



Study of amino acid and fatty acid in Soybean (*Glycine max. L.*)

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ABSTRACT

In the present investigation, Ion exchange chromatography with post column ninhydrin detection is one of the most commonly used method employing for quantitative amino acid separation of amino acid on an ion exchange column accomplished through a combination of change in pH and ionic strength. Soybean contain 40% protein its containing 14 different type of amino acid with different value But perhaps most effective method is cation exchange chromatography (CEC) in the presence of buffer system and post column derivatization step with ninhydrin and detections is performed with UV absorbance. Fatty acid mixtures can be separated into one fraction rich in saturated fatty acids and the other rich in unsaturated acids. Five different type fatty acid are found in differ in mean value in soybean. It may be saturated and unsaturated forms. saturated fatty acids have a higher melting point than unsaturated, liquid mixture to be fractionated is cooled to a temperature at which the larger part of the saturated acids crystallize, while the greater part of unsaturated acids remain in liquid form.

Keywords: *Ion exchange chromatography saturated fatty acid, the crystalline, Protein.*

Received 11.06.2021

Revised 21.09.2021

Accepted 20.11.2021

INTRODOCTON

Soybean (*Glycine max.L*) is one of the economically important grain legumes grown in world which gave good amount of profit to the farmer. The economic importance of soybean is mainly due to its chemical constituents, primarily oil and protein.. The miracle crop of soybean in India by Bhatnagar, P. S. (1982) In addition, it contains carbohydrate and sugars, cellulose, inorganic matter, vitamins and enzymes. The chemical properties of soybean have been summarized by Watanabe and Kishi (1984). DS-288 variety and climate, which can be influenced by location and season, are known as affect chemical constitution of soybean. Generally, Japanese summer types of soybean have high protein content, whereas American varieties are high in oil. Japanese and Chinese varieties have high carbohydrate content. Cellulose, hemicelluloses, and other polysaccharides are present in the cell wall. Sucrose is present in the range of 6 to 7 per cent and other oligosaccharides and stachyose vary from 1 to 2 per cent. The range of raffinose varies from 5 to 6 per cent. It is interesting that starch, although present in the bean prior to it's ripening, is completely absent in the seed on maturity.

MATERIAL AND METHODS

Seeds of soybean cultivars, DS-228 used in the present investigation were procured from Mahatma Phule Krishi Vidyapeeth, Rahuri (Maharashtra) both the cultivars are widely cultivated in Maharashtra. To begin with pilot experiments were conducted in padmashri vikhe patil college, pravaranagar, (M.S) at 2020- 21.when the soybean is matured at that time amino acid and fatty acid test are carried out by different method in laboratory.

Amino Acid Separation-

Ion exchange chromatography with post column ninhydrin detection is one of the most commonly used method employing for quantitative amino acid. sepration of amino acid on an ion exchange column accomplished through a combination of change in PH and ionic strength. But perhaps most effective method is cation exchange chromatography (CEC) in the presence of buffer system and post column derivatization step with ninhydrin and detections is performed with UV absorbance. Zhang, J.Z.etal, (1994). Shows that Development of genetic variation of high protein content in soybean. Amino acid is a general name of the chemical compounds that have both an amino group and a carboxylic group within

one molecule, and such amino acids are categorized into α -, β - and γ -amino acids based on the position of the amino group against the carboxylic acid group. Whereas there are more than eighty kinds of amino acids, proteins are made from only twenty six kinds of amino acids and the other three are dibromo tyrosine, triiodo tyrosine and thyroxine. All α -carbons except that of glycine are asymmetric carbons that have four different bonds with-H, -COOH, -NH₂ and -CmHn, and thus amino acids have two different stereo configurations: levorotatory L-form and dextrorotatory D-form. Amino acids synthesized chemically are optically inactive racemic bodies, mixtures of equal amounts of L- and D-forms. Natural amino acids that are components of proteins are all α -amino acids in L-form. Manufacturing of amino acids- Amino acids are produced by extraction, organic synthesis, fermentation or enzymatic synthesis. The first industrial manufacturing in 1908 was that of glutamic acid as seasonings separated from the extracts of wheat proteins. In 1955, invented was the fermentation method where bacteria are bred with sugar as carbon source and ammonia as nitrogen source to accumulate amino acid out of their cells in a large amount. L-Glutamic acid is the first industrial application.

Fatty Acid separation- Fatty acid mixtures can be separated into one fraction rich in saturated fatty acids and the other rich in unsaturated acids. Since saturated fatty acids have a higher melting point than unsaturated, liquid mixture to be fractionated is cooled to a temperature at which the larger part of the saturated acids crystallize, while the greater part of unsaturated acids remain in liquid form. Different industrial methods to separate the two phases are described. The oldest and simplest method is slowly to cool and crystallize the mixture in shallow pans to form cakes which then are pressed in presses of different design. By applying high pressure, the liquid olein is thus squeezed out from the cake, leaving the steering fraction behind. A new process to separate the phases is to mix an aqueous solution, containing a wetting agent, with the crystallized fatty acid mixture.

RESULTS AND DISCUSSION

Protein, which is the range of 30 to 42 per cent in soybean seeds mostly salt-soluble globulin and partly albumins by Sichkar, V. L. et al., (1982) Protein content in grain and lysine content in protein of soybean mutants induced by chemical mutagenesis and v-rays Soybean.

. From the view point of essential amino acid composition, soybean protein is fairly well balanced (Table 1). Lysine is abundant and there are less sulphur-containing amino acids, such as methionine and cystine, than in animal as well as cereal proteins. Gottschalk, W. and Muller, H. (1970). Monogenic alterations of seed protein content and protein pattern in X-ray induced *Pisum* mutants, Graef, G.L. et al., (1985), inheritance of three stearic acid mutants of soybean.

Table: 1 Amino acid composition of soy protein.

SR.NO.	AMINO ACID	G/16 G N
1	Arginine.	6.8
2	Histidine	3.2
3	Lysine	7.4
4	Tryptophan	1.3
5	Tyrosine	3.1
6	Phenylalanine	4.9
7	Methionine	1.4
8	Cystine	1.3
9	Threonine	4.0
10	Serine	5.8
11	Leucine	7.1
12	Isoleucine	4.5
13	Valine	5.0
14	Glutamic acid	19.9

Soybean oil, present in the seed to the extent of 20 per cent, consists largely of unsaturated fatty acids such as oleic and linoleic. Smutkupt, S. (1975), reported that the range of fatty acids among the soybean lines, averaged across seven environments, was 10.2- 11.9 per cent for palmitic, 2.9- 4.2 per cent for stearic, 18.6- 27.9 per cent for oleic, 50.0- 58.6 per cent for linoleic and 6.8- 9.3 per cent for linolenic. Erickson, et al., (1988), reported Inheritance of altered palmitic acid percentage in two soybean mutant. Fehr, W. R., et al., (1992), 'Inheritance of reduced linolenic acid content in soybean genotypes, Wilcox, J.R. and Cavins, J.F. (1985). Inheritance of low linolenic acid content of the seed oil of a mutant in *Glycine max* (L.) Merrill. Fatty acid composition of soybean oil is presented in Table 2.

Table: 2 Mean fatty acid composition of soybeans

SR.NO	FATTY ACID	TYPE	MEAN/ RANGE
1.	Palmitic (C 16)	Saturated	11 % \pm 1
2.	Stearic (C 18)	Saturated	4 % \pm 1
3.	Oleic (C 18:1)	Monounsaturated	25 % \pm 3
4.	Linoleic (C 18:2)	Polyunsaturated	50 % \pm 3
5.	Linolenic (C 18:3)	Polyunsaturated	9 % \pm 3

Lecithin, sterols and chlorophyll are also found in soybean oil. Lecithin and cephaline, belonging to phosphatide group, together are present up to about 2 per cent. Lecithin obtained from soybean oil is an excellent emulsifying agent and is used in production of chocolate and medicines. It is believed that lecithin prevents accumulation of cholesterol in blood. Sterols are compounds similar to vitamin D and hormones in chemical nature. Saponins present in soybean up to 0.6 per cent from soapy foam when mixed in water. Soybean saponins have recently been reported to prevent formation of peroxide oil, which causes senility. In addition, isoflavon and phytin are present in soybean. Isoflavon, a yellow substance accounting for the water solubility of soybean colour, has the same effect as saponins. Vitamins present in soybean are B1 and other members of B group such as riboflavin, niacin, pantothenic acid, carotene the precursor of vitamin A and vitamin E. Composition of vitamins varies from variety to variety.

ACKNOWLEDGMENT

The author is thankful to Head of Department of Botany, Padmashri Vikhe Patil College Pravaranagar, and Principal of P.V.P. College Pravaranagar who provided necessary facilities during research work.

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CITATION OF THIS ARTICLE

B.F. Mundhe. Study of amino acid and fatty acid in Soybean (Glycine max. L.). Bull. Env. Pharmacol. Life Sci., Vol 11[1] December 2021 : 109-111.