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Susceptibility of *Palmistichus elaeisis* (Hymenoptera: Eulophidae) to essential oils from *Lippia origanoides* Cham. (Verbenaceae) and *Cymbopogon citratus* (DC) Stapf. (Poaceae)[1]

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ABSTRACT

Palmistichus elaeisis (Hymenoptera: Eulophidae) is a parasitoid with potential for use in control of lepidopteran pests; its integrated use with botanical insecticides may be feasible in pest management. Therefore, the objective was to evaluate the susceptibility of *P. elaeisis* to the essential oils of pepper-rosemary and lemongrass. The experiment was implemented in a completely randomized design, in a 2 (oils) × 4 (concentrations: 0.125, 0.25, 0.5, and 1.0 %) factorial arrangement, with two controls (detergent and deltamethrin). The following traits were evaluated: parasitism (%) - in the F1 generation, emergence (%), the progeny per pupa, the sex ratio, the longevity of the parental generation of males and females, and the egg-adult period of the parental and F1 generation. There were no significant differences for the biological parameters evaluated regarding the essential oils, thus indicating that the oils were innocuous to *P. elaeisis*. This result was confirmed by the percentage of emergence of the next generation (F1), which was always greater than 85%. The essential oils also did not affect the percentage of parasitism of the F1 generation. Thus, at the dosages tested, the essential oils of pepper-rosemary and lemongrass are selective agents that do not damage *P. elaeisis*.

Keywords: pepper-rosemary, lemongrass, alternate control, biological control, selectivity.

INTRODUCTION

Inadequate use of chemical control in pest management contributes to the mortality of beneficial insects and to the evolution of pest resistance to insecticides, in addition to pollution of ecosystem components.[1,2] Harmonizing biological control with the use of chemical or botanical insecticides that are selective and do not act against natural enemies can contribute to an efficient and sustainable phytosanitary management program.[3,4] Botanical insecticides include essential oils that are complex substances produced from the secondary metabolism of plants and that have insecticidal potential by affecting the response or physiological characteristics of insects.[5,6]

Some plants are known to produce considerable amounts of essential oils, such as pepper-rosemary *Lippia origanoides* Hunth. (Verbenaceae) and lemongrass *Cymbopogon citratus* (DC) Stapf. (Poaceae). The essential oil of the former is mostly composed of carvacrol [(2-methyl5-(1-methylethyl)-phenol] and thymol [2-isopropyl-5-methyl-phenol)] and has shown acaricidal activity against *Tetranychus urticae* Koch (Acari: Tetranychidae) and insecticidal activity against *Cerataphis lataniae* (Boisduval) (Hemiptera: Aphididae),[7] the melonworm *Diaphania hyalinata* (Linnaeus) (Lepidoptera: Crambidae),[8] and fall armyworm *Spodoptera frugiperda* (J. E. Smith) (Lepidoptera: Noctuidae).[9] The essential oil of lemongrass is mainly composed of citral (3,7-dimethyl-2,6-octadienal) and has shown insecticidal and repellent activity against insect pests, such as *Megalurothrips sjostedti* Trybom (Thysanoptera: Thripidae),[10] *Trogoderma granarium* Everts (Coleoptera: Dermestidae),[11] and *S. frugiperda.*[9]

The use of essential oils as botanical insecticides has advantages, such as efficacy against a wide range of pests and diseases, multiple mechanisms of action, less chance of development of insect resistance to products, and relatively low toxicity against non-target organisms.[12] In addition, essential oil-based insecticides can be used alongside conventional insecticides and be advantageous in systems of chemical insecticide rotation.[13]

Previous studies have reported the selectivity of botanical insecticides in not acting against beneficial organisms, e.g., the essential oil of *Lippia sidoides* (Verbenaceae) does not harm the predator *Podisus nigrispinus* (Dallas) (Hemiptera: Pentatomidae).[14] However, there are also reports of the harmful action of these products on beneficial insects; products such as *Allium sativum, Carapa guianensis, Citrus sinensis, Neem, Origanum vulgare, Syzygium aromaticum*, and *Zingiber officinale* oils reduced the emergence and parasitism of *Trichogramma galloi* Zucchi (Hymenoptera: Trichogrammatidae).[15] Thus, there is a need for specific studies to evaluate the effects of essential oils on pests and their natural enemies.[14]

Palmistichus elaeisis Delvare & LaSalle (Hymenoptera: Eulophidae) is a generalist endoparasitoid of pupae of several species of Coleoptera and Lepidoptera, such as *Tenebrio molitor* (Linnaeus) (Coleoptera: Tenebrionidae) and *Anticarsia gemmatalis* Hübner (Lepidoptera: Noctuidae).[16] This parasitoid is already a registered as a biological control product with the Ministério da Agricultura, Pecuária e Abastecimento (MAPA) and has potential for use in control of lepidopteran pests, such as *Thyrinteina arnobia* (Stoll) (Lepidoptera: Geometridae) and *Diatraea saccharalis* (Fabricius 1794) (Lepidoptera: Crambidae), which attacks crops such as eucalyptus and sugarcane.[17]

Essential oils of rosemary pepper (*L. origanoides*) and lemongrass (*C. citratus*) showed to be a promising insecticide for controlling some pests, including, *T. arnobia.*[18] Thus, aiming to increase knowledge about the secondary effects of insecticides of plant origin on non-target organisms, the objective was to evaluate the susceptibility of *P. elaeisis* to damage from essential oils of pepper-rosemary (*L. origanoides*) and lemongrass (*C. citratus*).

MATERIAL AND METHODS

Experiment location

All steps of the experiment, except oil characterization, were carried out in a room under controlled conditions (25 ± 3 ºC, 70 ± 10 % RH and 12 h photoperiod) at the Applied Entomology Laboratory "(Laboratório de Entomologia Aplicada - LEA)" of the Universidade Federal de Ceará (UFC), Fortaleza, CE, Brazil.

Rearing of T. molitor

The alternative host *T. molitor* was reared with larvae coming from the LEA-UFC rearing stock. The larvae and adults were kept in plastic trays (35 × 25 × 10 cm) and fed with wheat bran; weekly, pieces of chayote were added to supply the water demand of the insects.

Rearing of P. elaeisis

The parasitoid *P. elaeisis* was obtained from the breeding stock of LEA-UFC. The adults were kept in glass tubes (20.0 × 2.0 cm) and fed with droplets of honey. The honey was fixed on the inside off the tube wall with the aid of a fine paint brush, and the tubes were covered with PVC® plastic film. *T. molitor* pupae of up to 48 hours of age were inserted in those tubes and remaining exposed to parasitism for 72 hours. After this period, the parasitized pupae were individualized in new glass tubes, remaining until emergence of the progeny.

Obtaining essential oils and their chemical characterization

Pepper-rosemary (*L. origanoides*) and lemongrass (*C. citratus*) essential oils were obtained from branches and leaves, respectively, collected from adult plants in a commercial plantation of the company Agropaulo Agroindustrial S/A located in Jaguaruana-CE (Latitude: 4° 49′ 51″ S, 37° 46′ 54″ W). The crops were managed in the organic production system. The essential oils were extracted using steam distillation on an industrial scale.[19] Plant materials were placed inside stainless steel baskets, which were then placed in hermetically sealed stainless steel containers. The extraction was carried out at 100 °C and a working pressure of 1 kgf.cm^{-2}. At the end of the process, the oil was separated from water by density difference using decantation containers. The yield of pepper-rosemary and lemongrass essential oils were 1.3% and 0.6% respectively. Before testing procedures were carried out, the oils were sent to the Natural Product Multiuser Chemistry Laboratory at Embrapa Agroindústria Tropical (Fortaleza, CE, Brazil) for analysis of chemical composition by gas chromatography - mass spectrometer (GC-MS), determining the Kovats retention index (IK) and the mass spectra of each constituent, using an Agilent GC-MS chromatograph (Table 1).

GC-MS analysis was performed on an Agilent instrument model GC-7890B /MSD-5977A (quadrupole), with electron impact at 70 eV, HP-5MS methylpolysiloxane column (30 m x 0.25 mm x 0.25 µm, Agilent), helium carrier gas with flow 1.00 mL.min-1, injector temperature 250 °C, temperature detector temperature 150 °C, transfer line temperature 280 °C. Samples were diluted 1:100 in GC hexane, with 1uL of the diluted solution injected into the equipment. The following temperature ramp programming was used: initial 70 °C, with a heating ramp of 4 °C.min-1 to 180 °C and an increase of 10 °C.min-1 to 250 °C at the end of the run. (34.5 min). The identification of the compounds was carried out by analyzing the fragmentation patterns displayed in the mass spectra with those present in the database provided by the equipment (NIST version 2.0 of 2012 – 243,893 compounds), calculations of the Kovats indices and literature data.[20]

Table 1. relative percentage of constituents of pepper-rosemary *Lippia origanoides* and lemongrass *Cymbopogon citratus* essential oils

Essential oil	Constituent	KI[a]	Content[b]
Lippia origanoides	Acetophenone	1058	32.75
	Carvacrol	1333	30.37
	α-Himachalene	1452	10.38
	Terpinolene	1083	7.96
	α-Pinene	940	5.08
	β-Myrcene	999	3.90
	α-Fenchene	946	1.96
	Thymol methyl ether	1244	1.95
	β-Cubebene	1393	1.72
	Total		96.07
Cymbopogon citratus	3-Carene	1014	29.01
	2,4-Decadienal, (E, E)	1314	25.95
	α-Citral	1266	16.22
	cis-Verbenol	1280	10.42
	Isopulegol	1164	5.75
	p-Menth-8-en-2-one, trans-	1188	1.90
	Perillene	1107	1.71
	Limonene	1040	0.94
	trans-β-Ocimene	1047	0.83
	Citronellol acetate	1363	0.28
	Total		93.01

[a] Kovats Retention Index (KI) by GC-MS. [b] Content of the compound in the essential oil.

Experimental development

The susceptibility of the parasitoid to essential oils of pepper-rosemary (*L. origanoides*) and lemongrass (*C. citratus*) was estimated using concentrations of 0.125, 0.25, 0.5, and 1.0 % of essential oil in distilled water (v./v.) that were previously dissolved with neutral detergent (1:1). Controls consisted of distilled water with neutral detergent at 1.0% (v./v.), and a non-selective insecticide that acts against *P. elaeisis* – deltamethrin (Decis 25 EC®) – at a dosage of 25 mg ai. L^{-1}.[21]

The bioassay was implemented using pupae of *T. molitor* (114.5 ± 15.0 mg) with up to 24 hours of age individualized in glass tubes (2.5 × 8.5 cm) along with 6 females of *P. elaeisis* of 24 hours of age.[22] The parasitoids were fed with honey droplets, and after 48 hours of exposure to the host, the females were removed. Then, the parasitized pupae were placed on folding aluminum foil where 550 ± 20 µL of the solutions for each treatment were applied by spraying (figure 1). After 30 min, the pupae were individualized in glass tubes and kept in a climate-controlled room (25±3 ºC, 70±10% RH and 12 h photoperiod) until emergence of the progeny (figure 2).

The following parameters were evaluated: emergence (%) [(number of *T. molitor* pupae with emergence of parasitoid adults)/(number of parasitized pupae) × 100], progeny per pupa (number of parasitoids emerged per pupa of *T. molitor*), the life cycle (days) (egg-adult) of the offspring, the longevity of the adult offspring (days) [on the day of emergence, 20 females and 10 males of *P. elaeisis* were randomly selected from each treatment and individualized in glass tubes containing a drop of honey, where they remained until their death], and the sex ratio of the progeny (number of females/number of adults, with the sex of the parasitoids determined according to morphological characteristics of the abdomen).[23] From the F1 generation, parasitism (%), emergence (%), progeny per pupa, life cycle, and sex ratio were evaluated using *T. molitor* pupae as the host. The reduction in the emergence rate of the parental generation was used to classify the products according to the toxicity classes of phytosanitary products established by the International Organization for Biological and Integrated Control of Noxious Animals and Plants (IOBC): Class 1, toxicity less than 30% = innocuous; Class 2, toxicity between 30 and 79% = slightly harmful; Class 3, toxicity between 80 and 99% = moderately harmful; and Class 4, toxicity greater than 99% = harmful.[24]

Experimental design and statistical analysis

The experiment was implemented using a completely randomized experimental design in a 2 (oils) × 4 (concentrations) factorial arrangement with two controls, for a total of 10 treatments, and 5 replications, each replication consisting of 3 pupae. For analysis of data from the F1 generation, 10 treatments with 4 replications, each consisting of 2 pupae, were totaled. Normality tests and analysis of variance (ANOVA) were used on the data at a 5% probability level, with the factorial arrangements compared with

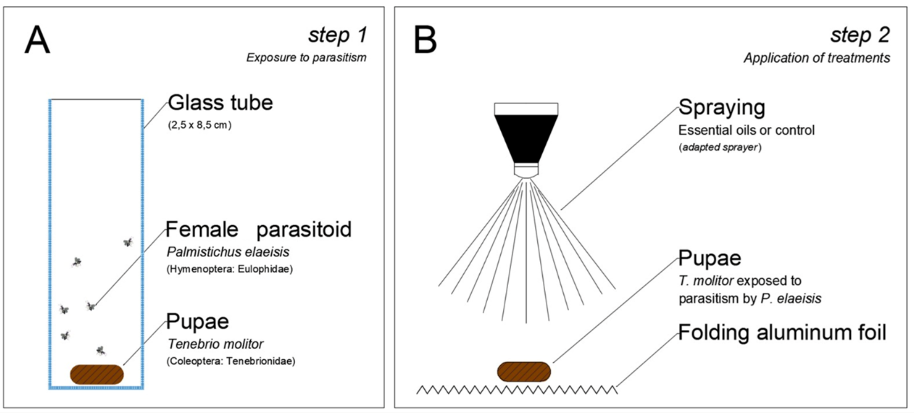

Figure 1. Exposure to *P. elaeisis* parasitism (A) and spraying on parasitized pupa (B).

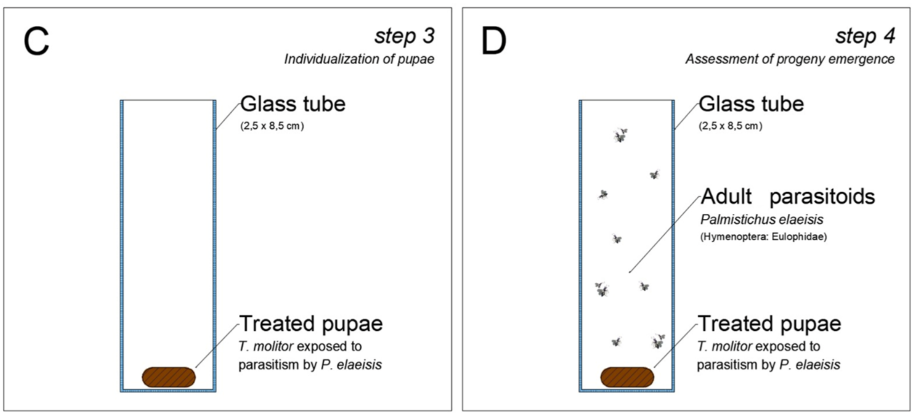

Figure 2. Individualization of parasitized pupa (C) and emergence of progeny (D).

the controls (negative and positive) by contrasts at a 5% probability level by Tukey's test using the R version 3.6.1 software.

RESULTS AND DISCUSSION

The yield of 0.6% for lemongrass essential oil found in this study is within the normal range, which varies from 0.25% to 0.90% of the fresh leaf mass.[25] Similarly, the 1.3% yield of pepper-rosemary essential oil also falls within the range reported in other studies.[26,27] It is important to highlight that the yield of essential oils from aromatic plants, as well as their chemical composition, can vary widely due to factors such as geographical origin, edaphoclimatic conditions, and the time of year when the plant material is collected.[28,29] In the case of *L. origanoides*, these variations are even more significant due to the existence of five chemotypes – plants morphologically similar but with distinct chemical compositions of secondary metabolites – identified based on the major compounds present in their essential oils.[30] Chemotype identification is particularly relevant in analyzing the insecticidal effects and selectivity of essential oils towards natural enemies. In this study, the higher carvacrol content observed suggests that the plant used belongs to chemotype B.[26]

The percentage of emergence (above 85.0%), the progeny per pupa (ranging from 65.2 to 79.3), the sex ratio (above 0.9), and the life cycle (egg-adult) (which varied from 20.1 to 23.9) of *P. elaeisis* showed no significant difference between pepper-rosemary (*L. origanoides*) and lemongrass (*C. citratus*) essential oils; and these parameters likewise did not vary with increasing concentrations of the essential oils (Table2). Adopting the IOBC classification, the oils were considered innocuous to the parasitoid at the dosages tested. The average longevity of females and males was 8.2 and 8.0 days respectively, differing only from the longevity of females subjected to essential oils at the 0.5% concentration (Table 2).

None of the dosages of the essential oils significantly affected the biological parameters (percentage of parasitism and emergence, progeny, sex ratio, and cycle duration) evaluated in the F1 generation (Table 3). However, in the positive control (Deltamethrin), the percentage of parasitism was 50.0% and the life cycle more than doubled in relation to the other treatments (Table 3). Thus, the results indicate that pepper-rosemary and lemongrass essential oils are selective agents that do not act against the parasitoid *P. elaeisis*, and they do not alter most of the biological parameters analyzed.

Table 2. Biological parameters of the parental generation of *Palmistichus elaeisis* (Hymenoptera: Eulophidae) that emerged from pupae of *Tenebrio molitor* (Coleoptera: Tenebrionidae) treated (after parasitism) with different concentrations of essential oils of pepper-rosemary (*Lippia origanoides*) and lemongrass (*Cymbopogon citratus*), in addition to the controls

Parameter		Concentration (%)				Control	
	Oil	0.125	0.25	0.5	1.0	Detergent	Deltamethrin
Emergence (%)	Pepper-rosemary	93.4 ± 6.6 a	86.6 ± 8.8 ab	100.0 ± 0.0 a	93.4 ± 6.6 a	100.0 ± 0.0 a	60 ± 12.6 b
	Lemongrass	100.0 ± 0.0 a	86.6 ± 13.4 ab	86.8 ± 8.9 ab	86.8 ± 8.1 ab	100.0 ± 0.0 a	60 ± 12.6 b
Progeny	Pepper-rosemary	71.2 ± 8.8 a	66.7 ± 6.8 a	65.5 ± 10.3 a	65.5 ± 12.1 a	90.3 ± 10.6 a	21.1 ± 1.8 b
	Lemongrass	79.3 ± 5.0 a	72.2 ± 12.0 a	72.5 ± 10.2 a	68.2 ± 6.5 a	90.3 ± 10.6 a	21.1 ± 1.8 b
Sex ratio	Pepper-rosemary	0.93 ± 0.01 ab	0.94 ± 0.01 ab	0.92 ± 0.01 ab	0.93 ± 0.00 ab	0.92 ± 0.01 a	0.96 ± 0.01 b
	Lemongrass	0.91 ± 0.01 ab	0.91 ± 0.01 ab	0.90 ± 0.02 ab	0.91 ± 0.00 ab	0.92 ± 0.01 a	0.96 ± 0.01 b
Cycle (egg-adult)	Pepper-rosemary	21.9 ± 0.9 ab	22.3 ± 1.0 ab	21.4 ± 2.0 ab	21.5 ± 3.0 ab	23.0 ± 1.0 a	24.9 ± 5.0 b
	Lemongrass	21.9 ± 2.0 ab	20.1 ± 2.0 ab	23.9 ± 1.0 ab	23.5 ± 1.24 ab	23.0 ± 1.0 a	24.9 ± 5.0 b
Longevity (females)	Pepper-rosemary	8.6 ± 0.8 a	8.1 ± 0.7 ab	7.9 ± 0.7* ab	9.6 ± 0.8 a	9.05 ± 0.7 a	7.05 ± 1.0 b
	Lemongrass	7.7 ± 0.7 b	8.5 ± 0.9 ab	9.1 ± 0.8* a	8.4 ± 0.7 ab	9.05 ± 0.7 a	7.05 ± 1.0 b
Longevity (males)	Pepper-rosemary	7.3 ± 1.2 ab	8.4 ± 0.7 a	7.8 ± 0.4 ab	9.6 ± 0.6 a	9.1 ± 0.9 a	6.1 ± 0.4 b
	Lemongrass	6.7 ± 0.9 ab	8.4 ± 0.8 a	8.1 ± 0.6 ab	8.1 ± 0.6 ab	9.1 ± 0.9 a	6.1 ± 0.4 b

Means followed by the same letter in the row do not differ from one another by Tukey's test at the 5% level of probability. * Significant in the column at the 5% level by the F test.

Table 3. Biological parameters of the F1 generation of *Palmistichus elaeisis* (Hymenoptera: Eulophidae) that emerged from *Tenebrio molitor* pupae (Coleoptera: Tenebrionidae) parasitized by the parental generation

Parameter	Concentration (%)					Control	
	Oil	0.125	0.25	0.5	1.0	Detergent	Deltamethrin
Parasitism (%)	Pepper-rosemary	100.0 ± 0.0 a	100.0 ± 0.0 a	100.0 ± 0.0 a	100.0 ± 0.0 a	100.0 ±0.0 a	50.0 ± 18.0 b
	Lemongrass	100.0 ± 0.0 a	100.0 ± 0.0 a	100.0 ± 0.0 a	100.0 ± 0.0 a	100.0 ±0.0 a	50.0 ± 18.0 b
Emergence (%)	Pepper-rosemary	87.5 ± 11.2 ab	87.5 ± 11.2 ab	87.5 ± 11.2 ab	75 ± 13.0 ab	87.5 ± 11.2 a	87.5 ± 0.0 b
	Lemongrass	75.0 ± 13.0 ab	87.5 ± 11.2 ab	87.5 ± 11.2 ab	75 ± 13.0 ab	87.5 ± 11.2 a	87.5 ± 0.0 b
Progeny	Pepper-rosemary	77.7 ± 9.6 a	78.6 ± 11.4 a	72.6 ± 8.8 a	83.9 ± 2.1 a	88.2 ± 2.3 a	47.6 ± 8.1 b
	Lemongrass	76.9 ± 6.6 a	81.1±8.1 a	75.4 ± 9.3 a	70.4 ± 16.7 a	88.2 ± 2.3 a	47.6 ± 8.1 b
Sex ratio	Pepper-rosemary	0.81 ± 0.01 ab	0.92 ± 0.01 ab	0.82 ± 0.01 ab	0.94 ± 0.01 ab	0.92 ± 0.01 a	0.95 ± 0.01 b
	Lemongrass	0.94 ± 0.00 ab	0.94 ± 0.01 ab	0.96 ± 0.01 ab	0.94 ± 0.01 ab	0.92 ± 0.01 a	0.95 ± 0.01 b
Cycle (egg-adult)	Pepper-rosemary	20.0 ± 2.7 a	22.7 ± 0.7 a	22.6 ± 0.2 a	22.8 ± 0.4 a	22.5 ± 0.2 a	53.3 ± 2.5 b
	Lemongrass	23.4 ± 0.5 a	23.6 ± 0.6 a	23.8 ± 0.60 a	23.0 ± 0.4 a	22.5 ± 0.2 a	53.3 ± 2.5 b

Means followed by the same letter in the row do not differ from each other by Tukey's test at the 5% level of probability.

In previous studies considering another species, *Trichogramma pretiosum* Riley (Hymenoptera: Trichogrammatidae), rosemary pepper oil was harmless and lemongrass oil was slightly harmful to the parasitoid.[31] Other essential oils known to have carvacrol as one of their main constituents, such as oregano *Origanum vulgare* Linnaeus (Lamiaceae) and thyme *Thymus vulgaris* Linnaeus (Lamiaceae), were relatively selective and did not act against the predator *Chrysoperla externa* (Hagen) (Neuroptera: Chrysopidae) [3] or against the parasitoid *Trichospilus pupivorus* Ferrière (Hymenoptera: Eulophidae).[32] Furthermore, the essential oil of oregano was also less toxic to the parasitoid *Habrobracon hebetor* (Say) (Hymenoptera: Braconidae).[33] These and other examples indicate that this insecticidal chemical compound is selective and does not act against various parasitoids and predators.[34,35]

The capacity of *P. elaeisis* for physiological defense against the essential oils tested may be related to the habit of parasitizing lepidopteran pests associated to *Eucalyptus* spp (Myrtaceae).[36] Several species of eucalyptus have monoterpenes and sesquiterpenes in the composition of their essential oils.[37] Thus, the interaction of the parasitoid with eucalyptus defoliator caterpillars may have selected individuals capable of surviving possible toxic substances from the secondary metabolism of the plant allocated in the fat body of the arthropod pest. However, this selection apparently did not include protection mechanisms for more complex compounds such as tetranortripenoids and azadirachtin, given the non-selective activity of neem oil against *P. elaeisis*.[38,39] Future research could investigate whether similar tolerance mechanisms are observed in other parasitoids species exposed to plant-derived compounds, clarifying the broader implications of natural ecological relationships on the use of essential oils in pest control programs.

The maximum level of parasitism (100%) of the pupae of *T. molitor* by the F1 generation shows that the oils are not toxic to *P. elaeisis* females emerging from treated pupae. The same did not happen with the females of the parental generation that emerged from *T. molitor* pupae treated with the insecticide Deltramethrin, since the percentage of parasitism reduced by 50%.

Although the biological parameters of emergence percentage, progeny, and sex ratio of treatments with essential oils did not show a significant difference from the negative control (detergent), their combination may affect the number of parasitized pupae when the parasitoids are released in the field for the control of a particular pest. For this reason, even selective biopesticides may require adjustments to release strategies. For example, calculating and releasing a higher number of parasitoids might compensate for small reductions in parasitism rates or longevity observed under laboratory conditions. Future field experiments are essential to validate these findings and optimize the integration of essential oils into biological control programs.

In summary, the use of essential oils in pest control has been recommended due to their potential to replace synthetic insecticides, their wide availability, and their lower impact on human health and the environment.[6] However, some plant-derived products can be toxic to non-target organisms.[40] Regarding natural enemies, in addition to causing direct mortality, these compounds can influence behavioral and physiological traits, affecting development, reproductive performance, and predatory capacity — effects commonly referred to as sublethal effects.[41] Although they tend to be more selective than commercial synthetic insecticides, their effectiveness varies depending on the insect species, the source plant, the application method, and the developmental stage of the affected organisms.[6,42] Therefore, it is crucial to further investigate the ecotoxicological impacts of these biopesticides in different contexts to ensure their safe and effective use in integrated pest management.

CONCLUSIONS

The parental and F1 generation of the parasitoid *P. elaeisis* were not significantly affected after contact with the botanical insecticides of *L. origanoides* and *C. citratus*.

Comparison between the *L. origanoides* and *C. citratus* botanical insecticides and the insecticide based on Deltamethrin highlights the potential of essential oils in conserving natural enemy populations.

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DATA AVAILABILITY STATEMENT

The authors declare that all data resulting from the research that originated this manuscript have been deposited in the Zenodo repository and are available at the following link: https://zenodo.org/records/15725267?token=eyJhbGciOiJIUzUxMiJ9.eyJpZCI6IjM3ZDYzYTk0LTZlOGEtNDcwNy05NjV-jLWYxMGNjNWVkODI2OCIsImRhdGEiOnt9LCJyY-W5kb20iOiJkMTBkYTUyYjU1MjJiZTNmN2RkOT-ZmNzFlNTgyZjMxNSJ9.5rfCMURFz1BtWpKtG_KT2zdbMf7Ehp7tM_ssjUAHwSPyzbtAql3efIliRagE-FyVFM7kG2DQoWOT2PCFbtdgbag.

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