## **List of contents**

	Page
1. INTRODUCTION	1
2. REVIEW OF LITRATURE	3
2.1. Geographical distribution of tilapias	3
2.2 Biological characters	4
2.2.1. Water temperature	4
2.2.2. Salinity tolerance	6
2.2.3. Dissolved oxygen	6
2.2.4. pH	7
2.3. Growth performance	7
2.4. Feeding habits	8
2.5. Sex determination	9
2.6. Fecundity	10
2.7. The unwanted reproduction of tilapia	10
2.7.1. Control of the unwanted reproduction	11
2.7.1.1. Hybridization in tilapia	11
2.7.1.2. The predation	11
2.7.1.3. Triploidy	12
2.7.1.4. Monosex	13
2.8. Nutrient requirements for tilapia fish	14
2.8.1. Feed sources	14
2.8.1.1. Natural food	14
2.8.1.2. Artificial feeding	15
2.8.2. Nutrient requirements in Artificial feeds .	16
2.8.2.1. Energy requirements	16
2.8.2.1.1. Carbohydrates requirements	16

2.8.2.1.2. Lipids and fatty acids requirements
2.8.2.1.2.1. Lipids as an energy source
2.8.2.2. Protein and amino acids requirements
2.8.2.2.1. Sources of protein.
2.8.2.2.1.1. Sources of animal protein
2.8.2.2.1.2. Source of plant protein
2.8.2.3. Dietary protein: energy (P/E ratio)
2.8.2.4. Minerals
2.8.2.5. Vitamins
2.8.2.6. Feed additives
2.8.2.6.1. Biogen
3. MATERIALS AND METHODS
3.1. Location
3.2. Experimental design
3.3. Fish source
3.4. Management
3.5. Diet preparation
3.6. Feeding practices.
3.7. Growth performance parameters
3. 8. Chemical analysis of fish and experimental diets
3.9. Data
3.10. Statistical analysis.
4. RESULTS AND DISCUSSION
4.1. First experiment
4.1.1. Body weight (BW)
4.1.2. Body length (BL)
4.1.3. Condition factor (K)
4.1.4. Body weight gain (WG)
4.1.5. Specific growth rate (SGR)

4.1.6. Feed intake (FI)	55
4.1.7. Feed conversion ratios (FCR)	57
4.1.8. Protein efficiency ratio (PER)	59
4.1.9. Chemical composition of fish	61
4.2. Second experiment	63
4.2.1. Body weight (BW)	63
4.2.2. Body length (BL)	67
4.2.3. Condition factor (K)	67
4.2.4. Body weight gain (WG)	68
4.2.5. Specific growth rate (SGR)	<b>7</b> 1
4.2.6. Feed conversion ratios (FCR)	73
4.2.7. Protein efficiency ratio (PER)	<b>76</b>
4.2.8. Chemical composition of fish	77
4.2.9. Economical efficiency	<b>79</b>
5. SUMMARY	82
6. REFERENCES	88
7. ARABIC SUMMARY	-

## **List of Tables**

No.	Table	Page
1	Composition and chemical analysis of the first experimental diets	36
2	Composition and chemical analysis of the second experimental diets	37
3	Means and standard error for the effect of increasing levels of biogen in the diets on body weight (BW), body length (BL) and condition factor (K) of Nile tilapia	42
4	Analysis of variance for the effect of increasing levels of biogen in the diets on body weight (BW), body length (BL) and condition factor (K) of Nile tilapia	42
5	Means and standard error for the effect of increasing levels of biogen in the diets on weight gain (WG) and specific growth rate (SGR) of Nile tilapia	48
6	Analysis of variance for the effect of increasing levels of biogen in weight gain (WG) and specific growth rate (SGR) of Nile tilapia	48
7	Means and standard error for the effect of increasing levels of biogen in the diets on Feed intake, Feed conversion ratio and protein efficiency ratio of Nile tilapia	56
8	Analysis of variance for the effect of increasing levels of biogen in the diets on feed intake, feed conversion ratio and protein efficiency ratio of Nile tilapia	56
9	Means and standard error for the effect of increasing levels of biogen in the diets on chemical composition of Nile tilapia	62
10	Analysis of variance for the effect of increasing levels of biogen in the diets on chemical composition of Nile tilapia	62

No.	Table	Page
11	Effect of increasing levels of sunflower in the diets on body weight (BW), body length (BL) and condition factor (K) of Nile tilapia	64
12	Analysis of variance for the effect of increasing levels of sunflower in the diets on body weight (BW), body length (BL) and condition factor (K) of Nile tilapia	64
13	Effect of increasing levels of sunflower in the diets on body weight gain (WG) and specific growth rate (SGR) of Nile tilapia fed experimental diets	69
14	Analysis of variance for the effect of increasing percentage of sunflower in body weight gain (WG) and specific growth rate (SGR) of Nile tilapia	69
15	Effect of increasing levels of sunflower in the diets on feed conversion ratio (FCR) and protein efficiency ratio (PER) of Nile tilapia fed the experimental diets	74
16	Analysis of variance for the effect of increasing levels of sunflower in the diets on feed intake (FI), feed conversion ratio (FCR) and protein efficiency ratio (PER) of Nile tilapia fed the experimental diets	74
17	Means and standard error for the effect of increasing levels of sunflower in the diets on chemical composition of Nile tilapia	78
18	Analysis of variance for the effect of increasing levels of sunflower in the diets on chemical composition of Nile tilapia	78
19	Feed costs (L.E) for producing one kg weight gain by fish fed the experimental diets	81
20	Local market price (L.E./ton) for feed ingredients used for formulating the experimental diets when the experiment was started	81

