The prevalence of benedeniasis in humpback grouper (Cromileptes altivelis) in floating net cages in Situbondo Regency, East Java, Indonesia

S O Wijaya¹, S Subekti²,4* and Kismiyati³

¹ Bachelor Programme in Aquaculture, Faculty of Fisheries and Marine, Universitas Airlangga, Surabaya, Indonesia
² Department of Marine and Institute of Tropical Diseases, Universitas Airlangga, Surabaya, Indonesia
³ Department of Fish Health Management and Aquaculture, Universitas Airlangga, Surabaya, Indonesia
⁴ Institute of Tropical Diseases Universitas Airlangga, Surabaya, Indonesia

*Corresponding Author: ssbendryman@yahoo.com.

Abstract. Humpback groupers (Cromileptes altivelis) are a high value commodity that consumers demand at both the national and international level, including in places such as Hong Kong, Singapore, Japan, Taiwan and Thailand. They mainly desire juveniles (3-5 cm) as ornamental fish. The ideal consumption size (400-800 g) is desired as a supply of seafood for restaurants. This study aimed to determine the prevalence of Benedeniasis in humpback grouper in floating net cages in Situbondo Regency, East Java. The method used in this research was a survey method. The prevalence of Benedeniasis in the form of worms in floating net cage systems was 10%. The frequency of the infestation was classified as Often. There were differences in the prevalence of ectoparasites among the worms in the districts of Bungatan, Kendit and Panarukan.

1. Introduction
Grouper fish are a high-value marine fishery commodity because they have a broad market value and a relatively high price, especially if sold alive abroad in places such as Singapore, Taiwan and South China [1]. Grouper cultivation in Indonesia has begun to develop, especially using floating net cages in the sea. One of the problems that often interferes with the cultivation of fish is the emergence of disease, including disease caused by parasites [2].

Parasites can cause organ damage to the point where growth is inhibited. This can eventually cause death [3]. Parasites that usually attack humpback groupers include Benedenia epinepheli [4], Neobenedenia girellae [5], Pseudorhabdosynochus seabasi [6], Diplectanum grouper [6] and Haliotrema epinepheli [7].

The purpose of this study was to determine the prevalence of humpback grouper (Cromileptes altivelis) infested with Benedenia ectoparasite worms (Benedeniasis) in the floating net cages in Situbondo, East Java.

2. Materials and methods
The equipment used included a plastic bucket, oxygen and plastic bags. The equipment used for the identification of ectoparasites included a binocular microscope, Lucida camera, scalpel, scissors,
specimen storage pots, object glass and cover glass. The equipment used for measuring the water quality included pH paper, a DO test kit and an ammonia test kit.

This research study was conducted using a survey method. The sampling was carried out in three locations of Situbondo regency cultivation: Bungatan sub-district, Kendit sub-district and Panarukan sub-district. The sampling in Bungatan and Kendit sub-districts took as many as 15 heads from each cage with a total of 60 heads from each sub-district from within four cages. In Panarukan sub-district, 20 samples were taken from two floating cages, making up 10% of the total population. The ectoparasite worm examination included all body parts, in addition to the fins and gills. The examination was carried out by scraping the surface of the body, fins and tail. For the gill examination, this was conducted by taking one gill that was suspected of showing symptoms of infection. Finally, the scrapings were checked under a microscope with a 100x and 400x magnification respectively. Coloring was done used the Semichen Acetic Carmine method, which refers to modified Kuhlmann (2006) [8].

3. Results and discussion

The identification results determined there to be one type of ectoparasite worm, *Benedenia epinepheli*. *Benedenia epinepheli* belongs to the Monogenea sub-class, and has a flat body shape and a disc on the posterior side. It is equipped with three pairs of accessory sclerites, anterior and posterior hamuli and 14 hooklets that surround the disc with a wavy pharynx on the anterior part of the body. This parasite was primarily found on the surface of the body.

![Image](image_url)

**Figure 1.** *Benedenia epinepheli*. Images taken using Acetic Carmine staining and with a binocular microscope equipped with a Lucida camera; bar scale = 0.1 mm.

Remarks: (Ad) adhesive organs; (Ey) eye spots; (Px) pharynx; (P) penis; (RAD) RAD gland; (Ov) ovary; (T) testes; (Op) Opisthaptor; (V) vitellaria; (As) Accessory sclerite, (Ah) anterior hamuli; Posterior hamule.
The results showed there to be different prevalence rates between Bungatan, Kendit and Panarukan sub-districts. In Bungatan sub-district, Benedenia epinepheli had a 10% prevalence rate (‘often’ category). In the Kendit sub-district, there were no ectoparasite worms found, so the prevalence was 0% (‘almost never’ category). In Panarukan sub-district, the researcher found the parasite with a prevalence rate of 58.33% (‘frequently’ category). The total prevalence rate of Benedeniasis in Situbondo regency was 25.63 % (‘often’ category).

The prevalence rate in Panarukan sub-district showed the highest presence of ectoparasite worms, which was 58.33%. This is because the cage was in a dirty condition. Dirt can be used as an attachment for Benedenia worm eggs. According to Usman (2011), they stated that the cages were cleaned minimally every month. Dirty net cages are a medium for attaching parasites and other microorganisms, and it also disrupts the water circulation [9]. Besides that, high currents can also affect the presence of Benedenia epinepheli because high currents can cause the fish stress and Benedenia epinepheli infestation will therefore be higher. The lowest prevalence was in Kendit sub-district, where the prevalence rate was 0%. This is because the cages were in a cleaner condition compared to Bungatan and Panarukan sub-districts. According to Diba (2009), the low prevalence rate was caused by the endemic conditions of the parasite, the adaptability of the parasites to the host body, the suitability of the host for parasite survival and environmental quality [10]. In addition to this, low stocking density also affects the presence of ectoparasitic worms. This is because the space and food for the fish is still in a normal condition; therefore there is no competition in terms of finding food and space.

4. Conclusion
The prevalence rate in Bungatan sub-district for Benedenia was 10% (‘often’ category). In Kendit sub-district, there were no ectoparasite worms found; the prevalence rate was 0% (‘almost never’ category). In Panarukan sub-district, the parasite had a prevalence rate of 58.33% (‘frequently’ category) and the total prevalence rate of Benedeniasis in Situbondo regency was 25.63 % (‘often’ category).

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