The Effects of Dietary Supplementation with Fan-shaped Jelly Fungus (*Dacryopinax spathularia*) on Color Intensity, Growth Performance and Reproductive System of *Betta splendens*

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ABSTRACT

Siamese fighting fish (*Betta splendens*) is one of the most popular freshwater ornamental fish in the world, which is renowned for their vibrant colors, diverse tail shape and fighting ability. Fan-shaped jelly fungus (*Dacryopinax spathularia*), a significant edible source of protein, vitamins, and high levels of carotenoids, is commercially cultivated for usage as an additive in the food industry with potential applications in animal feed for color enhancement. This study aimed to investigate the effects of dietary supplementation with D. *spathularia* on coloration, growth performance and reproductive development of B. *splendens*. A total of 30 Siamese fighting fish (15 males and 15 females), divided into 3 groups (control group, 5% fungus diet group, and 10% fungus diet group), were reared and fed once a day with D. *spathularia* supplemented diets for 10 weeks. Body weight, body length, tail length, color intensity (RGB: Red, Green, Blue), visceral organ weight, ovary weight, and water quality were recorded and analyzed. According to results of this experiment, it revealed that tail length, body weight and visceral weight were increased significantly only in female with the highest number in 5% fungus fed group. While no significant differences were recognized in body length, visceral organ weight in the same sex of different groups. Regarding coloration, each group exhibited different levels of dominance in Red (R), Green (G), and Blue (B) intensities on both the body and tail. In body part, red color intensity has the highest number in 10% fungus fed males, while the blue and green color intensities have the highest number in control males. In caudal part, red and green color intensity are the highest in 10% fungus fed females, whereas Furthermore, blue color intensity is the highest in 5% fungus fed males. The addition of D. *spathularia* into the diets did not cause adverse effects on water quality. These findings suggest that supplementation of *Dacryopinax spathularia* influences the development of color intensity and growth performance in *Betta splendens*.

INTRODUCTION

The Siamese fighting fish (*Betta splendens*) is a freshwater fish native to Thailand, widely distributed across nearly every region of the country. It is highly popular both domestically and internationally, being cultivated for traditional sporting purposes and as a prominent ornamental pet worldwide. Simultaneously, the fan-shaped jelly fungus (*Dacryopinax spathularia*), belonging to the Dacrymycetaceae family, is globally distributed, particularly in temperate and subtropical zones, including Thailand. This fungus contains a diverse array of nutrients and is notably rich in carotenoids. The aesthetic value of a Betta fish primarily depends on its color intensity and fin characteristics, which are the key factors determining its market price in the ornamental fish industry. However, Betta fish sold in general pet stores often face a decline in color vibrancy over time because they cannot synthesize carotenoid pigments endogenously. Therefore, this research aims to investigate the effects of *Dacryopinax spathularia* supplementation on the color intensity development and growth performance of the Siamese fighting fish (*Betta splendens*).



Figure 1: Betta fish

credit: mgronline.com



Figure 2: Fan-shaped jelly fungus

credit:pr2travel.com

OBJECTIVES

To investigate the effects of Fan-shaped jelly fungus (*Dacryopinax spathularia*) supplementation on the enhancement of color intensity and the growth performance of Veiltail Bettas (*Betta splendens*).

CONCLUSION

- Color Enhancement: Supplementation effectively boosted color intensity, particularly **Red Intensity**. The **10% concentration** yielded the highest red values in both body and tail zones without suppressing blue or green expression.
- Growth Performance: A 5% concentration was optimal for body weight gain (especially in females), while the 10% concentration significantly promoted body length in females.
- Safety & Water Quality: All supplementation levels were safe; pH levels remained within the optimal range for Betta fish.
- Reproductive System: Supplementation showed no significant effect on the reproductive development of either male or female specimens.

ACKNOWLEDGEMENT

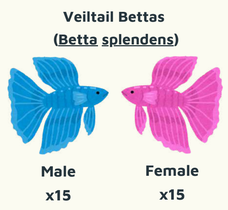
- Assistant Professor Dr. Boonsom Bussabun (Co-Project Advisor)
- Assistant Professor Dr. Nattawadee Nantarat (Seminar Committee)
- Ms.Chanoknun Khamsan (Research Assistant)
- Ms.Watcharapond Kantarun (Zoology laboratory staff)
- Division of Zoology, Department of Biology, Faculty of Science, Chiang Mai University

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- Sharma, B. P., Mishra, S., & Kumar, S. (2024). *Dacryopinax spathularia*: A wild nutraceutical mushroom of India. Journal Name/Publisher Information. https://ph01.tci-thaijo.org
- Thapiang, P., Sermwatanakul, A., & Saksiri, P. (2011). Effects of crude extract from marigold flower (*Tagetes erecta*) supplementation in diets on skin coloration of Siamese fighting fish (*Betta splendens*). Thai Fisheries Gazette, 64(4), 335-341.

METHODOLOGY

Buying fish



- Buying Betta fish from ornamental fish shop
- The fish were selected based on their healthy condition, uniform body size, and similar age

Prepare fish pellets

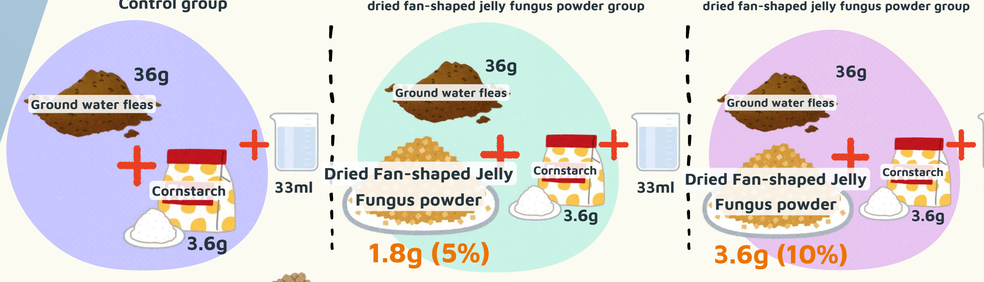
Prepare dried fan-shaped jelly fungus powder



- The *Dacryopinax spathularia* were cleaned using a soft brush.
- Dehydrated in an oven at 50 – 60°C for 6–10 hours.
- Finely ground into powder

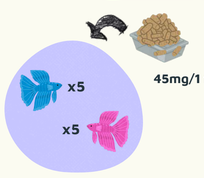
Dried D. *spathularia* powder kindly provided by Asst. Prof. Dr. Boonsom Bussabun

Prepare fish pellets



- Dehydrated in a hot air oven at 80°C for 10 min.

Feeding



- The fish were fed once daily throughout the 2-month experimental period.
- Water was changed every 4 days, and the fish tanks were cleaned on a monthly basis.

Data collection

- Body weight, body length and tail length were measured and photographed (every weeks)
- Water pH (every 4 days)
- At the end of the experiment, internal organs and ovaries were weighed and photographed for both male and female specimens

Statistical methods

(credit:gpandradep.github.io)

- All collected data were organized and processed using Microsoft Excel.
- The RGB color intensity data were analyzed using RStudio. A Two-way ANOVA was performed to determine the effects of dietary concentration and gender. Using Tukey's HSD (Honestly Significant Difference) test at a significance level of 0.05 ($p < 0.05$).

RESULT

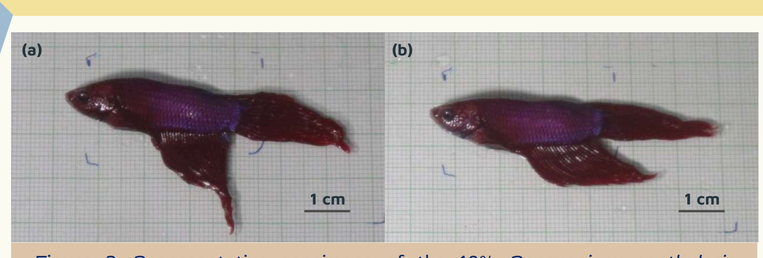


Figure 3: Representative specimens of the 10% *Dacryopinax spathularia* concentration group: (a) Male specimen in the first week; (b) Male specimen in the final week.

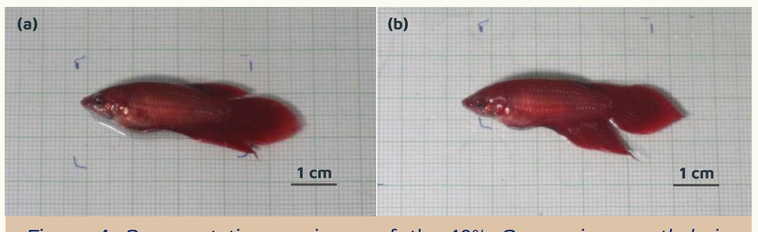


Figure 4: Representative specimens of the 10% *Dacryopinax spathularia* concentration group: (a) Female specimen in the first week; (b) Female specimen in the final week.

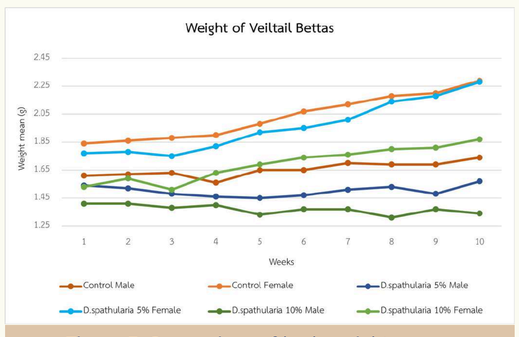


Figure 5: Comparison of body weight across experimental groups of *Betta splendens*

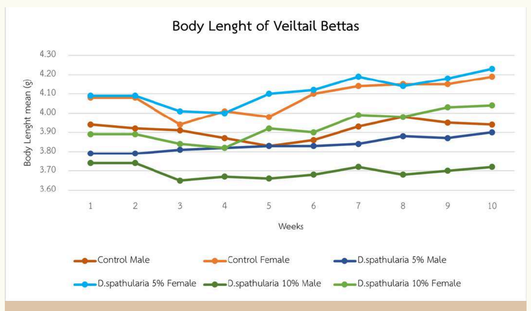


Figure 6: Comparison of body length across experimental groups of *Betta splendens*

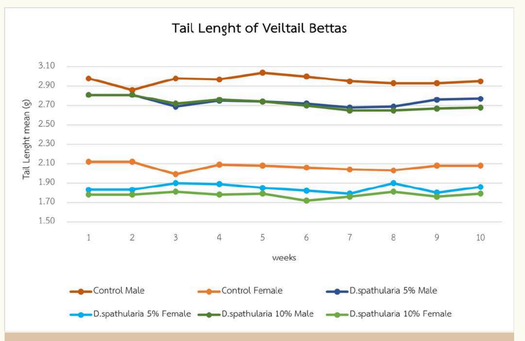


Figure 7: Comparison of tail length across experimental groups of *Betta splendens*

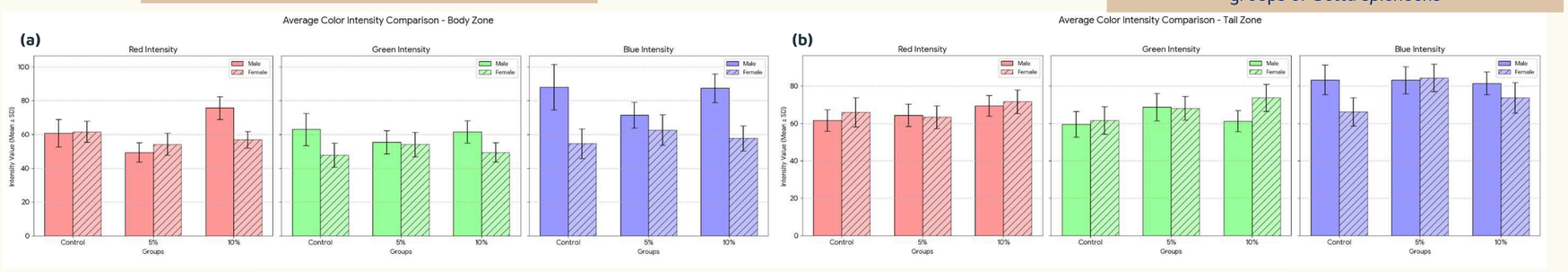


Figure 8: Comparison of the average color intensity of *Betta splendens* across experimental groups: (a) Body zone; (b) Tail zone

Regarding water quality, the pH values across all three experimental groups showed no significant differences, ranging from a maximum of 6.84 to a minimum of 6.78. Additionally, measurements of internal organ and ovarian weights revealed no significant differences among the three groups for both male and female specimens. Similarly, the ovarian weight in females did not differ significantly across all treatments.