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تأثير الاختلافات الفصلية على محتوى الاحماض الأمينيه الضرورية في ثلاثة أصناف من الاسماك النيلية

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أجرى هذا البحث لدراسة تأثير التغيرات الفصلية على محتوى الاحماض الأمينيه الضرورية في ثلاثة أصناف من الأسماك النيلية وهي على وجه التحديد : البلطي ، القرموط ، الشال في موسم صيد عام ١٩٨٥/٨٤.

وتم تقدير الأحماض الأمينيه الضرورية وصفيا وكميا باستخدام التحليل الكروماتوجرافي على الطبقه الرقيقة بينما تم تقدير التربتوفان باستخدام الطريقة الكيميائية.

وأظهرت النتائج أن جميع الأحماض الأمينية الضرورية كانت موجودة في الثلاثة أصناف المدروسه من الأسماك ولكن بمستويات مختلفه. وقد تباين محتوى الاحماض الأمينية تباينا ملموسا بين الأصناف الثلاثة وكذلك بين فصول السنة الأربعة.

فضلا عن ذلك فإن النتائج قد أظهرت أن الحامض الاميني الضرورى الأعلى تركيزا كان الثريونين يليه الميثيونين، الفالين ، الاجينين ثم اللايسين. الا أنه وجد أن المستوى الأعلى والمستوى الأدنى لكل حامض أميني ضرورى لم يتأثر بالاختلافات الفصلية في الأصناف الثلاثة المدروسة من الأسماك النيلية .

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EFFECT OF SEASONAL VARIATIONS ON THE ESSENTIAL AMINO ACIDS IN THREE NILE FISH SPECIES

(With One Table & One Fig.)

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SUMMARY

This investigation was carried out to study the effect of seasonal variations on the essential amino acids in trunk skeletal muscles (myotomal musculature) under the dorsal fin of three Nile fish species; namely: Tilapia nilotica (LINNAEUS, 1757), Clarias lazera (CUVIER and VALENCINNES, 1840) and Synodontis schall (BLOCH-SCHNEIDER, 1801).

Qualitative and quantitative essential amino acids determination was carried out using thin layer chromatographic analysis, while the tryptophan content was evaluated applying the chemical method. Data obtained revealed that all essential amino acids were present in the three studied fish species in variable levels, depending on the species and season.

Moreover, the major amino acids concentration of the three studied fish species was in the following descending order: threonine, methionine, valine, arginine and lysine.

The relative concentration of each amino acid in the total amino acids content remains constant in spite of the changes in that total amount due to different biological and enviromental conditions.

MATERIAL and METHODS

a. Materials:

Three Nile fish species, namely: Tilapia nilotica (LINNAEUS, 1757), Clarias lazera (CUVIER and VALENCINNES, 1840) and Synodontis schall (BLOCH-SCHNEIDER, 1801) were selected for the present study. The total lengths of samples of Tilapia nilotica, Clarias lazera and Synodontis schall ranged between 21-32 cm, 35-36 cm and 30-36 cm., while their weights were 195-244 grams, 340-397 grams and 388-501 grams, respectively. Then the fish were dissected and sex was determined. Samples of trunk skeletal muscle (myotomal musculature) under the dorsal fin were taken from each female species of selected fish. Whole musclies were removed and blended three times. The well mixed samples of fish were kept in tightly closed containers for analysis.

b. Methods:

1- Essential amino acids determination:

Essential amino acids contents were determined qualitatively and quantitatively by thin-layer chromatography applying the method described by BLOCK, et al. (1958).

2- Tryptophan determination:

Tryptophan content was determined applying the chemical method described by SPIES and CHAMBERS (1949).

RESULTS and DISCUSSION

The data of the effect of seasonal variations on essential amino acids composition of the three studied fish species are represented in table 1 and Fig. 1. The data revealed that in general the essential amino acids contents markedly varied within species as well as due to fishing season. However, such variation might be due to variations in dietary protein intake and energy content of the fish food. The data are in good agreement with those reported by HAMADI, et al. (1974) in Tilapia nilotica and Clarias lazera; KAUSHIK and LUQUET (1979) in rainbow trout and ABD-ALLA (1980) in Bagrus bayad and Lates niloticus.

Seasonal variations of lysine content for each of the three studied Nile fish species might be due to variations in certain dietary materials in water and periods of growth as reported by HIRANO and SUYAMA (1980) in wild and cultured ayu. Besides, the data (table 1) indicated that there were variations in histidine content between species and within seasons, which is in accordance with those reported by HAMMADI, et al. (1976) in Tilapia nilotica and Clarias lazera; ABD-ALLA (1980) in Bagrus bayad and lates niloticus.

Furthermore, variations in dietary lysine intake could affect the arginine catabolism in rainbow trout (KAUSHIK and FAUCONNEAU, 1984). Seasonal variations in arginine content of studied fish species might be due to metabolic role of arginine, dietary requirements and period of growth. Similar trend was recorded in methionine, threonine, valine, leucine-isoleucine and phenylalanine in the effect of seasonal variations on their content in the three studied fish species.

In addition the tryptophan content in the three studied fish species recorded the least level amongst the essential amino acids. Meanwhile, Tryptophan content was the fifth in concentration in Bagrus bayad, and the sixth in the case of Lates niloticus as reported by ABD-ALLA (1980).

In conclusion the major amino acid concentration of the three studied fish species was in the following desending order: Threonine, methionine, valine, arginine and lysine.

Table (1)
Effect of seasonal variations on essential amino acids composition of Tilapia nilotica (T.N.), Clarias lazera (C.L.) and Synodontis schall (S.S.)

Amino acids (g/100g. protein)	Autumn 1984			Winter 1985			Spring 1985			Summer 1985		
	T.N.	C.L.	S.S.	T.N.	C.L.	S.S.	T.N.	C.L.	S.S.	T.N.	C.L.	S.S.
Lysine	5.1	5.9	6.2	5.0	5.3	7.1	4.8	5.3	7.2	5.6	5.1	7.2
Histidine	3.3	5.4	3.9	3.1	5.8	4.3	3.0	5.9	4.0	3.3	6.0	4.2
Arginine	6.1	5.2	6.3	5.2	6.1	6.9	5.3	6.0	5.4	6.1	6.1	6.6
Methionine	8.8	7.9	8.0	6.7	6.9	8.1	5.9	6.8	9.1	7.3	6.6	8.3
Threonine	10.9	11.8	12.1	10.6	10.1	11.1	10.3	10.8	12.0	10.1	10.3	10.8
Valine	7.3	8.1	7.3	8.1	8.3	6.9	8.2	7.9	6.1	8.2	8.6	6.1
Leucine + isoleucine	5.8	5.3	5.1	3.2	5.8	4.6	2.9	4.9	3.3	3.3	5.1	4.8
Phenylalanine	4.8	6.1	2.5	4.1	5.1	1.8	3.3	6.0	1.9	5.0	6.0	3.1
Tryptophan	1.2	2.1	0.9	1.8	2.2	1.2	1.1	1.9	1.1	1.2	2.0	1.3

REFERENCES

Abd-Alla, S. (1980): Nutritive value of the flesh of different ages of some fishes in high Dam Lake, M.Sc., Fac. of Science, Aswan, Assiut Univ.

Block, K.J.; Emmett, L.D. and Gunter, Z. (1958): A manual of paper chromatography and paper electrophoresis, Academic Press, New York.

Dabrowski, K.R. (1982): seasonal changes in the chemical composition of fish body and nutritional value of muscle of the pollan (Caregonus pollan I.) from lough Neagh, Northern Ireland, Hydrobiologica, 87, 121-141.

Hamadi, K.A.; Youssef, K.E. and El-DEEB, A.A. (1974): Studies on the Nile fish. IV. Effect of canning on the amino acids composition of Bolti and Karmout, Minya J. of Agric. Res. and Develop., Vol. 1, No. 1, 143-155.

Hamadi, K.A.; Youssef, K.E. and Bassyouni, S.S. (1975): Evaluation of the nutritive value of eleven Nile fish species, Minya J. of Agric. Res. and Develop., Vol. 2, No. 1, 125-137.

Hirano, T. and Suyama, M. (1980): Quality of wild and cultured ayu. III- Seasonal variation of nitrogenous constituents in extracts, Bull. of Japanese Soc. of Scientific Fisheries,46 (2), 215-219.

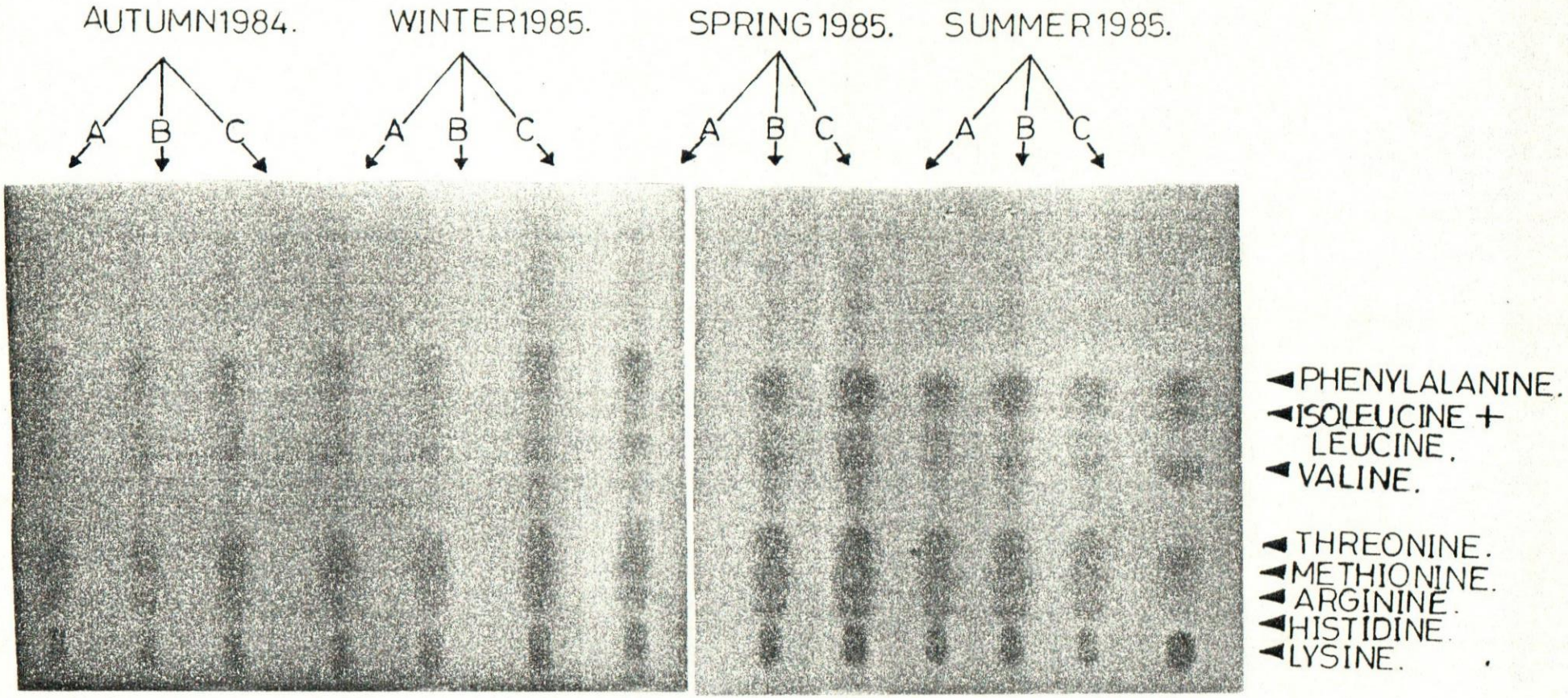
Jones, J.D.; Petersburg, S.J. and Burnett, P.C. (1967): The mechanism of lysine-arginine antagonism in the chick, J. Nutrition, 93, 103-116.

Kaushik, S.J. and Luquet, P. (1979): Influence of dietary amino acid pattern on free amino acid contents of blood and muscle of rainbow trout (Salmo gaird eri R.) Comp. Biechem, Physiol., Vol. 64 B, 175-180.

Kaushik, S.J. and Fuconneau, B. (1984): Effect of lysine administration on plasma arginine and on some nitrogenous catabolites in rainbow trout, Comp. Biochem. Physiol., Vol. 79 A., 459-462.

Spies, J.R. and Chambers, D.C. (1949): Determination of tryptophan, Anal. Chem., 20, 30.

Zaitsev, I.; Kizevetter, I.; Lagunov, L.; Makarova, T.; Minder, L. and Podsevalov, V. (1969): Fish curing and Processing, Mir Publishers, Moscow.



FIG(1)SEASONAL VARIATION OF ESSENTIAL AMINO ACIDS OF TILAPIA NILOTICA(A),CLARIAS LAZERA(B) AND SYNODONTIS SCHALL(C).