Indonesian Journal of Nutritional Epidemiology and Reproductive
ISSN: 2620-8261 (Online)
DOI : 10.30994/ijner.v5i3.188
Vol. 5 No. 3 September 2022, pp 79-84

Predation Power of Sepat Fish *(Trichogaster Trichopterus)* and Tilapia*(Oreochromis Niloticus)* Against Mosquito Larva As a Vector Control

Melinda Kania Listiani[1], Ema Mayasari[2].
Institut Ilmu Kesehatan STRADA Indonesia
*Corresponding Author : melindakania45@gmail.com

ABSTRACT

Vector-borne diseases that are still a public health problem in Indonesia are dengue fever, malaria and filariasis. Utilization of fish as natural predators of mosquito larvae such as sepat fish (*Trichogaster trichopterus*) and tilapia *(Oreochromis niloticus)* is one way of biological control that is easy for the community to do. This study aims to determine the predation power of sepat fish (*Trichogaster trichopterus*) and tilapia *(Oreochromis niloticus)* against mosquito larvae as an effort to control vectors. This type of research is experimental using the One shoot case study design. The variables of this study were 9 mosquito larvae, sepat fish *(Trichogaster trichopterus)* and tilapia *(Oreochromis niloticus)* each. Each time the observation used 100 mosquito larvae and was carried out 9 repetitions. Observations were made for 1, 2, 4 and 6 hours. Data analysis used the Independent Samples Test. The results of the Independent Samples Test obtained a p value of 0.000, proving that there is a difference between the predation power of sepat fish *(Trichogaster trichopterus)* and tilapia *(Oreochromis niloticus*) against mosquito larvae. According to this study, the best predatory fish is tilapia *(Oreochromis niloticus)*.It is recommended that the public use predatory fish in an effort to control diseases caused by mosquitoes.

Keywords : Fish, Mosquito Larvae, Vector

INTRODUCTION

Insects have a beneficial role for humans, but there are also insects that can harm humans, such as insects which are vectors that can transmit disease. The amount of loss due to insect vectors requires handling and controlling insect vectors to a limit that can be tolerated by humans. And efforts in handling and controlling the spread of mosquitoes in an area / geographic (Sabir, Annawaty and Fahri, 2017).

Worldwide, 3,549 species of mosquitoes have been identified which are classified into two sub-families and 112 genera. A total of 457 species of mosquitoes from 18 genera spread throughout Indonesia (Jeneri, Biologiand Universitas, 2018). Vector-borne diseases that are still a problem in public health in Indonesia are dengue fever, malaria and filariasis. The three kinds of diseases are transmitted from person to person by mosquitoes. Dengue fever is transmitted by Aedes aegypti mosquitoes and Aedes albopictus mosquitoes, malaria by Anopheles mosquitoes, while filaria by several genera, namely: Mansonia, Culex, Aedes, and also Anopheles.

To break the chain of disease transmission, one of the efforts that can be made in controlling infectious diseases is vector control (disease-transmitting insects). Vector control is an activity to reduce the level of vector density so as not to endanger human health (Purnama, 2017). Control methods have been carried out in various ways, both chemically and non-chemically, namely vector control by environmental processing, genetics and

biological vector control. A good control method must meet the criteria of being effective, efficient and environmentally friendly. Excessive use of insecticides with inappropriate doses has an impact on mosquito resistance.

According to Yogyana, L. (2013), one of the efforts to control dengue fever biologically is by raising fish. Utilization of fish as natural predators of mosquito larvae is one way of biological control that is easy for the community to do. Biological control methods using fish can reduce the density of mosquito larvae and not cause problems for environmental health. The use of fish as an effort to control dengue fever is effectively carried out at the larval stage, especially instar III larvae because at this stage the larvae are easily identified by the characteristics of hair all over the body, the head looks black, the metabolic rate is immature and more movement (Harsono, 2020).

METHODS

The research method that researchers use is quantitative research. This research is a quasi-experimental study (Quasi Experiment), where what you want to study is a comparison of the level of differences between fish and tilapia as a predator of mosquito larvae. The design of this research uses the design of One shoot case study (one shot case study) is used to determine the scientific value of a measurement in experimental research. In this design where there is a group that is given treatment bait which then the results of the treatment are observed, this treatment is an independent variable and the result is the dependent variable.

RESULTS

A. Distribution Of Larvae Mortality in Sepat Fish (*trichogastertrichopterus)*

Table 4.1 Distribution of the number of mosquito larvae deaths in sepat fish(*trichogastertrichopterus)*

Time	Observation (Hour)								
	1	2	3	4	5	6	7	8	9
1Hour	13	23	17	19	15	17	14	20	15
2 Hour	25	28	24	26	23	25	21	29	27
4 Hour	41	40	36	35	30	32	38	38	36
6 Hour	47	45	40	43	41	45	47	45	45

Based on Table 4.1, it is known that the predation power of the septic fish in the first 1 hour is at most 23 fish, at 2 hours at most 29 fish, at 4 hours as many as 41 fish, 6 hours as many as 47 fish.

Based on Table 4.1, it is known that the average feeding power of sepat fish to larvae is 44.2 fish with the lowest feeding power is 13 fish and the most feeding power is 47 fish.

B. Distribution Of Larvae Mortality in Tilapia *(oreochromis niloticus)*

Table 4.2 Distribution of the number of mosquito larvae deaths intilapia*(oreochromis niloticus)*

	Observation (Hour)								
Time	1	2	3	4	5	6	7	8	9
1Hour	30	33	30	39	35	32	37	33	34
2 Hour	41	49	46	55	51	47	52	46	49
4 Hour	61	68	67	72	70	68	73	65	67
6 Hour	75	83	80	88	86	81	86	77	78

Based on Table 4.2, it is known that the predation power of tilapia in the first 1 hour is at most 39 fish, at 2 hours at most 55 tails, at 4 hours as many as 73 fish, 6 hours as many as 88 tails.

Based on Table 4.2, it is known that the average feeding power of tilapia against larvae is 81.5 fish with the lowest feeding power is 30 fish and the most feeding power is 88 fish.

Independent t test results to determine the predation power of sepat fish *(Trichogaster trichopterus)* and tilapia *(Oreochromis niloticus)* against mosquito larvae as an effort to control vectors.

Table 4.3 Results of Independent T-Test Analysis of the predation power of sepat fish *(Trichogaster trichopterus)* and tilapia *(Oreochromis niloticus)* against mosquito larvae as an effort to control vectors with the spss test as follows:

Predatory Power of Fish	Mean	T	Pvalue
Sepat Fish	41,22	-21.872	0,000
Tilapia Fish	81,55		

Based on Table 4.3, the results of statistical tests with the Independent T-Test obtaineda p value of 0.000, so it is smaller than α, the conclusion is accept H1 which means there is a difference in the predation ability of sepat fish (Trichogaster trichopterus) and tilapia (oreochromis niloticus) against mosquito larvae. with the most effective predation rate is tilapia (Oreochromis niloticus). Supported by the mean value of sepat fish predation ability of 41.22 while tilapia got a mean value of 81.55

DISCUSSION

A. Predatory Power of Sepat Fish (trichogaster trichopterus)

The results of the study obtained the predation power of sepat fish (trichogastertrichopterus) in the first 1 hour at most 23 fish, at 2 hours at most 29 fish, 4 hours as many as 41 fish, and 6 hours as many as 47 fish. indicates that the predation rate is quite high for mosquito larvae.

One of the biological controls for mosquitoes is the use of fish that eat mosquito larvae, such as sepat fish (trichogastertrichopterus) (Joshua, 2015). This method is considered effective because it is more effective against mosquito larvae and does not pose a threat to the environment.

Feeding larvae-eating fish can be an option for eliminating disease vectors caused by mosquitoes (Amir, 2018).

The maintenance of fish that eat mosquito larvae must be adapted to the conditions of the waters which are the breeding places for mosquitoes, because not all larvae eating fish can survive in all water conditions. Sepat fish (Trichogastertrichopterus) is a fish that is predominantly found in swampy areas, both fresh and brackish waters (Windarso and Istiqomah, 2012).

Sepat fish (trichogastertrichopterus) that are kept around the environment can reduce the larva free rate. This is evidenced by Effi Damayanti's research (2006) which proves that for biological control using mosquito larvae predatory fish such as sepat fish (trichogastertrichopterus).

B. Predation Power of Tilapia (Oreochromis niloticus)

The results showed that the predation power of tilapia (oreochromis niloticus) in the first 1 hour was at most 39 fish, at 2 hours at most 55 fish, at 4 hours as many as 73 fish, 6 hours as many as 88 fish. therefore tilapia (oreochromis niloticus) shows that good feeding power in controlling mosquito larvae. Tilapia (Oreochromis niloticus) has appeal to the community because the fish can not only control larvae but also be consumed.

There are not many types of predators used for mosquito control.Predators that are easy to find and develop and cheap are mosquito larvae-eating fish. One of the fish that eat mosquito larvae that is known to eat mosquito larvae is tilapia (oreochromis niloticus). In using fish to control mosquito larvae, it is necessary to pay attention to the size of the fish so that it is effective in preying on mosquito larvae (Adnyana et al., 2015).

The adaptability of tilapia (Oreochromis niloticus) is that it can live in various types of water. This fish can live in fresh water, brackish water, and sea water. Tilapia are also resistant to environmental changes and are omnivorous (Nnurisa I, 2012). Tilapia (Oreochromis niloticus) uses smell and touch in looking for food if the food that comes in matches the size of its mouth it will be accepted and if it is too big it will be removed again and if the food that comes in matches the size of its mouth it will be accepted (Zen, 2012).

According to Santoso (1993), tilapia can be used as a predator for mosquito larvae. However, mosquito larvae predators are still rarely used by the community, even though these mosquito larvae predators can also be maintained and consumed, for example this tilapia.

C. Differences in Predation Power of Sepat Fish (Trichogaster trichopterus) and Tilapia (Oreochromis niloticus) Against Mosquito Larva

The results of the study concluded that there was a difference between sepat fish (Trichogastertrichopterus) and tilapia (Oreochromis niloticus) as predators of mosquito larvae. Based on the independent t test, it was found that the p value was 0.000, eating less than α, so the conclusion was that H1 was accepted, which means that tilapia (Oreochromis niloticus) was more effective in controlling mosquito larvae than sepat fish (trichogastertrichopterus). Tilapia (Oreochromis niloticus) got a mean result of 81.55 fish and sepat fish (Trichogastertrichopterus) got a mean result of 41.22 fish with a difference of 40.33 tails.

In addition to sepat fish that can be consumed, this fish can also be used to biologically eradicate mosquito larvae, because sepat fish are omnivores. Sepat fish can eat zooplankton, small crustaceans, and various insect larvae. The advantage of the sepat fish is that it can survive despite the lack of oxygen (Irianto et al., 2019). Tilapia has a mouth that is located terminally, the rib line is broken into 2 parts and is located extending from the top of the series and chest, the mouth of the tilapia is wide enough to make it easier for this fish to prey on food, especially mosquito larvae. Mambu tilapia live in water with an oxygen content of 3 – > 5 mg/liter (Arifin, 2016).

CONCLUSION

1. The predation power of sepat fish (trichogaster trichopterus) against mosquito larvae is the mean result of 41.22 fish with the lowest predation power of 13 fish and the highest predation power of 47 in 6 hours
2. The predation power of tilapia (oreochromis niloticus) against mosquito larvae is with the mean result of 81.55 fish with the lowest predation power of 30 individuals and the highest predation power of 88 individuals within 6 hours
3. There is a difference between the predation power of tilapia (Oreochromis niloticus) and sepat fish (Trichogaster trichopterus) to mosquito larvae (p value 0.000)
4. Tilapia (Oreochromis niloticus) is more effective as a predator of mosquito larvae than sepat fish (Trichogaster trichopterus).

REFERENCE

Adnyana, N. W. D. *et al.* (2015) 'Predasi ikan nila (Oreocromis niloticus) terhadap larva Anopheles di insektarium Loka Litbang P2B2 Waikabubak tahun 2014', *Jurnal Penyakit Bersumber Binatang*, pp. 10–17.

Amir, R. (2018) 'Biokontrol Ikan Pemangsa Jentik Dalam Pemberantasan Vektor Nyamuk Penyebab Demam Berdarah Dangue (DBD) Di Kota Parepare', *Ilmiah Manusia dan Kesehatan*, 1(1).

Arifin, M. Y. (2016) 'Pertumbuhan dan Survival Rate IkanNila (Oreochromis. Sp) Strain Merah danStrain Hitam yang Dipelihara pada Media Bersalinitas', *JurnalIlmiahUniversitasBatanghariJambi*, 16(3),pp. 159–166.

Damayanti, E. and Munif, A. (2006) 'Respon Fungsional Ikan Sepat Biru (Trichogaster Trichopterus) Terhadap Larva Aedes Aegypti Di Laboratorium', *Media Litbang Kesehatan*.

Harsono, S. (2020) 'Metode Boikontrol Ikan Cupang (Betta splendens) Sebagai Pengendali Vektor Penyakit DBD Di Kartasura Kabupaten Sukoharjo', *Manajemen Informasi dan Administrasi Kesehatan*, 01(02), pp. 3–4.

Irianto, A. F. *et al.* (2019) 'Kajian Potensi Ikan Sepat Rawa (Trichopus trichopterus) Lebo TaliwangKabupaten Sumbawa Sumbawa Barat Sebagai Pakan Unggas', *Jurnal Ilmu dan TeknologiPeternakanIndonesia*, 5(1), pp. 35–45.

Jeneri, L., Biologi, P. and Universitas, F. (2018) *Keanekaragaman Jenis Nyamuk (Diptera:Culicidae)DiKota JambiSebagai PenuntunPraktikum MataKuliah Entomologi*.

Joshua, A. (2015) 'Pengaruh Pemberian Ikan Hias Jantan Terhadap Jumlah Larva Aedes Aegypti Tahun 2015', *Ekp*, 13(3), pp. 122–124.

Nurisa, I. (2012) 'Peranan Ikan Nila Sebagai Pengendali Nyamuk Vektor Malaria', *Media Penelitian dan Pengembangan Kesehatan*, 4(02 Jun), pp. 15–17. doi:

10.22435/mpk.v4i02Jun.769.

Purnama, S. G. (2017) *Diktat Pengendalian Vektor*, *Prodi IKM FK Universitas Udayana*.

Sabir, M., Annawaty, A. and Fahri, F. (2017) 'nventarisasi Jenis-Jenis Nyamuk Di Desa Alindau, Donggala, Sulawesi Tengah', *Natural Science: Journal of Science and Technology*, 6(3), pp. 263–269. doi: 10.22487/25411969.2017.v6.i3.9200.

Windarso, S. E. and Istiqomah, S. H. (2012) 'Kemampuan Predasi Ikan Sepat (Trichogaster trichopterus) Dalam Memangsa Larva Anopheles sp', *Jurnal Kesehatan Lingkungan*, 4, pp. 1–6.

Zen, S. (2012) 'Biokontrol Jentik Nyamuk Aedes Aegypti Dengan Predator Ikan Pemakan Jentik Sebagai Pendukung Materi Ajar Insekta', *BIOEDUKASI (Jurnal Pendidikan Biologi)*, 3(1). doi: 10.24127/bioedukasi.v3i1.206.