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A Bibliometric Analysis of Anguilla Bicolor Feed (2012–2023)

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Abstract (English)

One potential fishery commodity for cultivation is eel (Anguilla bicolor). The distribution of eel fish in Indonesia is quite wide, from west to east Indonesia. There are at least six species of eel fish that live in Indonesia out of a total of 18 species that live in the world. Number of eel research quite a lot, but it is not yet known for certain. This research was conducted to answer questions about what is the actual number of Anguilla Bicolor Feed research in the period 2012 to 2023, and development of Anguilla Bicolor Feed research from year to year. This research data was obtained using data secondary, originating from articles from scientific journals. Year limited publication from 2012 to 2023. Data searched by using the Publish or Perish application, with the keyword "anguilla bicolor feed". The data was analysed using bibliometric analysis with the help of Microsoft Excel applications and co-word analysis were carried out using the VOSviewer application. Found as many as 200 publication titles since 2012 until 2023 involving as many as 89 authors. The most citation is “The Ways In Which Fish Use Estuaries: A Refinement And Expansion Of The Guild Approach” (434 cites). The most researched topic was rate (39 titles), and the least researched was enrichment, pasta feed, gastrointestinal tract, and vertical aquaculture system (8 titles).

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Anguilla Bicolor Feed, Bibliometric, VOSviewer

Abstrak (Indonesia)

Salah satu komoditas perikanan yang potensial untuk dibudidayakan adalah belut (Anguilla bicolor). Distribusi ikan belut di Indonesia sangat luas, dari barat hingga timur Indonesia. Setidaknya ada enam spesies ikan belut yang hidup di Indonesia dari total 18 spesies yang hidup di seluruh dunia. Jumlah penelitian tentang belut cukup banyak, namun belum diketahui secara pasti. Penelitian ini dilakukan untuk menjawab pertanyaan tentang berapa jumlah penelitian Anguilla Bicolor Feed yang sebenarnya dalam periode 2012 hingga 2023, dan perkembangan penelitian Anguilla Bicolor Feed dari tahun ke tahun. Data penelitian ini diperoleh menggunakan data sekunder, berasal dari artikel-artikel dari jurnal ilmiah. Publikasi terbatas dari tahun 2012 hingga 2023. Data dicari menggunakan aplikasi Publish or Perish, dengan kata kunci "anguilla bicolor feed". Data dianalisis menggunakan analisis bibliometrik dengan bantuan aplikasi Microsoft Excel dan analisis co-word menggunakan aplikasi VOSviewer. Ditemukan sebanyak 200 judul publikasi sejak tahun 2012 hingga 2023 melibatkan sebanyak 89 penulis. Kutipan paling banyak adalah "The Ways In Which Fish Use Estuaries: A Refinement And Expansion Of The Guild Approach" (434 kutipan). Topik penelitian paling banyak adalah laju (39 judul), dan yang paling sedikit diteliti adalah pengkayaan, pakan pasta, saluran pencernaan, dan sistem akuakultur vertikal (8 judul).

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Introduction

Indonesian waters have a very abundant fishery. One potential fishery commodity for cultivation is eel (Anguilla bicolor). The distribution of eel fish in Indonesia is quite wide, from west to east Indonesia. There are at least six species of eel fish that live in Indonesia out of a total of 18 species that live in the world (Klau et al., 2020).

The development of eel cultivation is influenced by the condition of the seeds in nature. Indonesia has natural resources that support eel cultivation activities because Indonesia has a tropical climate (Perdana et al., 2017). Utilization of eel fish resources is still an effort to catch them in public waters to meet market demand. Indonesia's potential for rearing and becoming an eel exporting country is wide open because Indonesia has large enough potential for eels to meet the needs of eel seeds (Pinoke et al., 2015).

Efforts to develop intensive eel cultivation by providing quality seeds in large quantities and continuously are important factors. Apart from that, the quality of water, feed, disease control, and the application of appropriate cultivation technology also need to be considered. However, the obstacle to eel cultivation is the length of time it takes to grow to reach consumption size (Koroh & Lumenta, 2014).

The slow growth rate factor is greatly influenced by the quantity and quality of feed provided, so to stimulate the growth of eel fish, it is necessary to provide food with high animal protein because of its carnivorous nature (Arsyadana et al., 2017). Growth occurs when the amount of feed consumed is greater than the minimum needed for fish survival. Providing sufficient, good quality and appropriate feed is one of the determining factors for increasing eel fish growth (Idris, 2016).

The availability of natural food plays an important role in fish cultivation, especially at the seed stage. In intensive cultivation, the provision of artificial feed is very necessary. Artificial feed can also provide nutrients that are not found in natural feed (Arief et al., 2011). Several studies have been carried out to support the growth of eels, but the results have not been able to increase their growth rate. Therefore, it is necessary to look for other alternatives so that they can be used to increase the growth rate of eels (Pratama et al., 2019).

Number of studies on Anguilla Bicolor Feed is reflected in one of its numbers published scientific articles. However Until now, no research has been found that reveals how much research about Anguilla Bicolor Feed and what the field distribution is like studies related to those. Therefore, this research tries to collect as many maybe the result of research on Anguilla Bicolor Feed. Furthermore, from all published results Tracked research will be mapped using a computer application called VOSviewer. Thus this research it is hoped that this can answer the following problems: (1) how many studies have there been on Anguilla Bicolor Feed represented by the number of scientific publications from 2012 to 2023 (September); (2) articles with the highest number of citations (3) such as what is the publication development map research on Anguilla Bicolor Feed based on analysis co-words or keywords.

Method

Research data was obtained using data secondary, originating from articles from scientific journals. Year limited publication from 2012 to 2023. Data searched by using the Publish or Perish application, with the keyword "anguilla bicolor feed". Data that was found from searches are imported into the VOSviewer application in RIS (Research Information System) format and into Microsoft Excel in CSV (Comma Separated Value) format for processing. Data processing using

VOSviewer produce author/researcher maps, affiliate networks researchers, as well as a map of study topics in research eel. Meanwhile, data processing using Microsoft Excel produces data on publication trends, most citations and publisher sources.

Result and Discussion

Publications Trend by Year

Based on the data search through application reference manager Publish or Perish from the Google Scholar database, 200 data articles about "Anguilla Bicolor Feed" were found. The publication involved as many as 89 authors. The number of citations from all articles used in this study is 1288, the number of citations per year is 117.09, the number of citations per article is 6.44, the average author in the articles used is 2.98, 13 articles have h-index, and 31 articles have g-index. In detail the development of the publication about "Anguilla Bicolor Feed" by year are shown in the Figure 1. The graph starts from 2012 to 2023.

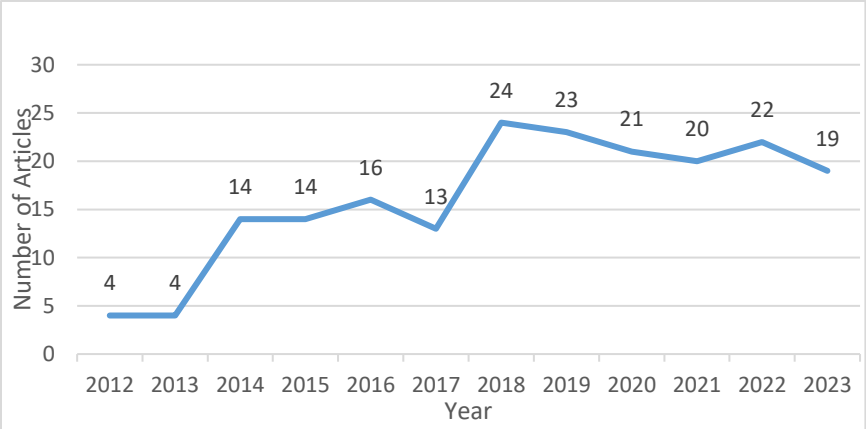

Figure 1. Graph of the development of the number of publications about Anguilla Bicolor Feed (2012-2023)

(source: Results of processed research data 2023)

From the graph it can be seen that the amount of the most publications about eels were in 2018 with a total of 24 titles published article. Meanwhile, there are the fewest publications were in 2012 and 2013 respectively as many as 4 article titles. Published in 2023 only until September 2023 so the number of publications this year does not reflect number of publications for one year of publication. Fluctuations in Anguilla Bicolor Feed research can be said to be good, because the trend is increasing every year. Data from published articles about eels on this research at least gives an idea about the researcher's interest in conducting research Anguilla Bicolor Feed.

Publication With The Highest Citations

The table 1 below is taken based on the 10 most citations from a total of 200 journals found.

Table 1. Anguilla Bicolor Feed Publication Data

No	Cites	Author	Title	Year	Publisher
1	434	IC Potter, JR Tweedley, M Elliott…	The ways in which fish use estuaries: a refinement and expansion of the guild approach	2015	Wiley Online Library
2	73	M Luo, R Guan, Z Li, H Jin	The effects of water temperature on the survival, feeding, and growth of the juveniles of Anguilla marmorata and A. bicolor pacifica	2013	Elsevier
3	70	AA MAHITALA	Efektivitas Substitusi Tepung Ikan dengan Tepung Maggot dalam Pakan Buatan terhadap Pertumbuhan dan Kelulushidupan Ikan Sidat (Anguilla bicolor) Fase Elver	2022	repository.unsoed.ac.id
4	47	T Arai, SR Abdul Kadir	Opportunistic spawning of tropical anguillid eels Anguilla bicolor bicolor and A. bengalensis bengalensis	2017	nature.com
5	37	T Arai, SR Abdul Kadir	Diversity, distribution and different habitat use among the tropical freshwater eels of genus Anguilla	2017	nature.com
6	28	E Feunteun, MJ Miller, A	Stable isotopic composition of anguilliform	2015	Elsevier

		Carpentier, J Aoyama…	leptocephali and other food web components from west of the Mascarene Plateau		
7	21	NS Nasruddin, MNA Azmai, A Ismail…	Histological Features of the Gastrointestinal Tract of Wild Indonesian Shortfin Eel, Anguilla bicolor bicolor (McClelland, 1844), Captured in Peninsular …	2014	hindawi.com
8	20	NW LESTARI, A BUDIHARJO…	Bakteri heterotrof aerobik asal saluran pencernaan ikan sidat (Anguilla bicolor bicolor) dan potensinya sebagai probiotik	2016	v2.smujo.id
9	19	K Asli	Nutritive value and fatty acids profile of fresh indonesian eel (Anguilla bicolor) and kabayaki	2014	core.ac.uk
10	16	K Rama Rao	A study on larvivorous fish species efficacy of lower Manair dam at Karimnagar, Andhra Pradesh, India	2014	academia.edu

Based on this data, the journal with the most citations was 434 cites in 2015 with the title "The Ways In Which Fish Use Estuaries: A Refinement And Expansion Of The Guild Approach" written by IC Potter, JR Tweedley, M Elliott and published by Wiley Online Library. Meanwhile, journal citations that are not shown in the data above amount to less than 16 citations.

Visualization of Anguilla Bicolor Feed Topic Area Using VOSviewer

The mapping visualization analysed in this study consists of 3 parts: network visualization (see Fig. 2), overlay visualization (see Fig. 3), and density visualization (see Fig. 4).

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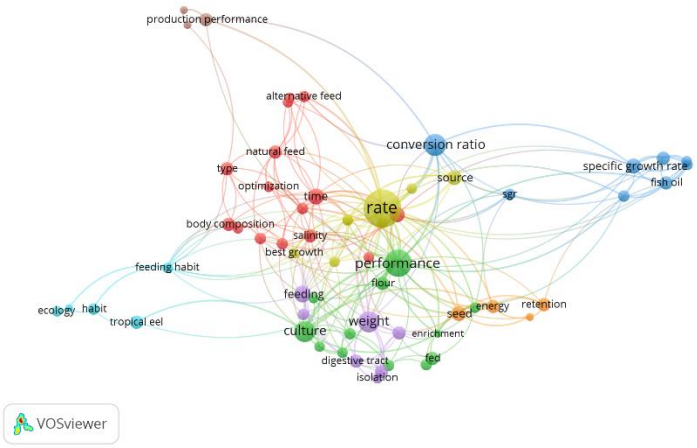

Fig 2. Network visualization of Anguilla Bicolor Feed keyword

From the Figure 2 it can be seen that some topics are quite prominent, such as: rate (39 studies), performance (20 research), and conversion ratio (13 studies). Meanwhile, other topics not as much as that topic. Lots of topics discussed are marked with fairly large circles. Meanwhile, several other topics are described with smaller circles, which means that the topic is not very well researched.

These keywords are grouped into eight clusters. Cluster-1 consists of 15 keywords marked in red, namely alternative feed, best treatment, body composition, feed intake, frequency, influence, maintenance, natural feed, nutritional content, optimization, proportion, salinity, temperature, time, and type. Cluster-2 consists of 12 keywords marked in green, namely amount, application, culture, enrichment, fed, flour, hour, impact, performance, production, productivity, and significant effect. Cluster-3 consists of 8 keywords marked in blue, namely conversion ratio, eel growth, feed efficiency, feed enrichment, fish oil, fishery, sgr, and specific growth rate. Cluster-4 consists of 8 keywords marked in yellow, namely best growth, growth promotion, rate, replication source, water exchange, water quality, and water system. Next, cluster-5 consists of 7 keywords marked in purple, such as digestive tract, eel species, feeding, fish feed, identification, isolation, and weight. Cluster-6 consists of 5 keywords marked in light blue are ecology, feeding habit gastrointestinal tract, habit, and tropical eel. Cluster-7 consists of 4 keywords marked in orange are energy, pasta feed, retention, and seed. The last one is cluster-8 consists of 3 keywords marked in brown, namely histology, production performance, and vertical aquaculture system.

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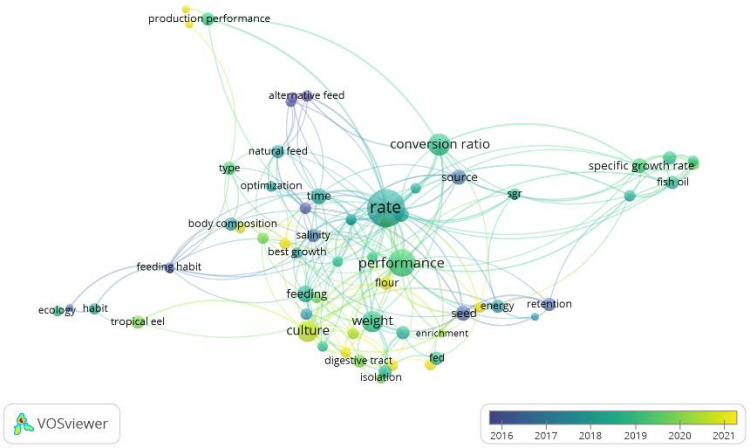

Fig 3. Overlay visualization of Anguilla Bicolor Feed keyword

Figure 3 shows an Overlay visualization that maps historical traces author in the Anguilla Bicolor Feed research. This mapping is characterized by the presence of nodes that have varying colors and edges that connect them topic with another topic. Dark colors on nodes indicate research has been carried out in the past from a predetermined time period. For example, in the image, the darkest node color (purple) represents the year 2016 and the brightest (yellow) represents the year 2023.

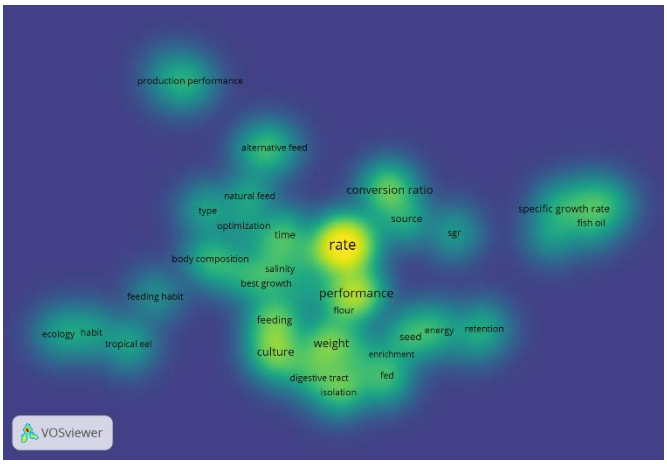

Fig 4. Density visualization of Anguilla Bicolor Feed keyword

From the density visualization results shown in Figure 4, it can be identified the presence of density or emphasis on nodes which means that the topic is researched on the keyword Anguilla Bicolor Feed has a relationship with each other. Additionally, level Node saturation in density visualization is indicated by the number of topics engage with other topics. As shown rate topics shows the brightest node density color, in other words the author conducted research by citing several topics alongside it as a form of research.

Conclusion

This research found that the number research on Anguilla Bicolor Feed represented by total publications as many as 200 titles involving as many as 89 authors or researchers. The publication contains the most research results on Anguilla Bicolor Feed "The Ways In Which Fish Use Estuaries: A Refinement And Expansion Of The Guild Approach" which contains 434 article cites. The most topics related to Anguilla Bicolor Feed the rate studied was 39 research, while the least researched are topics related to enrichment, pasta feed, gastrointestinal tract, and vertical aquaculture system with a number of studies a total of 8 studies. Thus then topics related to enrichment, pasta feed, gastrointestinal tract, and vertical aquaculture system have a great opportunity to be researched.

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