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Extraction and analysis of Khella Seeds Oil

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الأية

قَالَ تَعَالَىٰ:

﴿ قَالُوا۟ سُبْحَٰنَكَ لَا عِلْمَ لَنَآ إِلَّا مَا عَلَّمْتَنَآ ۖ إِنَّكَ أَنتَ ٱلْعَلِيمُ ٱلْحَكِيمُ ﴿٣٢﴾ ﴾

صدق الله العظيم

سورة البقرة الآية (32)

Dedication

***To** soul of our Fathers, Mothers, Brothers, and sisters*

Acknowledgment

We would like to thank Allah Almighty.We would like to thank our supervisor, Dr.Mutasim Maknon for his continuous support, guidance, and construactive criticism that lead to completion of this work. Great thanks to Dr: Mohamed Suleiman and we would like to thanks our colleagues for their encouragement. Our thanks also extended to the members of our families for their great help, support and facilitates they provided to accomplish this work.

Abstract

Alkhella seed oil has been extracted from Khella seeds.The oil percentage was found to be 8.17 % . The analysis of samples was conducted by G.G mass. About 37 compounds have been found in Khella seeds oil. From these Apiol 3.02 % , Methoxsalen 21.47 % , 4-Hydoxy – 9-(3- Methyl-2-butenyl) Furo (3,2-g) chromen-7-one 3.56 %, Nonacosane 6.98 %, Eicosanoic acid, octadecyl ester 3.49 % .

الخلاصة

تم استخلاص زيت بذرة الخلة وكانت نسبتة 8.17 %. وتم تحليل العينات بواسطة جهاز الإستشراب الغازي ووجد أن هنالك 37 مركب في زيت بذرة الخلة .

المركبات الأعلى نسبة بينها كانت ابيول 3.02 % ، وميثواكسالين 21.47 % و 4- هيدروكسي – 9-(3- ميثيل -2 – بيوتين) رباعي (3 ، 2 كرومين -7 – اون) 3.57 % ، نوناكوسين 6.98 % ، ايكوسانويك اسيد ، اوكتاديسايل استر 3.49 % .

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CHAPTER ONE

INTRODUCTOIN

1.1 khella overview information

Khella is a plant. The dried, ripe fruit is used to make medicine. People commonly prepare an “extract” by removing khellin, one of the active chemicals in khella, and dissolving it in a liquid that is then used as medicine. Khella is less commonly prepared as a tea.

Khella is used for respiratory conditions including asthma, bronchitis, cough, and whooping cough. It is also used for diseases of the heart and blood vessels (cardiovascular disorders) including high blood pressure, irregular heartbeat (arrhythmias), congestive heart failure (CHF), chest pain (angina), “hardening of the arteries” (atherosclerosis), and high cholesterol. Other uses include treatment of diabetes, colic and abdominal cramps, liver and gallbladder disorders, kidney stones, and fluid retention. Women sometimes use khella for menstrual pain and premenstrual syndrome (PMS). Some people apply khellin taken from khella directly to the skin and then expose the area to light to treat skin problems such as vitiligo, psoriasis, and patchy hair loss (alopecia areata). It is also put on the skin to treat wounds, skin redness and swelling (inflammation), and poisonous bites. Be careful not to confuse khella with its less commonly used relative, bishop's weed. The two species contain some of the same chemicals and work similarly in the body, but khella is more commonly used for heart and lung conditions, and bishop's weed is more commonly used for skin conditions.

1.2 How does it work?

Khella contains substances that seem to relax and widen blood vessels; decrease heart contraction; open up the lungs; increase "good cholesterol" (HDL, high-density lipoprotein); and fight bacteria, viruses, and fungi. Several prescription drugs including amiodarone, nifedipine, and cromolyn have been developed from khella.

1.3 khella uses & effectiveness what is this?

Insufficient Evidence for:

Psoriasis: Early research suggests that taking khellin, a chemical in khella, by mouth in combination with sunlight exposure helps clear skin sores in people with psoriasis. A skin discoloration disorder called vitiligo. Research on the effects of khella for treating vitiligo shows conflicting results. Some research shows that taking khellin, a chemical in khella, by mouth or applying it to the skin improves skin discoloration when used along with ultraviolet light therapy. However, other research shows that applying khellin to the skin along with sunlight exposure doesn't improve skin discoloration. Also, some research shows that khellin therapy requires longer treatment durations and higher light doses to improve skin discoloration similarly to the effects of psoralen plus ultraviolet light therapy (PUVA).

1. Stomach cramps.

2. Kidney stones.

3. Menstrual cramps.

4. Premenstrual syndrome (PMS).

5. Asthma.

6. Bronchitis.

7. Cough.

8. Whooping cough.

9. High blood pressure.

10. Irregular heartbeat (arrhythmias).

11. Congestive heart failure (CHF).

12. Chest pain (angina).

13. “Hardening of the arteries” (atherosclerosis).

14. High cholesterol.

15. Other conditions.

More evidence is needed to rate the effectiveness of khella for these uses.

Chapter two

Theoretical background

2.1 Essential oils

Essential oils from Al-khellah seed contain various types of effective elements, which are popularly used in food industries, daily chemical products and health care field. Citrus species are potential sources of variable oils which might be utilized for edible and other industrial applications. Humankind used plants for healing many thousands of years. From this tradition the use of aromatic plants compound in medicine was begun. Oils were used in embalming process, in medicine and in ointments in the old and new testaments. Essential oils are broadly used as pharmaceutical components, in nutritious supplements and for cosmetic industry and aromatherapy (Maria et al, 2012), Guenther (1955). There are about three hundred essential oils in general used today by professional practitioners, with continual bombardment of viral, bacterial, parasitic and fungal contamination in our world. Essential oils are great benefit to help protect our bodies and health from sickness. Essential oils are products obtained from vegetable raw materials (Berger2007). They are complex mixture, their composition may include volatile terpenic compounds, which have the formula $(C_5\ H_8)n$. Where the compounds are monoterpenes if n=2, sesquiterpenes when n=3, diterpenes if n=4,etc. (smith et al, 2001). These are secondary metabolites in plants (Mazen, 2002) and responsible for the characteristic aroma in the fruits. Immune system needs support and essential oils give that, because of the enormous amount of raw products on the market have been polluted

with lower quality, commercial grade oils or contain other chemical substances to reduce the cost or increase the profit margin a fact that not usually revealed on the label. This is why it is important to study the chemical composition of the volatile fraction once the essential oil is extracted. The fraction is characterized by the complexity in the separation of its components, which belong to various classes of compounds and which are present in wide range of concentrations. Therefore it is complicated to establish a composition profile of essential oils. The quality of essential oil depends on different factors among them are the chemo type and biotype of plant.

The gas chromatography method (GC) is exclusively used for the qualitative analysis of volatiles. The analysis of essential oils was developed in parallel with the technological development in GC, such as stationary phase, detection devices etc. (Manthey , 2004). However, advances in instrumentation were not the only important factor in the development of analytical method for essential oils in the plants. Sample extraction and amount also improved. The most outstanding improvements in the determination of the composition of essential oils came from the introduction of tandem techniques involving prior/further chromatography or spectroscopy. The great information on the application of GC field (Emenike 2006, Rapisarada 1999).

2.2 Occurrence of essential oils

Essential oils can be obtained from the flowers, leaves, roots, seeds, and bark of many plants. Oil of lavender for example is derived from flowers, oil of patchouli from leaves, and oil of orange from fruits (verzera ,2004). The oils are formed in the part of the plants (chlorophy11-bearing) and with plant maturity are transported to other tissues, particularly to the flowering shoots (verzera et al, 2004) essential oils are found in the vegetable structures to which they give their characteristic odor are intimately connected with the vital process that take place in plants. In plants, they may be formed by the hydrolysis of certain glycoside or directly by protoplasm or by decomposition of the resinogenous layer of the cell wall. Inside the vegetable cell, the essential oils are contained in the "vacuoles" cavities of roundish from bound by a single membrane. The tonoplast, and containing an aqueous solution full of juice the vacuolar juice, vacuole is a cellular organelle, probably originating from the endoplasmic reticulm, into which the "secondary products" or products of refusal of the metabolism are poured (gamarra et al, 2006).

The function of the essential oils in a plant is not well understood. Odours of flowers probably aid in naturel selection by acting as attractants for certain region in seeds, leaf, wood, and roots oils, may serve to protect against plant parasites or degradation by animals (Gamarra et al ,2006). Oleo resinous exudation that appear when the trunk of a tree is injured to prevent loss of sap and act as a

protective seal against parasites and disease organism. Few essential oils are involved in plants metabolism, and some investigators maintain that many of these materials are simply waste products of plant biosynthesis (Rapisarada ,1999).

2.3 What are Essential Oils?

Essentials oils are concentrated volatile aromatic compounds produced by plants; their easy evaporation gives plants their wonderful scents. Each of these complex precious liquids is extracted from a particular time of plant. Each plant species originates in certain region of the world, with particular environmental conditions neighboring fauna and flora (Sheng-Men, et al, 2012). Essential oils are frequently referred to as life force of plants(sheng-mine al 2012). Unlike fatty oils, these essential oils are volatile, highly concentrated substances, extracted from flowers, leaves, stems, roots, seeds, barks, or fruit rinds. The amount of essential oils found in these plants can be anywhere from 1-95 percent of total. That is why tons of plants material are required for just a few hundred pounds of oil. These oils have potent antimicrobial factors, having wide range of therapeutic constituents, these oils are often used for their flavor and their therapeutic properties, in a wide selection of products such as foods, medicines, and cosmetics, beware of imitations. Essential oils cannot be substituted with synthetics. Only pure oils contain a full spectrum of compounds that cheap imitations simply cannot duplicate (Maria et al, 2012).

2.4 Commercial importance

Essential oils are generally expensive, with prices from several thousand USD per kilogram. The high price of the natural oils coupled with their limited availability has encouraged a search for substituents .Great progress has been made in in the synthesis of individual's components such as geranial, Citral, linalyl, Acetate, and the like. These synthetics have been combined with natural oils to extend supplies, and they have also been blended together in an attempt to duplicate the oils themselves. Such reconstituted oils usually lack certain of odor. Notes of the natural products, because of the absence the trace ingredients, often unidentified, that may be present in the natural oils (Rapisarada ,1999). They also tend to have a more chemical odour because of trace impurities in the synthetics that are different from the components of natural oils.

2.5 Function of the essential oils in the plants

Essential oils are extracted from oil seeds, in flowers, seeds, leaves, roots, wood and bark. They differ significantly from the well-known vegetable, nut and seeds oils which are made up of various fatty acids, essential oils are used by the plants in somewhat the same way by humans, they fight infections, contain hormone-like compounds, initiate cellular regeneration, and work as chemical defense against fungal, viral, and animal foes. Despite their foliar origins however, essential oils have similar structure to some compounds found in blood and tissues, allowing them to be compatible with ourphysiology (GUENTHER 1955).

2.6 How to use Essential oils

The most effective way to use essential oils by external application or inhalation. though some can be very beneficial when taken internally. The use of essential oil include “body oils”, compresses, cosmetic lotion, baths, hair rinses, inhalation by steam, perfumes and room sprays (TOIA RF, 1985). Essential oils are very potent some will cause skin irritation or have other harmful effects if not used properly. Unless specifically noted, it is best to dilute all essential oils in a carrier of base oil like Almond, Jojoba or Apricot Kernel before applying to the skin-appropriate dilution is usually only 1-10% essential oils in carrier. For inhalation, a diffuser or oil lamp is effective for releasing essential oils into your environmenta very pleasant way of creating a particular atmosphere (Raymond p.W.Scott, University of London).

2.7 Methods for using essential oils

Essential oils are very important and powerful components in plants.They have the capability of being harmful if improperly used. Essential oils can be very helpful for some cases, supportive in other, and have little effect in others. There are three traditional uses of essential oils in aromatherapy.

2.7.1Inhalation

Inhalation is often effective for mood-altering effects, Rosemary for mental “stimulation” lavender for relaxation, etc. This is the direct effect of essential oils components on the limbic system. One may certainly blend essential oils in diffuser or burner, adding a couple

drops of each oil desired. Often a nice result can be had from mixing a brighter or sweeter oil (Rosemary, Basil, Orange) with one more earthy and grounding (Patchouli, Frankincense, Cedar).

2.7.2 Topical Application

Perhaps even more common than inhalation, topical application is the preferred for many essential oils. Most essential oil requires significant dilution as they can cause skin irritation. Lavender oil and chamomile oil are two essential oils that can be applied without dilution, Others, such as cinnamon oil and oregano oil should not be applied topically in most cases. They may be applied as very dilute solution to the bottom of the feet. A very small amount should be tested first, because essential oils tend to pass through the skin fairly readily, as they are lipotropic (fat soluble) and their molecular structure is fairly small. Essential oils can pass into the bloodstream and surrounding tissues.

2.7.3 Ingestion

Some essential oils may be ingested, usually either in water or in capsules, but this technique is rare, and not really considered effective in most cases.

2.8 Aromatherapy

The treatment of anxiety or minor medical conditions by rubbing pleasant smelling natural oils into the skin or breathing in their smell. It is the use of aromatic essential oils to benefit the Body- in emotional and physical health and beauty. Science has discovered that our sense of smell plays a significant role in our overall health

(GAMARRA, 2006). Many common essential oils have medical properties that have been applied in medicine since ancient times and are still widely used today, e.g. many essential oils have antiseptic properties, though some are stronger than the others. In addition, many have an uplifting effect on the mind, though different essential oils have different properties (MANTHEY, 2004).

2.8.1 Historical background of Aromatherapy

The first day distillation of essential oils was performed by the Persian philosopher Avicenna (980-1037 A.D.) who extracted the essence of rose petals through the (effleurage) process. His discovery and subsequent use of a wonderful perfume substance eventually lead him to write a book on the healing properties of essential oils of Rose, Early in the 20 century the French chemist; RENE-Maurice Gattefosse began studying what he called Aromatherapy. After several burning his arm in a laboratory accident, he thrust the arm into the nearest liquid, which happened to be tub of lavender oil. Surprised by the quick healing that followed, Dr. Gattefosse the remainder of his life researching the values of essential oils. His success made aromatherapy popular, and it became well-known in Europe (Guenther,1995)

2.8.2 How essential oils work in aromatherapy

An essential oil is inhaled and direct aromatherapy by the olfactory to the limbic system of brain. In true, the brain responds to particular scent affecting our emotions and chemical balance. Essential oil also absorbed by the skin and carried throughout the body via the circulatory system to reach all internal organs. By carefully choosing one or more oils, you can experience beneficial effects promoting overall health and even specific tangents. Benefits depend upon the unique nature of each person response to an aromatic stimulus.

2.9 Methods of extracting essential oils

Early efforts used alcohol fermentation process. New methods of essential oil extraction are entering the mainstream of aromatherapy. With the new label of carbon dioxide and super critical carbon dioxide, along the traditional “steam” and “hydro” distillation, “Absolute”, and cold pressing, a little study for the aromatherapy enthusiast can go way in essential oils selection, is one process better than other? Does one produce nicer smelling oil, or one with great aroma therapeutic value? It turns out that essential oil productions, is an art as well as a science, the way in which oils are extracted from plants is important because some processes use solvent can destroy the therapeutic properties . Some plants and particularly flowers do not lend themselves to steam distilling. They are too delicate, or their fragrance and therapeutic essences cannot

be completely released by water alone. This oil will be produced as “absolutes” and while not technically considered essential oils they can still be of therapeutic value.

2. 9.1 Maceration

Maceration actually creates more of an “influsedoil” rather than an “essential oils” the plants matter is soaked in vegetable oil. Heated and strained at which point it can be used for massage.

2.9.2 Cold pressing

Cold pressing is used to extract the essential oil from citrus rinds such as orange, lemon and bergamot. This method involves the simple pressing of the rind at about 120 degree Fahrenheit to extract the oil. The rinds are separated from the fruit, ground or chopped and are then pressed, the result is a watery mixture of essential oil and liquid which separate given time. Little, if any alternation from the oils original state occurs. These citrus oils retain their bright, fresh, uplifting aromas like that of smelling a wonderfully ripe fruit. It is important to note that oils extracted using this method have a relatively short shelf life. So make or purchase only what you will be using within the next six months.

2.9.3 Solvent extraction

A hydrocarbon solvent is added to the plant material to help dissolve the essential oil. When the solution is filtered and concentrated by distillation , a substance containing resin (resinoid),

or combination of a wax an essential oil (known as concrete) remains from the concentrate, pure alcohol is used to extract the oil. When the alcohol evaporates, the oil is left behind. This is not considered the best method for extraction as the solvents can leave a small amount of residue behind which could cause allergies and affect the immune system.

2.9.4 Enfleurage

Is an intensive and traditional way of extraction oil from flowers. The process involves layering fat over the flower petals. After the fat has absorbed the essential oils, alcohol is used to separate and extract the oil from the fat. The alcohol is then evaporated and the essential oil collected.

2.9.5 Supper critical CO_2 extraction

The most modern technologies, carbon dioxide and super critical carbon dioxide extraction involve the use of carbon dioxide as the "solvent" which carries the essential oil away from the raw plant material. The lower pressure carbon dioxide extraction involves chilling carbon dioxide to between 35 and 55 degree, Fahrenheit , and pumping it through the plant material at about 1000psi. The carbon dioxide in this condition is condensed to a liquid. Super critical carbon dioxide extraction (CO_2) involves carbon dioxide heated to 87 degree Fahrenheit and pumped through the plant material at around 8,000 psi, under these conditions the carbon dioxide is likened to "dense fog" or vapor. With release of the

pressure in either process, the carbon dioxide escapes in its gaseous form, leaving the essential oil behind. The usual method of extraction is through steam distillation, after extraction, the properties of good quality essential oil should be as close as possible to the "essence" of the original plant. The key to a good essential oil extracted is through low pressure and low temperature processing, high temperatures, rapid processing and the use of solvents alter the molecular structure, will destroy the therapeutic value and alter the fragrance.

2.9.6 Hydro distillation

Some process becomes absolute to carry out extraction process like hydro distillation which often used in primitive countries. The risk is that the still can run dry, or be overheated, burning, the aromatics and resulting in an essential oil with a burnt smell. Hydro distillation seems to work best for powders (i.e. spice powders, ground wood…etc.) and very tough material like roots, wood or, nuts.

2.9.7 Turbo distillation extraction

Turbo distillation extraction is suitable for hard-to-extract or coarse plant material, such as bark, roots, and seeds. In this process, the plants are soaked in water and steam is circulated through this plant continually recycled through the plant material. This method allows faster extraction of essential oil from hard-to-extract plant materials.

2.9.8 Steam distillation

Most commonly, the essence is extracted from the plant using a technique called distillation. One type of distillation place the plants or flowers on screen. Steam is passed through the area and becomes "charged" with the essence. The steam then passed through an area where it cools and condenses. This mixture of the water and essential oil is separated and bottled. Since plants contain such as a small amount of this precious oil, several hundred pounds may need to produce a single ounce.

2.10 Advantages of steam distillation

The advantage of steam distillation is that it is a relatively cheap process to operate at a basic level, and the properties of oils produced by this method are well known. Newer methodology, such as sub critical water extraction, may well eventually replace steam distillation, but so far even contenders such as carbon dioxide extraction- although establishing a firm market Revise –have not really threatened to take over as the major preparative technique.

2.11Analytical methods of oils

Chemical analysis of essential oils is generally done using GC gas chromatography for quantitative analysis. The GC.MS gas chromatography – mass spectrometer is used for qualitative analysis. Identification of the main components is carried out by the comparison of both the retention times and mass data against those

of the reference standards with known source. Sometimes identification by GC.MS must be confirmed by retention indices on two columns of different polarity and clams for the identification of new constituents should be supported by co-injection with authentic compounds. Recently some 900Kovats indices of 400 individual compounds are summarized from the general literature. The principle of GC is the differential distribution of the components between two phases (one stationary phase and the other is mobile phase). The mobile phase (carrier gas) usually is nitrogen. Depending on the nature of the mixture Ar, He, H_2, are also used. The stationary phase may be solid or liquid. Nowadays liquid stationary phase is more use. According to the nature of the stationary phase gas chromatography can be divided into two classes, if the stationary phase consist of silica,alumina, or carbon, the chromatography is termed as gas solid chromatography (GSC),and if the stationary phase is nonvolatile liquid held as a thin layer on a solid support, then the technique is known as gas liquid chromatography (GLC). The most common support used in GLC is diatomaceous earth or Kiselguhr. Because of tailing caused by nonlinear adsorption isotherm in GSC, GLC has now became the most important and widely used technique. The availability of versatile and specific detectors and the possibility of coupling the gas chromatography to mass spectrometer or an inferred. Spectrophotometer further enhances the usefulness of gas

chromatography. The main advantages of gas chromatography in analysis are:

1/ The technique has strong separation powered, event quite complex mixture can be resolved into its constituents.

2/ the sensitivity of the method is quite high, it is a micro-method and only a few milligrams of the sample are enough for analysis

3/ The speed of the analysis is very fast, giving good precision and accuracy, it involves relatively simple instrumentation, operation of gas chromatography and related calculation do not require highly skilled personal and thus the technique is very suitable for routine analysis.

4/ The cost of equipment is relatively low and its life is generally long.

Table (2.1)

Amount of oils in some plants

Raw material	Oil percentage %
Soybean seeds	17_20
Sunflower seed oil	40_50
Cotton seeds	17_20
Rape seeds	30_49
Corn seeds	3_5
Peanuts peeled	40_50
Sesame seeds	40_50
Flax seeds	35_40
Castor seeds	40_50
Palm fruit	30_50
Palm kernel	20_40

Olives	20_30
Nuclei olives	5_10
Coco nuts	40_50
Cocoa seeds	50_55
Tobacco seeds	30_43
Yellowish seeds	25_37
Jojoba seeds	25_40
Black bean seeds	35_45

Chapter Three

Materials and Methods

3.1 Material

3.1.1 Sample

Kella seeds were purchased from the local market

3.1.2 Chemicals

Petroleum Ether

3.1.3 Instruments

Analysis Instrument sohxlet

Condenser

Connecter

3.1.4 Extraction of oil

50 g of sample has been extracted by petroleum Ether solvent 500 ml extraction has been continues for 8 hour at 40^{o}c.

3.2 Methods

3.2.1 Sample

Kella seeds oil

3.2.2 Instrument

GC-MS analysis instrument Hewlett Packard 1800 A with Parameters- column capillary column HP-5 (lenght30,id0.25mm), carrier gas: Helium, flow rate. 1 ml min , inlet temp: 250 ^{o}c, Detector temp. 280^{o} with temperature programming 100^{o} c – 3min-10-25^{o}c-280oc. With mass detector and library search was carried out by HP chem. Software

Chapter Four

Results and Discussion

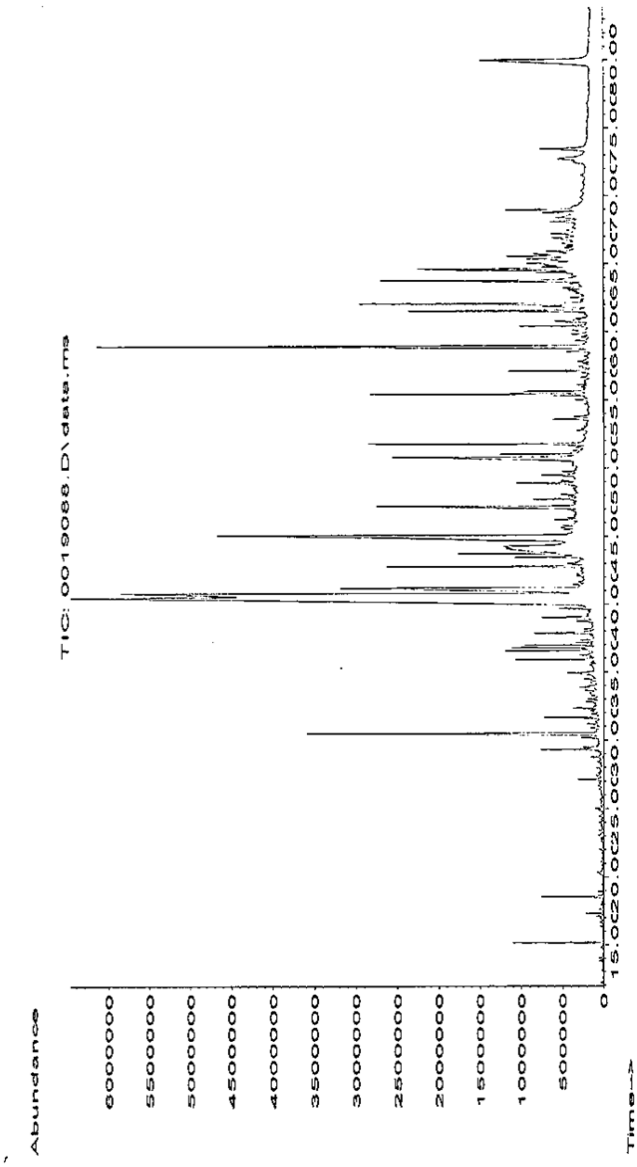

Fig: 1 Khella oil component

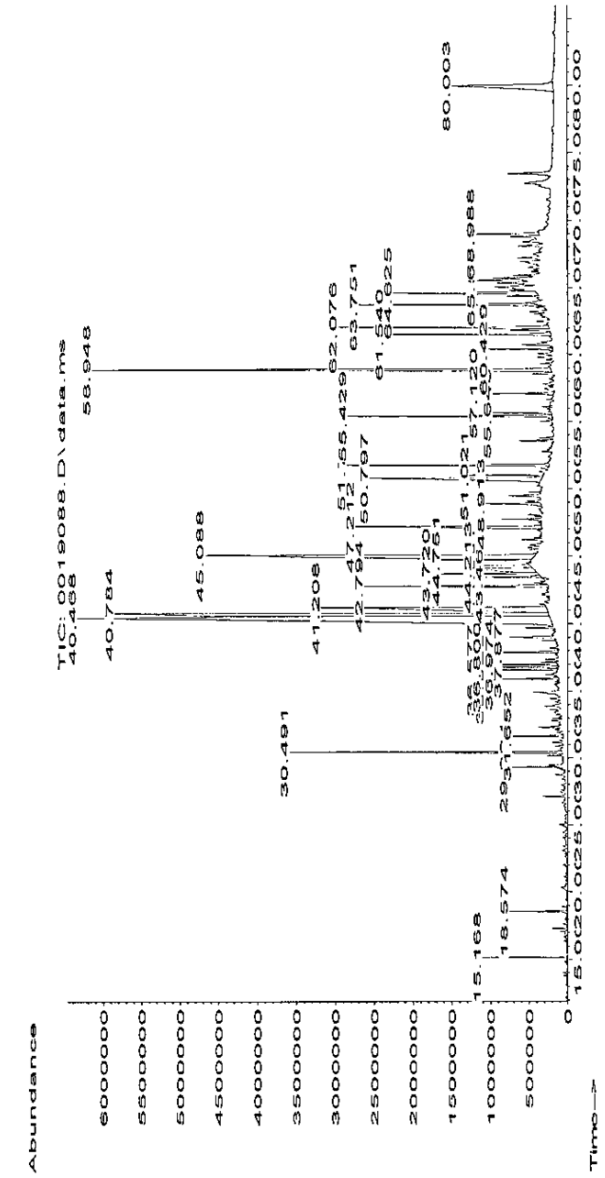

Fig: 2 Khella oil component

Table (4-1)

Components percentages in the oil

No.	Ret Time	Area	Area%	NAME	MW	Formula
1	15.168	35124898	0.61%	Bicyclo[2.2.1]heptan-2-one, 1,7,7-trimethyl-, (1S	152	$C_{10}H_{16}O$
2	18.574	26408020	0.46%	2-Cyclohexen-1-one, 2-methyl-5-(1-methylethenyl)-, (S)-	150	$C_{10}H_{14}O$
3	29.324	15371772	0.27%	Diethyl Phthalate	222	$C_{12}H_{14}O_4$
4	30.491	173311607	3.02%	Apiol	222	$C_{12}H_{14}O_4$
5	31.652	25253302	0.44%	Ar-tumerone	216	$C_{15}H_{20}O$
6	35.926	36990304	0.64%	Benzene, 1-(1,1-dimethylethyl)-2-methoxy-4-methyl-3,5-dinitro	268	$C_{12}H_{16}N_2O_5$
7	36.577	36060290	0.63%	i-Propyl tetradecanoate	270	$C_{17}H_{34}O_2$
8	36.800	35747899	0.62%	Phthalic acid, butyl tetradecyl ester	418	$C_{26}H_{42}O_4$
9	36.974	26805608	0.47%	2-Pentadecanone, 6,10,14-trimethyl-	268	$C_{18}H_{36}O$
10	37.877	43229675	0.75%	Hexadecen-1-ol, trans-9-	240	$C_{16}H_{32}O$
11	40.468	123371823	21.47%	Methoxsalen	216	$C_{12}H_8O_4$
12	40.784	681317484	11.86%	Methoxsalen	216	$C_{12}H_8O_4$
13	41.208	346636157	6.03%	7H-Furo[3,2-g][1]benzopyran-7-one, 4-methoxy	216	$C_{12}H_8O_4$
14	42.794	117049289	2.04%	1-Heneicosyl formate	340	$C_{22}H_{44}O_2$
15	43.464	26387400	0.46%	1-Heptatriacotanol	536	$C_{37}H_{76}O$
16	43.720	59930722	1.04%	1-Heptatriacotanol	536	$C_{37}H_{76}O$
17	44.097	105532128	1.84%	trans-13-Octadecenoic acid	282	$C_{18}H_{34}O_2$
18	44.213	83522818	1.45%	trans-13-Octadecenoic acid	282	$C_{18}H_{34}O_2$
19	44.751	51008621	0.89%	7,8-Dimethoxy-3,4-dihydro-2H-dibenzofuran-1-one	246	$C_{14}H_{14}O_4$
20	45.088	542656858	9.45%	7H-Furo[3,2-g][1]benzopyran-7-one, 4,9-dimethoxy-	246	$C_{13}H_{10}O_5$
21	47.212	175371298	3.05%	7H-Furo[3,2-g][1]benzopyran-7-one, 9-[(3-methyl-2-butenyl)oxy]-	270	$C_{16}H_{14}O_4$
22	48.913	40705440	0.71%	9,10-Secocholesta-5,7,10(19)-triene-3,24,25-triol, (3β,5Z,7E)-	416	$C_{27}H_{44}O_3$
23	50.797	204442728	3.56%	4-Hydroxy-9-(3-methyl-2-butenyl)furo(3,2-g)chromen-7-one	270	$C_{16}H_{14}O_4$
24	51.021	38241004	0.67%	Butyl 5,8,11,14,17-eicosapentaenoate	358	$C_{24}H_{38}O_2$
25	51.781	149760787	2.61%	1,2-Benzenedicarboxylic acid, mono(2-ethylhexyl) ester	278	$C_{16}H_{22}O_4$
26	55.429	130936341	2.28%	Heptacosane	380	$C_{27}H_{56}$
27	55.645	25984825	0.45%	Terephthalic acid, di(2-ethylhexyl) ester	390	$C_{24}H_{38}O_4$
28	57.120	42646463	0.74%	Octadecane, 3-ethyl-5-(2-ethylbutyl)-	366	$C_{26}H_{54}$
29	58.948	400886315	6.98%	Nonacosane	408	$C_{29}H_{60}$
30	60.429	33662057	0.59%	Tetratriacontane	478	$C_{34}H_{70}$
31	61.540	108786098	1.89%	10-Nonadecanone	282	$C_{19}H_{38}O$

No.	Ret Time	Area	Area%	NAME	MW	Formula
32	62.076	151085570	2.63%	Tetratriacontane	478	C34H70
33	63.751	117800814	2.05%	Stigmasterol	412	C29H48O
34	64.625	150105602	2.61%	γ-Sitosterol	414	C29H50O
35	65.560	27336027	0.48%	Lupeol	426	C30H50O
36	68.988	44636907	0.78%	Hexadecanoic acid, octadecyl ester	508	C34H68O2
37	80.003	200646609	3.49%	Eicosanoic acid, octadecyl ester	564	C38H76O2

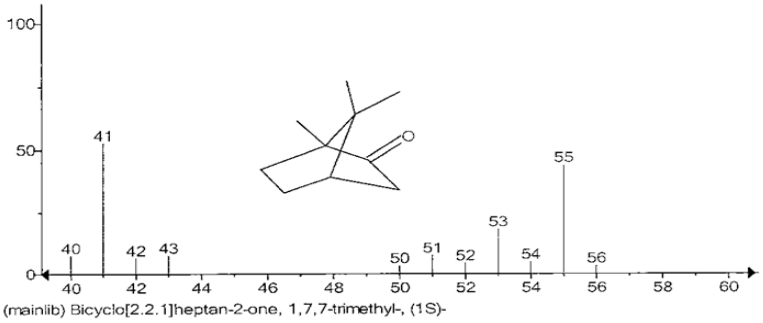

Fig: 3 Bicyclo(2.21) heptan-2 one,1.7.7-

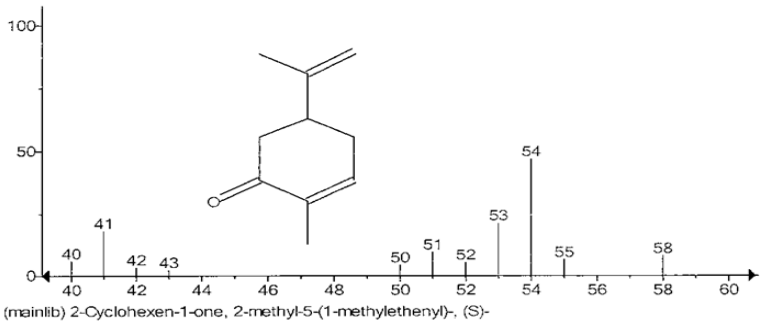

Fig: 4 2cyclohexen-1-one,2 methyl-5-

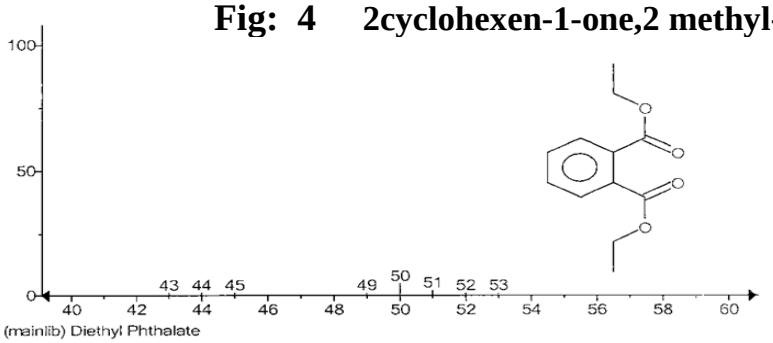

Fig: 5 Diethyl Phathalate

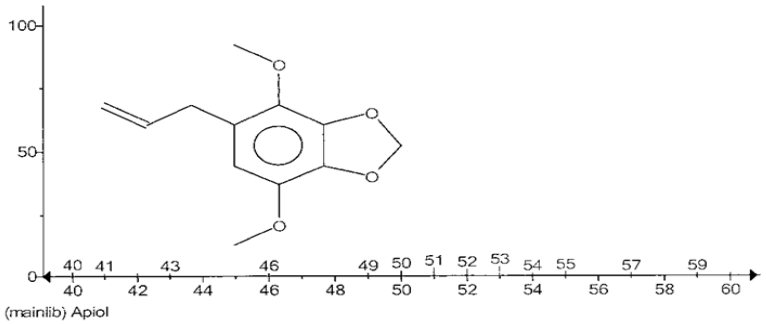

Fig: 6 Apiol

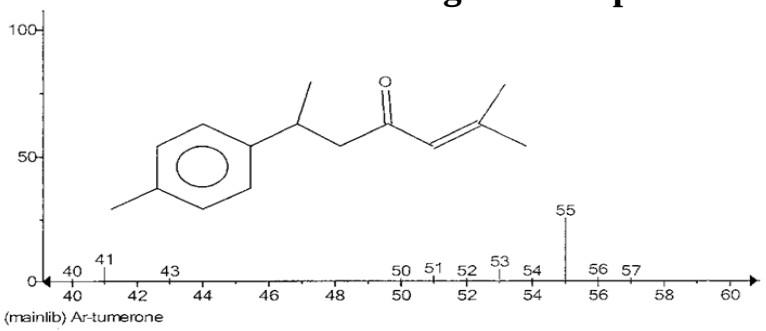

Fig: 7 Ar-tumerone

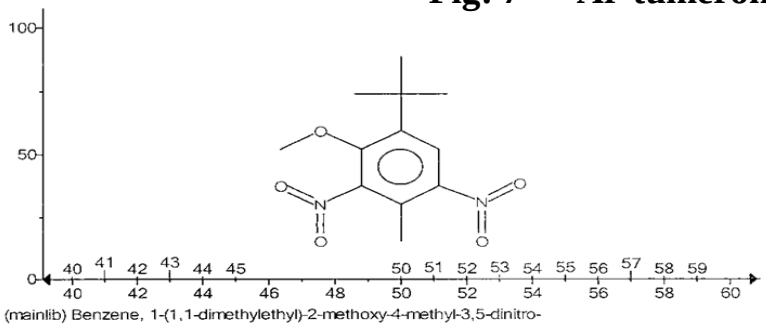

Fig: 8 Benzene,1(1,1- dimethylethyl)2 methoxy-4- methyl-3,5-dintro

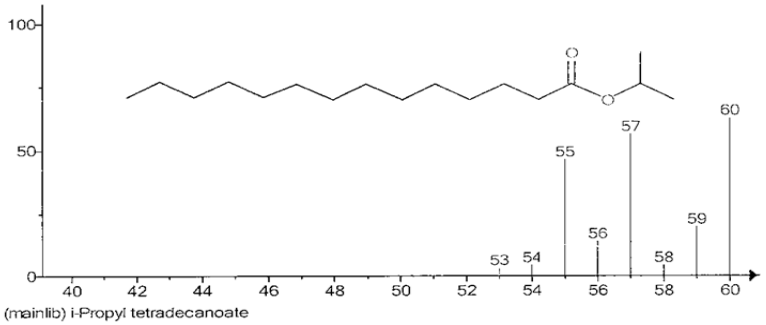

Fig: 9 i-Propyl tetradecanoate

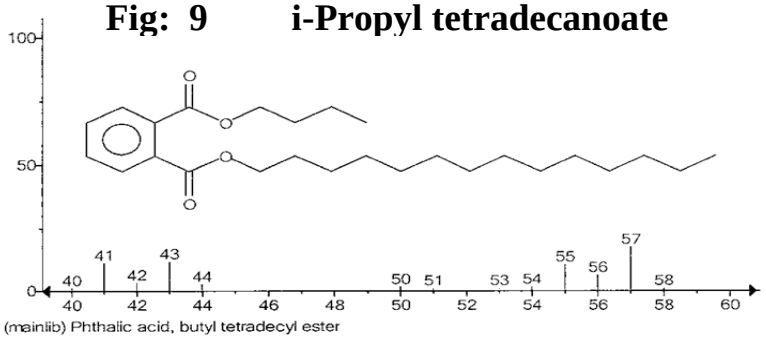

Fig: 10 phthalic acid,butyl tetradecyl ester

Fig: 11 2-Pentadecanone,G10,14-trimethyl

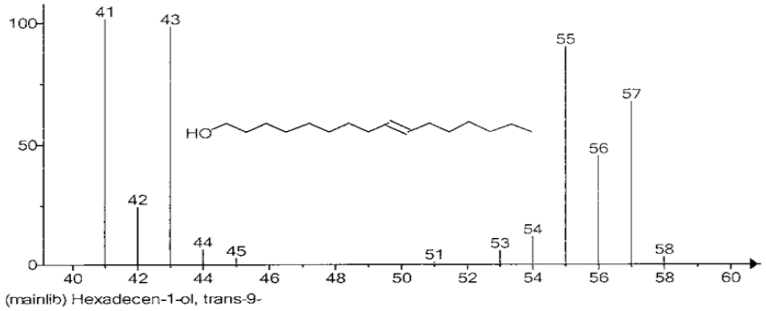

Fig: 12 Hexadecen-1-ol, trans.9

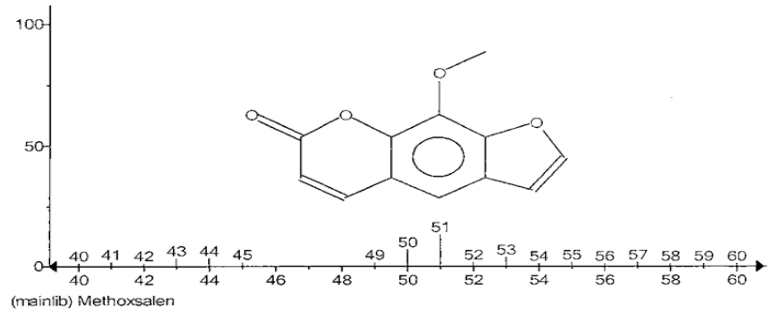

Fig: 13 Methxsalen

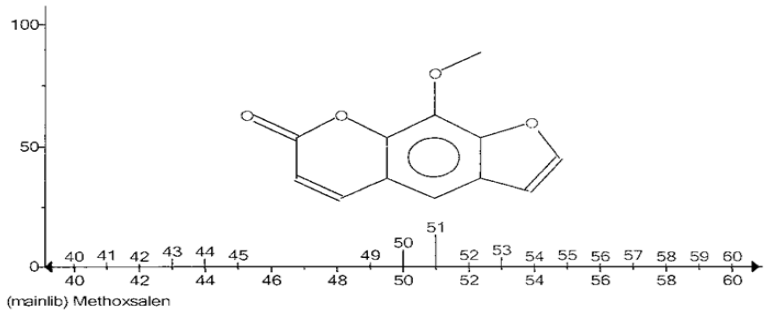

Fig: 14 Methoxsalen

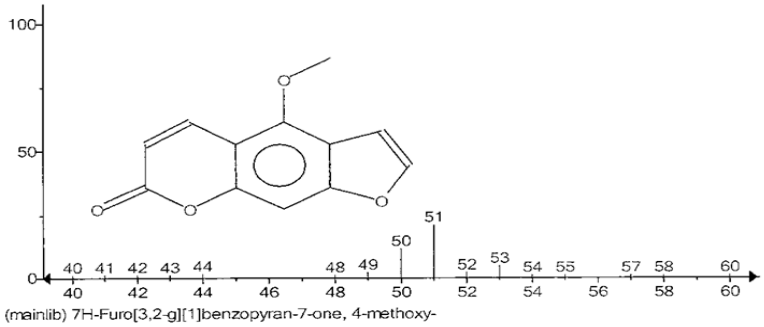

Fig: 15 7H-Furo{3,2.g} {1} benzopyran-7.one,4- methoxy

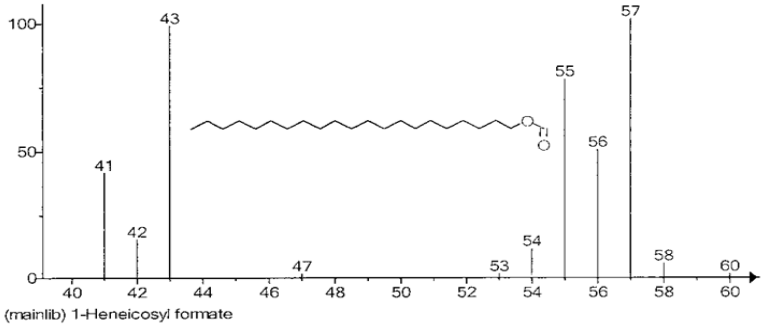

Fig: 16 1-Heneicosyl formate

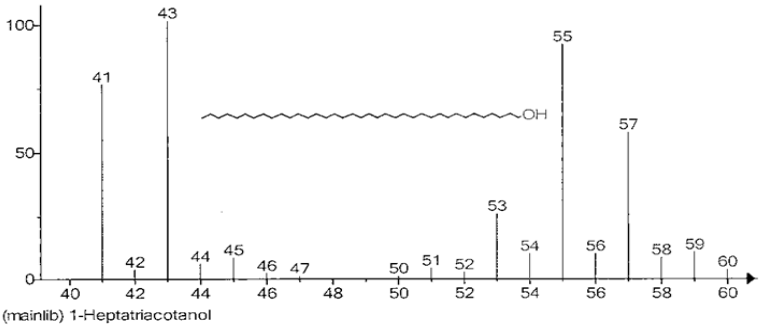

Fig: 17 1- Heptatriacotanol

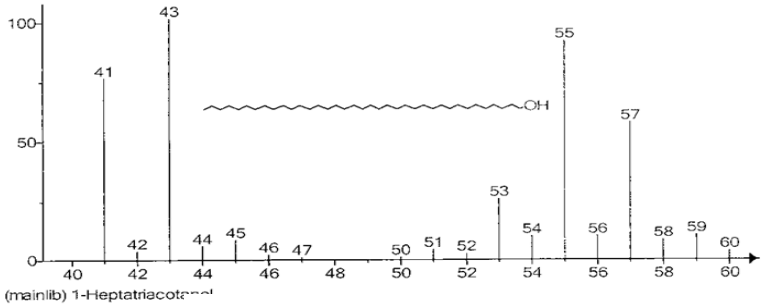

Fig: 18 Fig: 17 1- Heptatriacotanol

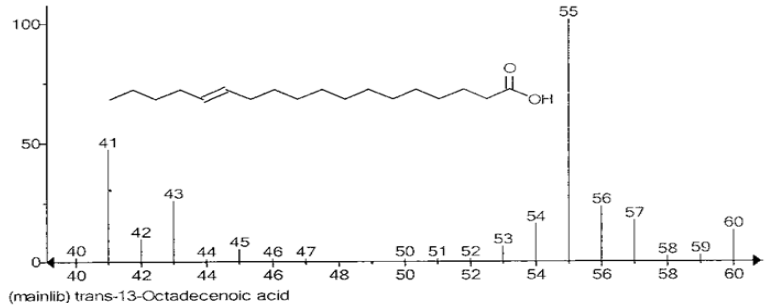

Fig: 19 Trans-13-Octadecenoic acid

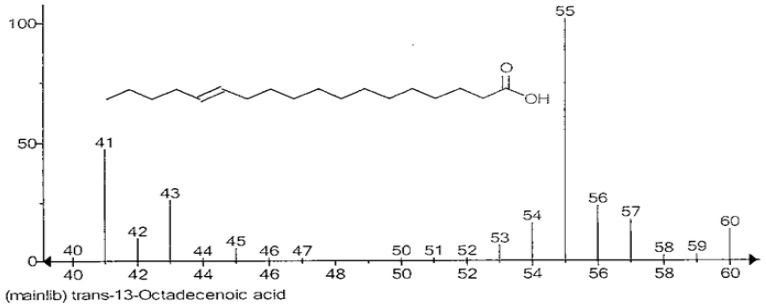

Fig: 20 Trans-13-Octadecenoic acid

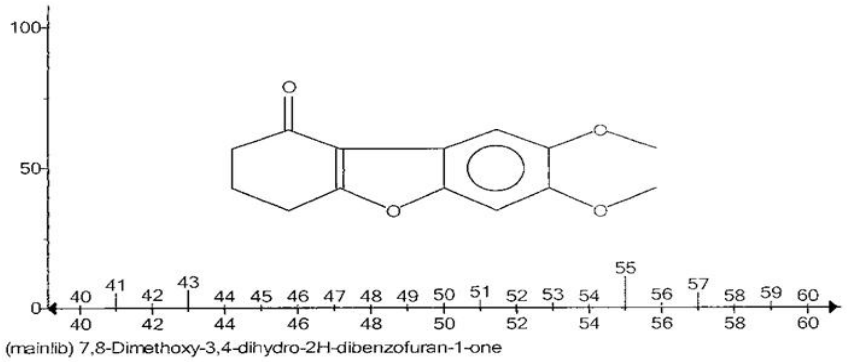

Fig: 21 7,8- Dimethoxy-3,4 dihdro-2H dibenzofuran-1-one butenyl) oxy

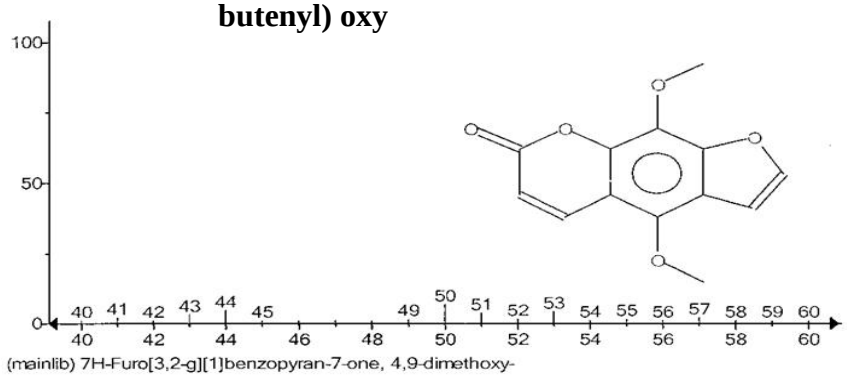

Fig: 22 7Hfuro{3,2.g} {1} bezopyran-2H-dibenzofuran-1-

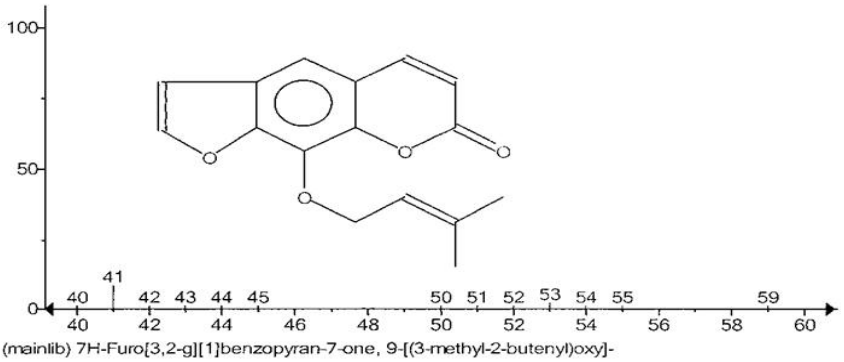

Fig: 23 7 Hfuro{3,2.g} {1} bezopyran-7-one,9{(3 methyl-2-butenyl) oxy

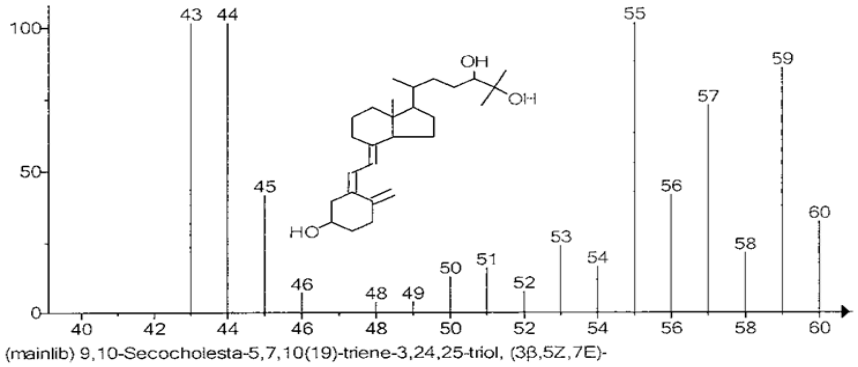

Fig: 24 9,10-secocholesta-5,7,10(19)-triene-3,24, 25-triol, (3ß,52,7E)

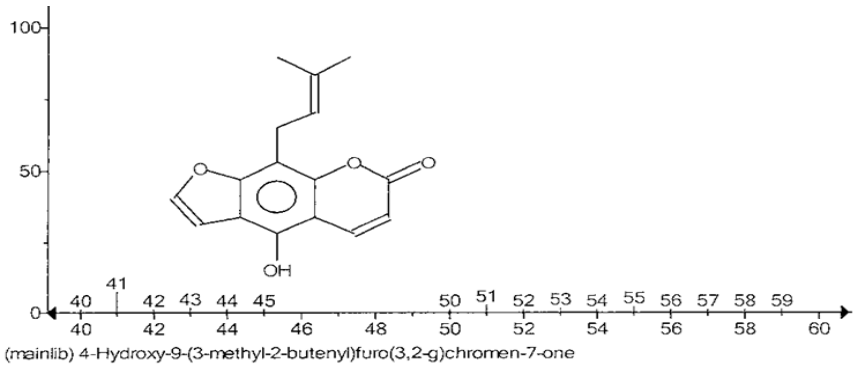

Fig: 25 4-Hydroxy-9(3-methyl-2-butenylifuro (3,2g)chromen-7-one

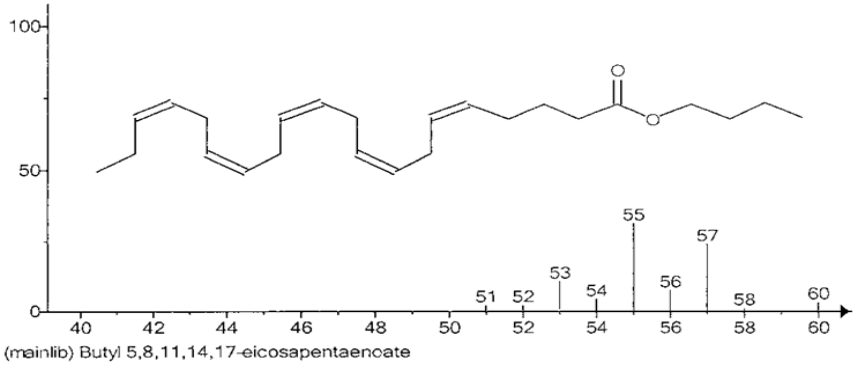

Fig: 26 Butyl 5,8,11,14,17-eicesapentaenoate

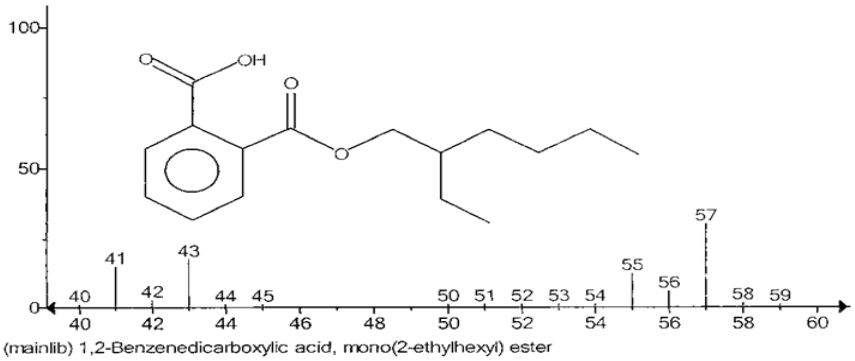

Fig: 27 1,2-Benzenedicarooxylc acid,mono(2-ethylhexy) ester

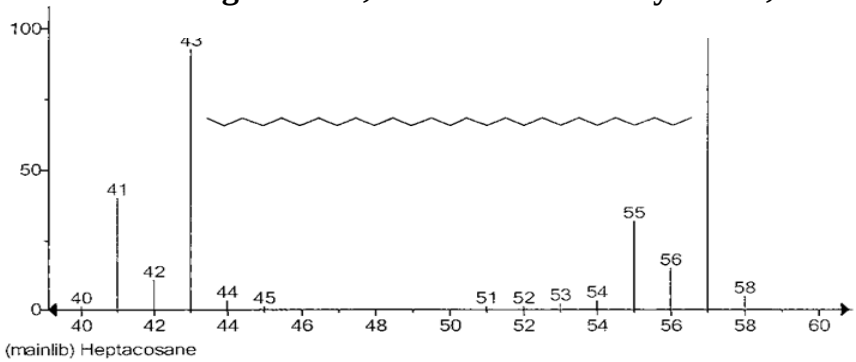

Fig: 28 Heptacasane

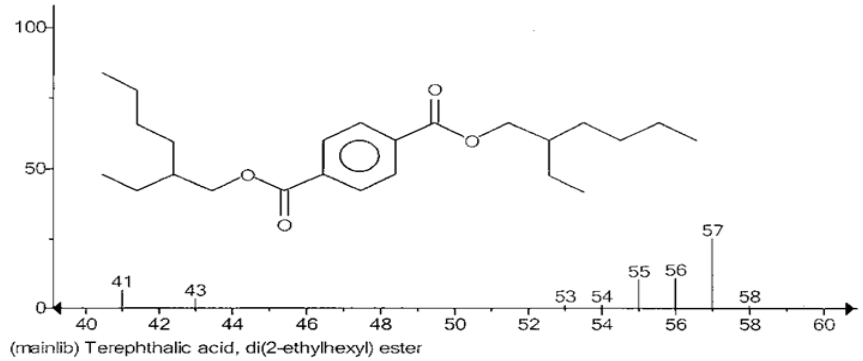

Fig: 29 Terephthalic acid , di(2-ethylhexyl) ester

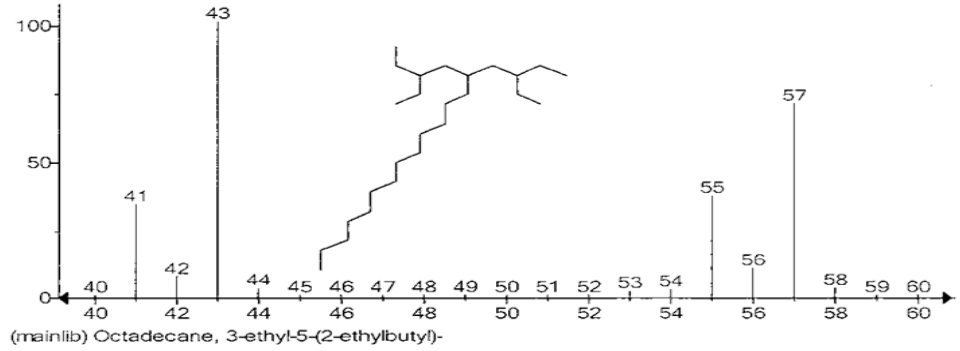

Fig: 30 Octadecane,3-ethyl-5-(2-ethylbuty)

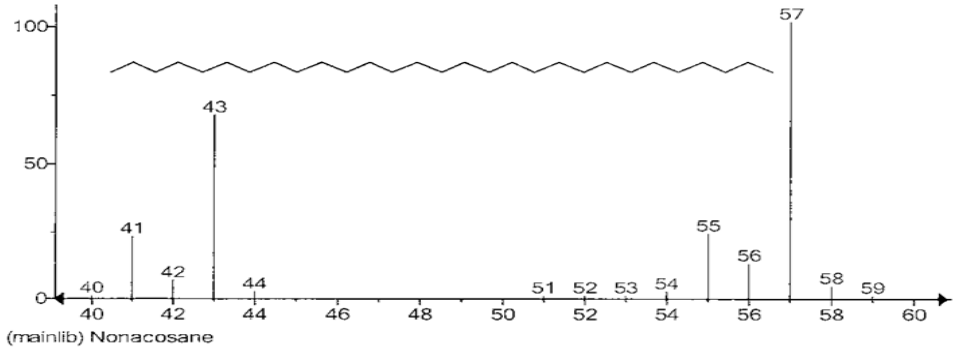

Fig: 31 Nonacosane

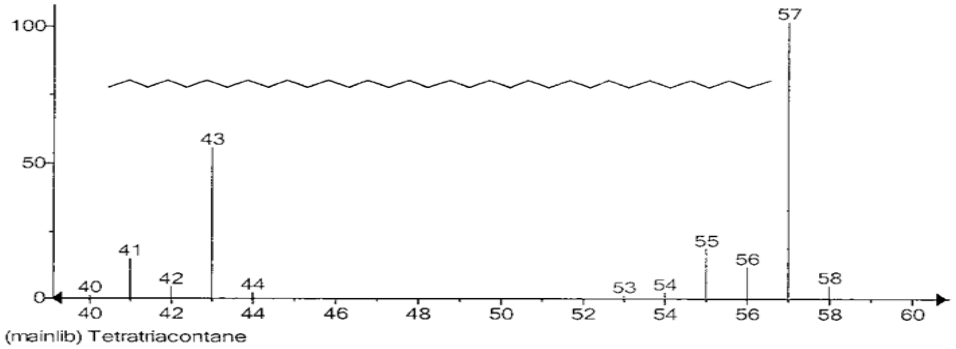

Fig: 32 Tetratr acontane

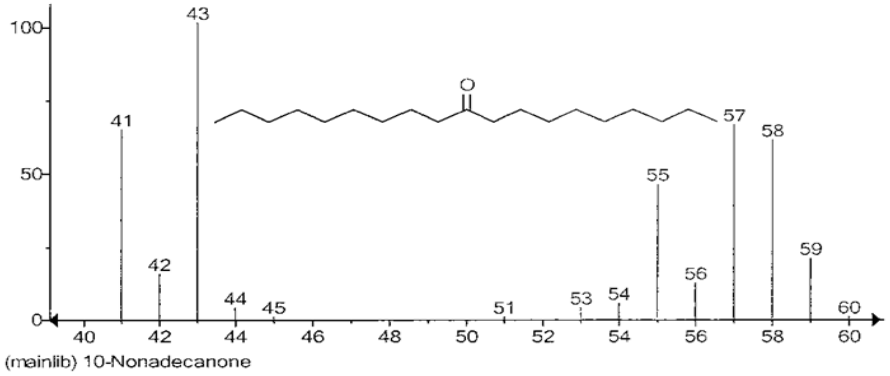

Fig: 33 10 Nonadecanone

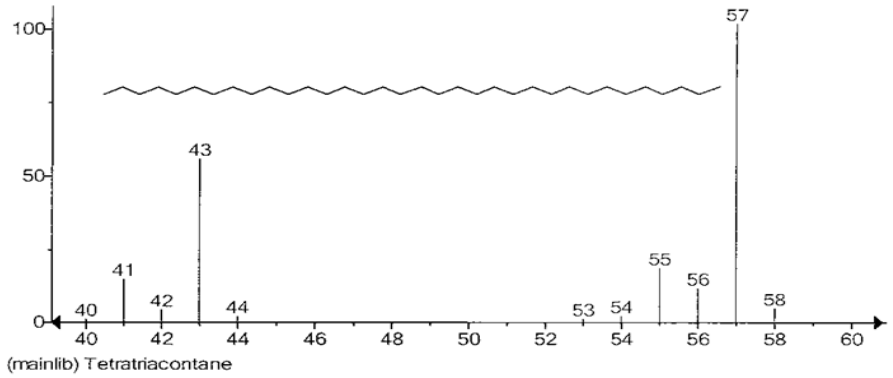

Fig: 34 Tecrtiacontance

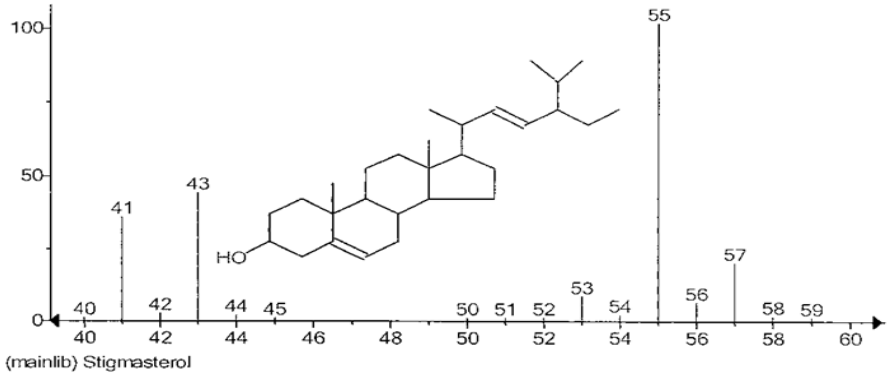

Fig: 35 Stigmasterol

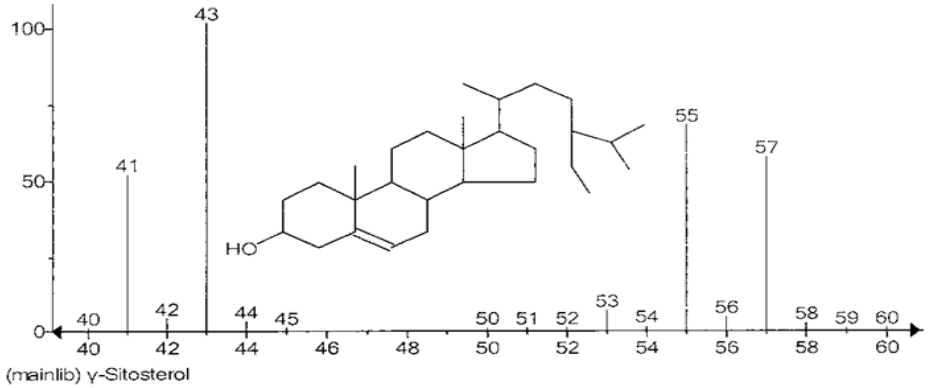

Fig: 36 V-sitosterol

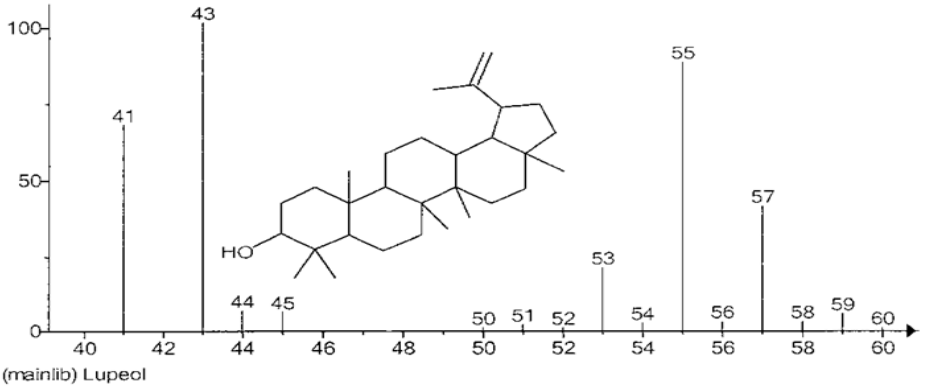

Fig: 37 Lupeol

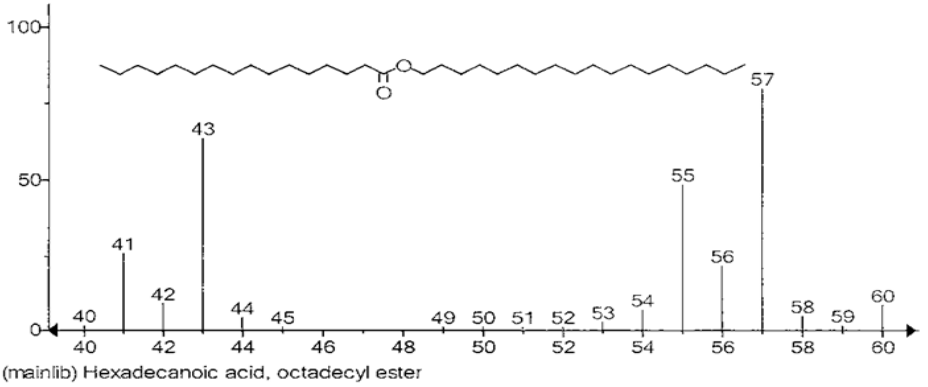

Fig: 38 Hexasecanoic acid , octadecyl ester

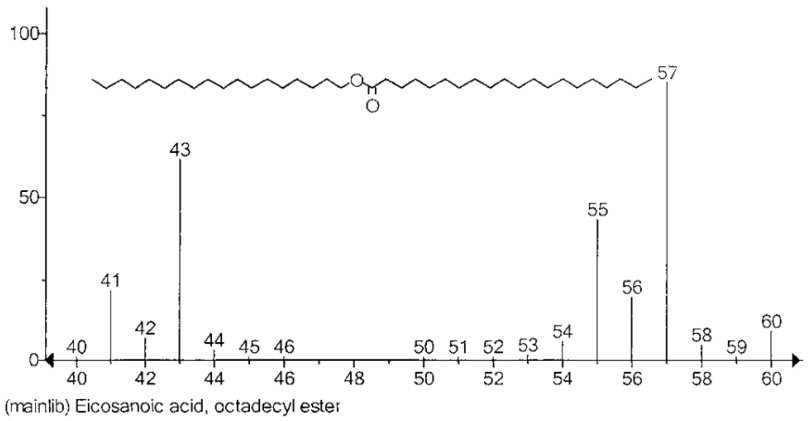

Fig: 39 **Eicosanoic acid , octadecy ester**

Discussion:

Methoxsalen - also called **xanthotoxin,** marketed under the trade names *OX50ralen, Deltasoralen,* ***Meladinine*** - is a drug used to treat psoriasis, eczema, vitiligo, and some cutaneous lymphomas in conjunction with exposing the skin to UVA light from lamps or sunlight. Methoxsalen modifies the way skin cells receive the UVA radiation, allegedly clearing up the disease. The dosage comes in 10 mg tablets, which are taken in the amount of 30 mg 75 minutes before a PUVA (psora len + UVA) light treatment. Chemically, methoxsalen belongs to a class of organic natural molecules known as furanocoumarins. They consist of coumarin annulated with furan. It can also be injected and used topically.

Area % = 21.47 % - 11.86 %.

Retention time = 40.458 – 40.784 .

Psoralen (also called **psoralene)** is the parent compound in a family of natural products known as furocoumarins . It is structurally related to coumarin by the addition of a fused furan ring, and may be considered as a derivative of umbelliferone. Psoralen occurs naturally in the seeds of *Psora/ea cory/ifolia,* as well as in the common fig, celery, parsley, West Indian satinwood and in all citrus fruits. It is widely used in PUVA (psora len + UVA) treatment for psoriasis, eczema, vitiligo, and cutaneous T-cell lymphoma. Many furocoumarins are extremely toxic to fish, and some are deposited in streams in Indonesia to catch fish.

Area % = 9.45 %

Retention time = 45.085.

Nonacosane is a straight-chain hydrocarbon with a molecular formula of C2gH60, and the structural formula CH3 (CH 2lz7CH3. It has 1,590,507,121 constitutiona l isomers. Nonacosane occurs naturally and has been reported to be a component of a pheromone of *Orgyia leucostigma,iZ1* and evidence suggests it plays a role in the chemical communication of several insects, including the female *Anopheles stephensi* (a mosquito). Nonacosane has also been identified within several essential oils. It can also be prepared syntheticalIy.

Area % = 6.98 %

Retention time = 58.948 .

Chapter Five

Conclusion and Recommendation

Conclusion:

Al Khella seed oil has been extracted from 50 g of Khella seeds By using petroleum ether extraction has been continues for 8 hour at 40^{o}c.

- , oil percentage was 8.17 %.
- In Egypt, a tea made from the fruit of this species has been used as an herbal remedy for kidney stones.
- Medications that increase sensitivity to sunlight interacts with khella

Recommendation:

- Khella seed oil has medicine uses.
- Used as an ointment for lepers.
- Further studies are needed for khella dosing.

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3- Manthey, J.A. *Agric. Food Chern.*52:7586-7592(2004).

4- Maria, C. C.; Rubria, E. R.; Jose E.B.; Gloria M. M.; Jose L.N.; Hugo, J.' Characterization of volatile compounds in the Essential oil of sweet lime' *Chilean journal of Agricultural research* 72(2), Pg 275(2012).

5- Mazen, K.T. Molecular regulation of plant Monoterpene biosynthesis in relation to fragrance 159p. *Thesis Wageningen Universities, Wageningen, the Netherlands (2002)*.

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7- Wikipedia.

Appendix

Khella plant

Kella seeds