INTRODUCTION

1. INTRODUCTION

The worldwide aquaculture industry depends on the availability of low cost, high quality feeds. Over a few decades, fish nutritionists have evaluated alternate sources of protein both of animal and plant origin in fish diets as partial or total replacement for fish meal (**Lim and Sessa, 1995**). Among plant proteins, cottonseed meal (CSM), a by-product of the cottonseed processing industry, has been tested in numerous fish species including tilapia *Sarotherodon mossambicus* (**Jackson *et al.*, 1982**) and *Oreochromis niloticus* (**El-Sayed, 1990; Rinchard *et al.*, 2000; Mbahinzireki *et al.*, 2001**), channel catfish *Ictalurus punctatus* (**Dorsa *et al.*, 1982; Robinson *et al.*, 1984 a and b; Robinson and Brent, 1989; Robinson and Li, 1994; Robinson and Tiersch, 1995**), chinook salmon *Oncorhynchus tshawytscha* and coho salmon *O. kisutch* (**Fowler, 1980**), and rainbow trout *Oncorhynchus mykiss* (**Dabrowski *et al.*, 2000 a, b, and 2001; Blom *et al.*, 2001**). Economically, CSM is the third largest oil-seed meal product in world production after soybean and rapeseed meal (**USDA, 2000**) and seems to be an interesting substitute for fish meal. CSM is widely available and ranked first among plant proteins produced in Egypt. Nutritionally, CSM contains high levels of proteins (**Forster and Cahloun, 1995**) and is very palatable to fish (**Robinson and Li, 1995**). However, the presence of gossypol, a yellow polyphenolic pigment found in the whole cotton plant, and the low level of lysine in CSM limit its use in diet formulation for monogastric animals. In short-term feeding experiments (4 and 8 months), **Dabrowski *et***

al. **(2000 a and 2001)** and **Blom *et al.* (2001)** showed that in market size or broodstock rainbow trout, respectively, growth and survival of both genders were not affected by complete replacement of fish meal (FM) by CSM. Moreover, CSM did not alter reproductive indicators such as plasma sex steroid hormones, sperm motility, and sperm fertilizing ability. In contrast, the long-term feeding experiment (22 months) with CSM impaired reproduction of males. Plasma levels of 11-ketotestosterone, a major steroid in male salmonid, significantly decreased in rainbow trout fed a diet in which fish meal was replaced by CSM at 75% and 100% (**Dabrowski *et al.*, 2000 b**).

To increase the use of cottonseed products in animal feeds, the gossypol toxicity imposed on nutritional and reproductive events has been extensively studied and reported (**Velasquez-Pereira *et al.*, 2002**) and preventive measures have been sought. The deleterious effects of gossypol and the use of CSM in feeds on nutritional and reproductive performance during several reproductive cycles in salmonid have not been studied until now, unlike in ruminants or non-ruminant terrestrial animals. Furthermore, a lack of consistency in the results of a few studies on fish was noticeable due to the variation in fish size and species and duration of CSM feeding with or without supplementation of lysine which is a limiting amino acid in the presence of gossypol (**Henry *et al.*, 2001**). A series of studies was conducted on the utilization of CSM and toxicity of gossypol to broiler chicks (**Mbahinzireki *et al.*, 2001; Dabrowski *et al.*, 2000 a, and 2001; Blom *et al.*, 2001; Lee *et***

_al.,_ 2002; Lee and Dabrowski, 2002; Rinchard _et al.,_ 2002, and 2003).

The present work aims to evaluate the effect of partial or complete replacement of FM by CSM in tilapia diets as well as the utilization of α- tocopherol (vit.E) as an antioxidant for avoiding the side effects of feeding CSM. Moreover, the present work aims at assessing the possibility of introducing Tilapia as an experimental model.