COMPONENT ANALYSIS ON THE GROWTH PERFORMANCE OF TILAPIA STOCKS REARED COMMUNALLY IN TANKS AND CAGE, WITH REFERENCE TO MICROSATELLITE VARIATION

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Abstract

The relationship between growth variation and microsatellite DNA polymorphism in several Nile (GIFT, FAC-selected, SEAFDEC-selected and NIFI or Tha-Chitralada) and red tilapia (BFS, NIFIred and HL) stocks reared communally in two farm environments was determined. Growth (length at 12 weeks or GRO12) differed significantly in the tank-reared stocks where FAC-selected (GRO12 = 10.51cm; P = 0.011 and HL (GR012 = 9.10cm; P = 0.005) outperformed the other Nile and red tilapia stocks, respectively. Genetic effect explained 78.3%- 80.6% of the variance in tilapia growth in tanks while no significant stock differences were noted for their growth in cages. An ANOVA on growth in cages showed no significant difference among the stocks (Nile tilapia, P = 0.491; red tilapia, P = 0.313), with the stock effect explaining only 28.1%-34.4% of the variance in growth. In spite the differential growth response of the tank–reared stocks, results indicated that growth was greatly affected by culture management more than by genetic stock variation, as all of the stocks generally grew better in cages than in tanks. Individual genetic diversity, expressed as multilocus heterozygosity (MLH) and mean squared allelic distance (mean d^2), did not influence growth since no correlation was found between final length and microsatellite variation at three loci (UNH216, UNH172 and UNH 123). An ANOVA on the growth of Nile and red tilapia individuals belonging to specific stocks then grouped into multilocus heterozygosity classes generally showed no significant MLH effect ($P>0.05$). Spearman rank correlation analysis likewise did not indicate any significant positive relationship between mean d^2 and residual final length in the stocks from the different enclosures (r_{59} = -0.142 and r_{51} = -0.153 for tank- and cage-reared Nile tilapia: r_{71} = -0.135 and r_{63} = 0.050 for tank- and cage-reared red tilapia). The lack of association between growth and genetic variation implies that based on the three markers, increased microsatellite diversity levels in cultured Nile and red tilapia are not reliable indicators of the stocks' relative growth performance. Efficient culture management schemes may be more relevant in improving growth of farmed Asian Nile and red tilapia stocks.