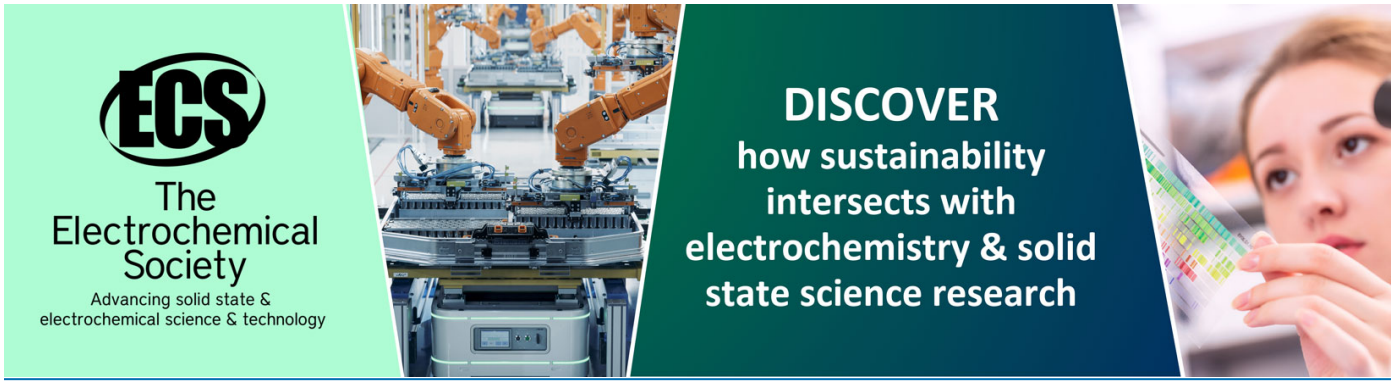
Application of Microcapsules Food with Different Dosage to Support The Growth of Fish Cork Seed (Channa Striata)



Application of Microcapsules Food with Different Dosage to Support the Growth of Fish Cork Seed (Channa Striata)

Hayati Soeprapto[1], Hadi Pranggono[2], Febri Mustafat Ridwan[3]

Aquaculture Study Program, Universitas Pekalongan

Abstract. Research occurred to manufacture microcapsule feed made by a local material like duck eggs and earthworms. These ingredients contain sufficient protein to support the growth of fish cork seed. The research was conducted for one month at the Laboratory of the Faculty of Fisheries, Pekalongan University. This study aims to determine the effect of microcapsules enriched with earthworms on snakehead fish seeds' growth. The use of earthworms with duck eggs is forming granules with sizes ranging from 20 µm - 120 µm, which are rounded as microcapsules feed. The research method used was experimental, using a completely randomized design (CRD) with treatments of 0 ml / l (A), 4 ml / l (B), 6 ml / l (C), 8 ml / l (D) and 10 ml. / l (E). The results showed that the microcapsule feed with different earthworm extract doses had a significant effect (F hit> F tab). The best treatment was at a dose of 10 ml (E) earthworms with a biomass weight of 0.46 grams. The supporting parameter is water quality in a temperature of 27-30oC and a pH of 7.4-7.9 to complete the cultivation of snakehead fish seeds.

1. Introduction

Snakehead fish (Chana striata) contains 42,73 albumin protein. Protein levels can be increased according to the protein needs of fish. Enhancing a protein by added animal protein like earthworms has a higher protein than others (Palungkun, 2010). According to Herlina (2016) in her research, the best feed for snakehead fish is earthworms rather than snails and pellets. The previous study found out the effect of snakehead fish's microcapsule feed (Chana striata). So it is vital to study on the effect of using microcapsules enriched with earthworm extracts with different doses on the growth of snakehead fish (Chana striata) seeds.

The use of snakehead fish is not only dishes and processed products. However, it is also useful in the pharmaceutical field as a source of albumin. The need for snakehead fish increasing in following day, in line with the search for a population that impacts the snakehead fish community's needs. (Danang, 2017). According to Muflikha (2008), snakehead fish can adapt to conditions without water for certain intervals. Snakehead fish can also live in waters that have salt levels such as in ponds in Purnawati's research (2016). Cultivation of snakehead fish has not received much attention from fish cultivators, The reason is lack of information about its cultivation technology.

Feed is the dominant factor in aquaculture business which must be managed intensively. An alternative that can be done to reduce costs in cultivation is by making homemade feed (Afrianto and Liviawati, 2005). In general, the form of artificial feed based on its size is divided into three types, they are crumble, flake, and pellets, while other types of feed are microcapsules. Microcapsules are a type of feed that can be fed to small fish, seeds or shrimp. The microcapsule feed used so far still uses commercial (factory-made) relatively expensive microcapsule feed. In fact, the feed can actually be made from local raw materials that are easily available and cheap. These ingredients include duck eggs and layur fish.

2. Methodology

The research was carried out in the Pekalonhan university aquaculture laboratory. The test fish used were between 4- 4.2 cm in size with 60 fry of seed weight between 0.4 - 0.42 gram / fish. The test feed used was microcapsules with earthworm extracts. Maintenance containers with a capacity of 16 liters of 16 units. The water media used comes from fresh water sources, which are deposited first for approximately 24 hours. The salinity of the study's water is 3 ppt, referring to Purnamawati's research (2017).

The research was conducted using a completely randomized design (CRD) method. Kusriningrum (2012) states that a completely randomized design is used if the media, tools and experimental materials are uniform or considered uniform. The completely randomized design (CRD) consisted of one source of diversity, namely the treatment and the random effect so that the results of the differences between treatments were only caused by the effect of the treatment and the random effect. This study used 5 treatments and 3 replications. The treatment applied was feeding microcapsules enriched with extracts of earthworms with different doses, namely:

A : Microcapsules
B : 4 ml Earthworm Extract / microcapsule formulation
C : 6 ml Earthworm Extract / microcapsule formulation
D : 8 ml Earthworm Extract / microcapsule formulation
E : Earthworm Extract 10 ml / microcapsule formulation

The preparation of the research container used is free from contamination by microorganisms for the maintenance of snakehead fish (Channa striata). The fish used were more or less uniform in size, namely 4- 4.2 cm with seed weights between 0.4 - 0.42 grams / fish, and were fastened first for one day and each aquarium consist of 10 fish. Feeding is done by satiation method, which is given three times a day. According to SNI (1999), th in the morning, during the day, and in the evening. Feeding is done as much as 10% of the weight of the biomass weight. Fish samples were taken by weighing snakehead fish which was carried out every 10 days for 30 days. The parameters observed in the study included growth, namely the survival rate of snakehead fish seeds and absolute weight can be obtained by calculating the formula (Effendi, 1997).

$$Wm = Wt - Wo \quad (1)$$

Wm : Growth in absolute weight (grams)
Wt : Final average weight (grams)
Wo : Initial average weight (grams)

According to Yanti et al., (2013) The calculation of the specific growth rate in weight and length can be obtained using the formula:

$$SGR\ berat = \frac{Ln\ Wt - Ln\ W0}{T1 - T2} \times 100\% \quad (2)$$

SGR : Daily growth rate (%)
W0 : Weight of fish at the beginning of the study (g)
Wt : Weight of fish at the end of the study (g)
T : Time

3. Results and Discussion

3.1. The growth of Cork Fish (Chana striata)

The results of the growth in fish biomass weight are presented in table 1.

Table 1. Growth of cork fish weight (biomass)

Frequency	Treatment					TOTAL
	A	B	C	D	E	
1	0,09	0,1	0,01	0,29	0,44	1,170093
2	0,14	0,14	0,3	0,32	0,48	
3	0,13	0,3	0,24	0,32	0,46	
AMOUNT	0.36	0,44	0,55	0.93	1,38	5,21
AVERAGE	0,12	0,15	0,18	0,31	0,46	

A : Microcapsule
B : Earthworm ecstract 4ml/microcapsule formulation
C : Earthworm ecstract 6ml/microcapsule formulation
D : Earthworm ecstract 8ml/formulation

According to Lucas et al. (2015), the survival rate is used to determine the percentage of survival in fish during maintenance that can be obtained by using the formula:

$$sr = \frac{Nt}{No} \times 100\% \quad (3)$$

Description:
SR: Survival rate (%)
Nt : Total number of fish living until end of study
No: Total number of fish at the beginning of the study
D : Earthworm Extract 10 ml / microcapsules formulation

The absolute growth of the highest cork fish seed based on table 3 was obtained at treatment E with an average value of 0.46 grams, while the lowest growth was obtained in treatment A with an average value of 0.12 grams.

3.2. Variety Analysis (ANOVA) of growth absolute biomass of cork fish seed

The absolute biomass growth of cork fish seeds for 30 days after normality tests showed that the data was normal. Furthermore, homogeneity tests were carried out which showed that the data was homogeneous. After obtaining the results of homogeneous data and spread normally, then the analysis of variety (ANOVA) is carried out.

Based on the variety analysis results obtained, F calculate 3,125.8 > F table 1% (5.04). This indicates that the treatment applied has a very noticeable difference effect.The results of the calculation of variety analysis are presented in table 2.

Table 2. Growth Variety Analysis Cork Fish Seed Biomass

SK	DB	JK	KT	F Count	F Table	
					5%	1%
P	4	0,1833	0,0458	3125,8**	3,48	5,04
G	10	0,004	0,0004			
T	14	1,170				

Description : ___ ** different is very real

The results of F Calculate showed greater than F table 5% and F table 1% which means that the treatment applied gives a very noticeable difference to the growth of cork seed biomass. From the observations and calculations of the growth graph of cork fish seed tesaji in figure 1.

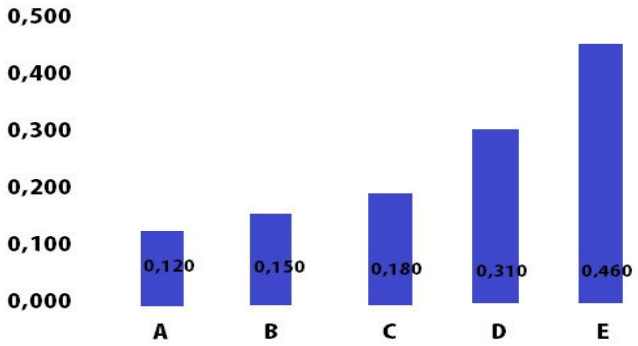


Figure.1. Cork seed growth chart

3.3. Daily specific weight growth rate (grams/day %) Fish seed Specific weight growth rate is presented in table 3.

Table 3. Specific Growth Rate (%)

Deuteronomy	Treatment					TOTAL
	A	B	C	D	E	
1	0.532	0.586	0.041	1.455	2.015	
2	0.809	0.252	1.542	1.623	2.211	
3	0.757	0.191	1.286	1.623	2.112	
Amount	2.097	1.029	2.869	4.702	6.338	17.034
AVERAGE	0.699	0.343	0.956	1.567	2.113	

Table above the growth rate of daily specific weight of the highest cork fish seed obtained at the E treatment with the administration of 2.0 ml of earthworm extract / microcapsules formulation is 3.401% and the growth rate of daily specific weight of the lowest cork fish seed is obtained in treatment A with the provision of microcapsules without the addition of earthworms of 2.351%.

3.4. Survival Rate (SR)

During the study, the life of cork fish seeds that were maintained can be seen in table 4.

Table 4. Survival Rate Cork Fish Seeds

Treatment	Deuteronomy	W0	WT	SR (%)
	1	5	5	100
A	2	5	5	100
	3	5	5	100
	1	5	5	100
B	2	5	5	100
	3	5	5	100
	1	5	5	100
C	2	5	5	100
	3	5	5	100
	1	5	5	100
D	2	5	5	100
	3	5	5	100
	1	5	5	100
E	2	5	5	100
	3	5	5	100

Table 5. Proximate Test of microcapsules feed

Types Of Feed	Content %				
	Water	KH	Protein	FAT	ASH
Microcapsules With Earthworm Extract	7	28,73	43,98	8,3	13
Microcapsules Without Earthworms	8,5	28,88	42,42	8,2	12

E. Water Quality Data of water quality range is presented in table 5.

Table 6. Water quality

Parameter	Observations	Standart	Reference
Temperature	27 - 30 °C	26 - 32 °C	Kordi and tancung (2007)
pH	7,4 - 7,9	5,0 – 9,0	Muflikhah (2008)

Source : research (2020)

Based on the results of various analysis tests (ANOVA) obtained that F calculate (3125.8) greater than table F 1% (5.04) and 5% (3.48) which showed that microcapsules feed with the addition of earthworms (B, C, D, and E) and microcapsules feed without the addition of earthworms exerted a very noticeable influence on the growth of cork fish seeds. The highest growth in biomass weight was obtained in the E treatment by microcapsules feeding with earthworm extract of 10 ml / microcapsule formulation, namely with an average yield of 0.460 grams, followed by D treatment with an average of 0.310 grams, C with an average of 0.180 grams, and B with an average of 0.150 grams. While the lowest result was obtained in treatment A with microcapsules feed treatment without the addition of earthworms of 0.120 grams. This indicates the addition of doses of earthworm extract in micro-capsule feed with the maximum dose shows the growth of weight that continues to increase and look maximum.

Based on Tukey advanced tests The highest value for all parameters obtained on the E treatment differs very noticeable with the treatments A, B, C and D, the E fish weight growth diagram shows the highest weight increase from the initial week of maintenance to the end of maintenance is at the E treatment (dose 10 ml) with an average of 0.46 gr. While the lowest weight growth increase is found in treatment A (without treatment) with an average of 0.12 gr. This indicates that the increasing addition of microcapsules using cacaing has a real influence on cork fish seed weight growth.

Significant growth can also be seen in the chart table of cork seed growth figure 3, where in the treatment of 0% to 6% has a constant growth rate that is with an average growth amount of 0.020, but the growth has increased significantly at a dose of 8% to 10% where differences influence the growth in each dose there is additional protein-enriched microcapsule feed and the use of digestive enzymes that support gastrointestinal power in fish seeds to be good. According to Yulisman et al., (2012) cork fish growth is better if given artificial feed containing 40%-53% protein. But in general, the growth value is still relatively low. Protein needs for fish is about 20-60%, while according to Mahyudi (2010) optimal feed protein content is about 25%-35%. This is because the protein's gastrointestinal power is not yet optimal. Protein digestion is highly determined by the type of feed raw materials, water temperature, enzymes and bacteria activity in the digestive tract of fish.

Protein is important in the process of enlargement of fish that affects the growth of weight and length. Proximate test results obtained with the results of microcapsules feed enriched by earthworms obtained protein 43.98%, water content of 7%, carbohydrates 28.73%, fat 8.3% and ash content 13% then microcapsules feed without being enriched with earthworms obtained protein content of 42.42%, water content of 8.5%, carbohydrates 28.88%, fat 8.2% and ash content of 12%. The proximat test results in Soeprapto research (2010) obtained microcapsules protein content of 42.73%, fat content of 23.65%, and fiber 6.65%. Proximat test microcapsul feed test obtained protein content of 41.69%, fat 32.97% and fiber 5.02 % Differences in protein content in the proximate test results showed lower but had a noticeable influence on the growth of both length and weight in fish seeds, it is supported by another influence that is good digestion in the stomach of cork fish seeds with the use of enzyme vitazim of 0.05 grams in each microcapsule feed production. According to Mahyudi (2010) optimal feed protein content is about 25%-35%. This is because the protein's gastrointestinal power is not yet optimal. Protein

digestion is highly determined by the type of feed raw materials, water temperature, digestive enzymes, and bacteria in the digestive tract of fish.

The daily specific growth rate (SGR) in cork fish seeds was best obtained at the E treatment of 2.11% with the treatment of microcapsules with the addition of 10 ml of earthworms. The specific growth rate in cork fish seeds obtained in this study (Table. 6) has results following the research of wa ode muliati et al (2018) on the comparison of pellets and gold snails obtaining a specific growth rate of cork fish between 1.25% - 3.15%. SR or life success rate is the life rate of cork fish seed during the maintenance period. Cork fish seed during maintenance of 35 days indicates that the success rate of life is marked with a value of 100%. This result is much different from wa Ode Muliati research (2018) with results between 53.33% - 60%. High SR value in this study is suspected because the quality of media water is always under control by conducting regular sprinkling and water turnover as well as the use of aeration as an oxygen supply of cork fish seeds.

Protein is important in the process of enlargement of fish that affects the growth of weight and length. Microcapsules have a very high protein, so it is suitable to meet cork fish seeds' protein needs. The proximat test results in Soeprapto research (2010) obtained microcapsules protein content of 42.73%, fat content of 23.65%, and fiber 6.65%. Proximat test microcapsul feed test obtained protein content of 41.69%, fat 32.97% and fiber 5.02% , while the content of microcapsules feed with the addition of earthworms obtained protein between 42.66%, fat content of 31.37%, fiber content of 4.90%. Earthworms themselves contain a considerable amount of 58–78% protein and amino acids are quite high.

The addition of protein content with earthworms in microcapsules feed succeeded in increasing the growth rate of cork fish seeds that are being researched. The content of amino acids contained in worms and anti-microbes so as to improve digestion and and endurance of the body of cork fish seeds. Earthworms also have a complete amino acid content compared to fish and anti-microbes. So in this study seen the amount of protein contained in microcapsules feed becomes increasing. Various studies related to the influence of feed types on the growth of cork fish, but the best result for growth is earthworms. According to Herlina (2016) earthworms are very good to trigger the growth of cork fish because it has a high protein content. Meanwhile, according to muniron (2018), earthworms' addition to pellet feed can provide optimal growth in preserved cork fish. So in this study, the increase in the dose of earthworm extract in microcapsules feed can influence the growth that occurs in cork fish seeds.

Water is a medium that serves as a place of life for aquatic organisms, both qualitatively and in quantity so as to support the growth and graduation of life of these organisms. Factors - environmental factors of fish waters include: temperature, dissolved oxygen, the degree of acidity of food and biological health of the fish in question (Effendi, 1979). Media water temperature observations during maintenance obtained a temperature range of 27°C - 30ºC. temperature range 27°C - 30ºC, and pH in maintenance media ranging from 7.4 to 7.9, In aquatic conditions can be said to still be in a decent range for the cultivation of cork fish. With its good environment fish will have an appetite, and have resistance to diseases.

4. Conclusion

Microcapsules feeding without the addition of earthworms and microcapsules feed with the addition of earthworms has a very real effect on the growth of cork fish seeds' biomass multak weight. The best growth obtained in the E treatment is microcapsules feed with the addition of earthworm extract of 10 ml, with an average yield of 0.46 grams. While the lowest growth was obtained in treatment A namely microcapsules without the addition of earthworms, with a yield of 0.12 grams.

Based on the results of the variety analysis (ANOVA) growth of cork fish seed obtained results F calculate > F. The research location that cendrung shady makes the temperature in the research water make a little down at night. According to Kordi K and Tancung AB (2007), the value of water quality indicates that this parameter is still within the limits of feasibility for cork fish's life. The optimal temperature range for the maintenance of cork fish ranges from 25-33ºC.

Refrences

[1] Afrianto E., dan Liviawati, E. 2005. *Pakan Ikan: Pembuatan, Penyimpanan, Pengujian, Pengembangan*. Yogyakarta : Kanisius. 138 hal.
[2] Agustiningsih, Dyah. 2012. Kajian Kualitas Air Sungai Blukar Kabupaten Kendal Dalam Upaya Pengendalian Pencemaran Air Sungai. *Tesis*. Semarang :
[3] Program Magister Ilmu Lingkungan Program Pasca Sarjana, Universitas Diponegoro Semarang.
[4] Alfarisy, M. Ulya. 2014. Pengaruh Jenis Kelamin dan Ukuran Terhadap Kadar Albumin Pada Ikan Gabus (Channa striata*)*. *Skripsi.* Surabaya. Institut Teknologi Sepuluh November.
[5] Arshady, R. 2009. *Microsphere And Microcapsule : A Survey Manufacturing Technique Part 1 : Suspension Cross – Linking*. *Research* Polymer Engginering And Science : 1746-1757.
[6] Bloch.1793.*Species Fact Sheets Channa striata*. *Research* FAO : Fisheries and Aquaculture Department.
[7] Destiara. 2018. *Pengaruh Penambahan Tepung Cacing Tanah (Lumbricus rubellus) terhadap ikan gabusi*. Program Studi Budidaya Perairan. Jurusan Perikanan. Fakultas pertanian. *Jurnal* Universitas Lampung. Lampung.
[8] Dewi, Ayi Anggraini Tungga. 2018. *Pengaruh Pemberian Enzim Pada Pakan Komersial Terhadap Pertumbuhan Ikan Gabus (Channa Striata Bloch, 1793)*. Jurusan Perikanan Dan Kelautan. Fakultas Pertanian. *Jurnal.* Universitas Lampung. Lampung.
[9] Effendie, M. I. 1997. *Metode Biologi Perikanan*. Yayasan Dewi Sri. Bogor.
[10] Hana. 2009. Pengaruh Subtitusi Pakan Mikrokapsul Dari Tubifex Sp. Pada Penyapihan Awal Laju Ingesti, Pertumbuhan Dan Sintasan Larva Ikan Gurame (Osphronemus goramy). *Jurnal* ikhtiologi. Program Studi Biologi Pascasarjana. Universitas Jenderal Soedirman. Purwokerto.
[11] Harvey B.,and J.Carolsfeld. 1993. *Induced Breeding in Tropical Fish Culture*. *Research* . Ottawa, Canada: IDRC.
[12] Hendrawati., Tri, H.P., Nuni, N.R. 2009. *Analisis Kadar Phosfat dan Nnitrogen (Amonia, Nitrat, Nitrit)* pada Tambak Air Payau akibat Rembesan Lumpur Lapindo di Sidoarjo, Jawa Timur. Program Studi Kimia FST UIN Syarif Hidayatullah. *Jurnal.* Badan Riset Kelautan dan Perikanan, Jakarta. 9 hal.
[13] Herlina, S. 2016. Pengaruh Pemberian Pakan yang Berbeda Terhadap Pertumbuhan dan Kelangsungan Hidup Benih Ikan Gabus (Channa striata). *Jurnal.* Universitas Darwan Ali. Seruyan.
[14] Hidayah, Nur. 2016. Perbandingan Berbagai Teknik Mikroenkapsulasi Pakan Dalam Menghasilkan Daging Sapi Sehat. *Jurnal.* Program Studi Peternakan. Fakultas Pertanian. Universitas Muhammadiyah Bengkulu. Bengkulu.
[15] Indriati. G.,Sumitri. M dan Widiana. R. 2012. Pengaruh Air Rebusan Cacing Tanah (Lumbricus rubellus) Terhadap Pertumbuhan Bakteri Escherichia *Coli*. *Jurnal* Prosiding Semirata Bks PTN-B MIPA 2012. ISBN 978-602.
[16] Khairuman dan K. Amri. 2010. *Mengeruk Untung Dari Beternak Cacing, 80.*. Bintaro. PT. Agromedia pustaka
[17] Kordi, M. Gufron. 2010. *Panduan Lengkap Memelihara Ikan Air Tawar di Kolam Terpal.* Yogyakarta. PT. Lily Publisher.
[18] Kusriningrum. 2008. *Dasar Perancangan Percobaan dan Rancangan Acak Lengkap.* Fakultas Kedokteran Hewan. Universitas Airlangga. Surabaya.
[19] Makmur, S, M.F. Rahardjo, dan Sutrisno Sukimin. 2003. Biologi Reproduksi lkan Gabus (Channa striato Btoch) di Daerah Banjiran Sungai Musi Sumatera Selatan. *Jurnal lkhtiotogi* Indonesia**.** 3.7:57-67.
[20] Muflikhah, N., M. Safran N.K. Suryati. 2008. *Gabus*. Balai *Riset* Perikanan Perairan Umum. 23 hal.

[21] Muliati, Wa Ode. 2018. *Studi Perbandingan Pertumbuhan Ikan Gabus (Channa Striata) Yang Diberi Pakan Pellet Dan Keong Mas (Pomacea Canaliculata)*. *Jurnal.* Fakultas Perikanan dan Ilmu Kelautan Universitas Halu Oleo. Kendari.

[22] Purnamawati. 2017. Kinerja Pertumbuhan Ikan Gabus (Channa Striata Bloch.) Pada Lahan Pasang Surut Melalui Rekayasa Kualitas Air. Sekolah Pascasarjana. *Jurnal* Perikanan. Institut Pertanian Bogor. Bogor.

[23] Salim K. A., K. E. Khalil, M. S. Abdel- Bary, and N. A. Abdel-Azeim. 2008. *Encapsulation And Untilization Of Red Pigmen From Roselle (Hibiscus sabdariffa L). Research* Natural Food Colourants, Egypt: Food Sci And Tech. Fayoum University.

[24] Soeprapto, H. 2010. Rancang Bangun Alat Pembuat Mikrokapsul Sebagai Pakan Larva Ikan Dan Udang. *Jurnal* Perikanan. Universitas Pekalongan. Pekalongan.

[25] Sukardi ; Mulyarto, A. R. ; Safera, W., 2007. Determination of an optimum extraction time and its production cost of powdered extract of guava (*Psidii folium*) lea*f.* J. Teknol. *Jurnal* Pertanian, 8.

[26] Sukardi, P. ,E. Yuwono dan I. Sulistyo. 2007. *Microencapsulated Diet Ramah Lingkungan Untuk Larva Udang Windu Menggunakan Bahan Lokal*. *Laporan* Penelitian Hibah Bersaing. Universitas Jenderal Soedirman. Purwokerto.

[27] Tulus, Wahyutomo, Puji Widodo, dan Syafrudin. 2011. Pemijahan ikan gabus (Channa striata) yang dipelihara di kolam lahan gambut. *Laporan* Perekayasaan Balai Budidaya Air Tawar Mandiangin.

[28] Tjahjo, D.W.H. & Purnomo, K. 1998.Studi Interaksi Pemanfaatan Pakan Alami Antar Ikan Sepat (Trichogaster pectoralis), Betok (Anabas testudineus), Mujair (Oreochromis mossambicus), Nila (Oreochromis niloticus) dan Gabus (Channa striata) di Rawa Taliwang. *Jurnal* Penelitian Perikanan Indonesia. Pusat Riset Perikanan Budidaya.IV(3): 50—59

[29] Yulisman, M. Fitriani, D. Jubaedah. 2012. Peningkatan Pertumbuhan dan Efiesien Pakan Ikan Gabus (Channa striata) Melalui Optimasi Kandungan Protein dalam Pakan. *Jurnal* Berkala Perikanan Terubuk. 40(2): 47-55.