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Faculty of Veterinary Medicine

Department of Fish diseases & management

Effect of some herbal extracts on the health status of cultured *Oreochromis niloticus*

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(B.V.Sc.2011, sadat University)

For the degree of

Master in veterinary Medical Science

(Fish diseases and management)

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Abstarct

The present study was conducted to determine the effect of (green onion leaves-barley seeds-rice straw) extracts on growth, some physiological parameters and immunity of tilapia fish. The experiment was carried in 21 glass tank for 60 days. Seven experimental diet were formulated at 25% crude protein representing the following levels {control (0), OE (0.5) OE (1), BE (0.5), BE (1), RE (0.5) and RE (1) g/kg diet} .210 fish (wt. 30±5g) were fed twice daily 3% of body weight. At the end of experiment there was significant increase ($P < 0.05$) in weight gain in groups fed OE and BE extracts (0.5-1g)/kg diet. After 8 weeks, serum lysozyme activity, phagocytosis showed significant increase in groups fed OE and BE extracts while there is no effect in fish fed RE extract. The analysis of AST, ALT, and ALP showed no significant changes in all treated groups. Globulin level increased in OE and BE groups. No changes in RBC_S count and HB level were detected in all groups while there was significant increase in WBC_S count in OE and BE groups. The blood glucose level showed significant decrease in OE groups than control one. The result of this study demonstrated that OE and BE could improve growth and fish immunity.

(OE= Onion leaves extract, BE= Barley seed extract, RE= rice straw extract).

Key words

Tilapia, growth, immunity, *Areomonis hydrophila* , herbal extracts.

TO WHOM I LOVE…….

My son Mazen

FATHER, MOTHER, AND ALL MY FAMILLY

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INTRODUCTION

Aquaculture accounts for more than 65% of fish available in the market. Nile tilapia is one of the most economical freshwater fishes due to its excellent biological characteristics as fast growth, popular taste and high economic value (**FAO, 2014**).

As the demands for fish increased nowadays so many fishes are being cultured at intensive levels especially those belonging to family *Cichilidae* **(Mokoro *et al.*, 2014)**

Efforts have been made to increase productivity per unit space by increasing the rearing density. This may lead to some stresses namely overcrowding, transport, handling, grading, poor water quality, sudden changes in temperature and poor nutritional status that tend to adversely affect the health of cultured fish **(Li *et al.*, 2004).** The improper conditions in aquaculture environment lead to suppression of the immune system and facilitate the spread of pathogens, producing high mortality rates **(Quesada *et al.*, 2013 and Guo *et al.*, 2015).**

The regular administration of antimicrobials and other chemicals as feed additives lead to the spread of bacterial resistant strains **(Cabello, 2006; Rico *et al.*, 2013).** It is also cost effective and contaminates the aquatic ecosystems by leaving the harmful residues **(Romero Ormazábal *et al.*, 2012)**. So the use of most chemicals is becoming more restricted in many countries **(Seyfried *et al.*, 2010)**.

Vaccination is also considered to be a potential control measure against disease outbreaks in aquaculture but they are too expensive and difficult in its application on wide range (**Harikrishnan *et al.*, 2011b**).

Using of immuno stimulants in aquaculture as feed additives is being encouraged nowadays because they have many advantages over chemotherapeutics and vaccination as they are safe, easily applied to various species and more effective in controlling fish diseases. They are also having a growth promoting and an immunostimulatory effect **(Apines-Amar *et al* 2013).** In fish culture, the maintenance

of a healthy marketable product is achieved by a good nutritional status **(Bello *et al;* 2012).**

Plants have many bioactive compounds as phenolic, polyphenolic, alkaloid, quinine, terpenoid, flavonoid and polypeptide compounds which can enhance the non-specific defense mechanisms and so increase fish resistance to diseases. (**Shukla *et al.,* 2014**).The immunostimulants from natural sources may be an alternative to the antibiotics and vaccines as the natural organic materials do not cause any threat to fish health, to the environment and to fish consumers (**Talpur *et al.,* 2013; Reverter *et al.,* 2014)**.

Among these plants, onion (*Allium cepa*) contains flavonoid compounds which act as growth promoters and immunostimulants in fish **(Scalbert and Williamson, 2000).** Also, onion has a prebiotic effect due to high soluble fibers (**Binaii *et al.,* 2014).** It has also been known to have antibacterial and antioxidant effects **(Ramos *et al.* 2006)**. There are many studies indicated that onion was one of the most effective dietary additives tested that improve lysozyme activity and act as an immunostimulant as in juvenile olive flounder (*Paralichthys olivaceus*) **(Cho and Lee 2012)**.

Another plant is Barley (*Hordeum vulgare*), a member of the grass family, *Poaceae*, is one of the main cereal crops grown around the world (**Madhujit *et al.,* 2006**). They contain a wide array of phytochemicals, primarily phenolic compounds including flavonols, phenolic acids and procyanidins. Some studies on the antioxidant activity and phenolic contents of barley have been reported in the literature (**Karppinen *et al.,* 2003**). The major phenolic components in barley seeds are ferulic, caffeic, and vanillic acids (**Madhujith *et al.,* 2004)**.

Rice straw (*Oryza sativa*) is one of the ligno-cellulosic plants. It makes pollutions in the environment due to its disposal by burning. Therefore we try to find a new method for utilization and disposal **(Van Soest 2006)**.

Therefore this study was planned to fulfill:-

1-Extraction of the most active ingredient in some plant extracts namely green onion leaves, barley seeds and rice straw.

2- Studying the effect of these plant extracts on the health status of cultured Nile tilapia (*Oreochromis niloticus*) as interpreted by growth promotion and immunostimulation.

3- Monitoring the prophylactic efficacy of such herbal extracts as assessed in ***Areomonas hydrophila*** experimental challenge of healthy cultured *Oreochromis niloticus*.

REVIEW OF LITERATURE

(1) Importance of herbals in fish feed and the most active ingredient in the herbal extracts

- **A. Importance of herbals in fish feed**
- **B. The most active ingredient in the herbal extracts**

(2)Herbal plants as growth promoters

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(1) Importance of herbals in fish feed and the most active ingredient in the herbal extracts:-

A. Importance of herbals in fish feed:-

Raa *et al.* (1992) recorded that the using of immunostimulants as prophylactic control measures is considered as one of the most hopeful methods to increase the defense mechanism of fish in aquaculture disease management.

Hansen *et al.* (1993) concluded that bacterial resistance is one of the most obvious disadvantages of continuous exposure to antibiotics. As in case of *Aromonas hydrophila* treatment the continuous exposure to oxytetracycline developed cross-resistance and negative impact on fish consumers.

Jeney and Anderson (1993) showed that the most effective method to increase the efficacy of the vaccine is the application of immunostimulants that could decrease the dose necessary for the vaccine to achieve the same effect.

Midtlyng *et al.* (1996) stated that the application of vaccine may cause induction of some gross pathological changes, which affect the aesthetic appearance of the fish but the application of immunostimulants is very simple and not cause any side effect when used in appropriate dose.

Raa (1996) conducted that using immunostimulants has a good effect in controlling of fish disease and enhancing of growth.

Dalmo *et al.* (1997) showed that some plant extracts could increase the non-specific immunity of fish which is considered as the first line of defense mechanism and represents a considerable part of the immune response.