

# Alternative treatments of gregarious locusts

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## The Problem



### Locust plagues

Cause major agricultural damage

Famine and starvation

Increase poverty

Increase migration

### Pesticides used so far (chemical)

Cause environmental damage

Long-term toxic effect

Less effective

Resistance

Photo credit: <https://www.independent.co.uk/news/world/africa/locust-plague-africa-somalia-kenya-ethiopia-east-africa-a9460816.html#gsc.tab=0>

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## Prospective alternative solution



Effective and safe **alternatives**:

low toxicity to humans and non-target organisms

available components which are easy to prepare and apply

rapid degradation after application.

Photo credit: <https://www.pexels.com/photo/agriculture-barley-field-beautiful-close-up-207247/>

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## Entomopathogenic fungi

- ◆ *Beauveria bassiana* causes white muscardine disease
- ◆ Lubilosa project from 1990 – 2002: *Metarhizium* sp.  
Green muscle™  
NOVACRID™
- ◆ Missing field studies on adult individuals!
- ◆ Temperature preference of sporulation:  
Night time: > 20°C, Day time: < 38°C
- ◆ Spores are solved in Diesel, Kerosene or other mineral oils:  
No oil controls conducted so far!



Stefan Jaronski - This image was released by the Agricultural Research Service, the research agency of the United States Department of Agriculture.

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## Neem oil (*Azadirachta* sp.)

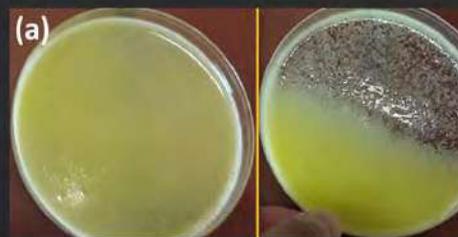
- ◆ *Schistocerca gregaria*: decreased the **flight performance** substantially up to 70%  
(H. Schmutterer et al. Journal of Applied Entomology. 1993 <https://doi.org/10.1111/j.1439-0418.1993.tb01186.x>)
- ◆ **Repellent effects** of different products of the neem tree on the red locust, *Nomadacris septemfasciata* lasts 5 days  
(Langewald, et al. Pflanzenschutz, Umweltschutz 68, 55–57 1995. <https://doi.org/10.1007/BF01996732>)
- ◆ Strong **phagorepellent effect** on the desert locust, *Schistocerca gregaria*, and on the red locust, *Nomadacris septemfasciata*  
(Baumgart, et al. Journal of Applied Entomology. 116. 178 - 186. 2009. DOI 10.1111/j.1439-0418.1993.tb01186.x.)
- ◆ Neem oil product causes **high mortality** in flying *S. gregaria*  
(Nasseh, H. Wilps and S. Krall Source: Zeitschrift für Pflanzenkrankheiten und Pflanzenschutz / Journal of Plant Diseases and Protection, Vol. 100, No. 6, 1993. pp. 611-621)

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## Hardening of linseed oil

After mixing linseed with soda solution



24 hours later



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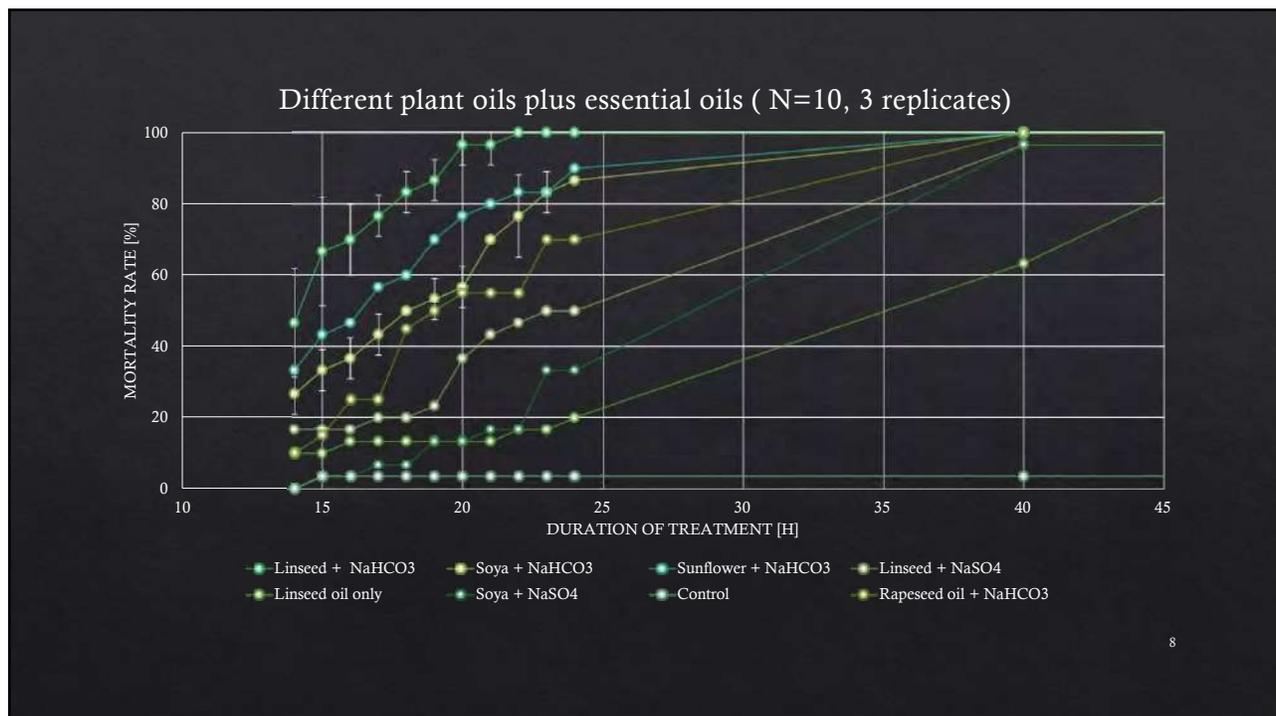
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## Screening for toxic essential oils

- ◆ Caraway, orange peel, wintergreen (birch oil), ginger, clove, peppermint, basil and Eucalyptus
- ◆ Highly toxic against *S. gregaria* and *L. migratoria*: **caraway, orange peel and wintergreen oil** in combination with the linseed oil emulsion.
- ◆ Publication: Abdelatti and Hartbauer 2019 **Journal of Pest Science** ([//doi.org/10.1007/s10340-019-01169-7](https://doi.org/10.1007/s10340-019-01169-7))
- ◆ Patent **P18417pct**: Formulation 102 and Formulation 103 (no orange peel oil)
- ◆ Has no toxic effects on adult mealworm beetles
- ◆ Moderate toxic for ladybug beetles
- ◆ Weat grass growth is mildly affected (some yellow tips after 3 weeks).

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## Components of our botanical pesticide



Photo credit: <https://w7.pngwing.com/pngs/86/903/png-transparent-linseed-oil-flax-cooking-oils-vegetable-oil-olive-oil-miscellaneous-food-nutrition.png>  
[https://www.healthline.com/hlcmsresource/images/AN\\_images/baking-soda-water-and-wooden-spoon-thumb.jpg](https://www.healthline.com/hlcmsresource/images/AN_images/baking-soda-water-and-wooden-spoon-thumb.jpg)  
<https://media.karousel.com/media/photos/products/2016/06/08/brand-new-lecithin-soy-based-1465358522-70069555.jpg>  
<https://www.nicholegolden.com/wp-content/uploads/raindrop.jpg>

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## How does it work?



Hardening of the oil emulsion affects the mobility and the ventilation of the locusts



Affects the nervous system and has an antifeedant effect

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# What we need?

Project partners and investors

Field studies to prove feasibility

Mode of action studies

Photo credit: <https://innspubnet.files.wordpress.com/2018/04/biochemical.png?w=714>  
<https://de.cleanpng.com/png-gcmp4i/download-png.html>

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