5 Male & 5 Female	5 Male & 5 Female
<b>Total <i>L. reclusa</i></b>	<b>20 Male &amp; 20 Female</b>	<b>20 Male &amp; 20 Female</b>



### Experimental Design

- L. reclusa* exposed to 3 trials of oil infused cardboard at 3.375 $\mu$ l/treatment: lemon, wild orange, lemongrass and 1 untreated (control) within individual cups (screened or unscreened)
- 20 *L. reclusa* per selected oil distributed equally by sex: 10 male and 10 female
- 5 male and 5 female per *L. reclusa* treatments inhalation and contact plus inhalation
- Following exposure to cardboard treatments (screened or unscreened cups) *L. reclusa* kept in cabinet at 20°C and 0:24 L:D
- L. reclusa* reactions observed: 24 hours, 48 hours, and 72 hours post treatment

## Discussion

- Citrus oils were more effective than the general plant oil
  - Both citrus oils displayed a mortality rate of 10% versus the 0% mortality rate for the lemongrass oil
  - Spiders exposed to the citrus oils also showed effects quicker than those exposed to the lemongrass oil
- Contact with the oil enhances the effects
  - Spiders prevented contact with the oil showed minimal effects, or none
  - Spiders allowed contact became sluggish and had difficulty moving

## Continued Research Directions

- Longer observation times are needed to determine the severity of potential chronic effects
- Differing method of contact with oils: place oil directly on spiders
- Warmer environment – cold temperatures could have effected behavior
- More spiders – for accurate results, more test subjects are needed. The experiment was limited by the numbers we had

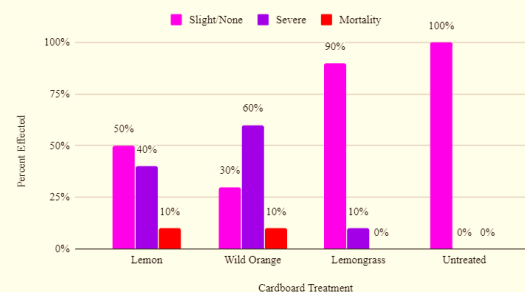


## Study System

*Loxosceles reclusa*

- Synanthropic organism typically found in many Kansas homes with a range including the south-central United States – from Colorado to Ohio west to east and Nebraska to the Gulf States north to south
- Can be any shade of brown from cream to dark brown
- Family Sicariidae (six-eyed spiders)
- Most recognizable feature: dark violin shape on the dorsal side of the cephalothorax

48 Hour Observation - Contact Allowed



## Preliminary Results

- Reactions to treatments observed:
  - Slight reactions - spiders slow to react and had trouble walking
  - Severe reactions - spiders couldn't walk and had difficulty righting when tipped on dorsal side
  - Mortality – spiders in "typical" death pose - legs curled under ventral side
- Contact with the oil infused cardboard resulted in more visible spider reactions than inhalation alone i.e. inability to walk, inability to right themselves quickly
- Overall, low mortality was observed**
- Surviving spiders appeared to recover within 48 hours after removal from treatment chamber

## References

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## Acknowledgements

We would like to thank the KSU Department of Entomology and Dr. Jeremy Marshall for providing this opportunity.