Chromatographic Study of the Group Composition of Some Vegetable Oils

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ABSTRACT

As a result of the work carried out, using the thin-layer chromatography-TLC method, the group composition of oils isolated from some melons was identified, and then their quantitative assessment was carried out. The possibility of using the TLC method for assessing the group composition and authenticity of vegetable oils is shown. Watermelon, melon and pumpkin oils were chosen as vegetable oils.
This approach can be used in the standardization of the quality of oils and in the development of regulatory documents for oils.

Keywords: Vegetable Oils,

Introduction

Fatty acids are the most essential component of oils and have a considerable impact on their properties. Despite the high number of fatty acids in fats, the number of normal fats is only 8-12. Saturated myristic, palmitic, styarine, arachic, begen, and unsaturated palmitolin oleic, linoleic, and linolenic acids are commonly found in oils.[1].

Waxes, phosphatides, phospholipids, cholesterol, cholesterol, carbohydrates, tocopherols, free fatty acids, vitamins, and other compounds in fats and oils, in addition to triglycerides, give oils their distinct qualities. The amount of polyunsaturated fatty acids, phosphatites, tocophytes, and other compounds in vegetable oils determines their biological significance[2].

Cotton, sunflower, apricot, grape, peach, coconut, corn, sesame, sesame, flax, almond, olive, soy, walnut, watermelon, melon, and other pumpkin seeds are examples of vegetable oils. [3,4] oils are derived from [3,4] One of the most pressing problems in this direction is the extraction of oils from watermelon, melon, and squash seeds. This is due to the ability to cultivate, harvest, and dry these plants, as well as the ability to extract a complete set of vitamins, macro and micro elements, and polyunsaturated fatty acids from the seeds through pressing. Cold pressing is the most common method for extracting oils from watermelon, melon, and pumpkin seeds. Furthermore, the extraction procedure is employed. Oil is extracted using appropriate procedures that include chloroform, hexane, and a variety of other organic solvents [5,6,7]. Melon oil is beneficial since it contains a variety of physiologically active ingredients with excellent therapeutic capabilities and low cholesterol. The acid-base equilibrium in the blood and cells is restored by melon, watermelon, and pumpkin seed oils. Participates in the body's cleansing process, boosts immunity, speeds wound healing, and lowers cancer risk.

They contain vitamins, physiologically active compounds, and polyunsaturated fatty acids in the range of 80-89% [8,9]. These acids are beneficial to the body and help to keep the heart, blood vessels, and brain in good working order. The following chemicals [10] are found in the group of oils, in addition to glycerides:

1. Free fatty acids are always present in fats. They are formed as a result of hydrolysis of fats during extraction and storage of oil.

Sterins are esters formed by high molecular weight polycyclic monohydric alcohols and their fatty acids. Phosphatides were esters of a mixture of glycerin with oil and phosphoric acid [11].

Chlorophyll, carotenoids, and gossypol, which is present in cottonseed oil, are examples of lipochromes that color oils and fats.

Vitamins - Vitamins A, C, E, and others are commonly found in fats and oils.

Organic molecules called chromogenic substances produce color reactions in oils. Sesame oil, sesame oil, and cottonseed oil gossypol are among them. Lipoids are the name given to all of the chemicals listed above. Lipoids are fat-soluble but not water-soluble.

Protein and mucous components, enzymes, hydrocarbons, essential oils, resins, high molecular weight alcohols, minerals, and other substances are found in fats and oils, in addition to lipoids. Oils are lighter than water, soluble in ethers, chloroform, gasoline, benzene, and other organic solvents, and insoluble in water.

The composition and quality of vegetable oils are commonly assessed using gas chromatography and high-efficiency liquid chromatography. The thin-layer chromatography method [12] is the simplest and most informative way of determining the group composition of vegetable oils.

The experimental part

The oils group was studied using watermelon, melon, pumpkin vegetable oils, as well as a variety of other fruit oil extracts. The Stal method [6, 7] was used to accomplish one-dimensional chromatography of lipids comprising of a research group of vegetable oils in our experiment. This was accomplished by dissolving 0.5 mg of vegetable oil in chloroform. Made on a Silufol plate measuring 8 x 5 cm. This was accomplished by washing the plate and drying it at 110^0C with an elliptical mixture of solvents. A chromatographic syringe was used to drop the test oil's hexane solution on the Silufol plate's beginning line, and the light petroleum ether was diluted with an 80:20:1 mixture of diethyl ether and acetic acid. An alcoholic solution of phosphorus-molybdenic acid was used to identify stains of separated lipid fractions. Figure 1 shows a chromatogram of watermelon oil extract obtained by thin-layer chromatography.

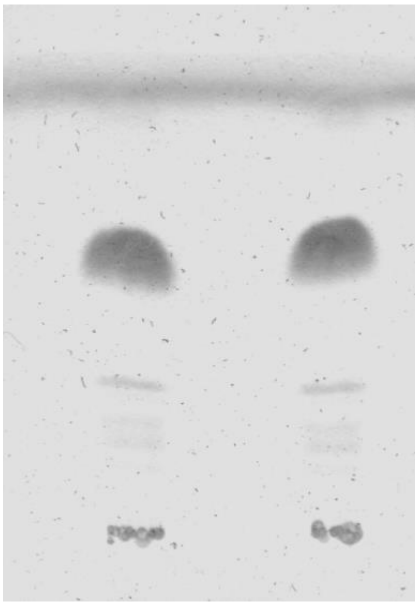

Figure 1. Chromatogram of watermelon oil extract obtained by ThLCh method

Identification of spots by Rf: triacylglycerides on the front line of the solvent (TAG) R_f = 0,57±0,61; free fatty acids (FFA) R_f = 0,31±0,33; holistirin 0,24±0,28; phospholipids (PhL) R_f =

0,21±0,23; cholistyrol R_f = 0,17±0,20;

The qualitative composition of the group substances was determined by the value of the distribution coefficient Rf, and the quantitative composition by the peak surface of the chromatogram. The results obtained are given in Table 1.

Table 1

Group composition of some melon vegetable oils

The name of the oil	Phospholipids	Holistirin	Holistyrol	Free fatty acids	Triglycerides (
Watermelon	0,70+0.20	0,60±0,21	7,31 ±0,84	0,82±(),23	89,52±2,14
Melon	0,74 ± 0,21	0,55 ± 0,19	7,20±0,75	0,96 ± 0,27	87,87±2,34
Pumpkin	0,75±0,19	0,61 ± 0,20	7,87±0,95	0,88 ± 0,30	85,70±2,68
Cotton	0,82±0,20	0,67±0,22	7,45±0,85	0,97±0,25	86,85±2,40
Sunflower	0,81±0,21	0,64±0,21	7,38±0,75	0,96±0,20	87,44±2,16

Results and their discussion

Based on the results obtained by the ThLCh method, the group composition of watermelon, melon and squash and other tested oils was determined. The results in Table 1 show that the vegetable oil extracts tested contained 5 fractions of neutral lipids: phospholipids triglycerides, cholistirin, cholistyrol, and free fatty acids. From the data in Table 1, it can be seen that the main group of watermelon, melon and pumpkin oils consists of triglycerides, as well as oils extracted from all other plants. The content of phospholipids and cholesterol in melon oils is relatively low.

The major part of neutral lipids in fats are triglycerides, which have been found to make up 89.52%. Thus, the advantage of the one-dimensional lipid chromatography method is that it does not require long-term processing of expensive equipment and samples. In this study, the results obtained on the basis of ThLCh method for the determination of vegetable oils and oil extracts showed that the relevant vegetable oils can be used to determine the composition of the group, check their quality and authenticity, and develop relevant regulations.

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