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The Assistance of Farmer Community in Utilizing Rice Straw of Catfish Pool Mud as a Medium of Silk-Worm Cultivation in Tanjung Bintang Sub-District, Lampung Selatan Regency

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Abstract: *The purpose of this study was to study the effect of different media compositions (straw and catfish culture mud) as a medium for cultivating silk worms on biomass and silkworm populations, by applying the Participatory Action Research (PAR) approach, in which research methodologies were applied, dimensions of action, and dimensions of participation. Based on the results of the study, it was shown that the sludge produced by catfish pond cultivation and fermented rice straw, which is known as waste, can provide benefits to the cultivation of silk worms that provide economic value to the community.*

Introduction

The main obstacle faced when carrying out aquaculture activities is the high mortality of fish larvae. This significant mortality rate in each nursery is due to the low availability of organic feed sources.[1] One of the organic feeds that are widely used to maintain the growth of fish larvae is silk worms which are natural food and have a high enough nutrient content needed by young fish. Silk Worm (*Tubifex sp*) is needed as a natural feed in hatchery unit activities, especially in the early phase (larvae), because it contains nutrients (57% protein and 13% fat) that are good for fish growth. The size is also following the diameter of the mouth of the larva.

Many cultivators supply silk worms as natural food still rely on the availability in nature that lives wild in several river and irrigation.[2] However, the establishment of several large-scale industrial companies that have high residues is causing pollution in several conditions, such as contaminated water and air. The presence of sewage is a reason for the decline in the population of silk worms because waste can reduce water quality, which causes a decrease in the number of breeding of these silk worms. Meanwhile, the number of fish cultivators who need a supply of silk worms for larval feed is quite high and increases significantly every year. So, the minimum amount of demand for these goods has not been fulfilled, and there is even a shortage of feed for the larvae. So, to meet the supply on demand for the availability of silk worms, one way that can be used is cultivation method[3]

[1] Fajri NW., Suminto dan Hutabarat J. *Pengaruh penambahan kotoran ayam, ampas tahu dan tepung tapioka dalam media kultur terhadap biomassa, populasi dan kandungan nutrisi cacing sutera (Tubifex sp.)(Jour. of Aquaculture Manag. And Tech. Vol.*3, No.4. 2014)

[2] Shafrudin DW., Efiyanti dan Widanarni. "Pemanfaatan ulang limbah organik dari *Tubifex* sp., dialam" . (*Journal Akuakultur Indo*. Vol.4, No.2. 2005)

[3] Fajri et.al. *Op.Cit* hal.105

which utilizes other micro-organisms to stimulate and support the growth and reproduction of *Tubifex sp* with several special treatments and actions to obtain an abundant quantity of silk worms while maintaining the quality of silk worms as found in the wild. Therefore, it is expected to fulfill the existing market in the community, and cultivation activities have more value in the socio-economic aspects of the community.

Activities in the silk worm cultivation process, the growth of Tubifex sp is influenced by several bacteria and organic particles, resulting from a bacterial overhaul as a food source for silkworms. In this process, the bacteria require levels of C/N content available in the maintenance media to produce cell proteins, so that silk worms use them for growth.[4] Silk worm (Tubifex. sp) is a natural food with an average length of 1-3 cm. Its small size makes fish cultivators choose silk worms as ornamental fish feed and fish seeds for consumption. In addition to being small in size, silk worms are organic food with a composition relevant to the needs for the growth of fish larvae. Silk worms are needed for fish growth because they contain high nutrients: 57% protein, 2.04% carbohydrates, 13.30% fat, 87.17% water, and 3.60% ash content.[5]

For the survival of silk worms life to grow and reproduce with the desired number, on a large scale, silk worms need nutrients to support accelerated reproduction and accelerate the growth period of Tubifex. sp. These nutrients are obtained from organic matter that has decomposed and settled on the bottom of the waters. The eating habit of silk worms is to eat detritus, thread algae, diatoms, or plant debris dissolved in the mud that has been overhauled and decomposed by some bacteria.[6] Silk worms will choose and like food that is relatively smaller and softer as a food source during their lifetime.[7]

Tubifex s.p's natural habitat is muddy clay or sandy clay,[8] Therefore, to get results with the maximum quantity and quality of worms, the silk worm research also uses mud as a cultivation medium to maintain the initial habitat. However, in several studies, it is stated that there need to be modifications or media innovations that still maintain the original habit but can give maximum results. So, the mud used for catfish cultivation is chosen as a substitute medium. It should be noted that the manure produced from catfish farming is a potential medium for silk worm cultivation because it has a fairly effective content to support the development and growth of silk worms.

According to Brinkhurst, the N content in catfish farming waste will be useful in bacterial growth. These bacteria will decompose organic matter so that the results of the overhaul can become nutrients for worms.[9] In addition to the N-organic content, the silk worm cultivation media also requires organic-C. One potential source of organic C in the cultivation of silk worms comes from a straw because it has a fairly abundant carbon

[4] Casmuji. 2002. *Pengunaan Supernatan Kotoran Ayam dan Tepung Tapioka dalam Budidaya Dapnhia sp.*, penelitian pada Program Studi Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institu Pertanian Bogor, Bogor

[5] Khairuman, SP, dkk. 2008. *Peluang Bisnis Tubifex.* AgroMedia: Jakarta

[6] Suharyadi, 2012. Studi Pertumbuhan dan Produksi Cacing Sutera (*Tubifex sp*) Dengan Pupuk Yang Berbeda Dalam Sistem Resirkulasi (Tesis). Program Pascasarjana Program Studi kelautan Bidang Minat Manajemen Perikanan. Univesitas Terbuka. Jakarta 84 hlm

[7] Febrianti D. 2004. *Pengaruh Pemupukan Harian dengan Kotoran Ayam Terhadap Pertumbuhan Populasi dan Biomassa Cacing Sutra,* penelitian pada Departemen Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor, Bogor

[8] Syam FS. 2012. *Produktivitas Budidaya Cacing Sutra (Oligochaeta) dalam Sistem Resirkulasi Menggunakan Jenis Substrat dan Sumber Air yang Berbeda*, Skripsi S1 (Tidak dipublikasikan). Departemen Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor, Bogor.

[9] Febrianti, *Op.Cit*

content. Straw contains C (Carbon) and N (Nitrogen) with C/N ratio values ranging from 15-25.[10] With this content, it is expected that the straw will be able to enrich the C element in the silk worm cultivation media. The straw used in this study was fermented straw using a microbial bio activator (EM4).

In addition to the content of C and N, straw also has a hard structure to increase the porosity of the silk worm cultivation media. Porosity is the proportion of total pore space contained in a unit volume of soil occupied by water and air. Porosity reflects the level of density of the soil to pass through the mass flow of water or the speed of water flow to pass through the soil mass. The high level of porosity of the culture media allows oxygen to survive in the media gap. The dissolved oxygen content (oxygen demand) on the surface to the bottom of the media does not decrease. The medium with high porosity also makes it easier for the worms to move. Because the medium has many gaps, silk worms do not need to create a way to move around the medium. Therefore, it is necessary to conduct research on the cultivation of silk worms (Tubifex sp.).

Tanjung Bintang sub-district is a slightly hilly plain area. With an area of 11,863.45 Ha. consisting of rainfed rice fields covering an area of 1,524.5 ha, dry land 4,826,25 ha, yards of 1,441.45 ha, and fields/gardens covering an area of 4,071.25 ha. Based on the description of the area, people in the Tanjung Bintang sub-district manage their fields for rice cultivation. Based on BPS data, Tanjung Bintang is able to produce 41,380 tons of rice per harvest. Many harvests indicate that rice straw and husks are scattered and covering the production area. If this is anticipated by burning straw, it will cause air pollution and be prone to fires.

On the other hand, the land area in the Tanjung Bintang sub-district is also used by the community for catfish cultivation in the form of ponds. In the catfish cultivation pond, there is usually waste or mud from catfish manure and inedible feed that has settled at the pond's bottom. When harvesting is coming, the mud will spread out a foul smell that can pollute the surrounding community.

In addition, in hatching catfish pond cultivation, mortality is still very high when the catfish are just born and during the growing period. This is caused by an insufficient supply of organic food. Farmers or communities who manage the catfish commonly provide inorganic feed in the form of pellets. However, under certain conditions, it can kill the catfish due to the deposition of the pellets. On the other hand, giving too many pellets resulted in death at an early age.

Based on the description of the problems that occur in the Tanjung Bintang sub-district, the researchers were motivated to take advantage of these very abundant wastes to produce a product that has economic value in the community. So that all sources can be utilized optimally without giving adverse effects (waste). Hence, the community in the sub-district needs assistance in utilizing existing resources.

Several previous studies have conducted similar research. For example, on the cultivation and growth of silk worms such as Suryadin et al, (2017)[11] they stated that the sewage sludge from catfish farming had a positive effect on the quality of cultured silk

[10] Sulistiyo, A., Widiastuti, I. M., dan Rizal, A. 2012. Pemanfaatan Ulang Limbah Organik dari Substrat Tubifex sp. di Alam untuk Pertumbuhan Bobot *Tubifex* sp. *Jurnal Agrisains*, 13(3): 233- 238.

[11] Suryadin, Dindin. Helmiati, Senny dan Rustadi. 2017. Pengaruh Ketebalan **M**edia Budidaya Cacing Sutra (*Tubifex* sp.) menggunakan Lumpur Limbah Budidaya Lele. Jurnal Perikanan Universitas Gadjah Mada 19 (2): 97-105

worms. The other research was conducted by Raharjo et al (2018)[12] it stated the proportion of catfish pond mud influences the growth of silk worms, which is ideal for obtaining high-quality tubifex sp. On the other hand, supporting variables for cultivating silk worms are also through several solid waste utilization from plants such as Bintaryanto and Taufikurohmah.[13] yang menggunakan kompos sebagai media budidaya tubefex sp yang menghasilkan hasil yang optimal.

Based on previous research, this research focuses on using mud media from catfish farming, which will be combined with straw with treatment in a closed room with sunlight, flowing water circulation, and modeling in multilevel containers. The variable renewal and several special treatments are expected to obtain maximum results in producing high-quality silk worms.

Method

The method used in this study is Participatory Action Research (PAR). This research method is carried out in a participatory manner among community members in a lower-level community whose enthusiasm encourages transformative actions to liberate society from the shackles of ideology and power relations (changes in conditions for a better life). This research was conducted in August - September 2020 and located at Tanjung Bintang, South Lampung. The tools used are 24 plastic trays measuring 50 cm x 13 cm x 11 cm, water machine, aeration hose, digital scale (0.001), DO meter, pH meter, litmus paper, and thermometer. Meanwhile, the materials needed include silk worms (Tubifex. sp), rice straw, microbial bio activator (EM4), and catfish cultivation mud.

The research design used was a completely randomized design (CRD) with two treatments and control with two replications. These treatments are:

- 50% fermented straw and 50% catfish cultivation mud
- 70% fermented straw and 30% catfish cultivation mud
- 100% Rice field Mud

[12] Raharjo, Eka indah. Islami Zahir dan Farida (2018) Persentase Pemanfaatan Lumpur Kolam Lele,Ampas Tahu Dan Dedak Padi Dalam Media Kultur Untuk Meningkatkan Produksi Cacing Sutera (*Tubifek* Sp.) *jurnal ruaya vol. 6. no .2. th 2018*

[13] Bintaryanto, Blosong Wahyu Dan Taufikurohmah Titik . 2013. Pemanfaatan Campuran Limbah Padat *(Sludge)* Pabrik Kertas Dan Kompos Sebagai Media Budidaya Cacing Sutra *(Tubifex .Sp)* Unesa Journal Of Chemistry Vol. 2, No. 1, Januari 2013

The layout of the silk worm cultivation container can be seen in the following figure

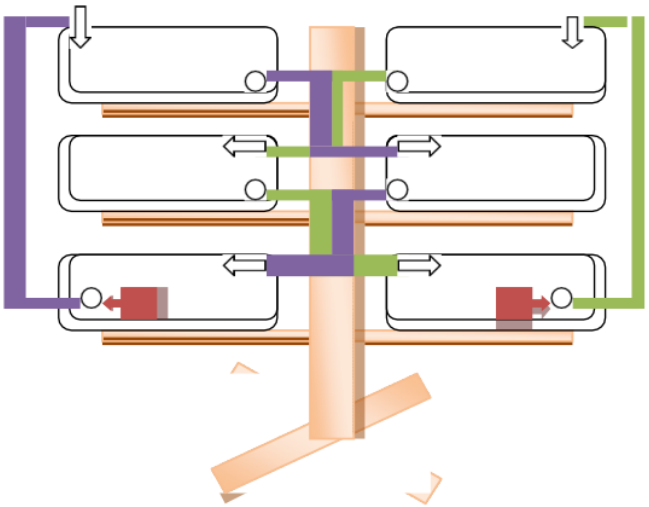


Figure 2. Cultivation Container Layout

Information :

: Water machine	:	Aerator hose
: Media Buffer	:	Inlet
: Media tray	:	Outlet

The linear model used is : [14]

$$Yij = \mu + \tau i + \Sigma ij$$

Information : Yij : Effect of different treatment of straw on the i and j replications
μ : Middle value
τi : Effect of different straw treatment i
Σij : Experimental error of different straw treatments i and j repetitions

[14] Steel, R dan J. H. Torrie. 1980. *Principles and Procedures of Statistics A Biometrical Approach. Second Edition*. 633 hal

Research procedure

Straw fermentation uses a commercial microbial bio activator containing photosynthetic bacteria, lactic acid bacteria, yeast, and fermented fungi. This commercial microbial bio activator is one of the activators used in the fermentation process, which improves the quality of fertilizers, especially the C-organic and N-organic content. In the fermentation process, the straw is first washed using clean water, then cut into small pieces. After that, put it in a plastic bag because the bacteria found in commercial microbial bio activators are anaerobic, so they do not use oxygen in their activities. Setelah itu ditambahkan bioaktivator mikroba dan dibiarkan selama ±7 hari. After that, a microbial bio activator was added and left for ± 7 days. Based on the research of Saadah et.al[15] straw fermented using Aspergillus niger for 96 hours or 4 days showed the most optimum enzyme activity. Isvisena's research[16] also stated that the best compost yield came from a mixture of 25% jackfruit straw and 75% rabbit manure using a Microbacter Alfaafa (MA-11) decomposer for 7 days. Commercial microbial bio activator was added as much as 5% of the amount of fermented straw mixed with 8000 ml of water and 320 grams of sugar[17] Fermentation runs perfectly if it has a fragrant smell, the texture is not stiff, not rotten, and not moldy.[18]

TOC Analysis

In this study, TOC (Total Organic Carbon) is measured to determine the organic carbon content in straw. TOC was measured four times: straw before fermentation, after fermentation, straw after mixed with catfish cultivation mud at the beginning of cultivation, and at the end of cultivation. TOC measurements were carried out with three repetitions. The tools and materials used to measure TOC (Total Organic Carbon) are Erlenmeyer 250 ml; 10 ml pipette, cuvette; Spectrophotometer; $K_2Cr_2O_7$, Sucrose; Sulfuric acid 95-98%. The procedure for measuring TOC (Total Organic Carbon) based on APHA is: [19]

- Preparation of a 0.5M potassium dichromate solution reagent: weigh 36.77 grams of $K_2Cr_2O_7$ and put in a 250 ml Erlenmeyer flask. Diluted to the mark limit.
- Preparation of standard solutions. Make a solution of 1000 ppm by weighing 0.2375 g of sucrose in a 100 ml flask, diluted to the limit.
- From the standard solution, a solution with carbon concentrations of 400 mg/l, 200g/l, 100 mg/l, and 25 mg/l was made.
- Each standard solution was added with 1 ml of $K_2Cr_2O_7$, shaken, and allowed to stand for 10 minutes.
- Added with 2 ml of concentrated H_2SO_4, shaken, and allowed to stand for 15 minutes.

[15] Saadah, Z, Noviana, I. S., Abdullah. 2010. *Produksi Enzim Selulase oleh Aspergillus niger Menggunakan Substrat Jerami dengan Sistem Fermentasi Padat.* Jurusan Teknik Kimia. Fakultas Teknik. Universitas Diponegoro. Semarang

[16] Isvisena, Y., Kumalaningsih, S., Mulyadi, A.F. 2014. *Pembuatan Pupuk Kompos dari Campuran Jerami Nangka dengan Kotoran Kelinci Menggunakan Dekomposer MA-11 (Kajian lama Ferenetasi dan Proporsi Bahan.* Jurusan Teknologi Industri Pertanian. Fakultas Teknologi Pertanian. Universitas Brawijaya. Malang

[17] Hadiroseyani, Y, Nurjariah, dan D. Wahjuningrum. 2007. Kelimpahan Bakteri dalam Budidaya Cacing *Limnodrillus* sp. yang dipupuk Kotoran Ayam Hasil Fermentasi. *Jurnal Akuakultur Indonesia*. Vol 6 (1): 79-87 (2007)

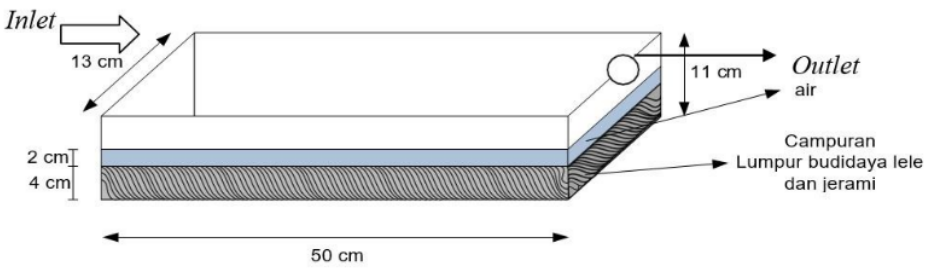
[18] Balai Pengkajian Teknologi Pertanian. 2011. Pemanfaatan Jerami Padi Fermentasi untuk Pakan Sapi. http://sumbar.litbang.pertanian.go.id

[19] APHA. 1992. Standart Methods for The Examination of Water and Waste Water, 16th Edition. American Public Health Association, Washington DC. 76 Pages

- The solution was added with 7 ml of distilled water, shaken, and allowed to stand for 10 minutes.
- The absorbance of the solution was measured using a spectrophotometer at a wavelength of 600 nm.
- From the data, a standard graph of absorbance and carbon concentration is made.
- Sample measurement was carried out according to the above procedure.

Preparation of Containers, Test Worms, and Watering

The containers used are plastic gutters measuring 50 cm x 13 cm x 11 cm as many as 24 pieces. Before use, the trays are cleaned, dried, and then filled with a mixture of straw and catfish cultivation mud as high as 4 cm (Figure 3). Meanwhile, irrigation of the substrate mixture was fed with water as high as 2 cm above the substrate surface with a water flow of 500 ml/minute. The discharge setting is carried out using an aeration valve. After irrigation, the media was left for two days in order to stabilize the substrate.



Stocking, Harvesting, and Water Quality Management

The silk worms were drained first and then weighed to determine the biomass weight of the test worms before stocking. After that, 10 g/container or 10 g/0.065 m^2 are stocked. Meanwhile, harvesting is conducted after 40 days of maintenance. Harvesting is conducted using a coconut milk filter. The worms obtained and still mixed with the media are placed in a coconut milk filter and doused with clean water. Then, it was placed on a basin filled with water. After that, it was left for 6 hours in an open room. The worms will cluster in a basin filled with water and can be picked up by hand. After that, the worms were drained and weighed to determine the final biomass weight.

Water quality management is carried out by regulating the flow of water using an aeration hose that aims to maintain the discharge quality. The water that comes from the container will flow back into the maintenance container. This study uses a closed system. It is the flow of water at any time using a recirculation system. In the circulation system, the water that comes out will be immediately discharged. Meanwhile, the water that comes out in the recirculation system will be accommodated and flowed back to the media. Organic matter that is food for worms may come out with the water so that it flows back into the

media.[20]

Sampling and Research Parameters

Sampling is conducted every 10 days. Sampling was carried out at three places in each container: the inlet (water intake), middle, and outlet (water output). Sampling is conducted by inserting a 3 cm diameter pipe into the substrate. Then, the pipe is removed by closing the top hole. The substrate is filtered while rinsing with water, then separated from the substrate. The rest of the substrate on the sieve is put into a plastic cup filled with water. Then, the top is shaken so that the remaining worms can come out and separate from the substrate. After that, the silk worms are weighed. After weighing, the results obtained are converted to the area of cultivation media used.

Biomass Weight Parameter

To determine the biomass, the sample worms were weighed using a digital scale (0.001 g). The biomass weight is calculated using this formula :

$$W = Wt - Wo$$

Information	W	: Silk worm biomass weight gain
	Wt	: Final weight of silk worm population (grams)
	Wo	: Initial weight of silkworm population (grams)

Environment Parameter

The water quality parameters observed in this study were pH, dissolved oxygen content, ammonia content, and temperature. Temperature measurements were carried out every day in the morning. Measurement of pH and dissolved oxygen levels were carried out once every five days using a pH meter and DO meter. Ammonia measurement was carried out three times in the study: at the beginning, middle, and end of the study.

Data Analysis

The weight of the biomass and the total population in the silkworm study were analyzed using analysis of variance (ANOVA) with a 95% confidence interval. One treatment has a significant effect on the biomass and population of silk worms, then proceed with the Least Significant Difference Test (BNT). The water quality data were analyzed descriptively.

[20] Syam, F. S. 2012. *Produktivitas Budidaya Cacing Sutra (Oligochaeta) dalam Sistem Resirkulasi Menggunakan Jenis Substrat dan Sumber Air yang Berbeda.* [Skripsi]. Departemen Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan. Institut Pertanian Bogor. Bogor

Results and Discussion

Farmers' groups and Farmers' Group Associations (GaPokTan) in Tanjung Bintang sub-district by profession as rice farmers and catfish cultivators with 205 groups and 5,257 members spread over 16 villages. In the process of cultivating silk worms, the first thing that must be provided is the main ingredients for making a place or nest for silk worms.

Materials that must be prepared include rice straw, EM4, and catfish pond mud. Tools or media that can be used are basins, water circulation machines. On the other hand that in this process, the worms cannot be produced directly from these materials, so that sires are needed that are ready to lay eggs in the media to be prepared.

The process of making the cultivation of silk worms is conducted by forming a discussion group forum. Thus, several groups will be formed. Later, in the implementation, a direct experiment will be carried out. On the first day of the experiment, information about the cultivation practice was given. The next day, they began to prepare and collect the main ingredients in the Tanjung Bintang sub-district.

The participation and collaboration of researchers and farmer groups are carried out to obtain maximum results and obtain knowledge that can be developed to benefit the community.

The researchers conducted socialization for residents in the Tanjung Bintang area, South Lampung, about the growth of silk worms. The socialization carried out was in the form of FGD (Focus Group Discussion) about matters related to growth and how to raise silk worms. The FGD is also a form of community service. It aims to support people in the Tanjung Bintang area of South Lampung, whose average livelihood is farming. So, they can develop their ability to raise silk worms that can support the community economy. Because the situation entered the New Normal era during the Covid 19 period, the FGD was carried out with the procedure for handling Covid with social distancing and limiting the number of participants to 10 people. Therefore, the FGD was conducted two times. The experimental design of silk worms, which was socialized to the public to see the growth of silk worms, will then be analyzed further. The growth of the silkworm population showed the highest population peak in treatment Y, which was 5,870 ind/m^2, followed by treatment X with 3,790 ind/m^2, and the lowest population in treatment Z with 1,508 ind/m^2.

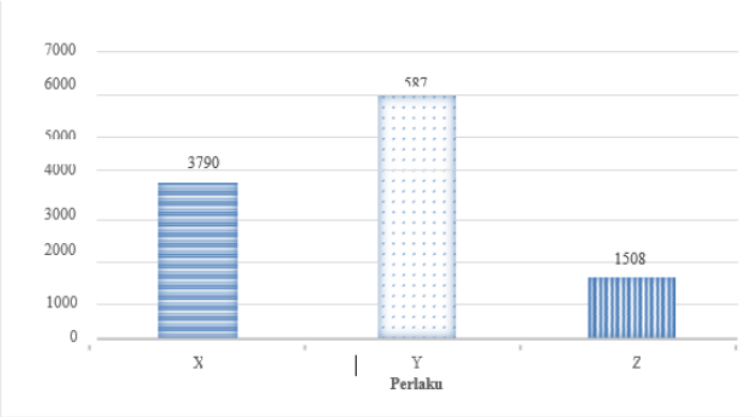


Figure 1. Silk worm Population;

Based on the smallest significant difference test (BNT), treatment x was significantly different from treatment y and z. It means that treatment x with 50% rice straw and 50% catfish mud gave a better population size than the treatment using 100% rice field mud. But the maximum results were obtained from the composition of rice straw with 70% content and catfish mud with 30% percentage. The average results of the measurement of additional silkworm population for each treatment during the study can be seen in Table 1.

Table 1. Average population increase of silk worms

Initial silk worm population		**Final average of silk worm**	**Increase in the number of**
Treatment	**Average (ind/m²)**	**population (ind/m²)**	**worm populations (ind/m²)**
X	2307	3.790	1483
Y	2307	5.870	3563
Z	2307	1.508	None

The highest increase in the population of silk worms during the study was in treatment Y. This treatment using 70% rice straw fermentation media and 30% catfish mud with a number of worms of 3,563 ind/m^2. Meanwhile, in Z treatment, using pure rice field mud as a control variable, there was no increase in population. The factor affecting the high population of silk worms is total organic matter (TOM), which bacteria use in the decomposition process to produce detritus as a source of nutrition for silk worms. This study's total organic matter value was 10.82%, and the C/N ratio of fermented rice straw was 11.035%.

Silk worm Biomass

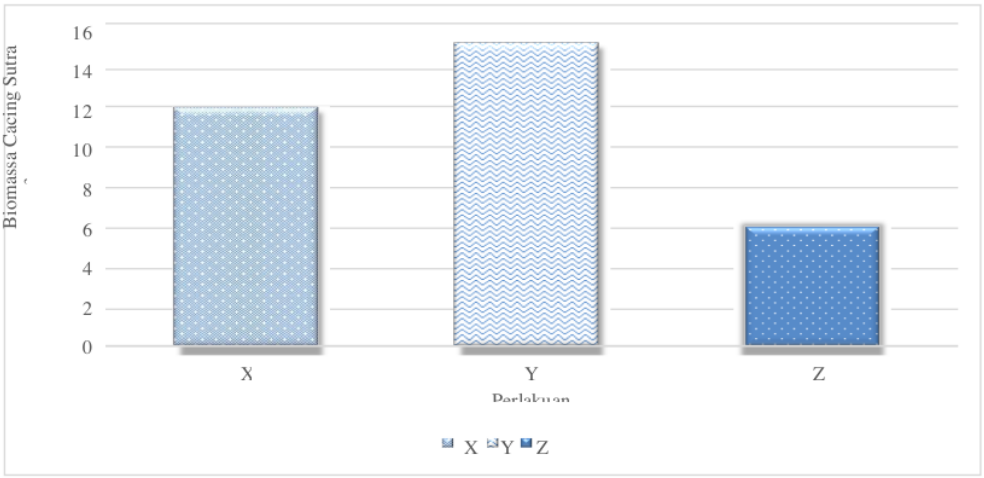


Figure 2. Silk worm Biomass

The graph above (Figure 2) shows the highest biomass peak in treatment Y, which is 15.21 gr/m². Furthermore, the X treatment was 11.91 g/m². The lowest biomass fell on treatment Z, which was 6.27 gr/m². The results of the variance of silkworm biomass showed that different rearing media had a significant effect on the growth of silkworm biomass ($p<0.05$). Based on the BNT test, the results showed that treatment X was significantly different from treatment Y and Z. In treatment X, it was not significantly different from treatment Y. This indicated that treatment with 70% rice straw and 30% catfish mud gave the best biomass growth compared to other treatment. The average growth of absolute silk worm biomass can be seen in Table 4. 2.

Table 2. Average increase in absolute biomass of silk worms

Treatment	Initial average silkworm biomass (gr/m²)	Final average silkworm biomass (gr/m²)	Total increase in silkworm biomass (gr/m²)
X	7,11	11,91	4,80
Y	7,06	15,21	8,15
Z	6,62	6,27	Tidak ada

Based on Table 2, for 40 days, the treatment of silk worms increased the final biomass by 8.15 gr/m². Treatment E experienced a decrease in silkworm biomass at the end of the study, causing no increase in the amount of biomass. One of the factors that affect biomass is the value of organic matter. Total organic matter in treatment Y was higher than other treatments, which was 10.82%. According to Suharyadi's research,[21] it is stated that in media with low organic matter conditions, it will be difficult to find silk worms.

Water Quality

Research Parameter	Average value			Quality standards
	X	Y	Z	
Temperature (°C)	26,6	26,4	26,6	25-30*
pH	6,07	6,01	6,2	6-8**
DO (ppm)	5,35	5,45	4,88	2,5-7***
Ammonia (ppm)	0,21	0,27	0,84	0,28-1,50****
Initial TOM (%)	10,82	8.62	4,64	-

Information:
* : Aston, 1973
** : Whitley, 1968
*** : Marian, 1984
**** : Shafrudin, 2005

[21] Suharyadi. 2012. *Studi Pertumbuhan dan Produksi Cacing Sutra (Tubifex* sp.*) dengan Pupuk yang Berbeda dalam Sistem Resirkulasi*. Tugas Akhir Program Magister Universitas Terbuka. Jakarta

The average values of temperature, pH, DO, and ammonia content was within optimal limits for the growth of silk worms. The average temperature value ranges from 26.4°C-26.8°C. Dissolved oxygen content values ranged from 4.88-5.45 ppm. Based on the opinion of Palmer (1968), who said that Tubificid was able to survive at low oxygen content because of its ability to carry out respiration. The ammonia content ranged from 0.21 to 0.84 ppm. This value was still suitable for the growth of silk worms. Silkworms are one of the aquatic biotas that can survive in aquatic environments with high ammonia levels. The content of ammonia in media water comes from the overhaul of organic nitrogen compounds by bacteria.

Conclusion

The use of straw and mud for catfish cultivation as growth media for silk worms and mud for catfish cultivation had a significant ($p<0.05$) effect on biomass and silkworm population. Media with a treatment composition of 70% fermented rice straw and 30% catfish cultivation mud produced the highest biomass (15.21 g/m^2) and the highest population (5,870 individuals/m^2). Media with 100% rice field mud as treatment composition produced the lowest biomass (6.27 g/m^2) and the lowest population (1,508 individuals/m^2).

Based on the results of mentoring on the cultivation of silk worms using existing waste in the community, Tanjung Bintang sub-district has new business potential, the cultivation of silk worms that have economic value for the community. The process is carried out by utilizing rice straw and catfish pond mud which can become waste when not utilized. In addition, the silk worms produced can support catfish farmers who experience mortality during hatchery and farming.

Reference

APHA. 1992. Standart Methods for The Examination of Water and Waste Water, 16th Edition. American Public Health Association, Washington DC. 76 Pages

Balai Pengkajian Teknologi Pertanian. 2011. Pemanfaatan Jerami Padi Fermentasi untuk Pakan Sapi. http://sumbar.litbang.pertanian.go.id

Bintaryanto, Blosong Wahyu Dan Taufikurohmah Titik . 2013. Pemanfaatan Campuran Limbah Padat *(Sludge)* Pabrik Kertas Dan Kompos Sebagai Media Budidaya Cacing Sutra *(Tubifex .Sp)*

Casmuji. 2002. *Pengunaan Supernatan Kotoran Ayam dan Tepung Tapioka dalam Budidaya Dapnhia* sp., penelitian pada Program Studi Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institu Pertanian Bogor, Bogor.

Chumaidi dan Suprapto.1986. Populasi *Tubifex sp.* di Dalam Media Campuran Kotoran Ayam dan Lumpur Kolam. Bulletin Penelitian Perikanan Darat. Depok 5 (2): 6 - 11

Fajri NW., Suminto dan Hutabarat J." Pengaruh penambahan kotoran ayam, ampas tahu dan tepung tapioka dalam media kultur terhadap biomassa, populasi dan kandungan nutrisi cacing sutera (*Tubifex* sp.)". *Jour. of Aquaculture Manag. And Tech. Vol.*3, No.4. 2014

Febrianti D. 2004. *Pengaruh Pemupukan Harian dengan Kotoran Ayam Terhadap Pertumbuhan Populasi dan Biomassa Cacing Sutra,* penelitian pada Departemen

Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor, Bogor

Hadiroseyani, Y, Nurjariah, dan D. Wahjuningrum. 2007. Kelimpahan Bakteri dalam Budidaya Cacing *Limnodrillus* sp. yang dipupuk Kotoran Ayam Hasil Fermentasi. *Jurnal Akuakultur Indonesia*. Vol 6 (1): 79-87 (2007)

Hadiroseyani, Y, Nurjariah, dan D. Wahjuningrum. 2007. Kelimpahan Bakteri dalam Budidaya CacingLimnodrillus sp yang dipupuk Kotoran Ayam Hasil Fermentasi. *Jurnal Akuakultur Indonesia*. Vol 6 (1): 79-87 (2007)

Hadiroseyani, Y. D. Nurjanah, Wahjuningrum. 2007. Kelimpahan Bakteri Dalam Budidaya Cacing Limnodrilus sp. yang dipupuk kotoran ayam hasil fermentasi. Jurnal Akuakultur Indonesia. 6 (1) : 79 — 87.

Isvisena, Y., Kumalaningsih, S., Mulyadi, A.F. 2014. *Pembuatan Pupuk Kompos dari Campuran Jerami Nangka dengan Kotoran Kelinci Menggunakan Dekomposer MA-11 (Kajian lama Ferenetasi dan Proporsi Bahan.* Jurusan Teknologi Industri Pertanian. Fakultas Teknologi Pertanian. Universitas Brawijaya. Malang

Khairuman, SP, dkk. 2008. *Peluang Bisnis Tubifex.* AgroMedia: Jakarta Lahen.Suardi, Putri.

Ika Wahyuni, Riskasari, Pemberian Dedak Padi Hasil Fermentasi Terhadap

Pertumbuhan Cacin sutera (Tubifex sp.) Menggunakan system resirkulasi

Jurnak Aroqua Vo. 17 no 2 th 2019

Masrurotun, Suminto dan Hutabarat J. 2014. Pengaruh penambahan kotoran ayam, silase ikan rucah dan tepung tapioka dalam media kultur terhadap biomassa, populasi dan kandungan nutrisi cacing sutera (*Tubifex* sp.). *Jour. of Aquaculture Manag. And Tech.* 3(4) : 151-157

Muria, E.S. 2012. Pengaruh Penggunaan Media dengan Rasio C:N yang Berbeda terhadap Pertumbuhan *Tubifex*. *Tesis*. Surabaya: Universitas Airlangga.

Pennak, R.W. 1978. *Freshwater Invertebrates of The United States*. A Wiley Intescience Publication. John Wiley And Sons, New York

Putri. Berta, Hudaidah Siti, dan Kesuma Widi Indra," Pemanfaatan Bungkil Inti Sawit sebagai Media Pertumbuhan Cacing sutra (Tubifex sp.). e-Jurnal Rekayasa dan Teknlogi Budidaya Perairan Vol 6 No 2 tahun 2018.

Raharjo, Eka indah. Islami Zahir dan Farida (2018) Persentase Pemanfaatan Lumpur Kolam Lele,Ampas Tahu Dan Dedak Padi Dalam Media Kultur Untuk Meningkatkan Produksi Cacing Sutera (*Tubifek* Sp.) *jurnal ruaya vol. 6. no .2. th 2018*

Saadah, Z, Noviana, I. S., Abdullah. 2010. *Produksi Enzim Selulase oleh Aspergillus niger Menggunakan Substrat Jerami dengan Sistem Fermentasi Padat.* Jurusan Teknik Kimia. Fakultas Teknik. Universitas Diponegoro. Semarang

Safrina, Putri. Berta dan Wijayanti Henni, " Pertumbuhan Cacing Sutra (Tubifex sp.) yang dipelihara pada media Kulit Pisang Kepok (Musa Paradisiaca) dan Lumpur Sawah. Prosiding Seminar Nasional Swasembada Pangan Polinela 29 April 2015

Setyawati, Ratih. (2014). Panduan Lengkap Budidaya dan Bisnis Cacing Sutra. FlashBooks, Jogjakarta

Shafrudin DW., Efiyanti dan Widanarni. "Pemanfaatan ulang limbah organik dari *Tubifex* sp., di alam". *Jour. Akuakultur Indo*. Vol.4, No.2. 2005

Simangunsong. Tuani Lidiawati dan Soesanti. Arum, "Aplikasi Sistem Wadah Bertingkat Dalam Budidaya Cacing Sutra di Desa Pungpungan Bojonegoro" Jurnal Sinergitas Pkm & CSR Vol. 01 No. 01 Oktober 2017

Steel, R dan J. H. Torrie. 1980. *Principles and Procedures of Statistics A*

Suharyadi, 2012. Studi Pertumbuhan dan Produksi Cacing Sutera (*Tubifex sp*) Dengan Pupuk Yang Berbeda Dalam Sistem Resirkulasi (Tesis). Program Pascasarjana Program Studi kelautan Bidang Minat Manajemen Perikanan. Univesitas Terbuka. Jakarta 84 hlm

Sulistiyo, A., Widiastuti, I. M., dan Rizal, A. 2012. Pemanfaatan Ulang Limbah Organik dari Substrat Tubifex sp. di Alam untuk Pertumbuhan Bobot *Tubifex* sp. *Jurnal Agrisains*, 13(3): 233-238.

Surya, R.E. dan Suyono. 2013. Pengaruh Pengomposan terhadap Rasio C/N Kotoran Ayam dan Kadar Hara NPK tersedia serta Kapasitas Tukar Kation Tanah. *UNESA Journal of Chemistry, II*(1): 137-144. Suryadin, Dindin. Helmiati, Senny dan Rustadi. 2017. Pengaruh Ketebalan **M**edia Budidaya Cacing Sutra (*Tubifex* sp.) menggunakan Lumpur Limbah Budidaya Lele. Jurnal Perikanan Universitas Gadjah Mada 19 (2): 97-105 ISSN: 0853-6384 eISSN: 2502-5066

Syam FS. 2012. *Produktivitas Budidaya Cacing Sutra (Oligochaeta) dalam Sistem Resirkulasi Menggunakan Jenis Substrat dan Sumber Air yang Berbeda*, Skripsi S1 (Tidak dipublikasikan). Departemen Budidaya Perairan, Fakultas Perikanan dan Ilmu Kelautan, Institut Pertanian Bogor, Bogor.

Tahapari, E., Sularto dan I. Nurlela. 2010. Intensifikasi Pemupukan pada Pemeliharaan Larva/Benih Ikan Patin Siam (*Pangasianodon hypophthalmus*) yang dilakukan secara *outdoor* di Kolam Tanah. Dalam: *Prosiding Forum Inovasi Teknolog Akuakultur 2010, hal. 19-29* Unesa Journal Of Chemistry Vol. 2, No. 1, Januari 2013

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