

The Effect of Aqueous and Alcoholic Extracts of Castor Leaves (*Ricinus Communis L*) on the Survival of the Mosquito (Diptera: Culicidae) *Culex Pipens L.*

Huda Ahmed Faisal Mazloum

University of Babylon College of science for women Biology department

Zeina Najm Abd Jouda

University of Maysan College of science Biology department

Wafa Faisal Najy Abdul Alrahman

Salah Alden University College of science Biology department

Duaa Asaad Haider Ibrahim

University of Baghdad College of science for women Biology department

Received: 2024, 15, Dec

Accepted: 2024, 21, Dec

Published: 2025, 06, Jan

Copyright © 2025 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).



Open Access

<http://creativecommons.org/licenses/by/4.0/>

Annotation: This study examines the effect of extracts from *Ricinus communis* (castor plant) leaves (aqueous and alcoholic) on the immature stages of *Culex pipiens* mosquitoes under laboratory conditions. The results are as follows:

1. The hot water extract of the plant leaves had a stronger effect than the cold water extract in terms of mortality rates for both eggs and the four larval stages as well as pupae. The egg mortality rates for hot and cold water extracts were recorded.

2. The ethyl alcohol extract also had an effect on the mortality of the immature stages of *Cx. pipiens*. The mortality rates for the first, second, third, and fourth larval stages were observed with the ethyl alcohol extract.

Introduction

Mosquitoes are considered one of the major and complex health problems. They are known to be the worst among medical and veterinary insects because they transmit pathogens that threaten the lives of millions of people. The main diseases transmitted include filariasis, malaria, and yellow fever. As a result, mosquitoes have received significant and increasing attention from researchers in the World Health Organization and beyond. Research and articles on various aspects of mosquitoes have exceeded thousands annually.

The primary research focus on mosquito control has for decades relied on the use of chemical insecticides, such as organochlorine pesticides (e.g., DDT) and organophosphate compounds (e.g., malathion). While these chemicals have been effective in controlling mosquitoes and reducing their harmful impacts, their overuse and unregulated application have led to environmental pollution and side effects on living organisms, including humans. Moreover, the development of pesticide resistance, a significant challenge in chemical control, has led to the need for alternatives, such as using plant extracts, which have active compounds that mosquitoes do not develop resistance to.

Study Objectives

The objectives of this study were:

- To prepare aqueous and ethyl alcohol extracts of castor plant leaves.
- To investigate the impact of these extracts on the immature stages of *Culex pipiens* mosquitoes.

Literature Review

Culex pipiens is one of the most significant vectors of pathogenic agents, widespread in tropical and temperate regions. It is a major public health concern due to its role in transmitting diseases such as dengue, West Nile virus, and filariasis.



Figure (1) *Culex pipiens*

- The life cycle of *Culex pipiens* is complete (holometabolous), consisting of egg, larval, pupal, and adult stages. The female mosquito feeds on blood from vertebrates, including humans, and lays eggs in stagnant water.

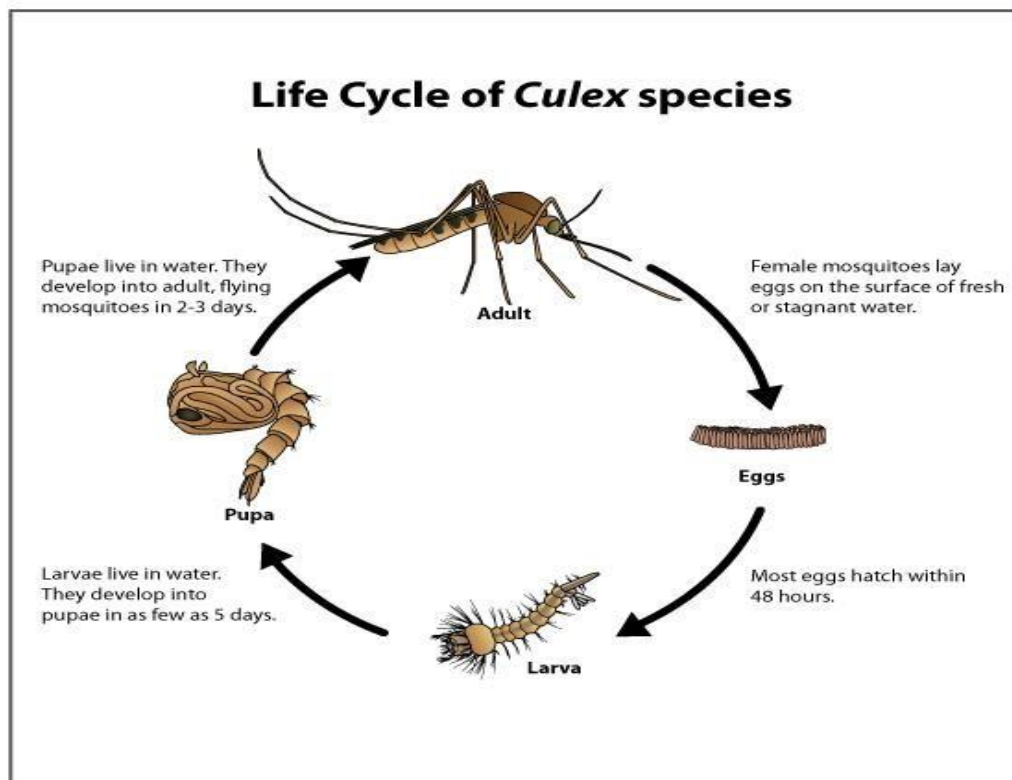


Figure (2) Life cycle of culex species.

Castor Plant (*Ricinus communis*)

Castor is a shrub belonging to the Euphorbiaceae family. It contains toxic compounds, particularly ricin, which is harmful to many insects. The plant's seeds contain a significant amount of oil, which has various industrial and medicinal uses. In this study, castor plant leaves were selected to examine their potential for mosquito control.

Chemical Composition and Toxicity of Castor Plant

The plant contains ricin, a toxic protein that causes blood clotting and is harmful to various organisms, including mosquitoes. Castor leaves and seeds also contain alkaloids, phenolics, and other compounds that affect insect physiology, particularly inhibiting feeding and growth.

Conclusions

The results of the current study indicate that:

- The hot water extract of *R. communis* leaves has a more significant effect than the cold water extract on the immature stages of *Cx. pipiens*, as evidenced by higher mortality rates for different larval stages. The effect of the extract increased with higher concentrations, with the first larval stage being the most sensitive.
- The ethyl alcohol extract had a greater effect than both the hot and cold water extracts.

Recommendations

1. Conduct broader studies to investigate the effects of *R. communis* extracts on other medical insect species from different orders.
2. Perform analytical studies to identify the chemical compounds in the plant and measure their biological effects on mosquitoes.
3. Conduct physiological studies to understand the impact of these extracts on the target tissues of the insect.

4. Continue researching other plant species with toxic properties against insects and explore their use as alternatives to chemical pesticides for environmental protection.
5. Conduct field studies to assess the efficacy of *R. communis* extracts in controlling mosquito breeding and spreading in natural habitats.

References

1. Al-Sharook ,Z ,Balank , K .Jiang Y. and Rembold H.1991. Insect growth inhibitors from two tropical meliaceae effects of crude extracts on mosquito larvae .J.Appl - Campbell .F.L. and Sulliran , w.w.1933 the relative toxicity of nicotin , methylanabasine and lupinine for Culicine mosquito larvae . - Duke .J.A and Wain K.K 1981. Medicinal plants of the world . - Grainge .M.S : Ahmed W.C and Mitchel , J.W 1986 plants species reportedly possessing pest control properties .
2. Harborne , J.B 1978 . Biochemical aspects of plant and animal coevolution .
3. Metspalu , L: Hiisaar , K : Joudu J. and Kuusik , A. 2001 . the effect of certain toxic plant extracts on the larva of colorado potato beetle and khapra beetle.
4. Olifa , J.I : Matsumura , F,Zee Vaart , J : Mullin , C.A and Charlam bous 1991. Lethal amounts of ricinin in green peach aphids (myzus persicae).
5. Pterson ,C.J.Tsao , R. : Eggler ,A.L and Coats. J.R.2000 . Insecticidal activity of cyano hydrins and monoterpenoid compoune molecules .
6. Rutledge .C.R. Clarke ,F.Curtis .A. and Sackett , S. 2003 .Larval mosquito control.
7. Southgate . B.A.1979. Bancroftian Filariasis . Egypt. Trop Dis .Bull.
8. Townsend , C.C. Guest, E and Omar , S.A 1980 . Flora of Iraqi .
9. Ministry of Agriculture and Agrarian reform Republic of Iraqi. - Wayhe , J.2001 . Culex pipiens : the Worthern House mosquito.
10. Zayed , A.B: Szum las, D.E. and Hanafi A.2006 . Use of bioassay and microplant assay to detect and measure insecticide resistance in filed populations of Culex pipiens from filariasis endemic areas of Egypt.