# USE OF SOME NATURAL FEED SUPPLEMENTS TO IMPROVE PRODUCTIVE PERFORMANCE OF FISH

By

**MOHAMED ELSAYED ELARABY ABDOU**

B.Sc. Agric. (Horticulture), Ain Shams University, 1993

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**Approval sheet**

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**This thesis for M.Sc. degree has been approved by:**

**Dr. Samir I. M. Ghoneam ……**

Prof. Emeritus of Fish Technology, Faculty of Environmental Agricultural sciences, Alarish, Suez Canal University.

**Dr. Mohamed Fathy Osman …….**

Prof. Emeritus of Fish Nutrition, Faculty of Agriculture, Ain Shams University.

**Dr. Mohamed Abdel-Baky Amer …….**

Assoc. Prof. of Fish Physiology, Faculty of Agriculture, Ain Shams University.

**Dr. Tarek Aboelmkarem Ali …….**

Asst. Prof. of Fish Nutrition, Faculty of Agriculture, Ain Shams University.

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**Under the supervision of:**

**Dr. Amin Abdel-Moaty Elgamel**

Prof. Emeritus of Fish Production, Department of Animal Production, Faculty of Agriculture, Ain Shams University.

**Dr. Mohamed Abdel-Baky Amer**

Assoc. Prof. of Fish Physiology, Department of Animal Production, Faculty of Agriculture, Ain Shams University.

**Dr. Tarek Aboelmkarem Ali**

Asst. Prof. of Fish Nutrition, Department of Animal Production, Faculty of Agriculture, Ain Shams University.

# 6. SUMMARY

This work was conducted in a closed system at fish production sector, Animal Production Department, Faculty of Agriculture, Ain Shams University, Egypt. The aim of this study was to investigate the effect use of some natural feed supplements to improve productive performance of fish. Nile tilapia, *Oreochromis niloticus*, was used in this study as a model for commercial aquaculture industry. The experimental period was lasted for 105 days started from 16th of July to 29 October 2006. This study was carried out using twelve plastics tanks (each tank is 1 $m^3$ water volume) and tanks were stocked with Nile tilapia fingerlings (11.5-12.9g in initial weight) at a rate of 85 fish tank (i.e. 85 fish/$m^3$ of water). The experiment involved three treatments each with four replicates as follow:

**6.1 Treatments**;

**6.1.1- Treatment (Control Group):**

Fish in this treatment were fed on a pelleted diet all over the experimental period (30.9% CP without Amico-Zime® and Bio-Bud®).

**6.1.2. Treatment (BIO – BUDS®) natural yeasts supplement:-**

Fish in this treatment were fed on a pelleted diet all over the experimental period (30.9% CP with Bio-Bud®. as 0.5kg/ton).

**6.1.3- Treatment (AMICO-ZIME®) natural enzyme supplement:**

Fish in this treatment were fed on a pelleted diet all over the experimental period (30.9% CP with Amico-Zime® as 0.5kg/ton).

**<u>The results obtained could by summarized as follows:-</u>**

**6.2. A. Growth traits:**

**6.2.A.1. Body weight**

After 15 weeks of the experimental period, the average body weights for the three treatments (T3, T2 and T1) were found to be 106.97, 98.18,

and 107.19 respectively. The statistical analysis of final body weight showed that the differences among the experimental treatments were significant (P<0.05). The highest body weight was obtained by treatment 1 (Amico-Zime®), while the lowest was obtained by treatment 2 (Bio-Bud®).

**6.2.A.2. Body length**

Fifteen weeks after the beginning of the experiment, the average body length was ranged between19.7 to 23.5 cm. At the end of the experiment the highest body length was obtained by treatment 3 (Amico-Zime®) while, the lowest was obtained in treatment 2 (Bio-Bud®) with significant differences (P<0.05).

**6.2.A.3. Body gain**

The highest value of body gain was recorded (95.44 g) for treatment 3 (Amico-Zime®), while the lowest value was obtained (85.38 g) for treatment 2 (Bio-Bud®) with significant differences (P<0.05).

**6.2.A.4. Specific growth rate**

Treatment 3 (Amico-Zime®) gave the highest value of specific growth rate (2.35%) while the lowest value was obtained (2.18%) for treatment 2 (Bio-Bud®) with significant differences (P<0.05).

**6.2.A.5. Relative growth rate**

Value of relative growth rate increased significantly (844.83) for treatment 3 (Amico-Zime®) while the lowest value was recorded (667.32) for treatment 2, (Bio-Bud®).With significant differences (P<0.05).

### 6.2.A.6. Total yield

At the end of the experiment, the average of the fish total yield recorded for treatments were (38.27kg) for T3 (Amico-Zime®), (29.15kg) for T2 (Bio-Bud®) and (36.15 kg) for T1 (Control. The results showed also that the different experimental groups seemed to have a slight effect on the survival rate.

### 6.2.B Feed Utilization Parameters:-

### 6.2.B.1. Food conversion ratio

The highest main value (The worst) of FCR was recorded (1.87g feed/g gain) for T2 (Bio-Bud®) followed by the value recorded (1.78g feed/g gain for T1 (Control), while the lowest significant ($P<0.05$) value was recorded (1.48g feed/g gain) (The best F.C.R) for T3 (Amico-Zime®).

### 6.2.B.2. Protein efficiency ratio and Protein productive value

The highest value of PER was in recorded in Amico-Zime® treatment (2.21), while the lowest was recorded in Bio-Bud®. treatment (1.79). The statistical analysis of the results showed that there were significant differences between treatments ($P<0.05$).

The protein productive values for the three treatments (T3, T2 and T1) were found to be 51.09, 48.01, and 43.12 respectively. The statistical analysis of final body weight showed that the differences among the experimental treatments were significant ($P<0.05$).

### 6.2.C-Water quality Parameters:

#### 6.2.C.1. Water temperature

The highest reading of water temperature was recorded in august while the lowest was in October and it was ranged between 21.5 to 30°C during the study period.

#### 6.3.C.2. Dissolved oxygen

The highest value recorded for dissolved oxygen was in Bio-Bud® . treatment (10.7mg/l) and control treatment (10.7 mg/l) in July and October, while the lowest were recorded for the same treatments Bio-Bud® . and control (7.2mg/ l) during August and September.

#### 6.3.C.3. The hydrogen ions (pH) concentration

The values of pH were ranged between 8.47 - 8.67 during the study period.

#### 6.3.C.4. Unionized ammonia

All treatments recorded the same concentration of free ammonia (0.23 mg/l) during the whole experimental period.

#### 6.3.C.5. Nitrite

A low concentration (0.02 mg/l) of nitrite was recorded in all treatments during the entire experimental period.

#### 6.3.C.6. Nitrate

The concentration of nitrate seems to be constant among treatments (0.1 to 0.2 mg/l).

### 6.4. Economic evaluation

The total income and net return were related greatly to the cost of inputs materials, which used in this study and to marketing price of the product.

Amico-Zime® treatment achieved the highest net return per kg (١٢٧.٥٨ LE.) then treatment 1 (٩٢.٠٠ LE), while the lowest net return was shown by treatment 2 (65.11 LE.).

# 4. RESULTS AND DISCUSSION

## 4.1. Effect of treatments and time on average weight;

Body weight of the experimental fish was calculated 8 times for each treatment through the whole present study (105 days) to measure the growth performance in all treatments and study the comparative between the different treatments due to the experiment time and calculate the total feed required for experimental fish in different period.

The observations recorded that, no significant value between different treatments for different times through the experiment in progress means of fish weight/gram, meanwhile the formula of treatment 2 (Bio-Bud®) and treatment 3(Amico-Zime®) are prepared without fishmeal in approximately the same chemical composition with low cost compared to treatment 1 (Control) table (4), in fluctuated wither conditions at the last 33 days of the study, treatment 3(Amico-Zime®) could be arrived to the same highest weight, however this treatment started as a lowest initial weight.

This observation were share opinion with many researches who said that; the reduction of diet cost with a higher performance (not the same performance) by using probiotics as a feed additive **Feord *et.al.* (1996).**

The addition of enzymes in feed can improve nutrient utilization reducing feed cost and the excretion of nutrients into the environment **Jackson *et.al.* (1996).** The Progress Means of fish weight/gram in different treatment for different times are presented in Table (9); Fig (1) and APP (1).

**Table (9)** Progress means of fish weight/gram in different treatment for different times:-

| Time / Treat. | Control (trt1) | Bio-Bud® (trt2) | Amico-Zime® (trt3) |
|---|---|---|---|
| 1 | 12.941a | 12.824a | 11.529a |
| 2 | 17.877a | 18.059a | 15.820a |
| 3 | 24.510a | 26.110a | 24.179a |
| 4 | 35.472a | 38.672a | 37.097a |
| 5 | 49.880a | 53.040a | 52.780a |
| 6 | 69.967a | 70.325a | 75.302a |
| 7 | 85.975a | 83.817a | 86.355a |
| 8 | 107.185a | 98.177a | 106.967a |

Means with the same letters don't differ from each other at 0.05 level of significantly

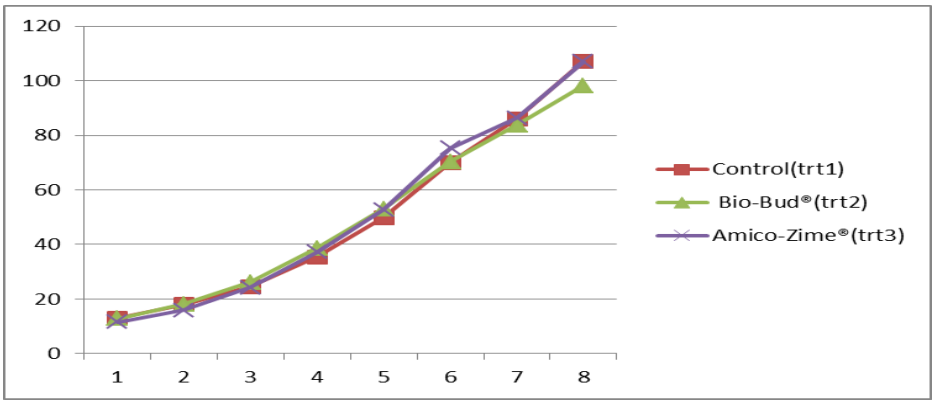


**Fig (1)**:- Means of fish weight for different treatment & time

### 4.2. Effect of treatments and time on body gain;

Growth performance of fish fed the experimental diets are presented in table (10); (11) and fig (2), where the best significant growth performance (P>0.05) was achieved by fish group fed the (Amico-Zime®). Treatment 3 (Amico-Zime®) showed higher significant weight gain (95.44 g/ fish) than treatment 2 (Bio-Bud®) and treatment 1(Control), where fish group fed the (Bio-Bud®) showed the lowest value (85.40 g/ fish).

The total weight gain / m3 of fish group for treatment 3 (Amico-Zime®) was calculated as 8.1 kg/m3 compared with 8kg/ m3 for treatment 1(Control) group and 7.3 kg fish/ m3 for treatment 2 (Bio-Buds®) group.

The observation due to the study periods indicate to the impact of enzyme and probiotic group starting from period No. (1) to period No. (8) on body gain as following:-

#### 4.2.1. Period no.(1) 12 days;

Significant values during this period were observed (body gain) where the highest value (444.3 ± 35.9) was recorded for treatment 2 (Bio-Buds®) and (419.6 ± 20.9) for treatment1 (Control) and the lowest value (364.7 ± 39.7) was recorded for treatment 3 (Amico-Zime®). This difference could be because of initial weight was higher in treatments 1 and 2 compared to treatment 3. The statistical analysis of the results showed that the differences between periods in body gain were significant (P<0.05).

#### 4.2.2. Period no.(2) 24 days;

Significant values during this period were observed (body gain) where the highest value (792.3 ± 32.4) was recorded for treatment 3 (Amico-Zime®) and the lowest value (563.4 ± 33.1) was recorded for treatment 1 (Control).This result indicates to start of (Amico-Zime®) activation in

experiment. The statistical analysis of the results showed that the differences between periods in body gain were significant (P<0.05).

**4.2.3. Period no.(3) 36 days;**

Significant values during this period were observed (body gain) where the highest value (1054.4 ± 51.1) was recorded for treatment 3 (Amico-Zime®) and the lowest value (912.03 ± 57.4) was recorded for treatment 1 (Control). The statistical analysis of the results showed that the differences between periods in body gain were significant (P<0.05).

**4.2.4. Period no.(4) 48 days;**

Significant values during this period were observed (body gain) where the highest value (1272.3 ± 45.1) was recorded for treatment 3 (Amico-Zime®) and the lowest value (1146.0 ± 29.2) was recorded for treatment 2 (Bio-Buds®). This result indicates to decrease the effect of (Bio-Buds®) from this period. The statistical analysis of the results showed that the differences between periods in body gain were significant (P<0.05).

**4.2.5. Period no.(5) 60 days;**

Significant values during this period were observed (body gain) where the highest value (1825.3 ± 43.8) was recorded for treatment 3 (Amico-Zime®) and the lowest value (1373.3 ± 39.2) was recorded for treatment 2 (Bio-Buds®). The statistical analysis of the results showed that the differences between periods in body gain were significant (P<0.05).

**4.2.6. Period no.(6) 72 days;**

Significant values during this period were observed (body gain) where the highest value (1296.7 ± 31.2) was recorded for treatment 1 (Control) and the lowest value (904.3 ± 21.8) was recorded for treatment 3 (Amico-Zime®). This difference could be because of affected of feeding by

weather condition in treatments 1 compared to treatment 3, specially the insufficient of this group and treatment 2 from fishmeal. The statistical analysis of the results showed that the differences between periods in body gain were significant ($P<0.05$).

### 4.2.7. Period no.(7) 90 days;

Significant values during this period were observed (body gain) where the highest value (1666.9 ± 21.7) was recorded for treatment 3 (Amico-Zime®) and (1657.1 ±37.6) for treatment 1 (Control) and the lowest value (1199.3 ± 28.6) was recorded for treatment 2 (Bio-Buds®). This difference could be because of starting of (Amico-Zime®) effect to push fish to resistance in its adoption for the fluctuation of weather condition. The statistical analysis of the results showed that the differences between periods in body gain were significant ($P<0.05$).

### 4.2.8. Period no. (8) 105 days;

Significant values during this period were observed (body gain) where the highest value (928.6 ± 27.0) was recorded for treatment 3 (Amico-Zime®) and the lowest value (649.0 ± 19.9) was recorded for treatment 1 (Control). The statistical analysis of the results showed that the differences between periods in body gain were significant ($P<0.05$).

**Table (10):-** Effect of treatments and time on body gain**.**

| Period | (1) 12 day | (2) 24 day | (3) 36 day | (4) 48 day | (5) 60 day | (6) 72 day | (7) 90 day | (8) 105 day |
|---|---|---|---|---|---|---|---|---|
| Control | 419.6 ± 20.9 a | 563.4 ± 33.1 c | 912 ± 57.4 b | 1181.3 ± 39.5 b | 1637.2 ± 46.5 b | 1296.7 ± 31.2 a | 1657.1 ± 37.6 a | 649.0 ± 19.9 c |
| Bio-Buds® | 444.3 ± 35.9 a | 684.6 ± 18.7 b | 1017.4 ± 39.7 ab | 1146.0 ± 29.9 c | 1373.3 ± 39.2 c | 1074.3 ± 24.5 b | 1199.3 ± 28.6 b | 759.4 ± 20.6 b |
| Amico-Zime® | 364.7 ± 39.7 b | 729.3 ± 32.4 a | 1054.4 ± 51.1 a | 1272.3 ± 45.1 a | 1825.3 ± 43.8 a | 904.3 ± 21.8 c | 1666.9 ± 21.7 a | 928.6 ± 27.0 a |

*Means with different subscripts a,b…….within column in each title are significantly different at least $p<0.05$

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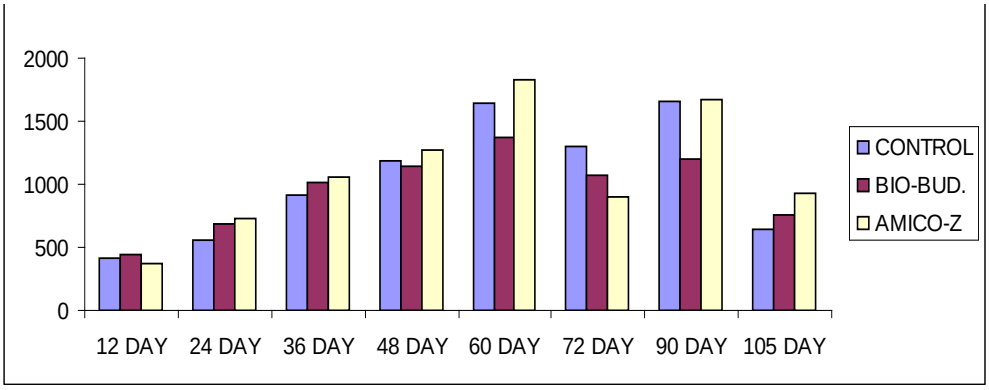


**Fig (2):-** Effect of treatments and time on body gain .

In general, this study observed that highest significant value at treatment 3(Amico-Zime®) compared with the other treatments.

This observation were share opinion with many researches which said that; However the use of these biotechnological resources has found some resistance in its adoption **(Cavero, 2004).**

In this context, digestive exogenous enzymes have been used in

purpose to improve animal performance. Enzymatic supplementation main goals are:

- Improve nutrient digestibility.
- Destroy or inactivate anti-nutritional factors.
- Improve non-starch polysaccharides (NSP).
- Improve endogenous enzymes activity.
- Minimize environmental pollution caused by residuals.
- Spare the use of amino acids on enzyme synthesis.

The researchers also indicate that the reduction of diet cost with a higher performance (not the same performance) **Feord *et.al.* (1996).**

The addition of enzymes in feed can improve nutrient utilization reducing feed cost and the excretion of nutrients into the environment **Jackson *et.al.* (1996).**

**From this comparative study, it could be deducted that:**

1- Activation of (Amico-Zime®) beginning increase from period no.(2) to the end of experiment but it slightly affected by weather condition in period no.(6) like other treatments, but restart to overlapping this problem by playing role according to previous context .

2-Activation of (Bio-Buds®) beginning decrease from period no. (4) to the end of experiment because the insufficient of this treatment formula from fishmeal plus the impact of the fluctuation on weather conditions.

3-In the control treatment, a little stability in growth was observed from the beginning to the end of the experiment because it's content of fishmeal in feed formula.

4- Growth performance of fish fed the experimental diets are summarized in table (11), where the best significant growth performance ($P>0.05$) was achieved by fish group fed the (Amico-Zime®).

- Treatment 3 (Amico-Zime®) showed higher significant weight gain (95.44 g/ fish) than treatment 2 (Bio-Bud®) and treatment 1(Control),