

**STRESS RESPONSE OF RED TILAPIA (*Oreochromis* sp.)  
AS AFFECTED BY DIFFERENT STOCKING  
DENSITIES**

by

**MARIA FE ODULLO PARAMBITA**

An Undergraduate Thesis presented to the faculty of the College of Fisheries in partial fulfillment of the requirements for the degree of

**BACHELOR OF SCIENCE IN FISHERIES**

**DEPARTMENT OF AQUACULTURE  
COLLEGE OF FISHERIES  
CENTRAL LUZON STATE UNIVERSITY  
Science City of Muñoz, Nueva Ecija  
Philippines**

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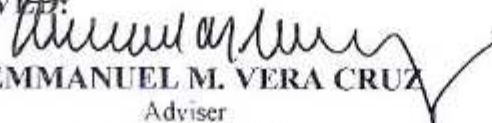
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## STRESS RESPONSE OF RED TILAPIA (*Oreochromis* sp.) AS AFFECTED BY DIFFERENT STOCKING DENSITIES<sup>1/</sup>

### ABSTRACT

This study aimed to evaluate the effects of different stocking densities on the stress responses of red tilapia (*Oreochromis* sp.) when exposed to physical stressor. The physical stressor applied was the chasing net applied for 60 seconds. There were four treatments namely, T1 (control) with a single fish, T2 - the 3-fish group, T3 - 6-fish group, and T4 - 10-fish group. T2, T3 and T4 were applied with the chasing net or the physical stressor. The effects were identified through the stress indicators namely, eye color pattern (ECP) and ventilation rate (VR).

Mean ECP values in the four treatments during the entire duration of the study were significantly different ( $P < 0.05$ ) from each other. T3 ( $4.26 \pm 0.51$ ) had the significantly highest ECP value among the four treatments, this was followed by T4 ( $3.48 \pm 0.72$ ), T2 ( $3.31 \pm 0.48$ ) and T1 ( $2.41 \pm 0.35$ ) had the significantly lowest ECP value.

Comparison of the mean VR values during the entire observation period showed that they were significantly different from one another. The significantly highest mean was observed on the T4 ( $2.10 \pm 0.41$  beats/sec), followed by T3 ( $1.99 \pm 0.51$  beats/sec), then T1 and T2, with the values  $1.90 \pm 0.55$  and  $1.64 \pm 0.74$ , respectively.

There was an increase in the mean ECP values in T4 right after the application of the stressor with the value  $3.33 \pm 1.14$  to  $3.50 \pm 0.25$  in comparison to other treatments (T2 and T3) with reduced ECP values. However, no significant difference was observed in all the treatments in the ECP values right after the application of the stressor. The VR values of all the treatments (T2, T3 and T4) applied with the stressor increased right after the application of the stressor (0 mins).

T2 (3-fish group) had the highest mortality rate of 44.44% compared to the other treatments. It was followed by T4 (10-fish group), then T3 (6-fish group), with 33.33% and 27.78%, respectively. The highest fish mortality may be attributed to the high occurrence of social dominance, in the 3-fish group, unlike in the 6-fish group and the 10-fish group, wherein the number of organisms in the experimental unit only slightly affected the occurrence of social dominance.

Positive correlation was observed between the mean VR and mean ECP ( $r = 0.023$ ;  $P > 0.05$ ;  $n = 44$ ) although the relationship was not significant. This indicates that fish which has a paler ECP value generally has a lower VR values also.

In conclusion: (1) there are greater stress responses (i.e. changes in ECP and VR) in fish held at high stocking density when they are exposed to physical stressor; (2) there is higher mortality rate at lower stocking density because of the effect of density on social interaction and the establishment of social hierarchy; and 3), there is a positive but not significant relationship between ECP and VR but ECP is a more reliable stress indicator than VR under this stressful condition. Thus, ECP could be used as effective, easy and inexpensive stress indicators.

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