ENVIRONMENTAL CONTROL OF GONADAL DEVELOPMENT IN THE FEMALE BLACKTIP GROUPER *EPINEPHELUS FASCIATUS*

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Introduction:

Photoperiod and temperature are potent environmental factors in regulating cyclic physiological and behavioural events in temperate fishes. It is not still unclear how fishes utilize environmental changes for their reproductive activity. The aim of the present study was to examine the involvement of photoperiod and temperature in ovarian development of the blacktip grouper *Epinephelus fasciatus*, which has been declined in Jeju Island, Korea, due to overfishing, and to commercial production of the species.

Methods:

Blacktip grouper broodstock was maintained at a 1:1 sex ratio in 500 L circle tanks. During March 2010, the photoperiod and water temperature was adjusted to 12L:12D and 22℃, respectively. In the treatment group, every 3 weeks daylight was increased as follows a 13L:11D and 14L:10D, and control group was maintained at 12L:12D. After 9 weeks water temperature was increased 25℃ both treatment and control group. Every 3 weeks fish sampled, and gonads were removed, weighed and fixed for histological analysis.

Results and Discussion:

The GSI (0.5±0.25) and oocytes diameter (60.9±3.4 μm) of the female blacktip gouper under all photoperiod conditions (12L:12D, 13L:11D and 14L:10D) at water temperature of 22℃ was maintained at low levels. However, GSI of the fish reared under photoperiod conditions of 14L:10D at water temperature of 25℃ increased highly to 4.5±0.45 (Fig. 1A). Moreover, highly developed oocytes at the yolk stages were observed in these conditions (Fig. 1B). In the sevenband grouper, sexual maturation induced at photoperiod of 14L:10D and water temperature of 18.5℃ conditions [1]. These results suggested that the long photoperiod of 14L:10D and high water temperature of over 25℃ were essential environmental factors for the reproductive activity of the female blacktip grouper.

Conclusion:

This study shows that environmental factors play an important role on the gonadal maturation in female blacktip grouper. A short daylength (12L:12D and 13L:11D) and low temperature (under 25℃) inhibits the oocyte development. However, long daylength (14L:10D) and high water temperature (25℃) conditions strong influence to gonadal maturation of the blacktip grouper. Photoperiodic and temperature variations appear to both plays a crucial role in the control of the blacktip grouper reproduction.

Acknowledgements:

This research was supported by development of the suitable systems for aquaculture of blacktip grouper, *Epinephelus fasciatus*, Ministry for Food, Agriculture, Forestry and Fisheries, Republic of Korea.

References:

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Fig. 1. Change of gonadosomatic index (GSI), oocyte diameter and ovarian development of female blacktip grouper in control and treatment group during experimental period. Scale bars indicate 200 μm