EFFECT OF USING HUMIC ACID AS A PREBIOTIC WITH DIFFERENT PROTEIN LEVELS IN FISH DIETS ON WATER QUALITY AND PRODUCTIVE PERFORMANCE OF TILAPIA AND COMMON CARP UNDER EGYPTIAN CONDITIONS

By

HOSSAM AHMED MOHAMMED MOUNES

B.Sc. Agric. Sc. (Animal Production), Ain Shams University, 2000
M.Sc. Agric. Sc. (Animal Nutrition), Ain Shams University, 2006

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This thesis for Ph.D. degree has been approved by:

Dr. Ashraf Yossef Ibrahim El- Dakr ……...……...
Prof. of Fish Nutrition, Faculty of Fisheries, Suez University

Dr. Mohamed Fathy Osman ……...……
Prof. Emeritus of Fish Nutrition, Faculty of Agriculture, Ain Shams University

Dr. Hamdy Mohammed Mohammed Khattab.....
Prof. Emeritus of Animal Nutrition, Faculty of Agriculture, Ain Shams University

Date of Examination: **14 / 5 / 2015**

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HOSSAM AHMED MOHAMMED MOUNES

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M.Sc. Agric. Sc. (Animal Nutrition), Ain Shams University, 2006

Under the supervision of:

Dr. Hamdy Mohammad Mohammad Khattab

Prof. Emeritus of Animal Nutrition, Department of Animal Production, Faculty of Agriculture, Ain Shams University (Principal supervisor)

Dr. Tarek Aboelmakarem Ali Mohammad Mohammad

Lecturer of Fish Nutrition, Department of Animal Production, Faculty of Agriculture, Ain Shams University

Dr. Zienab Attia Nagdi

Prof. Emeritus of Limnology, Department of Limnology, Central Laboratory for Aquaculture Research (CLAR), Agricultural Research Center

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ABSTRACT

Hossam Ahmed Mohammed Mounes. Effect of Using Humic Acid as a Prebiotic With Different Protein Levels in Fish Diets on Water Quality and Productive Performances of Tilapia and Common Carp Under Egyptian Conditions. Unpublished ph. D. Thesis, Animal Production Department, Faculty of Agriculture, Ain Shams University, 2015

The present work was conducted in Central Laboratory For Aquaculture Research, (CLAR) Abassa, Abu-Hammad, Sharkia, Egypt, to investigate the effect of addition humic acid (Humabol) with three different protein levels (25, 22.5 and 20 % CP) on water quality and growth performance of Tilapia (*Oreochromis niloticus*) and Common Carp (*Cyprinus carpio*).

Thirty six concrete ponds of 2 meter as a diameter x 1.2 m as depth, respectively, represents eighteen treatments (two replicates / each) in three experiments, with a (3.77 m3 total volume) with 3 fish / m^3. The experimental treatments were as follow: Tilapia were fed diets contained 0.2 % Humic acid with 25 or 22.5 or 20 % protein (T_1, T_2 and T_3), respectively, Common carp were fed diets contained 0.2 % Humic acid with 25 or 22.5 or 20 % protein (T_4, T_5 and T_6), respectively, represent the first experiment. Tilapia were fed diets without humic acid contained 25 or 22.5 or 20 % protein (T_7, T_8 and T_9), respectively, Common carp were fed diets without humic acid contained 25 or 22.5 or 20 % protein (T_{10}, T_{11} and T_{12}), respectively, represent the second experiment. Tilapia and common carp in the same pond were fed diets contained 0.2 % Humic acid with 25 or 22.5 or 20 % protein (T_{13}, T_{14} and T_{15}), respectively, Tilapia and common carp in the same pond were fed diets without humic acid contained 25 or 22.5 or 20 % protein (T_{16}, T_{17} and T_{18}), respectively, represent the third experiment. The experimental ponds were supplied with well water. Water exchange rate was 100 % of the

total pond area / 14 days. The first experiment lasted 105 days from the 1st of July to the 15th of October 2013 (T_1 to T_6), the second and the third experiments lasted 105 days from the 1st of July to the 15th of October 2014 (T_7 to T_{18}).

Results showed that there were no significant differences between treatments with and without humic in temperature degrees, dissolved oxygen, pH, Secchi disk, orthophosphate and chlorophyll (a), while there were increased in humic acid treatments in NH_3, NO_3, NO_2, total alkalinity and total hardness.

There were significant differences ($P < 0.05$) in NO_3, NO_2, total alkalinity, total hardness and orthophosphate due to fish species.

Protein level did not effect significantly on temperature, dissolved oxygen, secchi disk, NH_3, NO_3, total alkalinity, total hardness and chlorophyll (a). However, pH and NO_2 were significantly increased gradually as the level of protein increased.

Humic acid significantly decreased iron, zinc and cadmium, while it significantly ($P < 0.05$) increased in lead, and had no significant effect on manganese and copper.

Fish species had a significant ($P < 0.05$) effect on iron, zinc, manganese copper, cadmium and lead.

Protein level effect significantly on iron, zinc, copper, cadmium and lead. However, manganese had no significant effect due to level of protein.

The highest value of chlorophyceae and cyanophyceae (313336 and 11655.5) were observed in humic acid treatments with significant differences ($P < 0.05$), while the highest values of bacillariophyceae and euglenophyceae (1546 and 2328) were detected in treatments without humic acid.

Fish species had a significant ($P < 0.05$) effect on phytoplankton during the experiment.

Protein level had significant effect on phytoplankton, 25 % protein level recorded the highest chlorophyceae (279892), while 20 % protein

level recorded the highest cyanophyceae, bacillariophyceae and euglenophyceae values (9210, 1008 and 1903, respectively).

Average of body weight, RGR, SGR, moisture % and fat % and survival rate in humic acid treatments was higher (64.7 g, 18.46 g / g, 1.11 % / day, 71.6, 20.4 % and 81.25 %, respectively) than those without humic acid (57.1 g, 15.1 g / g and 0.98 % / day, 71.1, 19.5 % and 48.5 %, respectively) with significant effects. While humic acid didn't significantly affect fish body length, daily gain or condition factor.

The highest body weight, body length and daily gain, FCR, ash % and survival rate were (89.4 g, 17.46 cm, 0.59 g / day and 3.4, 14.3 % and 80.5 %, respectively) for tilapia, while carp showed the lowest body weight, body length and daily gain, ash % and survival rate were (35.4 g, 12.82 cm, 0.41 g / day, 2.1 and 10.9 % and 49.25 %, respectively).

The highest body weight, body length, daily gain and condition factor, head weight value and its percentage and viscera weight and its percentage and survival rate were (70.03 g, 15.73 cm. 0.55 g / day, 1.65 g / cm^3, 27.1 g / fish, 29.8 %, 9.5 g / fish and 10.8 % and 67.13 %, respectively) were shown for the group fed 25 % protein, while the lowest body weight and body length head weight value and its percentage and viscera weight and its percentage and survival rate (63.31 g and 15.23 cm, 23 g / fish, 27.4 %, 7.9 g / fish, 9.7 % and 62.38 %) were recorded for fish fed 22.5 % protein, the lowest value of daily gain was found in treatment 20 % protein level (0.48 g / day).

Carp recorded the highest overall mean value of RGR, SGR, PER, PPV, moisture % and fat % (25.49 g / g, 1.52 % / day, 0.57, 33.9, 72.6 % and 21.7 %, respectively) whereas the lowest RGR and SGR, condition factor, PER, PPV, Fe, Mn, Cu and Cd were detected in tilapia (10.73 g / g, 0.61 % / day, 1.42 g / cm^3, 0.35, 21.5, 0.19, 0.002, 0.003 and 0.0007 mg / g, respectively). The highest value of condition factor and protein % was detected in tilapia + carp (1.66 g / cm^3 and 63.1 %).

Fish group fed 22.5 % protein level recorded the highest significant ($P < 0.05$) RGR, SGR and FCR, Fe, Zn, Cu and Pb values (17.32 g / g and

1.07 % / day, 2.8, 0.22 mg / g, 0.0.07 mg / g, 0.003 mg / g and 0.00009 mg / g, respectively); while the 25 % protein level noticed the lowest RGR and SGR, FCR, PER and PPV, Zn, Mn, Cd and Pb values (15.99 g / g and 1 % / day, 2.7, 0.39, 23.2, 0.0.05 mg / g, 0.002 mg / g, 0.001 mg / g and 0.00006 mg / g, respectively). Moreover, the 20 % protein level had significant best values of both PER and PPV (0.5 and 30.1, respectively).

Values of FCR, PER and PPV for treatments with or without humic acid were (2.7, 0.46, 27.1 and 2.8, 0.46 27.9, respectively).

The values of head weight and its percentage to the body weight were significant ($P < 0.05$) higher (25.8 g / fish and 30.3 %) recorded in treatments without humic acid than those with humic acid (23.5 g / fish and 26.6 %). Viscera weight and viscera percentage values recorded in treatments with humic acid (9.3 g / fish and 10.6 %) while the lowest one (7.5 g / fish and 9.4 %) was found in treatments without humic acid.

Keywords: Humic acid, Protein levels, Tilapia, *Oreochromis niloticus* and Common Carp, *Cyprinus carpio*.

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