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# VARYING LEVELS OF CHROMOLAENA ODORATA AND LANTANA CAMARA LEAF POWDER ON THE CONTROL OF HOUSE FLY, MUSCA DOMESTICA L

**CARISSA G. BARNACHEA**

Assistant Professor, Agriculture and Veterinary Medicine, President Ramon Magsaysay State University, San Marcelino Campus, Nagbunga, San Marcelino, Zambales, Philippines. Email: barnacheacarissa@gmail.com

**Abstract**

Presently, chemical control methods are widely utilised against houseflies; however, significant drawbacks, such as housefly resistance, toxic adverse effects to humans and the environment, have increased. Chromolaena odorata (hagonoy) and Lantana camara (bangbangsit) were evaluated for their egg, larvicidal, pupicidal, and adulticidal against house fly and compared them with chemical insecticide. The study was laid in a 3x3 factorial on Completely Randomized Design were all treatment combinations were replicated three times. Collection of adult housefly and rearing for egg, larvae and pupae were performed. All treatment was subjected to dipping method for the bioassay test of egg, larvae and pupae while insecticidal susceptibility test for the adult. Result showed no significant differences on the different growth stages of the life cycle of housefly as affected by the different treatment combinations. The highest insecticidal activity (egg, larava, pupa and adult) was shown by L. camara leaf powder at 75g/L of concentrations. These results exhibited toxicity comparable with cyfluthrin. Therefore, Lantana camara and Chromolaena odorata should be further used botanical insecticide housefly control.

**Keywords**: Plant Leaf Powder, House Fly, Noxious Weeds

## INTRODUCTION

### Background of the Study

Musca domestica L. (Diptera: Muscidae) is a significant mechanical vector of several human and animal pathogens (Chavasse et al., 1999; Emerson et al., 1999). Musca domestica, also known as the housefly, reproduces frequently, particularly in trash cans containing rotting food and animal waste. In Japan, Sasaki et al. (2000) found that houseflies transmit a deadly strain of Escherichia coli. Zurek et al. (2001) demonstrated that adult houseflies can transmit Yersinia pseudotuberculosis. In regions where cholera and typhoid are prevalent, they also transmit these diseases (WHO, 1991). The housefly is one of the most prevalent invertebrates in human settlements. Considering that houseflies are pathogen vectors, they are categorized as parasites. The management of houseflies relies significantly on sanitation, screening measures, and the application of pesticides (Kumar et al., 2011).

During the month of July 2015, thousands of housefies invaded a barangay (village) in Villasis, Pangasinan, with some residents getting sick and others losing their livelihoods because of houseflies. All the residents are pinning the blame on poultry farms in the area. Barangay chairman Amado Cenizan explained that the infestation started on July 1, 2015, after the rains came and the poultry farms made harvests (Zara, 2015, TV5). Numerous insecticides, including organochlorides, organophosphates, pyrethroids, and spinosad, have been used to control

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houseflies. However, houseflies are capable of developing resistance to these pesticides (Scott et al., 2000). As a result, one of the safest methods for controlling insect pests and vectors is using readily biodegradable plant compounds as an alternative to synthetic pesticides (Remia & Logaswamy, 2010).

Chromolaena odorata and Lantana camara are considered voracious and poisonous weeds due to their rapid spread and suffocation of native vegetation, destruction of animal habitats and biodiversity, lack of forage for herbivores, and toxic effects when consumed by livestock; consequently, the villagers regularly eradicate L. camara. The study will investigate the insecticidal activity of various plant leaf granules to prevent the emergence of adult houseflies using a method that is eco-friendly, economical, and pollution-free.

## RESEARCH METHODOLOGY

### Research Materials

The proposed materials in this study were egg, larvae, pupae and adult housefly, noxious leaves (C.odorata and L. camara), petri dishes, stop watch, electric grinder, forceps, distilled water, commercial fly control, filter paper, screen cage, sieve and weighing scale (1kg-capacity).

### Research Methods

#### Collection of plants and preparation of plant leaf powder

Leaves of C. odorata and L. camara were collected in the Province of Zambales. Leaves were washed, dried, powdered with the help of an electric grinder and sieved to obtain the fine leaf powder. The different plant leaf powders were dissolved in distilled water with varying levels of concentration based on the treatment.

#### Collection and storage of experimental organism

Adult house flies were collected at the PRMSU-Botolan Campus Broiler production area located at Porac, Botolan, and Zambales. It was reared under laboratory for the egg, larvae, pupae and adult.

#### Dipping method for the bioassay test of the egg

Varying concentrations of different plant leaf powders were prepared using distilled water. Therefore, 25g/L, 50g/L and 75g/L of solution were obtained. The dipping method was applied according to the method described by Sukontason et al. (2004). The egg of the housefly was gently collected from the rearing cage and randomly distributed to each group. Filter paper were treated with Commercial insecticide (T1) positive control @25g/L ($C_1$ $P_1$), 50g/L($C_2$ $P_1$), and 75g/L ($C_1 3 P_1$)of solution, (T2) C. odorata powder @25g/L($C_1$ $P_2$), C. odorata powder @50g/L ($C_2$ $P_2$), C. odorata powder @75 g/L ($C_3$ $P_2$), LPAC- L. camara powder @25g /L ($C_1$ $P_3$), L. camara powder @50g /L ($C_2$ $P_3$) and L. camara powder @75g /L ($C_3$ $P_3$) consecutively. Twenty-five (25) eggs were gently placed into the filter paper and treated with insecticide solutions. After about 9 hours, the number of emerging larvae was recorded. The criteria for mortalities were evaluated egg of house flies that do not turn into larvae were considered dead.

The Seybold Report
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### Dipping method for the bioassay test of the larvae and pupae

Using a plunging technique, larval and pupal bioassays were conducted. Twenty-five larvae or pupae of the third instar were immersed in 10 ml of each test solution for 30 seconds before being transferred to filter paper (in a 250-ml plastic container). Mortality of larvae was documented at 1, 6, 12, and 24 hours, and mortality of pupae was recorded at eight days. The criteria for mortalities were evaluated, and non-responding larvae and pupae of house flies were deemed deceased. Each test was conducted in triplicate alongside a positive control.

### Insecticide Susceptibility test

The adulticidal bioassay followed WHO guidelines for susceptibility testing (WHO, 2006). Flies were exposed to plant leaf powder-treated filter paper for one hour in a plastic container before being transferred to another plastic container, where knockdown rates were re-measured at 10, 30, and 60 minutes, and mortality was measured 24 hours after exposure. Adult houseflies that did not respond to treatment were deemed deceased, and mortality was recorded 24 hours after treatment. Each test was conducted in triplicate.

### Research Design and Lay-out

The study was laid in a 3x3 factorial on Completely Randomized Design (CRD). All treatment combinations were replicated three times. Different treatment combinations are shown in table 1.

**Table 1: The 3 X 3 Factorial Treatment Combinations of the Three Powder and Three Concentration Levels**

| Concentration level (g/L) | Factorial treatment Combination | | |
|---|---|---|---|
| | Commercial Insecticide ($P_1$) | C. odorata Leaf Powder ($P_2$) | L. camara leaf powder ($P_3$) |
| 25 ($C_1$) | $C_1$ $P_1$ | $C_1$ $P_2$ | $C_1$ $P_3$ |
| 50 ($C_2$) | $C_2$ $P_1$ | $C_2$ $P_2$ | $C_2$ $P_3$ |
| 75 ($C_3$) | $C_2$ $P_1$ | $C_3$ $P_2$ | $C_3$ $P_3$ |

### Data Gathering Procedure

Houseflies eggs that do not turn into larva were recorded as dead. Larvae of house flies not responding was considered and counted as dead. Housefly pupae that do not emerge into an adult housefly were considered and recorded dead. Moreover, adult house flies not responding was considered and recorded as dead. The percentage mortality was calculated by using the formula below:

$$\text{Percent mortality} = \frac{\text{Number of dead egg/ larva/ pupa/ adult}}{\text{Number of egg/ larva/ pupa/ adult introduced}} \times 100$$

### Statistical Analysis

All data were gathered and recorded, tabulated, organized, and statistically analysis using analysis of variance in a Completely Randomized Design. The Duncan Multiple Range Test was used to separate the means when the data was subjected to statistical analysis.

The Seybold Report
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## RESULTS AND DISCUSSIONS

### Mortality of Housefly Egg

Based on the study conducted by Keiding, J., WHO, 1986, housefly egg usually turns into larva after 6-9 hours upon adult housefly oviposition. At about 9 hour, data on the dead egg were gathered. Mortality of housefly egg as affected by the different plant leaf powder at different concentration levels. C. odorata leaf powder at 75g/L ($C^3P^1$) concentration got the highest egg mortality with a mean of 20 while L. camara leaf powder at 25g/L got the least egg mortality having a mean of 11. Thus, C. odorata leaf powder at 75g/L ($C^3P^1$) is the most effective treatment combination in suppressing the housefly egg to turn into larvae. However, statistically there is significant difference between the treatment and on the factor B which is the level of concentration having 7.42 and 24.70 computed F respectively which is higher than the tabular f values at 5% and 1%. On the other hand, Factor A, replication and the treatment combinations revealed a no significant difference with computed F value of 2.44, 0.55 and 1.27 respectively.

### Mortality of Housefly Larvae

Larvicidal effect of the different plant leaf powder on different concentration levels at different time interval was shown in Figure 1. Dipping method last only about 30seconds, data was collected at 1 hour, 6hours, 12 and 24 hours after the dipping method (WHO, 2006). . On the first hour, almost all the treatment combinations got a mean of 2 dead housefly larvae showing that there is no significant difference between all the treatment combinations having a covariance of 35.15%. At 6 hours, the positive control, C. odorata at 25g/ L $C^2P^1$and L. camara at 25g/L $C^3P^1$ got the highest larval mortality (5) and C2P3 got the lowest number with just 2 larval mortality. L. camara at 25g/L got the highest mortality of housefly larvae after 12 hours with a mean number of 10 larvae. About 24 hours after dipping, final mortality of housefly larvae was recorded. Data revealed that the positive control got the highest mortality of housefly larvae with a mean of 23 while C. odorata at 75g/L $C^2P^3$ got the lowest mortality of 12.

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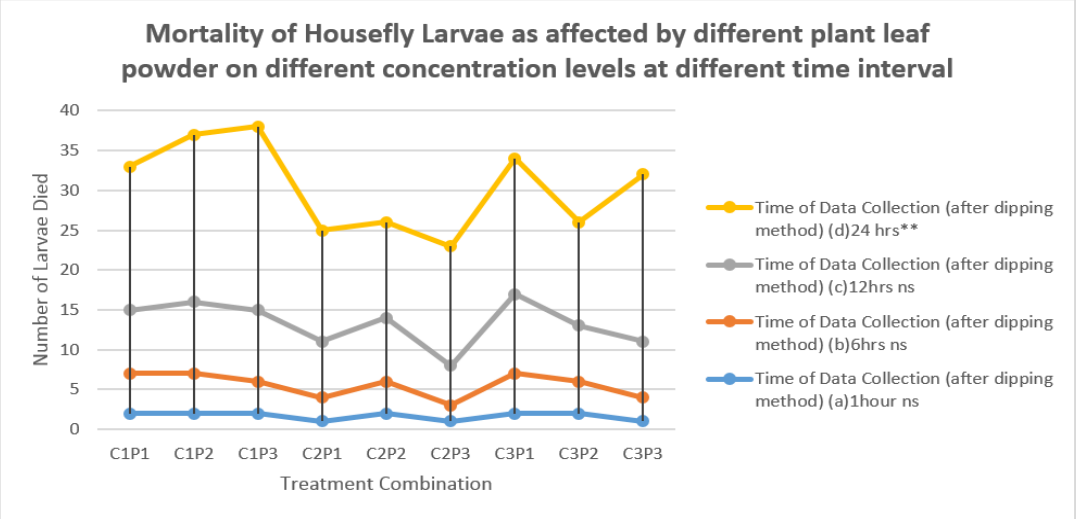


**Figure 1: Mortality of Housefly Larvae as affected by different plant leaf powder on different concentration levels at different time interval**

**=significant at 1% level, * = significant at 5% level, $^{ns}$= not significant

Statistically, at 1hr, 6hr and 12hr, there is no significant difference between treatment combination means with a covariance 35.15%, 24.72% and 16.44% respectively. At 24 hour, effect of treatment combinations shows significant difference with a covariance of 9.92%

**Mortality of Housefly Pupae**

Figure 2 shows the effect of the different plant leaf powder at different concentration levels on the pupae of housefly. An hour after the dipping method, number of larvae was gathered. Almost all treatment combinations got a mean of 3. At 6 hours, a sudden increase in the number of dead pupae was observed. Treatment combinations have a common denominator of mean which is 5. Subjecting all the data in statistical analysis revealed that there are no significant differences between all the treatment combinations.

Furthermore, about 24hrs of observation highest pupae mortality was observed. The control and L. camara at 75g/L concentration have the highest pupal mortality with a mean of 23. It was found out that pupa of housefly can be control using C. odorata leaf powder at 75g/L concentration.

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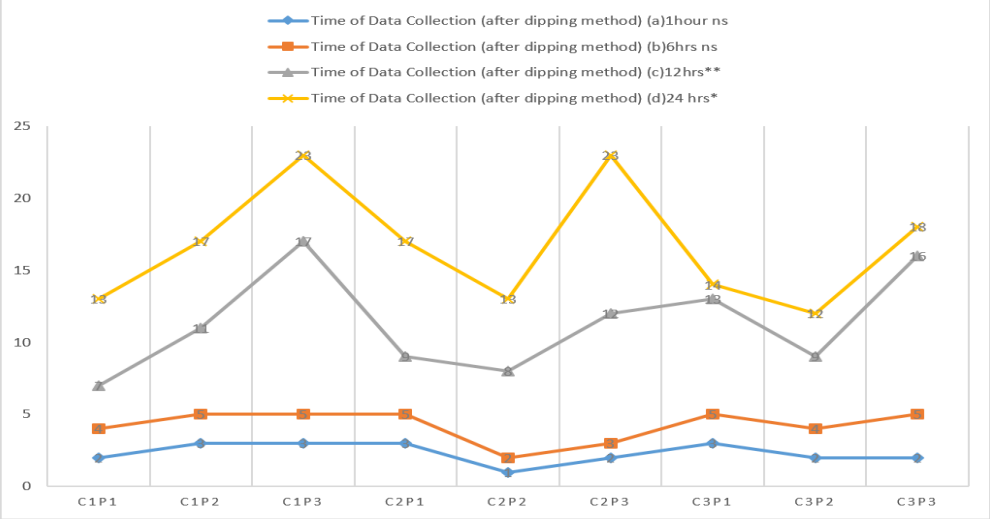


**Figure 2: Mortality of Housefly Pupae using different plant leaf powder at different concentration levels on the pupae of housefly**

**=significant at 1% level, * = significant at 5% level, $^{ns}$= not significant

**Mortality of Adult Housefly**

Adult housefly is considered as a common problem of every household especially during summer and very hard to control (Keiding, J., WHO, 1986). Focusing on the adulticidal effect of the different plant leaf powder at different concentration levels. L. camara leaf powder ($C^3P^1$) and the positive control at 75g/L concentration got the highest housefly adult mortality with a mean of while L. camara leaf powder at 25g/L got the least number of dead egg having a mean of 23. Thus, L. camara leaf powder at 75g/L ($C^3P^3$) is the most effective treatment combination in causing the adult housefly to die. Statistically, there is no significant difference between all the treatment combinations.

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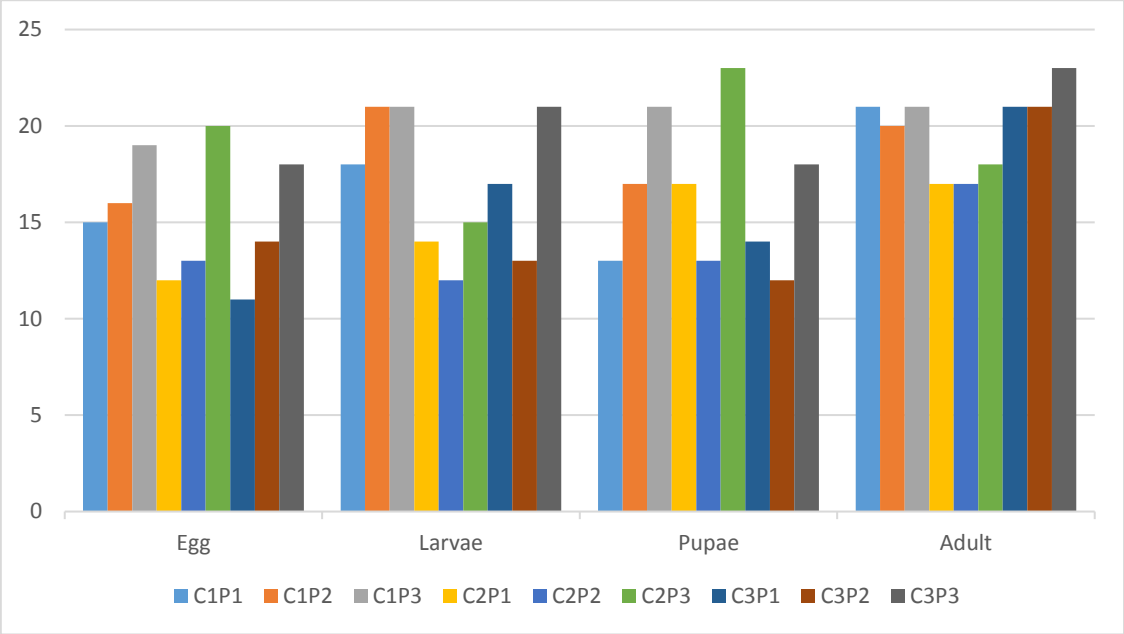


**Figure 3: Mortality Mean Summary of Different Growth Stages of Housefly as Affected by the Different Plant Leaf Powders**

## CONCLUSIONS AND RECOMMENDATIONS

Based on the result of the study the following were concluded; (a) There is no significant difference in the mortality of housefly egg, larvae, pupae and adult; (b) At 75g/L concentration is the most effective level of concentration of L.camara and C. odorata in the control of housefly; (c) Larval stage of housefly growth got the highest morality; (d) There is a significant difference on the levels of C. odorata and L. Camara plant leaf powder and ; (e) There is a significant difference on the stages of housefly growth applied with C. odorata and L. camara plant leaf powder.

Based on the results of the study the following were recommended: C. odorata and L. camara @ 75g/L can be used to suppressed the growth of housefly egg, larva and pupa and can kill the adult housefly. Also, the 75 g/ L concentration of L. camara is effective to control the housefly, however further chemical analysis and study shall be conducted to determine its active content which makes the housefly susceptible. More studies using different preparation of C. odorata and L. camara can be done to find out the most effective preparation and will give best result. In addition, further study could be done to assess the effectiveness of using 75 g/ L concentration of L. camara in controlling housefly egg, larva, pupa and adult among poultry and livestock farm, using it as an alternative for commercial insecticide.

The Seybold Report
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**Biographical Sketch**

The author is a graduate of Master of Science in Agriculture Major in Animal Science minor in Crop Science in 2017 at President Ramon Magsaysay State University (PRMSU). An Assistant Professor 3 under the College of Agriculture and Veterinary Medicine, PRMSU- San Marcelino Campus, Nagbunga, San Marcelino, Zambales. Currently designated as the San Marcelino Campus Extension Coordinator. Moreover, a Competency Assessor in Organic Agriculture NCII qualification and a holder of National TVET Trainer in Agricultural Crop Production NCIII, Organic Agriculture NCII and Animal Production NCII. A former Program Chairperson for the Bachelor of Science in Agriculture and Palayamanan Project In-Charge.

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