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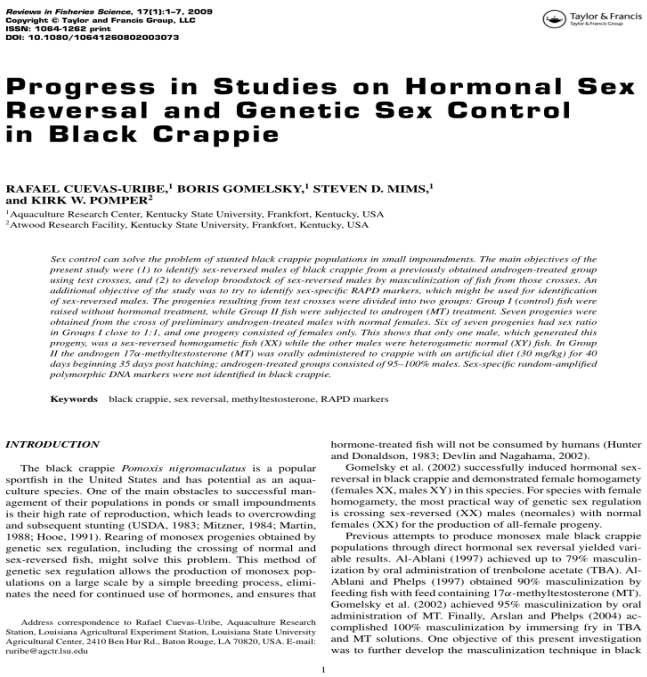

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Progress in Studies on Hormonal Sex Reversal and Genetic Sex Control in Black Crappie

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Sex control can solve the problem of stunted black crappie populations in small impoundments. The main objectives of the present study were (1) to identify sex-reversed males of black crappie from a previously obtained androgen-treated group using test crosses, and (2) to develop broodstock of sex-reversed males by masculinization of fish from those crosses. An additional objective of the study was to try to identify sex-specific RAPD markers, which might be used for identification of sex-reversed males. The progenies resulting from test crosses were divided into two groups: Group I (control) fish were raised without hormonal treatment, while Group II fish were subjected to androgen (MT) treatment. Seven progenies were obtained from the cross of preliminary androgen-treated males with normal females. Six of seven progenies had sex ratio in Groups I close to 1:1, and one progeny consisted of females only. This shows that only one male, which generated this progeny, was a sex-reversed homogametic fish (XX) while the other males were heterogametic normal (XY) fish. In Group II the androgen 17α-methyltestosterone (MT) was orally administered to crappie with an artificial diet (30 mg/kg) for 40 days beginning 35 days post hatching; androgen-treated groups consisted of 93–100% males. Sex-specific random-amplified polymorphic DNA markers were not identified in black crappie.

Keywords black crappie, sex reversal, methyltestosterone, RAPD markers

INTRODUCTION

The black crappie *Pomoxis nigromaculatus* is a popular sportfish in the United States and has potential as an aquaculture species. One of the main obstacles to successful management of their populations in ponds or small impoundments is their high rate of reproduction, which leads to overcrowding and subsequent stunting (USDA, 1983; Mitzner, 1984; Martin, 1988; Hooe, 1991). Rearing of monosex progenies obtained by genetic sex regulation, including the crossing of normal and sex-reversed fish, might solve this problem. This method of genetic sex regulation allows the production of monosex populations on a large scale by a simple breeding process, eliminates the need for continued use of hormones, and ensures that hormone-treated fish will not be consumed by humans (Hunter and Donaldson, 1983; Devlin and Nagahama, 2002).

Gomelsky et al. (2002) successfully induced hormonal sex-reversal in black crappie and demonstrated female homogamety (females XX, males XY) in this species. For species with female homogamety, the most practical way of genetic sex regulation is crossing sex-reversed (XX) males (neomales) with normal females (XX) for the production of all-female progeny.

Previous attempts to produce monosex male black crappie populations through direct hormonal sex reversal yielded variable results. Al-Ablani (1997) achieved up to 79% masculinization by oral administration of trenbolone acetate (TBA). Al-Ablani and Phelps (1997) obtained 90% masculinization by feeding fish with feed containing 17α-methyltestosterone (MT). Gomelsky et al. (2002) achieved 95% masculinization by oral administration of MT. Finally, Arslan and Phelps (2004) accomplished 100% masculinization by immersing fry in TBA and MT solutions. One objective of this present investigation was to further develop the masculinization technique in black

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