

Research Article



Local Wisdom Fly Trap Effectiveness in the Culinary Area of Bantul Beach Tourism, Yogyakarta

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ABSTRACT

Background: Flies are insects that can contaminate food with various harmful disease agents. It is not yet known which fly trap is the most effective at trapping flies. There are three types of fly traps as local wisdom for the culinary area of Bantul Beach, which is used to control fly populations: sticky paper, plastic bowls, and plastic bottles. This study aims to determine the effectiveness of sticky paper, plastic bowls, and plastic bottles in trapping flies.

Method: This research was an experimental study with three fly traps: sticky paper, plastic bowls, and plastic bottles. Measurements were made by placing fly traps in 12 seafood stalls in the culinary area of Bantul Beach. The number of trapped flies was counted by hand counter. Data were analyzed using the One-Way ANOVA test, significance level (α) = 0.05, and Post Hoc Test Multiple Comparison advanced test.

Results: Sticky paper could trap 297 flies (69.4%), followed by 121 plastic bowls (28.3%) and ten plastic bottles (2.3%). The analysis showed that sticky paper had significantly different effectiveness in trapping flies compared to plastic bowls ($p = 0.032$) and plastic bottles ($p = 0.004$). In contrast, the efficacy of plastic bowls and bottles was not significantly different ($p = 0.130$).

Conclusion: The effectiveness of sticky paper in trapping flies was significantly different from that of plastic bowls and plastic bottles, while the efficacy of plastic bowls and plastic bottles was not significantly different.

Keywords: Coastal tourism culinary; Effectiveness; Fly; Fly traps

INTRODUCTION

The coast of Bantul Regency, Special Region of Yogyakarta (DIY), has become a popular culinary tourism destination for processed seafood. The number of tourists visiting this tourist location increases every year. In 2016, the number of tourists who visited was 2.2 million people, then in 2017, it grew to 2.8 million visits and rose again to 3.6 trips in 2018 (1,2). This

increase in the number of visits will impact the economic development of the surrounding community. According to a preliminary study at the end of 2020 (pandemic period), the number of seafood-processed culinary stalls operating on the beach of Bantul amounted to 80 stalls. They spread over four central beach locations: Parangtritis beach on the east side of Bantul with a total of 21 stalls, Depok beach with 26 stalls, Goa Cemara beach with 11 stalls and Baru beach on the west side of Bantul with a total of 22 stalls.

The increase in people's income due to the development of culinary tourism is undeniable. However, seafood processed culinary also has problems for public health (3,4). Many culinary managers have limited infrastructure and knowledge, and the habit of implementing a healthy lifestyle is still low. This situation is reflected in the sanitation of culinary stalls and an unsanitary environment. Ultimately, this triggers the growth and proliferation of fly populations (5).

Several flies from the family Syrphidae, Calliphoridae, Empididae, Tachinidae, and Muscidae, help pollinate plants and support the sustainability of natural ecosystems through the process of breaking down waste into other needed organic materials (6-8). However, flies that land on feces can transfer the dirt into the food and drink of the humans it infests (9,10). Flies can be dangerous for consumers, such as diarrhea, dysentery, cholera, typhus, hepatitis, and myiasis in humans and animals (11-15). Flies cause myiasis by laying eggs in wounds so that when they hatch, the larvae enter the damage and cause more extensive wounds (wound myiasis) (16,17). Flies can also spread diphtheria-causing agents (18,19) and anthrax (20,21). Flies transfer disease agents by contaminating the food they infest through vomit, feces, or transmitting disease agents attached to their bodies (22,23).

According to the information of 12 culinary managers spread over four coastal locations, namely Parangtritis Beach, Depok, Goa Cemara, and Baru Beach, they know that flies are dangerous to health and have controlled the fly population by using fly traps. There are three types of fly traps they know and circulate among the community as local wisdom fly traps: sticky paper, plastic bowls, and plastic bottles. The use of the three types of fly traps by the community has several reasons. Sticky paper is a fly trap easily obtained by the public because it is widely sold at low prices in stalls around the culinary area. Plastic bowls are used because of the tool's durability, which can be used many times in trapping flies. The community obtained this bowl as a fly trap for the assistance given by the government. Plastic bottles are used to utilize used goods and reduce environmental pollution. The technique of making fly traps from used plastic bottles was obtained from training held by the government.

The effectiveness of fly traps used to control fly populations has been measured in various locations (24-27). However, based on literature studies, no publications present the results of different tests of effectiveness in trapping flies from fly traps of local wisdom in the Bantul Beach tourism culinary area. This information is essential to know to provide input to the community on which type of fly trap should be used. This study aims to determine the differences in the effectiveness of sticky paper, plastic bowls, and plastic bottles in trapping flies.

METHOD

This research was carried out in 12 seafood stalls in the culinary area of Bantul beach tourism, namely Parangtritis beach, Depok, Goa Cemara, and Baru beach. The study used a quasi-experimental design with a post-test-only design (28), which allowed researchers to measure the number of flies trapped by each type of fly trap studied and then analyze the differences in their effectiveness. The research was carried out in the field, and the confounding variables cannot be fully controlled (29).

The tools and instruments used were fly traps of local wisdom of the Bantul Beach tourism culinary community: sticky paper, plastic bowls, plastic bottles, stopwatches, hand counters, roll meters with a length of 5 meters, and filling sheets. The three fly traps were installed in culinary seafood stalls in the kitchen, dining room, and courtyard. The distance between fly traps were ± 2 meters. The bait followed the local community's custom: shrimp paste for plastic bowls and bottles. No additional bait was given for sticky paper because it already emits an aroma. Measurements were taken during the day for 2 hours. After 2 hours, the number of trapped flies was counted, processed, and analyzed using the One-Way ANOVA statistical test because the results of the variance test were not different/homogeneous (p -value = 0.103). The level of significance used was at 0.05 (30).

RESULTS

The number of flies trapped by the fly trap shows the effectiveness of the fly trap in trapping flies. The number of trapped flies by type of fly trap is presented in Table 1. Sticky paper was a fly trap that can trap the most flies compared to plastic bowls and plastic bottles. Sticky paper trapped as many as 297 flies with an average of 24.8. A plastic bowl trapped 121 flies with an average of 10.1 flies, while a plastic bottle only trapped as many as ten flies with an average of 0.8. Furthermore, a homogeneity test results obtained p -value = 0.103 ($\alpha > 0.05$), which means that the variance of the data was homogeneously distributed. Accordingly, further statistical tests were should be carried out using One-Way ANOVA.

Table 1. Number of flies trapped by fly trap type

Beach location	Seafood Stall Observed	Number of flies caught in the fly trap		
		Sticky paper	Plastic bowl	Plastic bottle
Parangtritis	P1	1	0	0
	P2	17	0	0
	P3	19	3	0
Depok	D1	10	8	0
	D2	28	25	0
	D3	57	49	0
Goa Cemara	G1	43	8	1
	G2	42	12	0
	G1	57	7	3
Baru	B1	11	1	4
	B2	4	5	1
	B3	8	3	1
Amount		297	121	10
Average		24.75	10.08	0.83

Table 2 shows the results of the One-Way ANOVA test shows the value of the sum of the squares in the variance between groups of 13962.88, and the variance value in the group is 4009.33. The degree of validity between groups is 2 with a mean square of 6981.44. The degree of validity in the group is 6, with a mean square of 668.22. In this study, the calculated F value was 10.44 and a significance value of 0.01 which means significant ($0.01 < 0.05$). This means there was a substantial difference between the number of flies trapped by sticky paper fly traps, plastic bowls, and plastic bottles. Furthermore, further tests were carried out with the Post Hoc Test Multiple Comparison to determine which type of fly trap had a significant difference in trapping flies.

Table 2. ANOVA test results

Group	Sum of Squares	df	Mean Square	F	Sig
Between Groups	13962.88	2	6981.44	10.448	0.01
Within Groups	4009.33	6	668.22		
Total	17972.22	8			

Table 3 shows a significant difference between sticky paper and plastic bowls in trapping flies with a p -value = 0.032 ($0.032 < 0.05$). Likewise, there was a significant difference between sticky paper and plastic bottles with a p -value = 0.004 ($0.004 < 0.05$). In contrast, there was no significant difference between plastic bowls and plastic bottles with p -value = 0.130 ($0.130 > 0.05$). The data meant that the effectiveness of trapping sticky paper fly traps differs from plastic bowls and plastic bottles. In contrast, the effectiveness of plastic bowls and plastic bottles was no different.

Table 3. The results of the different tests of flies trapped by fly traps

Treatment	Sticky paper	Plastic bowl	Plastic bottles
Sticky paper	-	0.032	0.004
Plastic bowl	0.032	-	0.130
Plastic bottles	0.004	0.130	-

DISCUSSION

The results of the ANOVA statistical test and the Post Hoc Test Multiple Comparison follow-up tests showed that sticky paper fly traps had significantly different effectiveness in trapping flies than plastic bowl fly traps, even substantially different from plastic bottles. Meanwhile, plastic bowl fly traps and bottles have the same or no different effectiveness. The results showed that the number of flies trapped by the sticky paper fly trap was 297 flies or 69.4%, followed by the bowl fly trap, as many as 121 flies or 28.3%, then the plastic bottles fly trap with the number of flies trapped as many as ten flies or 2.3 %.

The sticky paper had the highest fly trapping effectiveness (64.9%) and was statistically significantly different from plastic bowls (28.3%) and plastic bottles (2.3%). This happens because the catch area of the sticky paper is much broader than the catch area of plastic bowls and plastic bottles. Meanwhile, catching plastic bowls is wider than plastic bottles, so

trapping plastic bowl flies (28.3%) is more effective than plastic bottles (2.3%). However, the difference between the effectiveness of plastic bowls and plastic bottles is not statistically significant. The catchment area affects the catch of the target insect (31): the more comprehensive the fishing area, the more excellent the opportunity to trap flies. In addition, flies have a habit of perching and do not like to fly continuously (32). This habit allows the fly to land on the sticky paper surface and then get trapped. Flies also have a habit of living in groups (33). Therefore, flies attached to the sticky paper will invite other flies to land on the sticky paper. Thus, the number of flies that stick to the sticky paper increases over time.

The sticky paper has a more pungent and diffuse odor than plastic bowls and bottles. The smell of fish on sticky paper is evenly distributed over the entire surface of the paper and spreads freely into the environment. In contrast, the smell of shrimp paste on plastic bowls and plastic bottles is more concentrated in the space of the bowl and bottle where the bait is located, so that little is spread to the environment. Thus, the odor stimulus produced by sticky paper becomes more robust and more diffuse to the environment than the odor stimulus from plastic bowls and bottles. That makes sticky paper can invite more flies to get trapped (34,35). Research results Nadeak et al. (25), who examined the effectiveness of fly traps with various baits, concluded that shrimp bait was more effective than tomato fermented bait because the aroma released by shrimp bait was more pungent than tomato fermented bait. Fitriana and Mulasari's research results (36) also concluded that shrimp bait was most effective in attracting flies because it had a more pungent aroma than fish bait, jackfruit, shrimp paste, and mango. Similarly, research conducted by Savitriani and Maftukhah (27) stated that flies preferred fish gill bait to wet shrimp and bagasse bait because fish gills emitted a more pungent odor than wet shrimp and bagasse.

CONCLUSION

The effectiveness of trapping sticky paper fly traps differs from plastic bowls and plastic bottles. In contrast, the efficacy of plastic bowls is no different from that of plastic bottles.

Authors' contribution

AR contributed to data collection, analysis, report writing, and manuscript publication. MR contributed to data collection, report writing, and licensing.

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Conflict of interest

There is no conflict of interest in this research.

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