

Soursop and Papaya Leaves Crude Extract to Kill Mosquito Larvae and Salt Addition Factor

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Abstract

Crude extract of soursop (*Annona muricata*) and papaya (*Carica papaya*) leaves had been tested to kill mosquito larvae (*Culex sp*) during August 26-27th, 2025 at Ecology Laboratory, Biology Department, Sriwijaya University, Indralaya, South Sumatra. Addition of 0.5 g salt (NaCl) also tested as a treatment to increase of larvae mortality. It was found that both soursop and papaya crude extract leaves kill mosquito larvae ; 58 % for soursop leaves and 100 % for papaya leaves. Addition of 0.5 g NaCl could increase mortality of larvae at soursop leaves treatment, but it is not significant statistically.

Keywords: Crude extract; Papaya; Soursop; Mortality; Mosquito; Salt

1. Introduction

Mosquitoes of the *Culex* genus are responsible for a large burden of zoonotic virus transmission globally. Collectively, they play a significant role in the transmission of medically significant diseases such as Japanese encephalitis virus and West Nile virus (Madhav et al., 2024). *Culex sp* mosquitoes are generally more active at night. It has several specific location that can serve as breeding sites such as stagnant water, flowing water, rice fields, swamps, aquatic plants, and shrubs. Therefore controlling this type of mosquito, requires special attention and management. Natural control, using insecticides, can work more effectively and yield faster results, compared to other biological control methods (Nurjazuli and Santjaka, 2020).

The continuous application of synthetic insecticides causes development of resistance in vector species, biological magnification of toxic substances through the food chain and adverse effects on environmental quality and non target organisms including human health. Application of active toxic agents from plant extracts as an alternative mosquito control strategy was available from ancient times. These are non-toxic, easily available at affordable prices, biodegradable and show broad-spectrum target-specific activities against different species of vector mosquitoes (Ghost et al., 2012). Kewa et al., (2020) had reported that ethanol extract of soursop leaves is effective to kill *Culex sp* larvae. Kristanto et al., (2024), wrote that a 20% concentration of the ethanol extract achieved 100% mortality of stable flies (*Stomoxys calcitrans*) within 50 minutes, indicating that papaya leaf extract is a cost-effective and environmentally friendly bioinsecticide, particularly when using ethanol as a solvent.

As Kewa (2020) and Kristanto (2024) used ethanol extract, this experiment try to use crude extract, without solvent, in order to make simplicity where peoples commonly can do it at their houses.

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2. Methodology

Crude extract of soursop and papaya leaves made by grind 100 g fresh leaves and press it to result the green gel extract. Fifty plastic cups filled by water, where 10 cups filled with 200 ml water, 10 cups filled by 199.5 ml water with 0.5 ml crude extract of soursop, 10 cups filled by 199.5 ml water with 0.5 ml crude extract of papaya, 10 cups filled by 199 ml water with 0.5 ml crude extract soursop leaves plus 0.5 g NaCl, and 10 cups filled by 199 ml water with 0.5 ml papaya leaves crude extract plus 0.5 g NaCl. All cups placed by ten mosquito larvae then, continued by counting of larvae mortality after 24 hours treatment. Mortality data compared each other with T-test procedure, to know, whether addition of crude extract of soursop and papaya leaves kill the mosquito larvae, compared with control (no addition of extract), and whether addition of salt to extract treatment, increase the mortality. T-test procedures be done at $\alpha = .05$ and $df = 18$.

3. Result and discussion

One day treatment of crude extract to mortality of mosquito larvae, find out the result as represent by below table.

Table 1 Mortality Number of Mosquito Larvae, after 24 hours treatment of Crude Extract

No of replication	Larvae Mortality Number				Larvae Mortality Number Of Control
	Soursop Leaves		Papaya Leaves		
	Without Salt	With Salt	Without Salt	With Salt	
1	6	7	10	10	0
2	4	5	10	10	0
3	7	2	10	10	0
4	7	4	10	10	0
5	5	8	10	10	0
6	8	8	10	10	0
7	4	7	10	10	0
8	4	9	10	10	0
9	5	6	10	10	0
10	8	7	10	10	0
Mean	5.8 (58 %)	6.3 (63 %)	10 (100 %)	10 (100 %)	0

From above table, seems that mosquito larvae death number, more than 50 % of all treatment, soursop and papaya extract leaves, with and without salt addition. Addition of NaCl 0.5 % (m/v), looks increase the mortality at the soursop extract treatment, but it was not significant different statistically. Setiawan et al., (2016) showed that NaCl 0.4 % could increase the mortality of *Pomacea canaliculata*, rice field pest. *Pomacea canaliculata* may be more sensitive to salt than mosquito larvae, or it could be caused by solvent usage.

This result match with Kewa et al., (2020) and Kristanto et al., (2024) publication as be explained at introduction subject. The score 58 – 63 % deaths of soursop treatment shows that bioactive of crude extract success to disrupt the metabolism and respiratory system of larvae. According to Nurhasanah(2013) this condition weakens the larvae physiological defenses, allowing the bioactive compounds in soursop extract to work more easily.

The potency of papaya leaves crude extract, proved higher than soursop leaves. Papaya leaves contain secondary metabolites such as alkaloids, flavonoids, tannins and saponins, which are known to interfere with the physiological processes of mosquito larvae. According to Ilham et al., (2019), the alkaloids present in papaya leaves particularly carpaine that can inhibit acetylcholinesterase activity; this enzyme plays key role in nerve impulse transmission.

So, by this experiment, could be consider to control mosquito larvae, easily, by using crude extract leaves. Natural larvacides are one of the alternative way to eliminate mosquito larvae. Hoped this could be a problem solver, to break

mosquito life cycle with cheap fund. Plant based larvicides are easily decomposed in the environment (Annisah et al., 2025). Papaya crude extract, can kill 100 percent of experiment target, after 24 hours, even the mortality beginning from first hour; that indicates papaya leaves can serve (Denge et al., 2021), a reliable natural alternative to chemical larvicide, offering environmental friendly, biodegradable and available solution for mosquito control.

4. Conclusion

Crude extract of soursop and papaya leaves kill the mosquito larvae. Papaya leaves crude extract even kills 100 % mosquito larvae, *Culex sp*, after 24 hours.

Addition of 0.5 % of salt to water medium, not influence the mortality score of larvae statistically, although it is different nominally.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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