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COHO SALMON DIPLOID GYNOGENESIS - A SHORT-CUT TOWARDS MONOSEX FEMALE MILT PRODUCTION

One of the main reasons for interest in the induction of gynogenesis is its potential for the production of monosex populations. Gynogenesis is a form of all-maternal inheritance in which eggs are activated to develop using sperm which does not genetically contribute to the genome of the embryo. To prevent paternal genetic contribution (including the "Y" male determining sex chromosome) the sperm is irradiated using ultraviolet light. Use of sperm from a related species which results in inviable hybrids is preferable. The normal diploid condition of the developing gynogenetic embryo is achieved through retention of the chromosome set that would normally be lost by reduction division or meiosis. Gynogenetic diploids can be produced by application of treatments similar to those used to induce triploidy, i.e., heat or pressure shock.

In cases where the female is homogametic ("XX" sex determination) the masculinization of gynogenetic progenies by androgen treatment provides a means of quickly producing males of female genotype which at maturity can produce monosex sperm for the generation of all-female populations.

Several years of research and development at the West Vancouver Laboratory have made available to the mariculture industry monosex stocks of chinook salmon produced by an indirect method which requires the masculinization of first, mixed sex progenies, and second, monosex female progenies. This approach applied to coho salmon has not yet resulted in the identification of all-female progenies.

A significant step towards this goal has recently been achieved using the diploid gynogenesis technique. Flow cytometric and histological analysis of samples from groups of coho salmon produced by fertilization of ova with irradiated sperm followed by heat or pressure shock showed that several diploid monosex female groups had been produced. The most successful treatments were a heat shock of 26°C for 20 min and a pressure shock of 11,000 p.s.i. for 4 min, both starting 25 min post-fertilization. Mean survival to the eyed-stage in two replicates of each treatment was 66 and 70%, respectively. One of each of these replicates were masculinized and they are currently being reared at the West Vancouver Laboratory. rogeny testing of these fish will be done at maturity.

Similar procedures were carried out this fall on Atlantic salmon using irradiated sperm from rainbow trout. The technique is also very promising for the generation of new genetic sources of monosex sperm from chinook salmon.

We believe that the preliminary results achieved in coho take us one step closer to the production of monosex female milt from coho salmon and the development of alternative sources of monosex chinook.

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