

ABSTRACT

The main objective of this study was to determine chemical analysis of the two medicinal plants (cinnamon and marjoram) with respect to each oil extract and its aqueous alcoholic extract to determine the different natural compound groups which can cause an effective activity on the immunity. Also, the effect of different levels of cinnamon, *Cinnamomum zeylanicum* and marjoram, *Origanum vulgare* supplement to the diets as growth promoters on growth performance, feed utilization, whole-body composition and entropathogenic *Aeromonas hydrophila* – challenge for all-male Nile tilapia, *Oreochromis niloticus* fingerlings. The four experimental diets used were formulated to contain 0.0 (control) for cinnamon and marjoram and 0.5, 1.0, and 1.5 % for each cinnamon and dried marjoram leaves. All diets are isonitrogenous (30 % crude protein) and isocaloric (4.40 kcal/ gm). The study was conducted in triplicate treatments whereas three 100 -l have been randomly allocated to each treatment. Each aquarium was stocked with 15 fingerlings of an average weight 11.5 g. Experimental feed was provided at a rate of 3 % of live body weight of experimental fish, twice/day, 6 days a week, for 90 days. Diet containing 1% cinnamon and 1.5% marjoram resulted significantly ($P < 0.05$) in a better production performance as reflected in gain %, specific growth rate (SGR), feed conversion ratio (FCR), feed efficiency ratio (FER), protein efficiency ratio (PER), Apparent protein utilization (APU) and energy utilization (EU). The survival rate was enhanced due to the

inclusion of cinnamon and marjoram in fish diets. In regard to body composition, there was no significant difference in dry matter, protein, lipids, and ash ($P>0.05$) contents which could be related to the levels of cinnamon and marjoram meal in the experimental diets. Blood plasma profile showed an improvement in hemoglobin (Hb), red blood cell (RBCs), hematocrite (PCV), total protein, albumine and globulin while showed a decrease in creatinin, urea, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and glucose in all treatment groups.

Cinnamon and marjoram were found to have antibacterial activity antagonized to *Aeromonas hydrophila* in *Oreochromis niloticus*. The reduction in feed cost compared with control diet showed 10.14 % to produce one kg fish gain of treatment containing 1 % cinnamon and 11.22% to produce one kg fish gain of treatment containing 1.5% marjoram.

CONTENTS

LIST OF ABBREVIATIONS	i
LIST OF TABLES	iii
LIST OF FIGURES	vii
LIST OF SCHEME	1
ABSTRACT	xv
I. INTRODUCTION	1
AIM OF THE WORK	4
II. REVIEW OF LITERATURE	5
2.1. Feed additives (medicinal plants)	5
2.2. Growth performance and surviving	5
2.3. Feed and nutrient utilization	11
2.4. Composition of fish body	15
2.5. Blood parameters	19
2.6. Immunity	21
III. MATERIALS AND METHODS	23
3. 1. Plants materials	23
3. 2. Chromatographic analysis	23
3. 2.1. Two Dimension Paper Chromatography (TDPC)	23
3. 2.2. Gas liquid chromatography (GLC)	24
3.2.3. High Performance Liquid Chromatography (HPLC)	24

3. 3. Fish and culture technique	25
3. 4. Experiment design	26
3. 5. Feed preparation	26
3.6. Feeding system	27
3. 7. Physico- chemical analyses methods	30
3. 7.1. Physical method	30
3.7.2. Chemical analysis methods	30
1.pH	30
2. Dissolved oxygen (mg/l)	30
3.Unionized ammonia and total ammonia	30
3. 8.Proximate chemical analysis of diet and fish	31
1. Moisture content	31
2.Crude protein content	31
3.Lipid content	33
4.Ash content	33
5.Crude fiber content	33
3. 9.Measurements of Growth parameters, somatic indices and condition factor	34
3. 10.Physiological measurement	35
1. Preparation of blood sample	35
2. Blood cell count	36
3. Determination of hemoglobin (Hb)	36
4. Packed Cell Volume (PCV %)	36
5. Liver enzymes	37
6. Estimation of serum total proteins	37
7. Determination of serum albumin	38

8. Estimation of serum creatinine	38
9. Estimation of plasma glucose	39
10. Estimation of lipid	40
11. Estimation of urea	40
3. 11. Challenge test	40
3. 12. Economical evaluation	41
3. 13. Statistical analysis	42
IV. RESULTS	43
4.1. Cinnamon (<i>Cinnamomum zeylanicum</i>)	43
4. 1. 1. Chemical analysis of cinnamon	43
1. Chemical composition	43
2- Isolation and identification of volatile oils of cinnamon	44
3- Isolation and identification of methanolic extract of cinnamon	46
3.1. Colour and precipitation test for phenolics and flavonoids	46
3.2. Chromatographic investigation	47
A. Paper chromatographic investigation	47
B. High Performance Liquid Chromatography (HPLC)	47
4.1.2. Growth performance and surviving	50
4.1.3. Feed and nutrient utilization	55
4.1.4. Body composition	60
4.1.5. Condition factors and somatic index	63
4.1.6. Physiological parameters	63
1. Hematological indices of the growing fish	63
2. Serum biochemical parameter	65

4.1.7.Challenge test	72
4.18. Economic evaluation	76
4.2. Marjoram (<i>Origanum vulgare</i>)	77
4. 2. 1. Chemical analysis of dried marjoram	77
1- Chemical composition	77
2- Isolation and identification of volatile oils of marjoram	78
3-Isolation and identification of methanolic extract of marjoram	79
3.1. Colour and precipitation test for phenolics and flavonoids	79
3.2. Chromatographic investigation	80
A. Paper chromatographic investigation	80
B. High Performance Liquid Chromatography (HPLC)	81
4.2.2. Growth performance and surviving	85
4.2.3. Feed and nutrient utilization	89
4.2.4. Body composition	93
4.2.5. Condition factors and somatic index	95
4.2.6. Physiological parameters	96
1. Hematological indices of the growing fish	96
2. Serum biochemical parameters	98
4.2.7. Challenge test	102
4.2.8. Economic evaluation	106
V. DISSCUTION	108
VI. SUMMARY	119
6.1. For cinnamon	120
6.2. For marjoram	122

VII. CONCLUSION	123
VIII. REFERENCES	124
ARABIC SUMMARY	138

LIST OF ABBREVIATIONS

ALT	Alanine aminotransferase
APU	Apparent protein utilization
AS	Anise, <i>Pimpinella anisum</i>
AST	Aspartate aminotransferase
BSM	Black seed meal, <i>Nigella sativa</i>
CINNAMON	<i>Cinnamomum zeylanicum</i>
CLAR	Central Laboratory for Aquaculture Research
CNM	Corn meal
CP	Crude protein
CSM	Caraway seed meal
DBL	Dried basil leaves, <i>Ocimum basilicum</i>
DE	Digestible energy
DML	Dried marjoram leaves, <i>Origanum vulgare</i>
DPL	Dried peppermint leaves, <i>Mentha piperita</i>
ER	Energy retention
EU	Energy utilization
FCR	Feed conversion ratio
FER	Feed efficiency ratio
FI	Feed intake
FKSM	Fenugreek seeds meal
FQ	Fulton condition factor
GE	Gross energy
GLC	Gas liquid chromatography
Hb	Hemoglobin
HFM	Herring fish meal
HPLC	High performance liquid chromatography
I / P	Intrapretonial injection
LSI	Liver somatic index

NFE	Nitrogen free extract
NILE TILAPIA	<i>Oreochromis niloticus</i>
PCV	Packed cell volume
PER	Protein efficiency ratio
PPV	Protein productive value
RBC _s	Red blood corpuscles
RSM	Roquette seed meal
SBM	Soybean meal
SGR	Specific growth rate
TDPC	Two Dimension Paper Chromatography
TN	Total nitrogen content
VSI	Viscera somatic index
WB	Wheat bran