



Identification of Chemical Constituents of Essential Oil of Almond Seed

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ABSTRACT

Essential oils are natural products that plants produce for their own needs other than nutrition which are generally made up of complexes mixtures of organic compounds that gives characteristic odours and flavours to the plant. The need to qualitatively determine the components of essential oils for its usefulness and side effects to human, plants and animals lead to the study of the oils of almond plant. The wet seeds of this plant were collected and the essential oil was extracted using hydrodistillation method, the extract was then analysed using gas chromatography- mass spectroscopy. The extract was found to contain quiet a number of compounds which include Linalool, Citral, 2-undecanone, 2,6-Octadien-3,7-dimethylpropanoate, isoneral, caryophyllene among others. Most of this chemicals finds usefulness in the perfumery and flavouring industries, while other like linalool and citral have antimicrobial qualities and phenomenal effects on insects. The presence of this chemical components account for the use of almond oil in medicine perfumery, soap making and insecticides industries.

Keywords: essential oils, almond, hydrodistillation, composition, plant

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1. INTRODUCTION

Essential oils are concentrated volatile compounds produced by plants. They are the easily evaporated essences that gives plants their wonderful scents. Each of these complex precious liquids is extracted from a particular species of plant. Each plant species originates in certain regions of the world with particular environmental conditions. Essential oils are frequently referred to as the life force of plants and they have enhanced thousands of lives for thousands of years, offering benefits from cosmetics and dietary purposes to spiritual and religious use. These oils could be extracted from flowers, leaves, stems, roots, seeds, barks, resin or fruit rinds. The amount of essential oils found in plants can be anywhere from 0.01 percent – 10 percent of the total. Essential oils are used by the plants in somewhat the same way they are by human- they fight infections, contain hormone like compounds, initiate cellular regeneration and work as chemical defence against fungal, viral and animal foes (Baser, 2010). Nuts belong to various plants families, although they have special common features such as high oil content and large seed size when compared to other oilseed species. Taxonomically, the almond tree, *Prunus dulcis*, belongs to the *Amygdalus* subgenus inside the *Prunus* genus, the *Rosaceae* family and the order *Rosale* (Felipe, 2000) are part of the main group of tree nuts and nut oil sources which are not only important oil crops but also an essential dietary component, acting as energy and functional compound sources.



Actually, nut oil have been widely enjoyed for food applications, mainly due to their particular flavour and more recently, because of their relationship with health-promoting effects, besides, tree nut oils are also widely used in the cosmetic industry (Miraliakbari and Shahidi, 2008).

The almond group is composed of two Species, namely, *prunus dulcis* (sweet almond) and *prunus amara* (bitter almond). Almond oil is extracted mainly from sweet almonds, which contain about 50 percent oil (Soler et al 1988). There are different extraction methods for essential oil but only one was used here using the sweet almond species. With the aim of maximizing the uses of oils of natural plants, the present work focuses on the study of the chemical compositions of the essential oil from sweet almond: its extraction and chemical compositions. The effect of identified compounds was then looked up in literature for their relevance in various industries.

2. MATERIALS AND METHODS

Fresh almond seed samples were harvested from several trees at different areas within Abeokuta and Lagos. The sample was allowed to dry under air for about three days in the laboratory. The sample was allowed to dry under air for about three days in the laboratory. The seed was later cut into slice for ease of extraction. Hydrodistillation method of extraction was used to extract oil using Clevengers apparatus, 300g of dried sample of almond seed were weighed and placed in a round bottom flask containing 500ml of distilled water which was placed on heating mantle to boil. The essential oil was collected in a cleavenger-type apparatus. All necessary precautions were taken during the extraction process so as not to loss volatile compounds. The oil obtained was then was then analysed using a GC 8000 chromatograph coupled with an electron impact mass spectroscopy voyager. The spectra obtained were compared with those of the equipment data bank.

3. RESULT AND DISCUSSION

The extract from the almond seed was a colorless oily liquid with pleasant smell which is insoluble in water, miscible in alcohol with high concentration. It is also miscible in paraffin ether, chloroform and glacial acetic acid. The compounds identified in the linalool, citral, 2-undecanone, caryophyllene, trans-6-Bergamotene, Cis-s-β-Farnesene, 2,6-octadien-3,7-dimethyl propanoate, 3-methyl-2-(2-methyl-2-butenyl)furan. Linalool $C_{10}H_{18}O$, 3,7-dimethyl-1,6-octadien-3-ol, is a monoterpene found in many flowers, spice plants and fruits. It has a role as a plant metabolite, a volatile oil component, an antimicrobial agent and a fragrance (pubchem.gov). In addition, it is used by pest professionals as a flea, fruit fly and cockroach insecticide.

Citral $C_{10}H_{16}O$, 3,7-Dimethyl-2,6-octadienal. Used mainly as a flavour, it also has strong antimicrobial qualities and pheromonal effect. It could be used to synthesis vitamin A, lycopene and methylionone. 2-undecanone, $C_{11}H_{22}O$, is a dialkyl ketone which can be extracted from plants as well as manufactured synthetically. It is used in flavouring and perfumery, because of its strong odor, it is primarily used as an insect repellent or animal repellent (pubchem.gov). Caryophyllene, $C_{15}H_{24}$ is a natural bicyclic sesquiterpene that is a constituent of many essential oils. it has a role as a non-steroidal anti-inflammatory drug, a fragrance and a metabolite (pubchem.gov). Some of the key health benefit of Caryophyllene are that it relieves pain, boost immune system function, alleviates stress and anxiety, promotes healthy digestion and reduces inflammation(mong.com). Trans-α-Bergamotene, $C_{15}H_{24}$, is predominantly used effectively for inflammations in the intestines especially if accompanied with mucous, diarrhea and tissue disruption. It is absorbed by the human body without any negative side effects (essentialoil.in). 2,6-octadien-1-ol, 3,7-dimethylpropanoate, $C_{13}H_{22}O_2$, also known as Neryl propanoate is used in perfumery and food flavouring. Most have the identified compounds in the almond seed are terpenes which are usually found in plants.



4. CONCLUSION

The oil extracted from almond plant seed was extracted using hydrodistillation type of extraction which is suitable for temperature sensitive materials which may decompose at and over their boiling point. The identified components are mainly rich in terpenes. Most of the identified components find use in perfumery, food flavouring, and insecticide industries. Some of the components also have medicinal importance. Therefore, the potential to utilize the essential oil of this almond seed for use in the cosmetic and food industry seems favourable. This use of this seed will further minimize the waste generated from its disposal.



REFERENCE

1. Baser, C (2010). Chemistry of essential oils. In Handbook of Essential Oils: Science, Technology and Applications. K.H.C., Buchbauer, G Eds.; CRC Press, Taylor and Francis Group London, UK.
2. Bergamotene, www.essentialoil.in/bergamotene . Assessed May 8, 2018
3. Felipe, A (2000). El almendro. El material Vegetal. Ed. Mira Editores. Zaragoza
4. Miraliakbari H. and Shahidi F (2008). 'Antioxidant activity of minor components of tree nut oils', Food chemistry, vol. 111, No. 2. Pp 421-427
5. National Center for Biotechnology Information. PubChem Database. Beta-Caryophyllene, CID=5281515, <https://pubchem.ncbi.nlm.nih.gov/compound/beta-Caryophyllene> (accessed on June 13, 2018)
6. National Center for Biotechnology Information. PubChem Database. Linalool, CID= 6549, <https://pubchem.ncbi.nlm.nih.gov/compound/linalool> (accessed on June 13, 2018)
7. National Center for Biotechnology Information. PubChem Database. 2-Undecanone, CID= 8163, <https://pubchem.ncbi.nlm.nih.gov/compound/2-Undecanone> (accessed on June 13, 2018)
8. Soler L, Canellas J and Saura-Calixto F (1988). 'Oil content and fatty acid composition of developing almond seeds', Journal of Agricultural and Food Chemistry, vol. 36, no. 4. Pp. 695-697
9. Terpene profile: Beta- Caryophyllene, <https://monoq.com/eo/terpenes/beta-caryophyllene> (assessed May 12, 2018)