Data Article

Data of insecticide action of a nanoemulsion of Citronella essential oil on Cochliomyia hominivorax blowfly

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\textbf{A R T I C L E   I N F O}

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\textbf{A B S T R A C T}

Cochliomyia hominivorax is the dipteran that causes the worst and most serious types of myiasis in animals and humans in the Americas. The data described here show the effects of a commercial product formulated on the basis of citronella essential oil nanoemulsified (Nano Citronela Plus\textsuperscript{®}) directly on eggs, first, second and third stage larvae of the C. hominivorax blowfly, in addition to the indirect effect on the oviposition of adult flies. These data make up the gross base that was used in the preparation of the article “Repellent, ovicidal, larvicidal and adulticidal action of a nanoemulsion of Citronella essential oil (Cymbopogon winterianus) on Cochliomyia hominivorax (Diptera: Calliphoridae)” Bricarello et al., 2021. Counting data of larvae, eggs and adult flies live and dead after contact with the product, data on weighing and counting of eggs from the repellency test are available, as well as photos of cuticular changes that occurred in the larvae and malformations observed after contact with Nano Citronela Plus\textsuperscript{®}.

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Specifications Table

| Subject                        | Parasitology                  |
|-------------------------------|-------------------------------|
| Specific subject area         | Entomology                    |
| Type of data                  | Photo, Video, Table MS Excel®, File SAV SPSS®. |
| How data were acquired        | Microscope stereomicroscope   |
| Data format                   | Raw                            |
| Analysed                      |                                |

Parameters for data collection

A commercial product formulated with the essential oil of Citronella (Cymbopogon winterianus) nanoemulsified at a concentration of 15% was tested for its action on eggs, larvae and adult flies of the species Cochliomyia hominivorax (Diptera: Calliphoridae). These data compose the raw basis that was used in the preparation of the article: “Repellent, ovicidal, larvicidal and adulticidal action of a nanoemulsion of Citronella essential oil (Cymbopogon winterianus) on Cochliomyia hominivorax (Diptera: Calliphoridae)” Bricarello et al., 2021. https://doi.org/10.1016/j.aspen.2021.06.006

Description of data collection

We collected the raw data on larval mortality of the specimens by direct observation 24h after contact with the tested products. The observation was made with the aid of a stereo microscope. We carried out the weighing of the eggs with the aid of a high-precision electronic scale. The repellency test consisted of exposing adult flies to indirect contact with the tested substances and of observing the effect of this treatment on their oviposition. The evaluation performed computed in the presence or absence of oviposition and the weight of the egg masses obtained in each treatment. We initially recorded these data in a laboratory notebook and then systematized them in a Microsoft Excel spreadsheet format. We documented malformations using photos taken by a Smartphone Digital Camera and stored in Google Drive.

Data source location

Institution: Federal University of Santa Catarina - Agricultural Sciences Center. Animal Parasitology Laboratory.
City/Town/Region: Florianópolis/Santa Catarina
Country: Brazil

Data accessibility

The data is deposited at Mendeley's Open Repository. It can be accessed through the link [1]:
https://data.mendeley.com/datasets/8k5d9nb5st/3

Related research article

Bricarello, P.A. Barros, G.P. Seugling, J. Podestá, R. Veleirinho, M.R. Mazarino, L. Repellent, ovicidal, larvicidal and adulticidal action of a nanoemulsion of Citronella essential oil (Cymbopogon winterianus) on Cochliomyia hominivorax (Diptera: Calliphoridae). Journal of Asia-Pacific Entomology. https://doi.org/10.1016/j.aspen.2021.06.006

Value of the Data

- This dataset provides data of the effect ovicidal, larvicidal and repellence of a nanoemulsion of Citronella essential oil on Cochliomyia hominivorax blowfly.
- Data can be used to develop other nanoencapsulated phyotherapy products for dipteran control.
- The data is useful for researchers interested in the development of natural products for the treatment and control of myiasis.

1. Data Description

The data are grouped in three folders in the Mendeley Dataset Directory, organized according to the theme. It can be accessed through the link: https://data.mendeley.com/datasets/8k5d9nb5st/3.

In the folder titled “Raw data” there is a MS Excel file in which the raw data are presented after systematization of the laboratory notebook, in addition to this, the folder also contains two files in the processing format used by the SPSS Software, that demonstrate the statistical
approach used. The second folder “Malformations after tests” groups media files that present the malformations that occurred in the specimens after the tests and healthy specimens for comparison. The third folder is titled “Preparation for tests” and houses photos and videos that report the testing procedures.

The folder “Malformations after tests” contains:

**Image 01** - Morphological abnormalities found in adult flies of *Cochliomyia hominivorax* after contact of third stage larvae with a Nano Citronela Plus®.

**Image 02** - Flies adults of *Cochliomyia hominivorax* without morphological abnormalities found after contact of third stage larvae with destilled water.

**Video 01** - Morphological abnormalities found in adult flies of *Cochliomyia hominivorax* after contact of third stage larvae with a Nano Citronela Plus®.

The folder “Test preparation” contains:

**Image 03** - Egg masses obtained after the in vitro repellency test with adult *Cochliomyia hominivorax* flies after indirect contact with: A- Nano Citronela Plus®, B- distilled water (negative control group), C- Trichlorphon synthetic insecticide (Neguvon®) in a concentration of 0.194% (v/v) or 1.94 gl⁻¹ (positive control), D- vehicle of Nano Citronela Plus® (negative control group).

**Image 04** - Second stage *Cochliomyia hominivorax* larvae showing some change in the larvae characteristic color after contact with Nano Citronela Plus®. **Right:** Larvae without the color change; **Left:** Larvae with a blackened coloration.

**Image 05** - Morphological abnormalities found in *Cochliomyia hominivorax* pupae after contact of third stage larvae with a Nano Citronela Plus®. **Top figure:** Pupae with malformations. **Lower figure:** Pupae without malformations.

**Video 02** - Adult flies of *Cochliomyia hominivorax* during the performance of the in vitro repellency test.

**Video 03** - *Cochliomyia hominivorax* first stage larva after contact with Nano Citronela Plus® observed in a binocular stereomicroscope.

2. Experimental Design, Materials and Methods

2.1. Cochliomyia hominivorax colony in laboratory

We kept *C. hominivorax* laboratory colony according to the methodology described by Seugling et al. [2]. The researchers followed the European Directive 86/609/EEC on the Protection of Animals Used for Experimental and Other Scientific Purposes.

2.2. Nano Citronela Plus®

Nano Citronela Plus® is an oil-in-water nanoemulsion obtained by high-pressure homogenization method. The composition of tested nanoemulsion was 15% *Cymbopogon winterianus* essential oil, vanillin, caprylic/capric triglyceride, polysorbate 80, sorbitan oleate, tocopheryl acetate, sodium benzoate and water. Dynamic Light Scattering (DLS) studies have shown that citronella nanoemulsion has a monodisperse distribution of particles (Pdi < 0.2), with a mean particle size around 200 nm.

2.3. Ovicidal, larvicidal et repellence in vitro efficacy test over Cochliomyia hominivorax

These tests basically consisted of submitting groups of eggs, larvae or adults of *C. hominivorax* to direct or indirect contact with the tested substances in its aqueous form and
subsequent observation of the effect of this treatment on the continuity of development. The full methodology is described in: Bricarello, P.A. Barros, G.P. Seuling, J. Podesta, R. Veleirinho, M.R. Mazarino, L. Repellent, ovicidal, larvicidal and adulticidal action of a nanoemulsion of Citronella essential oil (Cymbopogon winterianus) on Cochliomyia hominivorax (Diptera: Calliphoridae). Journal of Asia-Pacific Entomology. https://doi.org/10.1016/j.aspen.2021.06.006.

2.4. Experimental outline and analysis of applied statistics

The considered response variable was the mortality rate for the ovicidal and larvicidal efficacy tests. For the repellency test, we decided to use the number of ovipositions and their weight as a response variable. In the analysis of the observed mortality on adults exposed to the repellency test, we used the mortality rate as the response variable. We performed tests of adhesion to Normal distribution on the residues of the linear model. We carried out tests for homogeneity of variances between experimental treatments. For all tests developed, the variation factors were the experimental treatments: distilled water, vehicle of Nano Citronela Plus®, Nano Citronela Plus® and Triclorphon. As there was no normality on the residues and no homogeneity of variances was found, we decided to apply the Kruskal-Wallis non-parametric statistical test in order to show the effect of treatments on mortality rates in the tests of ovicidal and larvicidal efficacy and on the weight of the eggs and number of ovipositions in the repellency test. The applied level for probability of error was 5% ($p < 0.05$). We applied the test pos hoc by Dunn to separate the means. We analyzed the data by using the computational package SSPS® version 25.

Ethics Statement

The researchers followed the European Directive 86/609/EEC on the Protection of Animals Used for Experimental and Other Scientific Purposes.

Declaration of Competing Interest

The authors declares no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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[2] J. Seuling, S. Kuhnen, G. Pereira De Barros, M.B. Velerinho, L. Mazzarino, P.A. Bricarello, Development of Baccharis dracunculifolia (Asteraceae) essential oil nanoemulsion and its biological activity on pre-pupae of Cochliomyia hominivorax (Diptera: Calliphoridae), J. Pharm. Pharmacol. 7 (2019) 293–308, doi: 10.17265/2328-2150/2019.06.003.