



Composition and Lipid Classes of Orange, Tomato and Pumpkin seed oils of Vidarbha Region of Maharashtra

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ABSTRACT

Seeds such as Orange (Citrus sinensis), Tomato (Lycopersicum esculentum), and Pumpkin (Cucurbita maxima) belonging to the Rutaceae, Solanaceae and Cucurbitaceae families, were extracted with n-hexane and chloroform:methanol (2:1) (v/v) to yield the oils and total lipids which were subjected to examination for physical and chemical characteristics. The fatty acid composition of their methyl esters was determined by GLC which showed the pre-dominance of palmitic, oleic and linoleic acids. The analysis of total lipids by TLC, showed the presence of neutral, glyco- and phospholipids.

Keywords: Orange, Tomato, Pumpkin seed oils, total lipids, composition, lipid classes.

INTRODUCTION

Vegetable oils are essential in meeting nutritional demands of the globe and are utilized for many food and industrial purposes. The world consumption is dominated by, soybean, ground nut, palm, rapeseed, and sunflower oils. These conventional sources of vegetable oil are unable to meet the ever increasing demands of domestic and industrial sectors.

India was an exporter of oilseeds and oils in the past but now is an importer of oils due to steadily widening gap between supply and demand. Therefore, the need exists to look for other sources to supplement the supplies. From this view point, non-conventional oilseeds are of much concern to cope this challenge. More recently, research activities have focused on examining and characterizing new sources of edible oils [1-5] offering good scope in reducing the demand-supply gap.

Orange, Tomato and Pumpkin seeds, which are the major component of fruit processing industry wastes, are found in abundance in the Vidarbha region of Central India which is famous for growing oranges and cotton. Expansion in the citrus industry in recent years calls attention to citrus seeds as a potential minor oil source. The extraction and commercialization of this oil will reasonably enhance the profit status of most fruit juice making industries. The major component of tomato pomace, a waste product from tomato processing plants, is the seeds, which are considered to be a good source of oil, along with the skins, and pulp. Pumpkin seeds are used widely in many countries for oil or protein production. The oil has been used traditionally as medicine in many countries such as China, India, Mexico, Brazil, and America.

Work on composition of seed oils [6-8] has been reported.

This work reports on the physico- chemical characteristics and fatty acid composition and lipid classes of seeds and oils found in the Vidarbha region of Maharashtra...

EXPERIMENTAL SECTION

Seed Materials:

The seeds were collected from local fruit canning industries and were prepared for use by decorticating, sun drying and grinding.

Extraction of seed oils and total lipids:

The ground seeds were extracted with the help of a Soxhlet extractor by n-hexane and chloroform:methanol(2:1, v/v)by the method of Folch et al. [9] to yield the oils and total lipids.The combined extracts were concentrated to thickness under reduced pressure and diluted with chloroform and stored at -20°C for further use.

Fractionation of total lipids:

The total lipids were fractionated on a silicic acid column and eluted successively with chloroform, methanol and acetone..Neutral lipids were eluted in chloroform, glycolipids in methanol and phospholipids in [10] acetone. Identity of total sugars was confirmed by Dubois method [11],Phosphorus by Bartlett method [12] and Nitrogen by Kjeldah's[13] method.The total lipids were then separated by thin-layer chromatography (TLC) using the solvent system chloroform/methanol/water (65:35:5 v/v/v)[14]. Phospholipids and Glycolipids were qualitatively identified by spraying with Dittmer's reagent [15]and periodate-benzidine reagent [16] as spray reagents, respectively.

Fatty acids composition:

Standard methyl esters were obtained from Analabs, North Haven, CT,USA. Fatty acid methyl esters of respective oils were prepared by the Padhi and Singh procedure [16] and were analyzed by GLC having a column packed with 15%Chromosorb-w (40-60 mesh) with a flame ionization detector at 280°C.The conditions of GLC were: chart speed 60 cm/hr; injection port temperature and column temperature 200°C and 300°C, respectively and nitrogen and flow rate 60 mL/min.

RESULTS AND DISCUSSION

Physio-chemical properties of these seed oils(Table I) showed that the iodine value ranged from 105.2 to 121.5 while the Saponification value ranged from191.4 to 198.1. The oils had low unsaponifiable matter content. Fatty acids composition of seed oils(Table 2) indicated pre-dominance of Palmitic(C 16:0),Oleic(C 18:1) and Linoleic (C 18:2) acids.

Table I:Physico-chemical properties of Seed Oils

Seed oils	Oil content%	Refractive index at 25 °C	Specific gravity at 15 °C	Acid value	Iodine value	Sap. value	Unsap. matter %
Orange	30.0	1.4745	0.933	2.3	105.2	198.1	1.8
Tomato	30.3	1.4700	0.937	3.0	114.4	192.3	0.8
Pumpkin	31.4	1.4728	0.917	1.0	121.5	191.4	1.1

Table 2: Fatty acids composition of seed oils (by wt%)

Seed oils	Fatty acids					
	C 16:0	C 18:0	C 18:1	C 18:2	C 18:3	Others
Orange	24.7	3.6	28.5	41.7	0.8	0.7
Tomato	15.6	6.8	26.0	46.5	2.8	2.3
Pumpkin	20.7	6.0	38.5	34.2	0.3	0.3

Others means C 12:0, C 14:0, C 20:0,C 22:0 acids

TLC analysis of the total lipids showed the presence of nitrogen, sugar and phosphorus indicating the presence of major lipid classes namely neutral, phospholipids and glycolipids, identity of which was further confirmed by applying specific color reactions. The orange seeds contain a fairly high percentage of oil, the recovery of which by

conventional methods of pressing appears to present no unusual problems. When refined, bleached, and deodorized the oil would be quite acceptable as a food oil.

The work was largely in good agreement with earlier work [18,19,20] carried out on these oils of other regions.

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