Journal of Chemical Science and Engineering
JCSE, 2(3): 122-125
www.scitcentral.com

ISSN: 2642-0406

Original Research Article: Open Access

The Effect of Solvent and Distilled Water Extraction of *Calotropis* spp. on Housefly

Taha Mohammed Sharief Mohammed[1*] and Ahmed Elzain Eldoma Hussien[2]

[*1]*Department of Horticulture, University of Zalingei, Zalingei, Sudan*

[2]*Department of Biology, University of Zalingei, Zalingei, Sudan.*

Received August 09, 2019; Accepted September 03, 2019; Published September 25, 2019

ABSTRACT

This study is an attempt to find out material from natural product friendly to environment and cheap to human. The crude ethanol, butane and distilled water extracts of *Calotropis procera* leaves and flower have been screened for their insecticidal activities against *Musca domestica*. The main objective of this work is encouraging the use of natural product pesticide friendly to environment. The ethanolic, botanic and water extract of leaves flowers from the Sudanese plant *Calotropis procera* (Asclepiadaceae) were tested against house fly. The obtained results indicated that the crude latex extracted by these solvent showed a significant effect on house fly mortality while there were no significant differences among the solvent and distilled water.

Keywords: *Calotropis procera*, Solvent extract, Mortality

INTRODUCTION

Calotropis procera, a small shrub is of immense pharmacological importance as a traditional medicine in the Middle East, Africa and South East Asia. Two common species of Calotropis have been mentioned in literature by ancient writers, *C. procera* and *C. gigantean*. Both of these species contain similar phytochemical constituents and could possibly be used as substitutes for one another. It is widely used in Indian, Arabic and Sudanese traditional medicinal systems for curing wide range of diseases. Various tribes of the world are also known to use *C. procera* as a curative for skin disease, elephantiasis, toothache, asthma, leprosy and rheumatism [1]. Various phytochemicals that have pharmacological implications are found spread across different parts of the plant, such as leaves, roots and bark, flower, fruits, stem and latex. The plant is reported to possess acaricidal, schizonticidal, antimicrobial, anthelmintic, insecticidal, anti-inflammatory, antidiarrheal, anticancerous and larvicidal activities [2]. This is possibly due to the presence of numerous phytochemicals, namely, calotropin, calotropagenin, calotoxin, calactin, uscharin, amyrin, amyrin esters, uscharidin, coroglaucigenin, frugoside, corotoxigenin, calotropagenin and voruscharine [2]. Presence of norditerpenic esters, organic carbonates, cysteine protease, alkaloids, flavonoids, sterols and various cardenolides makes *C. procera* a significant candidate plant for new drug discoveries. Hence, it is imperative to highlight the pharmacological benefits that could be reaped from this small erect shrub. In this review, we focus on different pharmacological benefits of numerous constituents found in *C. procera* and shed light on its potential as an anti-cancer agent. Plant overview habitat: *C. procera* is mostly found in habitats with little competition from other plants. These plants tend to grow in dry and rugged habitats with little rainfall (150 to 1000 mm) annually and areas with well-drained soil having 2000 mm of annual precipitation. The plant is commonly found on roadsides, beachfront dunes, and urban areas. It is also found in areas 1000 m above sea level. Due to its xerophytic nature it can grow and propagate under harsh desert conditions. It is also grown as an ornamental plant in dry or coastal regions in the world [2,3]. The common houseflies *Musca domestica* L. (*Diptera: Muscidae*) are known as one of the most serious pests at human and animal dwellings worldwide [4] which can spread a deadly pathogenic bacterium [5] as well as transmit antibiotic-resistant bacteria [6]. Adult houseflies are

Corresponding author: Taha Mohammed Sharief Mohammed, Department of Horticulture, University of Zalingei, Zalingei, Sudan, Tel: +249912108486; E-mail: taha1226@gmail.com

Citation: Mohammed TMS & Hussien AEE. (2019) The Effect of Solvent and Distilled Water Extraction of *Calotropis* spp. on Housefly. J Chem Sci Eng, 2(3): 122-125.

mechanical vectors of numerous dreadful diseases including typhoid fever, cholera, amoebic dysentery, diarrhea, salmonellosis, anthrax and helminthic infections in man [7]. Conventional chemical and synthetic insecticides have been used extensively for many years for controlling this commensal species [8,9]. But the indiscriminate and unregulated uses of such insecticides have adverse effects like development of insect resistance and residual effects on humans, animals and the environment [10,11]. These problems, coupled with acute neurotoxicity to man and his domesticated animals, have stimulated the search for alternative plant-derived phytochemicals, commonly known as botanicals or bioinsecticides that have been shown to be valuable for controlling houseflies in their natural habitats [12,13]. This approach could lead to gradually decreased uses of chemical and synthetic insecticides against this important pest species.

MATERIALS AND METHODS

Leaves and flowers extract of *Calotropis procera* were prepared by different solvent (distilled water, ethanol and butane). The dried ground leaves and flowers were soaked for 24 h water in room temperature. Twenty number of 1st, 2nd and 3rd adult house fly of *M. domestica* were selected separately for each set of treatment. Each experiment was conducted in triplicates along with the control group. Mortality of adult insects followed by the exposure was recorded in 4 h. LC_{50} was calculated using Karber's method (Karber, 1931).

Collection and processing of plants sample

Fresh leaves and flowers of *C. procera* were collected from around the University of Zalingei. Leaves and flowers were properly cleaned and shade dried for 12 days at 32-35°C and relative humidity 50-60%. The dried leaves and flowers were powdered mechanically using commercial electrical stainless steel blender (Remi Anupam Mixie Ltd., India). The samples were stored in air tight container at room temperature in dark for further analysis.

Extraction of plant extracts

The dried leaves and flowers of *C. procera* were extracted separately with 1 L of 90% ethylene, butane and distilled water. The extracts were concentrated at 50°C and the residue obtained was stored at 4°C.

STATISTICAL ANALYSIS

All the experiments were carried out in three replications in Split Plot Design. Data were subjected to ANOVA to find out the difference among the concentrations of the plant extracts using DMR test at 5% level of probability.

RESULTS AND DISCUSSION

In the present study, the ethanolic, butane and distilled water extracts of the leaves and flower of the plants, *C. procera* was quite effective against the housefly. These extracts drastically affected the adults as an insecticide, result showed that it may have pesticidal or anti-feedant properties [14,15]. Though reports on nematicidal [16], antimicrobial and anti-helminthic [17] activities of *C. procera* extract and its use in the treatment of toothache, cough and subcutaneous diseases [18] exist, there is no report at all regarding the LC50 for the alcoholic extract of *C. procera* leaf against *M. domestica*. The results presented in **Table 1 and Figure 1** exhibit the toxicity of flowers and leaves extract of *Calotropics procera* against *M. domestica*, showed a significant effect in insect mortality but there were no significant differences between them that mean distilled water will play a significant role in extraction of the active ingredient from both flower and leave. The lowest amount of extracted material was collected from flowers using distilled water. Earlier authors reported that the bio insecticides, particularly those are derived from plant origin, have been increasingly evaluated in controlling the population of insect's pest [19,20]. Flowers and leaves extract showed a better result than flowers or leaves. Natural products of plants origin are alternative agents for insect control because they constitute a rich source of bioactive chemicals. Numerous studies have been drawn by considering the toxic effects of plant extracts and dipterans [21,22]. The botanical extracts from the plant leaves, roots, seeds, flowers and bark in their crude form have been used as conformist pesticides for centuries [23,24].

Table 1. Shows the effect of solvent and water extraction *Calotropis* spp. on house fly.

Solvent	Yield	Plant part	Yield	Rep	Yield
Butane and ethanol	86.700[a]	Flowers and leaves	86.700[a]	2	78.778[a]
Ethanol	74.322[a]	Leaves	78.233[ab]	3	78.700[a]
Distilled water	69.289[a]	Flowers	68.889[b]	1	72.833[a]
LSD/0.05	7.75	LSD/0.05	6.1	LSD/0.05	7.75

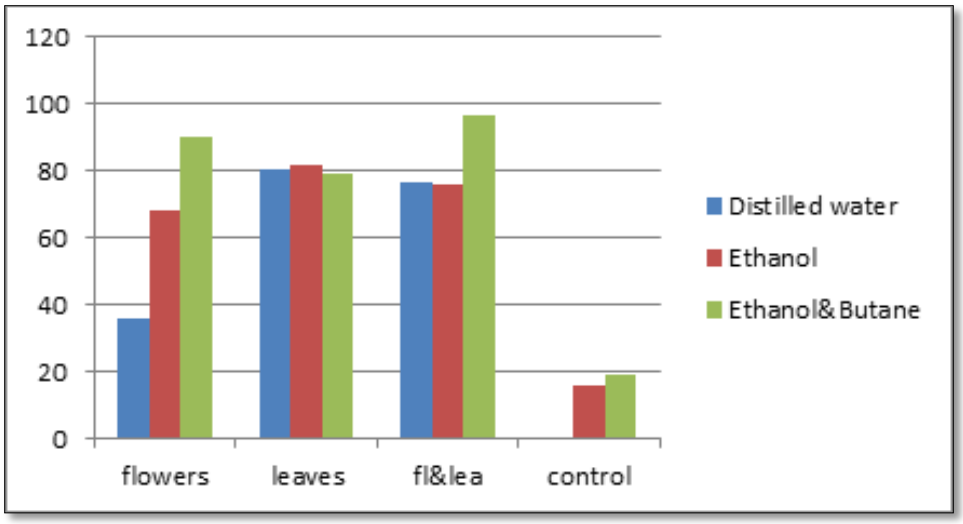

Figure 1. Shows the effect of extraction by ethanol, butane and distilled water.

CONCLUSION

The result of present investigation reveals the insecticidal potentials of the tested botanical extract against the house fly *M. domestica*. The leaf and flower extract of *Calotropis procera* was very promising; furthermore, all these plant materials can be easily collected from the natural vegetation. Therefore, plant originated insecticides can be used as sustainable pesticide in a housefly control programme. These findings have emphasized the need to explore the possibility of using plant based pesticides and reduce the chemical hazards in the environment. Further studies on these plants, including mode of action, synergism with the biocides under field condition are needed. Also isolation of the active compounds from these plants and further trial assay in the field are required.

ACKNOWLEDGEMENT

We are here acknowledged the staffs of the laboratory of biology, faculty of education, University of Zalingei, who are assisting the scientist in different way of having good knowledge.

REFERENCES

1. Parihar G, Balekar N (2016) *Calotropis procera*: A phytochemical and pharmacological review. Thai J Pharm Sci 40: 3.
2. Mueen Ahmed KK, Rana AC, Dixit VK (2005) Calotropis species (Ascelpediaceace) - A comprehensive review. Pharmacogn Magazine 1: 48-52.
3. Parrotta AJ (2001) Healing plants of peninsular India. CAB International Wallingford, UK, pp: 169-170.
4. Mündi K (1994) Housefly, an everyday monster. Colorado Springs, Winstar Studios, Co, USA.
5. Sasaki T, Kobayashi M, Agui N (2000) Epidemiological potential of excretion and regurgitation by *Musca domestica* (Diptera: Muscidae) in the dissemination of *Escherichia coli* O157:H7 to food. J Med Entomol 37: 945-949.
6. Macovei L, Zurek L (2006) Ecology of antibiotic resistance genes: Characterization of enterococci from houseflies collected in food settings. Appl Environ Microbiol 72: 4028-4035.
7. Scott JG, Warren WC, Beukeboom LW, Bopp D, Clark AG, et al (2014) Genome of the house fly, *Musca domestica* L., a global vector of diseases with adaptations to a septic environment. Genome Biol 15: 466.
8. Cao MK, Song FL, Zhao TY, Dong YD, Sun CHX, et al (2006) Survey of deltamethrin resistance in houseflies (*Musca domestica*) from urban garbage dumps in Northern China. Environ Entomol 35: 1-9.
9. Malik A, Singh N, Satya S (2007) House fly (*Musca domestica*): A review of control strategies for a challenging pest. J Environ Sci Health B 42: 453-469.
10. Acevedo GR, Zapater M, Toloza AC (2009) Insecticide resistance of house fly, *Musca domestica* (L.) from Argentina. Parasitol Res 105: 489-493.
11. Pezzi M, Lanfredi M, Chicca M, Tedeschi P, Brandolini V, et al (2011) Preliminary evaluation of insecticide resistance in a strain of *Musca domestica* (Diptera: Muscidae) from an intensive chicken farm of Northern Italy. J Environ Sci Health B 46: 480-485.
12. Mee KC, Sulaiman S, Othman H (2009) Efficacy of *Piper aduncum* extract against the adult housefly (*Musca domestica*). J Trop Med Parasitol 32: 52-57.

13. Urzua A, Santander R, Echeverria J, Cabezas N, Palacios SM, et al (2010) Insecticidal properties of the essential oils from *Haplopappus foliosus* and *Bahia ambrosoides* against the house fly, *Musca domestica* L. J Chil Chem Soc 55: 392-395.

14. Alkofahi A, Rupprecht JK, Anderson J E, McLaughlin JL, Mikolajczak KL, et al. (1987) A search for new pesticides from higher plants. Insecticides of plant origin, ACS symposium series 387.Washington, D.C, pp: 24-25.

15. Schmutterer H (1990) Properties and potential natural pesticides from neem tree. Ann Rev Entomol 35: 271-297.

16. Khirstova P, Tissot M (1995) Soda-Anthroquinone pulping of *Hibiscus sabdariff* (Karkadesh) and *Calotropis procera* from Sudan. Bioresour Technol 53: 670-672.

17. Iqbal Z, Lateef M, Jabbar A, Muhamma G, Khan MN (2005) Anthelminthic activity of *Calotropis procera* (Ait) flowers in sheep. J Ethnopharmacol 102: 256-261.

18. Kew F (1985) The useful plants of west tropical Africa, families A-D (2nd Edn). (ed Burkill, H M). Royal Botanical Gardens 1: 219-222.

19. Siriwattanarungsee S, Sukontason KL, Olson JK, Chailapakul O, Sukontason K (2008) Efficacy of neem extract against the blowfly and housefly. Parasitol Res 103: 535-544.

20. Kamaraj C, Bagavan A, Rahuman AA, Zahir AA, Elango G, et al (2009) Larvicidal potential of medicinal plant extracts against *Anopheles subpictus* Grassi and *Culex tritaeniorhynchus* Giles (Diptera: Culicidae). Parasitol Res (in press).

21. Abdel Fattah AK, Hussein KT, Shoukry KK (2009) Biocidal activity of two botanical volatile oils against the larvae of *Synthesiomyia nudiseta* (Wulp) (Diptera: Muscidae). Egypt Acad J Biol Sci 2: 89-10.

22. Malik A, Singh N, Satya S (2007) House fly (*Musca domestica*): A review of control strategies for a challenging pest. J Environ Sci Health B 42: 453-469.

23. Bagavan A, Kamaraj C, Rahuman AA, Elango G, Zahir AA, et al (2009) Evaluation of larvicidal and nymphicidal potential of plant extracts against *Anopheles subpictus* Grassi, *Culex tritaeniorhynchus* Giles and *Aphis gossypii* Glover. Parasitol Res 104: 1109-1117.

24. Kumar S, Wahab N, Warikoo R (2011) Bio efficacy of *Mentha piperita* essential oil against dengue fever mosquito *Aedes aegypti* L. Asian Pac J Trop Biomed 1: 85-88.