JURNAL KESEHATAN LINGKUNGAN
JURNAL DAN APLIKASI TEKNIK KESEHATAN LINGKUNGAN

ISSN 1829-9407 (Print)
ISSN 2581-0898 (Online)

Volume 21, No. 1, January 2024; Page: 91-96; *DOI: https://doi.org/10.31964/jkl.v21i1.742*

EFFECTIVENESS OF DECOCTION OF CINNAMON BARK (*Cinnamomum burmanii*) AS A FLY REPELLANT IN THE DRYING PROCESS OF SALTED FISH

Muhammad Syahrurradi, Tien Zubaidah, Muhammad Irfa'i, Muhammad Pahruddin
Banjarmasin Ministry of Health Polytechnic, Department of Environmental Health
Jl. H. Mistar Cokrokusumo No. 1A Banjarbaru South Kalimantan 70714
Email: syahrurradi@gmail.com

Article Info

Article history:
Received July 30, 2023
Revised July 30, 2023
Accepted January 01, 2024

Keywords:
Cinnamon
Repellent
Flies

ABSTRACT

Effectiveness of Decoction of Cinnamon Bark (*Cinnamomum Burmanii*) as A Fly Repellant In The Drying Process of Salted Fish. Flies are vectors that can transmit disease to humans. Therefore, it needs to be controlled. To control flies, use natural insecticides (natural repellents). This study aimed to determine the effectiveness of the decoction of cinnamon bark (Cinnamomum burmanii) as a fly repellent in the drying process of salted seat fish. This type of study is quasi-experimental, with a posttest-only control group design. The samples in this study were flies found in the wild. It consisted of 5 treatments, one control, and four repetitions (replications). The ANOVA test showed that varying doses of boiled cinnamon bark (Cinnamomum burmanii) as a fly repellent affected drying salted fish. The sig value is 0.00 < 0.05. The difference in the repellent power of the 12% dose was 14.47%, the 15% dose was 37.35%, the 18% dose was 55.2%, the 21% dose was 67.71%, and the 24% dose was 83.63%. It is hoped that the public can use a decoction of cinnamon bark as a natural repellent for fly vectors.

INTRODUCTION

Indonesia is a country that is rich in biological resources. One of them is a source of animal protein, especially fish. Almost 65 percent of fishery products in Indonesia are still processed by salting, which produces salted fish products. The drying stage is one of the important processes in processing salted fish (Abdullah, 2015) [1]. The process of drying salted fish is carried out in the open-air using sunlight and is usually dried on bamboo para-paras with mats or warings. This drying process allows for fly attacks, particularly house flies (Musca domestica) and green flies (Chrysomya megacephala) (Indriasih et al., 2015) [2]. In addition to carrying dirt and bacteria, it also lays eggs on the fish it attacks. The eggs attached to the fish flesh will develop into larvae (maggots), which will cause physical damage. Flies also act as an intermediary for the contamination of putrefactive bacteria, pathogens, and poison-formers such as Acinetobacter, Staphylococcus, and Vibrionaceae, allowing them to transmit disease to humans (Ariyani et al. 2007) [3].

Diseases transmitted by flies are still a public health problem, both in urban and rural areas. Diseases caused by flies include abdominal typhus, dysentery, cholera, and typhoid fever. To minimize damage caused by flies during the drying process, salted fish processors often use chemical insecticides that are sprayed directly on processed fish products (Abdullah, 2015)

[1]. According to Yuliana (2009), fish processors' chemical habits show that 53.3 percent have used bleach and formalin.
The use of chemical insecticides that are not appropriate for their function or are excessive in size can cause health problems (Tanjung, 2022) [5]. Several studies explain that chemical insecticides can have long-term effects, namely causing cancer, reproductive health problems for men and women, neurological disorders, and damaging the immune system (Abdullah, 2015) [1]. Therefore, to replace the use of chemical insecticides, it is necessary to explore alternative options, such as vegetable insecticides, which are insecticides with basic ingredients derived from nature (Asmaliyah (2010), as cited in Sari (2020) [6].
As stated by Anisah (2018) in Sari (2020) [6], The use of vegetable insecticides can be done by using fly repellent plants, namely plants with a strong, fragrant aroma. Cinnamon has potential as a plant-based insecticide that repels flies because its bark has a strong, fragrant aroma. Apart from that, cinnamon bark also contains several compounds such as tannins, essential oils, flavonoids, saponins, cinnamaldehyde, eugenol, and coumarin. Among these components, those that have a strong larvicidal effect are cinnamaldehyde (60.72%), eugenol (17.62%), and coumarin (13.39%) (Syahrizal, 2017) [7]. This research aims to determine the effectiveness of boiled cinnamon bark (Cinnamomum burmanii) as a fly repellant in the drying process for salted fish.

MATERIALS AND RESEARCH METHODS

This research is a quasi-experiment with a posttest-only control group design. In this design, there are two groups, each selected randomly. The study aims to measure the effect of treatment in the experimental group by comparing it to the control group (Aliah, N., 2016)[8].
Cinnamon bark was the material used in this research. Cinnamon bark is washed with clean water and then dried in the sun. The dried skin is cut into small pieces and weighed at 200 grams. It is then boiled in 400 ml of water until it boils. The boiled water is diluted into doses of 12 percent, 15 percent, 18 percent, 21 percent, and 24 percent, then put into a spray bottle. The samples in this study were flies found in the wild. According to Ariyani et al. (2007), house flies and green flies frequently land on salted fish during the drying process.
This experiment used approximately 15 kg of catfish. The area of the salted sepat fish bed is 45 cm x 45 cm, with the weight of the fish in each bed being 600 gr. We sprayed the fish 10 times in the morning. Fly observations were carried out every 2 hours for 20 minutes, starting from 08.00–16.00 WITA (Sulistyaningrum, 2019) (9), and repeated 4 times. Next, the repellent power was calculated and analyzed using the ANOVA test, and then continued using the LSD test. The repellent power is calculated using the following formula:

$$DU = \frac{\Sigma A - \Sigma B}{\Sigma A} \; x \; 100\%$$

Information :
A = Flies land on dick
B = Flies land on the treat (Aris, 2022)[10]

RESEARCH RESULTS AND DISCUSSION

There are variations in the dosage of the decoction of cinnamon bark (Cinnamomum burmanii) as a repellant.

Flies are involved in the drying process of salted fish.

The dose used in this study consisted of 5 treatments, namely 12 percent, 15 percent, 18 percent, 21 percent, 24 percent, and 1 control (0%). At a dose of 12 percent, it can repel flies amounted to 14.47 percent, 15 percent of the dose to 37.35 percent, and 18 percent of the dose to 55.2 percent.
The 21 percent dose was 67.71 percent, and the 24 percent dose was 83.63 percent.

I concur with Djarot's research (2019) [11], which indicates that aromatic cinnamon bark wax, with an essential oil concentration of 3 percent, has the ability to repel flies at 89.72 percent, 75.28 percent at 2 percent, and 68.06 percent at 1 percent. Dubey (2010) (12) and Koul (2008) [13] stated that the biological activity of cinnamon essential oil against insects can be repellent. Cinnamon contains essential oils, with eugenol being the primary component. Eugenol can affect the nervous system, which is unique to insects and is not found in warm-blooded animals. The cinnamon plant is known to contain eugenol essential oil, the aroma of which flies do not like.

Air temperature and humidity measurements

The temperature and humidity measurements on day 1 revealed that the highest temperature measured at 12.00 WITA was 36.5°C, and the lowest temperature was 29.4°C at 08.00 WITA. Meanwhile, the highest air humidity is 49 percent, and the lowest is 77 percent. The results of field temperature and humidity measurements on day 2 showed that the highest temperature at 12.00 WITA was 37.6 °C and the lowest temperature was 28.9 °C at 08.00 WITA, while the highest humidity measurement result was 47 percent and the lowest was 79 percent.

On the first day, the air temperature was the highest at 36.5 °C at 12.00 WITA and the lowest at 29.4 °C at 08.00 WITA, while the air humidity ranged from 49 percent to 77 percent. On the second day, the highest temperature was 37.6 °C measured at 12.00 WITA, and the lowest was 28.9 °C measured at 08.00 WITA, while the air humidity ranged from 47 percent to 79 percent.

According to Qomariah (2010) [14], the number of flies will increase at temperatures of 20–25 °C, and at temperatures less than 35 °C, flies are actively looking for food. The optimum humidity for flies is 45 percent to 90 percent. Meanwhile, according to Schou (2013) [15], fly activity will increase during the day at a temperature of 30 °C and decrease at temperatures below 15 °C and above 35C. The optimum activity of flies is at a temperature of 34 °C with a humidity of 90 percent (Indriasih, 2013) [2].

The drying time for salted fish depends on the number of flies that land.

According to the research results, the drying time for salted fish is two days. On the first day, the average number of flies that landed was the lowest at the 24 percent dose, namely 3.05, and the highest at the 0% control, 22.05. On the second day, there was a decrease at the same dose, namely 24 percent with 2.6 animals and the highest (0% control) with 15.85 animals.

Repellent Power (%) Decoction of Cinnamon Bark (Cinnamomum burmanii) Against High Number of Flies

The repellent power of boiled cinnamon bark (Cinnamomum burmanii) was highest at a dose of 24 percent, at 83.63 percent, and lowest at a dose of 12 percent, at 14.47 percent

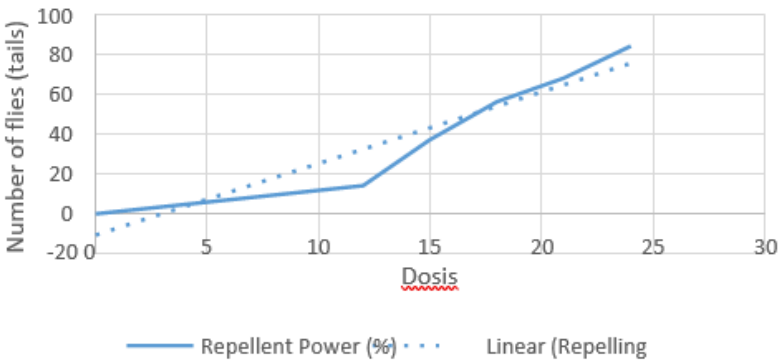

Figure 1 displays the repellent power of the decoction of cinnamon bark.

Figure 1 shows that the higher the dose of boiled cinnamon bark used, the greater the ability to repel flies on salted fish.

According to the research conducted by Garmini (2019) [16], cinnamon at a dosage of 55 grams resulted in 1.50 flies landing.Many chemicals, including tannins, essential oils, flavonoids, saponins, cinnamaldehyde, eugenol, and coumarin, are found in the bark of the cinnamon plant (Cinnamomum burmanii). This is thought to be why. According to Hasan (2011) in Emilda (2018) [17], the major components of the essential oil contained are cinnamaldehyde (60.72%), eugenol (17.62%), and coumarin (13.39%). These compounds are thought to be antifeedant compounds (Mahardika et al., 2014)[18]

According to Alowisya F. Liem (2013) [19], saponin is a type of sapogenin glycoside with the characteristic of being easily soluble in water. Saponin has a high toxicity, so it can be used as a vegetable repellent for insects. MeanwhMeanwhile, M. Sudjak Saenong (2016) [20] asserts that insects exposed to plants containing saponin will experience a lack of fluids, as saponin possesses repellent properties. ile, according to Mahardika (2014) in Sitohang (2022)[21], insects exposed to saponin compounds can temporarily or permanently inhibit the insect's ability to eat. This is in line with the theory, which states that cinnamon has active substances that can be used as a vegetable insecticide. Utami (2017), 22; and Alfarid (2020), 23 support this theory.

Effect of Varying Doses of Decoction of Cinnamon Bark (Cinnamomum burmanii) on the Number of Flies That Land.

The calculation results show that the average number of flies that landed on each repetition after being given the natural insecticide boiled cinnamon bark (Cinnamomum burmanii) ranged from 0 percent to 24 percent. At the 0 percent dose, the number of flies that landed was 19; at the 12 percent dose, 16.47; at the 15 percent dose, 8.42; at the 18 percent dose, 6.4; and at the 21 percent dose, 3.1. It can be concluded that the greater the dose of boiled cinnamon bark (Cinnamomum burmanii), the fewer the average number of flies that land on salted fish. According to Garmini research (2019) [16], cinnamon oil contains various components that are toxic to insects, including an anti-feedant (affecting insect feeding) and an anti-hormonal (disrupting hormone formation).

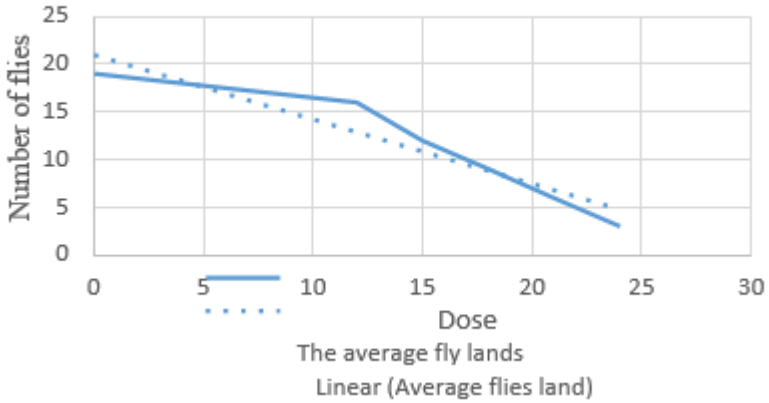

Figure 2 shows a graph that illustrates the impact of different doses on the number of flies that land.

According to the linear line in the graph above, the higher the dose of cinnamon bark (Cinnamomum burmanii) decoction, the fewer flies will land. In line with research by Baito et al. (2018) [24], which states that cinnamon oil has an insecticidal effect on house flies (Musca dumestica), Cinnamon oil at a dose of 1.0 percent was able to cause 61.11 percent of fly deaths; a 5 percent dose caused 88.5 percent of fly deaths; and a 10 percent dose caused 100 percent of fly deaths. Agrees with Khater & Geden (2018) (10), who stated that cinnamon affects the development of flies and can cause a mortality rate of 95.6% percent

Based on the results of the ANOVA test, a significant value was obtained (p value = 0.00), which means that there was an influence of varying doses of boiled cinnamon sticks (Cinnamomum burmanii) on the number of flies that landed during the drying process of salted fish. This is in line with the theory that cinnamon bark contains eugenol compounds, which are not liked by flies' sense of smell, so it can be a natural repellant. The eugenol compound has a distinctive aroma or odor, has a spicy taste, and is easily volatile, making it possible for the compound to become a repellent (Noya, 2022) [25].

CONCLUSIONS AND RECOMMENDATIONS

The doses used in this study were 0 percent, 12 percent, 15 percent, 18 percent, 21 percent, and 24 percent. The repellent power of 12 percent is 14.47 percent, 15 percent is 37.35 percent, 18 percent is 55.2 percent, 21 percent is 67.71 percent, and 24 percent is 83.63 percent. It is hoped that the decoction of cinnamon bark (Cinnamomum burmanii) can be used by the community as a natural repellent for vectors, especially flies, during the drying process for sepat fish.

REFERENCES

1. Abdullah S K, Wahyudin D. Pengaruh Konsentrasi Larutan Daun Cengkeh Terhadap Jumlah Lalat Hijau Yang Hinggap Selama Proses Penjemuran Ikan Asin. *Jurnal Kesehatan Lingungan Kesehat Lingkungan.* 2015; Vol 12, No 2.
2. Indriasih M, Chahaya I, Ashar T. Sebagai *Repellent* Nabati Dalam Mengurangi Jumlah Lalat YangHinggap Selama Proses Penjemuran Ikan Asin. 2015.
3. Ariyani F, Haryati S, Wahyuni M, Wisudo SH. Penggunaan Ekstrak Bahan Alami Untuk Menghambat Infestasi Lalat Selama Penjemuran Ikan Jambal Asin. *Jurnal Pascapanen dan Bioteknologi Kelautan dan Perikanan*. 2007. Vol 2, No 2.
4. Yuliana E, Suhardi DA, Susilo A. Tingkat Penggunaan Bahan Kimia Berbahaya Pada Pengolahan Ikan Asin: Kasus Di Muara Angke Dan Cilincing, Jakarta. *Jurnal Pengolah Has Perikan Indonesia.*2011; Vol 14, No 1 :14–21.
5. Tanjung NIIH, Nurhapsa, Madjid A. Pengaruh Penggunaan Larutan Daun Cengkeh Terhadap Penurunan Kepadatan Vektor Lalat Pada Proses Penjemuran Ikan Asin. *Jurnal Ilmiah ManusiaDan Kesehatan.* 2022; Vol 5, No 2 :161–72.
6. Sari R.P,. R, Hamidy TW. EFEKTIVITAS Insektisida Organik Dalam Pengendalian Lalat Rumah (Musca Domestica) Dan Bau Sampah Pada Tps Rajawali Pekanbaru. *Jurnal Ilmu Lingkungan.* 2017; Vol 13, No 1:108–16.
7. Syahrizal. Pemanfaatan Bubuk Kayu manis *(Cinnamomum veru)* sebagai Bioinsektisida Alami untuk Mengusir Lalat Rumah *(Musca domestica)*. *Jurnal Kesehatan Ilmiah Nasuwakes.* 2017; Vol 10, No 1:108–16.
8. Aliah N, Susilawaty A, A.Ibrahim I. Uji Efektivitas Ekstrak Daun Cengkeh *(Syzigium Aromaticum)* Sebagai *Repellent* Semprot Terhadap Lalat Rumah *(Musca domestica)*. *Jurnal Penelitan.* 2016; Vol 2, No 3:113–20.
9. Sulistyaningrum TW, Evnaweri. STUDI CARA PENGAPLIKASIAN EKSTRAK SERAI *(Cymbopogon citratus)* Terhadap Serangan Lalat Hijau *(Chrysomya megacephala)* Pada Penjemuran Ikan Asin Gabus *(Channa striata)*. *Jurnal Tropical Fisheries.* 2019; Vol 14, No1.
10. Pahruddin M, Aris Sandi R, Zubaidah T. Perbedaan Efektivitas Rebusan Daun Cengkeh *(Syzygium aromaticum L)* Dan Daun Pandan *(Pandanus amaryllifolius Roxb)* Sebagai Pengusir Lalat Rumah *(Musca domestica)*. *Jurnal Sanitasi Profisional Indonesia.* 2022; Vol 3, No 1:16–22.
11. Djarot P, Moerfiah, Ambarwati D. Lilin Aromatik Minyak Atsiri Kulit Batang Kayu Manis *(Cinnamomum Burmannii)* Sebagai Repelen Lalat Rumah *(Musca Domestica)*. Ekologia.

2019; Vol 19, No 2 :55–64.
12. Dubey NK, Shukla R, Kumar A, Singh P, Prakash B. Prospects of botanical pesticides in sustainable agriculture. Curr Sci. 2010; Vol 98, No4 :479–80.
13. Koul O. Phytochemicals and insect control: An antifeedant approach. CRC Crit Rev Plant Sci. 2008; Vol 27, No1 :1–24.
14. Komariah S dan TM. Pengendalian_Vektor.Pdf. Vol. vol 6, *Jurnal Kesehatan Bina Husada.* 2018.p. 10.
15. Schou TM, Faurby S, Kjærsgaard A, Pertoldi C, Loeschcke V, Hald B, et al. Temperature and population density effects on locomotor activity of musca domestica *(Diptera: Muscidae).* Environ Entomol. 2013; Vol 42, No 6 :1322–8.
16. Garmini R, Purnama R. Efektivitas Bubuk Kayu Manis *(Cinnamomum burmanii)* sebagai Bioinsektisida Pengusir Lalat Rumah *(Musca domestica)*. *Jurnal Kesehatan Lingkungan STIKes Muhammadiyah Palembang.* 2019; Vol 7, No 2:431–9.
17. Emilda. Efek Senyawa Bioaktif Kayu Manis *(Cinnamommum burmanii)* Terhadap Diabetes Melitus. J Fitofarmaka Indones. 2018;5(1):246–52.
18. Putra Mahardika I, Puspawati N, Widihati I. Identifikasi Senyawa Aktif Antifeedant Dari Ekstrak Daun Pangi *(Pangium Sp)* Dan Uji Aktivitasnya Terhadap Ulat Kubis *(Plutella Xylostella)*. J Kim. 2014; Vol, No 2:213–9.
19. Liem AF, Holle E, Y I, Gemnafle, Wakum S. Isolasi Senyawa Saponin Dari Mangrove Tanjang *(Bruguiera gymnorrhiza)* Dan Pemanfaatannya Sebagai Pestisida Nabati Pada Larva Nyamuk. *Jurnal Biologi Papua*. 2013; Vol 5, No 1:27–34.
20. Saenong MS. Tumbuhan Indonesia Potensial sebagai Insektisida Nabati untuk MengendalikanHama Kumbang Bubuk Jagung *(Sitophilus spp.). Jurnal Penelitian dan Pengembangan Pertanian.* 2017; Vol 35, No 3:131.
21. Sitohang M, Mamahit JME, Pakasi SE. Inovasi bomb fizzies antifeedant dari ekstrak daun pangi*(Pangium edule Reinw.)* untuk pengendalian hama kubis Plutella xylostella L. *Jurnal Agroteknologi Terapan.* 2022; Vol 3, No 2:124–30.
22. Utami R, Khasanah LU, Yuniter KK, Manuhara GJ. PENGARUH OLEORESIN DAUN KAYU MANIS *(Cinnamomum burmanii)* Dua Tahap Terhadap Karakteristik Edible Film Tapioka. Caraka Tani *Journal of Sustainable Agriculture.* 2018; Vol 32, No 1:55.
23. Sriwijaya U. Daun Kayu Manis *(Cinnamomum burmannii)* Sebagai Larvasida Aedes aegypti Skripsi Muhammad Daffa Alfarid. 2020;
24. Boito JP, Da Silva AS, dos Reis JH, Santos DS, Gebert RR, Biazus AH, et al. Insecticidal and repellent effect of cinnamon oil on flies associated with livestock. Rev MVZ Cordoba. 2018; Vol23 No 2 :6628–36.
25. Noya L, Nindatu M, Jems A, Unitly A, Silahooy VB. Potensi *Repelent* Ekstrak Etanol Daun Cengkeh Terhadap Nyamuk Anopheles sp . *Biofaal Jurnal*. 2022; Vol 3, No 2:105–11.