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Amino Acid Composition of Cissus Populnea Stem Bark Extract

Matawalli Ajagana Geidam (Ph.D, Associate Professor)

Department of Chemistry, Faculty of Science, Yobe State University, P.M. B. 1144 Km 7 Gujba Road, Damaturu, Yobe State Nigeria

ABSRACT

The qualitative and quantitative analyses of the composition of amino acid in ground stem bark of Cissus populnea was studied as preliminary part of a wider study. Ground Cissus stem bark, 8gm of, was dried to constant weight, defatted with chloroform/methanol (2:1) mixture using soxhlet extractor apparatus, hydrolysed and evaporated in a rotary evaporator, and then loaded into the technicon sequential multi sample amino acid analyzer (TMS). Cissus stem bark contains higher amount of glutamate (9.65), arginine (7.25) and alanine (3.05), compared to others like valine (0.16), phenylalanine (0.17) and isoleucine (0.18).

Key words: Amino Acids, Cissus populnea, Essential Amino acid,

INTRODUCTION

The basic structural unit of proteins, asmino acids, consists of an amino group, a carboxyl group, a hydrogen atom, and a distinctive R group bonded to a carbon atom. Amino acids of side chains varying in size, shape, charge, hydrogen bonding capacity, and chemical reactivity totaling twenty in number are commonly found in proteins. Indeed, all proteins in all species, from bacteria to human, are constructed from the same set of twenty amino acids. it is as a result of the diversity and versatility of these twenty building blocks that proteins have diverse array of functions. it is also these tetrahydral array of four different groups about the α– carbon atom that confer optical activity on amino acids. Of the L – isomer and D – Isomer, as the two mirror images called, only L – amino acids are constituents of proteins. Of the twenty amino acids the body can synthesize all but eight if nitrogen is made available through ingestion of an excess of some of the amino acids. Threonine, valine, leucine, isoleucine, methionine, lysine, tryptophan and phenylalanine, the eight, are called essential or indispensable amino acids. All the other 12 are dispensable or non-essential. Two, Arginine and glycine, are partly dispensable because they can be synthesized only at limited rates. According to Stryer (1980) the body for example can make arginine but not at a fast rate. In a different way, cystine and tyrosine are partly indispensable. The body can make cystine from methionine and tyrosine from phenylalanine but only if the supply of methionine and phenylalanine is adequate for both the requirements of these two amino acids and also for the production of cystine and tyrosine. If methionine is present in limited quantities in the diet, then cystine must be supplied.

A biologically good protein is one that contains all the indispensable amino acids in proportions not far different from those needed by the body. A much smaller intake of such a protein is required to produce nitrogen equilibrium than that of a protein which has a limited amount of one or more of the essential amino acids .the best proteins from this point of view are those found in eggs, meat, fish, and cheese. The vegetable proteins usually have a lower nutritional value because they are less completely digested. The present study was designed to among others study the quality and quantity of the various amino acids in cissus as part of a wider and more comprehensive studies.

MATERIALS AND METHODS

Experimental Plant Material.

Cissus populnea (Family Ampelidaceae) locally called *Okoho* (in Idoma language of north central Nigeria, where it is the main delicacy in meals), *Dogon miya* in Hausa Language of northern Nigeria), *Karno* (in the Kanuri language of North eastern Nigeria) and *Aja* in South western Nigerias Yoruba language. Purchased fresh from the open market in Jos, Cissus was harvested from the wild in Tilden Fulani (Longitude 9^0 Latitude 10^0) on the out skirts of Jos, Nigeria in winter (Tyler et al, 1976). It was cleaned by scrapping the powdery ash coloured bark with a knife. This was then pounded lightly with a large pestle to expose the strips of thread-like part containing the mucilagenous substance. These were separated from the inner wooden core and then room dried (Tyler et al, 1976). The dried threaded strips were then pounded in a mortar to get a clear brownish ground Cissus. This was stored in a glass stoppered brown bottle until use.

Amino acid profile in the ground cissus stem bark was determined using the methods described by Spankman et al (1958) as follows;

Defatting of Sample

Known weights of ground Cissus stem bark were placed in extraction thimble and the fat was extracted with chloroform/methanol (2:1) mixture using soxhlet extractor apparatus by official methods (AOAC, 1980). The extraction lasted for 8 hours.

Hydrolysis of sample

Defatted Cissus stem bark sample weighing between30-50 mg were placed in a glass ampoule. 7 ml of 6N HCl was added and oxygen was expelled by passing nitrogen into the ampoule. This was placed in oven preset at $105^0c \pm 5^0c$ for 22 hours. The ampoule was broken open at the tip after cooling and the content filtered.The filtrate was then evaporated to dryness at 40^0c under vacuum in a rotary evaporator. The residue was dissolved with 5 ml of acetate buffer (PH 7.0) and stored in plastic specimen bottles, frozen.

Loading of the Hydrolysate onto the TSM Analyser About 10 microlitre of the hydrolysate was loaded into the cartridge of the analyser. The machine (TSM analyser) is designed to analyse and separate free acidic, neutral and basic amino acids. This lasted for about one hour. Method employed in calculating amino acid values from the chromatogram peaks are attached herewith in index. The results of the calculations are presented in table 2.

Proximate Composition of Cissus stem bark.

The proximate composition (moisture, ash, crude fibre, fat, carbohydrate and protein contents) of ground Cissus populnea stem bark was determined by means of standard methods (AOAC, 1984).

Percent (%)Total Ash:-Total ash was determined using 1.0g sample in a muffle furnace (supplied by Bamford, Sheffield, England) at 550 - 600^oC by official methods (AOAC, 1984).

Moisture Content: Percent moisture was determined with 1.0g sample of ground Cissus stem bark in a Genelab hot air oven at 105^o – 120 ^{o}C according to official methods (AOAC, 1984).

Crude Protein: This was determined by the microkjeldahl method (AOAC, 1984) in 0.2g of ground Cissus stem bark sample in duplicate.

Crude Fibre: Crude fibre content of the ground Cissus stem bark sample was estimated in 2.0g of the sample in duplicate according to official methods (AOAC, 1984).

Percent Fat: This was determined in 2.0g ground Cissus stem bark by official methods (AOAC, 1984).

Percent Carbohydrate: Average percent carbo - hydrate was determined by difference after the above analysis.

RESULTS

The results of the tests employed in the determination of the proximate composition of ground Cissus populnea stem bark are shown in table 1 below. Table 2 shows the Amino acid profile of the ground and processed Cissus populnea stem bark.

Table 1: Proximate Composition of ground Cissus Stem Bark (Values are means of three determinations ±S.D.)

Parameters Determined	% Present
Protein	3.51±0.85
Fat	2.28±0.5
Carbohydrate	76.57±6.5
Moisture	9.38±1.8
Crude fibre	2.50±0.2
Ash	5.76±1.9

Table 2: Amino Acid Profile of ground Cissus populnea stem bark (Values are ±SD of three estimations)

Amino Acid	Concentration 8/16gN
Lysine	1.54
Histidine	0.29
Arginine	7.25
Asparagine	0.53
Threonine	0.26
Serine	0.15
Glutamate	9.65
Proline	0.30
Glycine	0.17

Alanine	3.05
Cystiene	0.67
Valine	0.16
Methionine	0.37
Isoleucine	0.18
Leucine	2.07
Tyrosine	0.64
Phenylalanine	0.17

The present study has shown that Cissus stem bark contains relatively higher amount of glycine, arginine and alanine. Although glycine is not considered an essential amino acid because the body can make it from other chemicals, its presence in a diet is beneficial as it is used for treating schizophrenia, stroke, benign prostatic hyperplasia (BPH), and some rare inherited metabolic disorders. typical diet contains about 2 grams of glycine daily. The primary sources of glycine are protein-rich foods including meat, fish, Dairy, and legumes

Glycine, used to make proteins, is also used to protect kidneys from the harmful side effects of certain drugs used after organ transplantation as well as the liver from harmful effects of alcohol. Other uses include cancer prevention and memory enhancement. Glycine is also involved in the transmission of chemical signals in the brain, so there is interest in trying it for schizophrenia and improving memory. Some researchers think glycine may have a role in cancer prevention because it seems to interfere with the blood supply needed by certain tumors. The presence in relatively higher concentration of arginine makes consumption of soup prepared with *Okoho* beneficial as arginine is good for It is obtained from the diet and is necessary for the body to make proteins. Arginine is found in red meat, poultry, fish, and dairy products. It can also be made in a laboratory and used as medicine. Some people use arginine for preventing the common cold, improving kidney function after a kidney transplant, high blood pressure during pregnancy (pre-eclampsia), improving athletic performance, boosting the immune system, and preventing inflammation of the digestive tract in premature infants.

L-arginine is converted in the body into a chemical called nitric oxide. Nitric oxide causes blood vessels to open wider for improved blood flow. L-arginine also stimulates the release of growth hormone, insulin, and other substances in the body.

Alanine, also present in higher concentration in Cissus, is an amino acid that helps the body convert the simple sugar glucose into energy and eliminate excess toxins from the liver. Alanine has been shown to help protect cells from being damaged during intense aerobic activity, when the body cannibalizes muscle protein to help produce energy.

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