e-ISBN : 978-93-6252-178-1
IIP Series

FATTY ACID COMPOSITION OF GULMOHAR SEED OIL FROM BULANDSHAHR (U.P.)

Abstract

Researchers looked into the fatty acid composition and physico-chemical characteristics of oil extracted from Gulmohar seeds in Bulandshahr, Uttar Pradesh. Using an m-Bondapak C-18 column and a UV/VIS detector, high performance liquid chromatography was used to analyse the fatty acid composition of Gulmohar, and standard methods from the American Oil Chemists Society were used to determine the physico-chemical characteristics. There is a lot of unsaturated acid in the oil. Omega-6, or linoleic acid, is the predominant acid. The main fatty acids detected were oleic and linoalenic acid; small amounts of saturated arachidic acid were also detected.

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I. INTRODUCTION

One of the Leguminosae family's well-researched plants is Gulmohar (Delonix Regia). In Hindi, it is frequently referred to as Gulmohar. Fruits and flowers in bunches that ripen from August to October are crimson-red. September through October saw the collection of seed pods. 25 to 30 brown seeds with a dark ridge each in separate cavities. Gulmohar plant parts have been used as an antiper, rheumatism remedy, etc. [1-4] Unsaturated and polyunsaturated fatty acid chains can have one or more double bonds at particular positions, or they can be fully saturated. The nutritional and health implications of fatty acid analysis have drawn a lot of attention to its significance. The makeup of the fatty acid mixture determines the physical and chemical characteristics of fat and oil. As for gas chromatography, although gas chromatography (GC) is the method of choice for fatty acid analysis, high-performance liquid chromatography (HPLC) is also useful for handling unusual materials, preventing the degradation of functional groups that are susceptible to heat, and micro-preparative tasks. Selectivity and detector sensitivity have both improved with HPLC of carboxylic acid phenacyl ester derivatives. Rather and Reid were the first to prepare fatty acid derivatives of phenacyl halides [6–10]. The basis for separation was solubility differences. Shriner et al.'s approved method for the organic qualitative analysis of carboxylic acids is the preparation of substituted phenacyl ester derivatives [11–13]. Therefore, the fact that HPLC runs at room temperature and poses comparatively little risk to delicate functional groups can be a significant advantage. We report on the physio-chemical characteristics and identification of fatty acids (FAs), or we conduct chemical screening of the oil extracted from the Gulmohar seeds in Bulandshahr, Uttar Pradesh.

II. MATERIALS AND METHODS

Isolation of Fatty Oil: Gulmohar's mature seeds were transported from Bulandshahr. After the seeds were cleaned and free of contaminants, they were ground into a powder in a ball mill. Approximately 20g of powder was extracted using petroleum ether (450–550C) in a 6-hour Soxhlet extractor. Reduced pressure is used to extract the solvent, and the fatty oil is then refrigerated until needed again.Standard American Oil Chemist's Society procedures were used to determine the analytical values of the oil and seed as well as the physico-chemical properties of the oil, such as its acidity, saponification, and iodine content. Table I displays the obtained results. After the unsaponifiable material was eliminated, free fatty acids were extracted as usual.

Table 1: Physico-chemical properties of the seeds and oil of Gulmohar

Characteristic	Value
Oil content (%)	2.0
Protein content (%) (Nx6.25)	32.6
Moisture (%)	1.0
Iodine value (wij's)	90
Acid value	3.0
Saponification value	155
Unsaponifiable matter (%)	1.90

Preparation of Mixed Fatty Acids: A round-bottom flask containing oil (2.5g) and 20ml of 1N alcoholic potassium hydroxide solution was refluxed for five hours in a steam bath. After cooling the mixture and removing the alcohol using a rotary evaporator under low pressure, 30 millilitres of distilled water were added, and solvent ether was used to extract the mixture. The ethereal extract contained non-saponifiable material that was extracted. Diluted HCl (5N) was used to acidify the aqueous layer, and ether was used to extract the free fatty acids.

Anhydrous sodium sulphate was used to dry the ethereal solution after it had been cleaned with water. After the solvent was removed, free fatty acids were found and refrigerated.

Fatty Acid Phenacyl Esters Preparation: By using a KOH solution to neutralise a sample of free fatty acids that has been dissolved in methanol: Lower pressure is applied to the mixture as it is dried on a rotating evaporator. After that, it is combined with 0.1 ml of 4-bromophenacyl bromide and 2 mM 18-crown-6 in acetonitrile. After gently mixing the mixture for 20 minutes at 700C, the mixture is cooled and diluted with acetonitrile.

Fatty Acid Phenacyl Ester Separation on HPLC: Derivatives of phenacyl esters are especially useful for HPLC analysis. A modified approach was applied. Gilson HPLC with a degasser, a binary pump, and a column (900 x 6.4 mm) packed with Bonda pack C-18 were among the equipment used. Acetonitrile-water was used to elute the sample in the initial ratio of 65:35 (by volume), which was then gradually increased to 75:25 in 10 minutes, then again in another 15 minutes, and finally changed to 96:4 in another 15 minutes at a flow rate of 2 ml/minute. A UV/VIS detector was used to complete the detection process. Table II provides the composition of fatty acids.

Table 2: Fatty acids composition of the oil from seeds of Gulmohar

Fatty Acid (%)	Composition
Oleic	18.5
Linoleic	38.6
Linolenic	15.0
Arachidic	16.0

III. RESULTS AND DISCUSSION

Table I displays the oil content and physico-chemical characteristics of the oil extracted from Gulmohar seeds in Bulandshahr.The range of the oil yields was 2.5–3.0%. The oil is liquid at room temperature and has a brownish yellow colour.The main components of oils and fats are fatty acids. Using the fatty acid phenacyl ester as a comparison, four fatty acids were found. Arachidic acid was found to be the saturated fatty acid. Myristic acid was not present in this species, and arachidic acid was reported to be the predominant saturated acid at 16.5%.

The main unsaturated fatty acids were discovered, including oleic, linoleic acid (omega-6), and linolenic acid. In terms of monounsaturated fatty acids, this species' predominant fatty acid was oleic acid (18.5%). The percentages of polyunsaturated fatty acids ranged from 15.0% to 38.6%, respectively. When compared to the findings of the general literature, the percentage of linoleic acid (omega-6) in this study was found to be high [14–15]. Based on the findings of this initial investigation, it is evident that the seed oil had a significant concentration of oleic acid and high levels of linoleic acid (omega-6). Omega-6 fatty acid, or linoleic acid, is necessary for human health and can be found in seeds. As a result, the study might provide a rationale for using the seeds in both human and other commercial products.

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