جوجوبا الواقع والأمل

Jojoba Reality & Hope

International Workshop on Jojoba Reality and Hope

The International Workshop on Jojoba Reality and Hope provides a platform for scientists to discuss the current and future cultivation and utilization of the jojoba, a promising plant for arid-land agriculture, pharmaceutical industry, alternative energy and the protection of the environment. To be held at King Faisal University, Al-Hofuf, Al-Hassa, Saudi Arabia, on Wednesday 11 Safar 1439 H corresponding to 29 November 2017.

Website: http://www.kfu.edu.sa/en/colleges/agriculturalSciences/Jojoba/Pages/Home.aspx

Place of Lectures and Exhibition: Festival Hall, King Faisal University, Hofuf

Field Trip: Department of Agricultural Biotechnology laboratories, College of Agricultural and Food Sciences; Agricultural and Veterinary Research and Training Station, Qatar Road

Introduction

King Faisal University is pleased to welcome you to the International Workshop on Jojoba Reality and Hope provides a platform for scientists to discuss the current and future cultivation and utilization of the jojoba, a promising plant for arid-land agriculture, pharmaceutical industry, biofuel source and protection of the environment. To be held at King Faisal University, Al-Hofuf, Al-Hassa, Saudi Arabia, on Wednesday 11 Safar 1439 H corresponding to 29 November 2017.

The main theme of the conference is "Exploring the latest innovations and technologies in cultivating dry land, and manipulating drought and heat resistance genes". Biotechnology for Jojoba 2017 provides a platform for interaction between researchers, experts, students and stakeholders in Saudi Arabia and around the world to discuss the latest research developmentsand new applications and technologies in jojoba cultivation and industrial utilization.

Scientific Program Sessions

- **Agricultural biotechnology, genomics and molecular biology**
- **Conservation, environment and biomedical engineering**
- **Agricultural industry, economics and biofuels**

Objectives of the Jojoba Workshop: Reality and Hope

- **Highlight the importance of Jojoba and inform researchers and investors of the latest developments in the agricultural, industrial, pharmaceutical, medical, biofuel, environmental protection and its future fields in the Arab world.**
- **Develop a strategy to expand Jojoba cultivation and take advantage of the existing industries based on Jojoba using modern biotechnologies.**
- **Broadening scientific collaboration among national and international universities and research centers to encourage technology transfer and the training of researchers, graduate students, investors and those interested in different fields of Jojoba.**
- **Encourage economic cooperation partnership with national and international companies and institutions relevant to jojoba.**

Workshop Topics

Agriculture: The Expansion of Jojoba cultivation from a national and international perspective and the latest biotechnologies used.

Economy and Investment: Jojoba plant as a promising economic crop in the arid zones and executing studies on some of its main uses.

Biofuels: Jojoba as an economic crop for renewable energy production in Saudi Arabia.

Biotechnology: Jojoba as an economic crop in the field of agricultural, bio-ecological, Bio-compounds Engineering and pharmaceutical industries.

Field Trip and Exhibition

- **Tissue culture and biotechnology.**
- **Breeding, reproduction, genetic improvement and gender identification.**
- **Jojoba economics and marketing.**
- **Jojoba and industrial-biological techniques (motor oil, fuel for vehicles, pharmaceutical and cosmetic industries).**
- **Jojoba oil promising oil: its utilizations and health benefits.**
- **Researchers and investors group meeting.**

Targeted Audiance

Ministries: Ministry of Environment, Water and Agriculture; Ministry of Energy, Industry and Mineral Resources

Institutions: King Abdulaziz City for Science and Technology, Universities and Research Centers, General Establishment for Irrigation

Companies: Saudi Arabian Oil Company (Aramco), SABIC

Public: Individuals interested in agriculture, environment, energy, bio-industries, and economics.

**Table1. Proposed program of Jojoba Workshop at King Faisal University in cooperation with Aramco,
Wednesday, 11/03 / 1439H corresponding to 29/11/2017**

First day/ Time	Subject	Speaker
09:05-9:00	Opening Ceremony - Holy Quran	Abdullah Al-Maywaid
09:20-09:07	Speech of the workshop Patronage	Dr. Mohammed A. AlOhali, Rector - King Faisal University, Hofuf, Alhssa
09:38-09:23	The Speech of the official Sponsor and the strategic partner	Engineer Khalid Al-Buraik, Aramco Vice President of Production Operations in the Southern Region, Dhahran, Saudi Arabia
09:56-09:41	The Speech of King Abdulaziz City for Science and Technology	Prince Dr. Turki Bin Saud bin Mohammed AlSaud, King Abdulaziz City for Science and Technology, Riyadh, SA
10:22-10:00	King Faisal University Speech about Jojoba: The reality and Hope in Jojoba: Exploring latest Innovations and technologies in plant genes editing	Ibrahim S. Al-Mssallem, Department of Biotechnology, Faculty of Agricultural and Food Sciences, King Faisal University,Hofuf, Alhssa, SA
10:46-10:24	University of Cambridge Speech (Scientific Partner): Potential use of novel cryo-protective compounds isolated from Jojoba (Simmondsia Chinensis) to improve islet cells/pancreas cryo-storage and therapeutic efficacy related to diabetes	Prof. Nigel Slater, Ex- chairman of Chemical Engineering and Biotechnology and the Provost of University of Cambridge, Cambridge, United Kingdom. Hassan Rahmoune, Engineering and Biotechnology, University of Cambridge, Cambridge, United Kingdom.
11:08 -10:48	The Speech of Aramco. Technology Development	Nabeela Tunsi, Chief Engineer, Aramco, Dhahran, SA
11:30-11:10	Queensland University, Qaafi(Scientific Partner); Improving plant feedstocks for bioenergy and biomaterials	Henry Robert, Professor of Innovation in Agriculture, Director Queensland Alliance for Agriculture and Food Innovation(QAAFI), University of Queensland, Brisbane, Australia
11:52-11:32	Queensland University, Qaafi: Manipulation of genes resistant to drought, heat and cold.	Kharabian, M. Ardashir University of Queensland, Brisbane, Australia
13:10-11:55	Afternoon prayer break and lunch	King Faisal University, Student Restaurant Hall
13:30-13:10	Jojoba Biodiesel	Prof. Mohsen Radwan, Engineering School. Helwan University, Helwan, Egypt.
13:52-13:32	King Abdullah University for Science and Technology (KAUST). Combustion Jojoba derived fuels for future engines	S. Mani Sarathy, Associate Professor, Chemical and Biological Engineering Associate Director, Clean Combustion Research Center, King Abdullah University for Science and Technology, Thuwal, SA

14:14-13:54	Aramco Research and Development: Energy for transport	Prof. Gautam Kalghatgi, Principal Professional at Saudi Aramco and Visiting Professor at Imperial College, London and at Oxford University
14:34-14:16	Ministry of Environment, Water and Agriculture(MEWA)	Prof. Suleiman A. Alkhateeb, General Manager of Plant Production in MEWA, Riyadh, King Abdullah University for Science and Technology, Thuwal, SA
14:56-14:36	Abdulrahman bin Faisal University, Dammam: Production of biodiesel from Jojoba oil using nano-particles metal oxide catalyst	Habis AlZoubi, Abdullah Manda, Abdelaziz Matani, Associate professor, Environmental Engineering Department, Imam Abdulrahman Bin Fasial , Dammam, SA
15:20-15:00	Asar prayer break and coffee	King Faisal University, festival Hall
15:35-15:20	A paper from the Faculty of Engineering at King Faisal University on the use of Jojoba oil in lubrication	Prof. Noman Haimour and Abdul Aziz Elsinawi, College of Engineering, King Faisal University, Hofuf, Alhssa, SA
15:53-15:37	Effect of Seawater Irrigation on Growth and Some Metabolites of Jojoba Plants	Prof. Bafeel, Samera Omar Professor of plant and plant physiology, King Abdulaziz University, Jeddah, SA
16:10-15:55	Investors Speech: Jojoba Shrubs. A new hope for desert development The Egyptian experience for plantation and developing applications	Nabil Sadek El Mogy, Chairman of Egyptian Natural Oil Co, Cairo, Egypt
16:27-16:12	Saudi Investor	Saleh Abbas Al-Ghamdi, Dr. Saleh Abbas Eye Medical center, AlBaha, SA
16:44-16:29	Studying and evaluating the cultivation of Hohoba under the conditions of the central region of the Kingdom	Abdulrahman A. Al-Soqeer, Plant Production and Protection Dept., Collage of Agr.&Vet.Med. Qassim University, Buraidah, Qassim, SA
17:00-16:55	University of Sadat City, Egypt Jojoba: It's Potential for Sustainable Development in Egypt and International Cooperation	Prof. ADEL HEGAZY, Plant Biotechnology, Genetic Engineering and Biotechnology Research Institute (GEBRI), University of Sadat City, Egypt
17:20-17:00	Magrib prayer break	King Faisal University, festival Hall
19:00-18:30	Aisha prayer break	King Faisal University, festival Hall
21:30-19:00	Dinner and Recreation Party	Agricultural and Veterinary Research and Training Station of KFU, Qatar Road, Hofuf, Alhssa,SA

Second day/Time	Subject	Speaker
9:30-09:00	Visiting Biotechnology labs Plant biotechnology for sustainable production of energy and co-products from Jojoba	Mohei El-Din Solliman Dept. of Biotechnology, College of Agricultural and Food Science BLD 31
11:30-09:35	Visiting Agricultural and Veterinary Research and Training Station	Nabeel Al-Bulushi Director of Agricultural and Veterinary Research and Training Station-KFU, Qatar Road
12:00-11:30	A practical experiment: propagation of Jojoba and sex determination (only 20 participants)	Mohei Suleiman. Dept. of Biotechnology, College of Agricultural and Food Science BLD 31
13:20-12:00	Afternoon prayer break and lunch	King Faisal University, Student Restaurant Hall
14:30-13:30	Final session and Recommendation	All participants

Table 2. The names of the main speakers (candidates) at the Jojoba Workshop, King Faisal University in cooperation with Aramco Wednesday, 11/03/1439H corresponding to 29/11/2017

No	Name and Affiliation	Presentation Title
1	Al-Buraik, Khalid, Aramco Vice President of Production Operations in the Southern Region	Aramco and Environment
2	Bafeel, Samera Omer Professor of plant and plant physiology, King Abdulaziz University, Jeddah, SA	Effect of Seawater Irrigation on Growth and Some Metabolites of Jojoba Plants
3	Al-Ghamdi, Saleh Abbas Clinics Ibn Abbas for the eyes, Albaha, SA	Saudi Investor in Jojoba (Hohoba)
4	Hegazy, Adel Professor of Plant Biotechnology, Genetic Engineering and Biotechnology Research Institute (GEBRI), University of Sadat City, Egypt	Jojoba: It’s Potential for Sustainable Development in Egypt and International Cooperation
5	Kalghatgi, Gautam Professor, Principal Professional at Saudi Aramco and Visiting Professor at Imperial College, London and at Oxford University, Dhahran, SA	Energy for Transport
6	Kharabian, M. Ardashir University of Queensland, Brisbane, Australia	Manipulation of genes resistant to drought, heat and cold.
7	Al-Khateeb, Suleiman A. General Manager of Plant Production in Ministry of Environment, Water and Agriculture (MEWA). Professor, Faculty of Agricultural and Food Sciences, King Faisal University, Hofuf, Alhssa, SA	Saudi Arabia Strategy for Agriculture
8	El-Mogy, Nabil Sadek Chairman of Egyptian Natural Oil Co. Cairo, Egypt	Investors Speech; Jojoba Shrubs. A new hope for desert development The Egyptian Experience for plantation and developing applications

9	**Al-Mssallem, Ibrahim S.** **Department of Biotechnology, Faculty of Agricultural and Food Sciences, King Faisal University, Hofuf, Alhssa, SA** **Ex- Director of Joint Center of Genomic Research Center, King Abdulaziz City for Science and Technology, Riyadh, SA**	**Reality and Hope in Jojoba: Exploring latest Innovations and technologies in plant genes editing**
10	**Rahmoune, Hassan, Chemical Engineering and Biotechnology, University of Cambridge, Cambridge, United Kingdom**	**Novel cryo-protective agents isolated from Jojoba (Simmondsia Chinensis) to improve islet cells/pancreas cryo- storage**
11	**Radwan, Mohsen S.** **Oxon Professor , Faculty of Engineering at Mattaria** **University of Helwan , Cairo , Egypt**	**Bio-Fuels from Jojoba**
12	**Robert, Henry** **Professor of Innovation in Agriculture** **Director Queensland Alliance for Agriculture and Food Innovation University of Queensland, Brisbane Australia.**	**Improving plant feedstocks for bioenergy and biomaterials**
13	**Sarathy, S. Mani** **Associate Professor, Chemical and Biological Engineering Associate Director, Clean Combustion Research Center King Abdullah University for Science and Technology (KAUST). S. Mani Sarathy. Thuwal, SA**	**Combustion Jojoba Derived Fuels For Future Engines**
14	**AlSaud, Turki bin Saud**	**King Abdulaziz City for Science and Technology**
15	**Elsianwi, Abdulaziz and Haimour,Noman College of Engineering, King Faisal University, Hofuf, Alhssa, SA**	**Utilization of Jojoba Oil as Bio-lubricant**
16	**Slater, Nigel.** **Ex- chairman of Chemical Engineering and Biotechnology and the Provost of University of Cambridge, Cambridge, UK**	**Potential use of novel cryo-protective compounds isolated from Jojoba (Simmondsia Chinensis) to improve islet cells/pancreas cryo- storage and therapeutic efficacy related to diabetes**
17	**Solliman, Mohei El-Din** **Department of Biotechnology, Faculty of Agricultural and Food Sciences, King Faisal University, Hofuf, Alhssa, SA.** **Plant Biotechnology Dept., National Research Centre, Dokki – Egypt, Cairo**	**Plant biotechnology for sustainable production of energy and co-products from Jojoba**
18	**Al-Soqeer, Abdulrahman A.** **Plant Production and Protection Dept., Collage of Agr. &Vet. Med. Qassim University, Buraidah, Qassim, SA**	**Studying and evaluating the cultivation of Hohoba under the conditions of the central region of the Kingdom**
19	**Tunsi, Nabeela** **Chief Engineer, Aramco, Dhahran, SA**	**The role of Aramco in Environment and technology**
20	**Al-Zoubi, Habis; Abdullah Manaa and Abdelaziz Matani. Abdulrahman bin Faisal University, Dammam, SA**	**Production of Biodiesel From Jojoba oil using Nano-particles Metal Oxide Catalyst**

Introduction

Jojoba or Hohoba is called *Simmondsia chinensis*, also known as wild hazelnuts. It is a shrub, native to the southwest of North America (America and Mexico). It is grown on a commercial scale to produce Jojoba oil. Scientific name is *Simmondsia chinensis* of the family Simmondsiceae and the order Caryophyllaces.

Jojoba plants are plants that tolerate harsh environmental conditions such as salinity, drought and high temperature, and showed clear adaptation to the dominant environmental conditions in Saudi Arabia. The strains that were planted either at King Faisal University, Hofuf, Ahssa or Al-Khalidiya Farm in Tabarka, Al-Quwaiyya, Riyadh, Saudi Arabia, proved very successful in terms of adaptation and rapid vegetative growth. It gave a promising seed crop only two years after planting, with minimal care, water and nutrients requirements. This indicates that this plant is suitable for the dominant climate in Saudi Arabia. Therefore, the possibility of growing it as a promising economic crop with multi-purpose, tolerant to heat-and water scarcity.

Oil represents about 50% of the weight of Jojoba seeds and is characterized as a wax liquid similar to oil in its form but is quite different from it in the chemical structure, and it is therefore widely used in industrial products and cosmetics.

The workshop aims to clarifying the importance of expanding the cultivation of plants suitable to the nature of the Arab countries where the desert environment characterized by high temperature, salinity, drought and scarcity of water, and these plants have vital and industrial uses and a promising future. The Jojoba plant is one of the most promising new plants for our Arab world, which is compatible with the prevailing climate and desert environmental conditions, and the diversification of investment and the economy.

Based on the role of the university in expanding and developing the umbrella of scientific cooperation with leading national companies; to preserve the environment and create investment opportunities in the field of producing high value-added materials in the vital and industrial fields. This workshop starts with the cooperation and support of Aramco, for innovative scientific ideas and research and to better serve the beneficiaries intersets. This will have a positive impact on the Saudi society, in particular the agricultural environment, bio-industrial products, biofuels and the economy of the Kingdom in general.

The suitable geographical location for the cultivation of Jojoba

Jojoba grows between latitudes 23 and 35 north, but the cultivation of Jojoba has been successful at latitude 4 south in Brazil, 10 in North Costa Rica and 18 in Sudan. It is clear that the plant can grow, bloom and produce under different conditions of latitude and longitude.

Vegetative description of Jojoba plant

Roots: The root is strong and deep, and reaches a depth of ten meters, depending on the soil quality and the ability of the roots to penetrate. That qualifies the plant to utilize as much groundwater as possible, which enable this plant to use the largest possible reservoir of groundwater. Branching of the wedge root a set of non-surface roots.

Vegetative: The vegetative consists of several stems, which are a spherical shrub with a height of 1.5 to 4 meters. The leaves are oval shaped close to the shape olive leaves, but thick and covered with a thick layer of wax in the form of crystals to reflect the greatest amount of sunlight. The plant is drought tolerance and difficult conditions of lack of water and rain.

Flowers and fruits formation: Jojoba flowers are made of newly grown branches and begin to bloom during the summer and autumn months, when the temperature is moderate, and remains dormant in the winter and after exposure to low heat or drought. Begin to bloom in late winter and early spring. The fruit begins to grow and increase in volume as it grows and matures in May and June in hot places, July and August in the less humid places. The jojoba plant needs about 14 months.

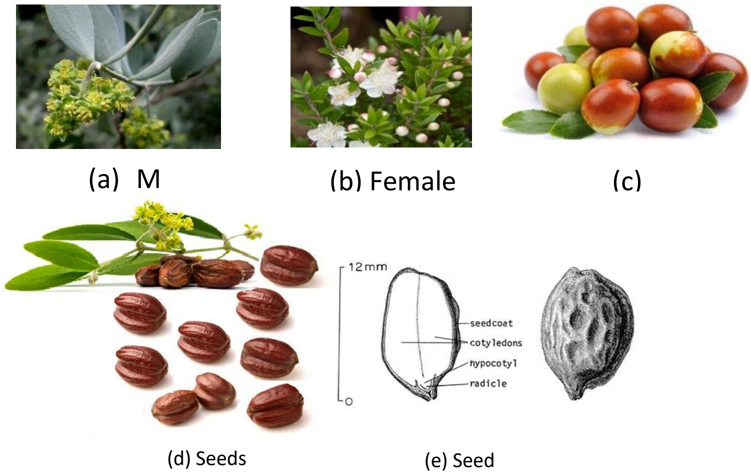

Fig. 1. Male flower (a), (b), female flower, fruits (c), seeds (d), and

Agricultural requirements of Jojoba plant

Temperature: The optimal temperature for the growth of Jojoba plant is 20-27°C, and successful cultivation in temperate regions where fluctuation in the temperature occurs during night and day. Jojoba plants can withstand high temperatures. It is believed that a temperature higher than 38°C would close the leaves pores and thus damage the photosynthesis and vegetative growth of the plant. However, recent reports indicate that temperatures up to 50 °C do not harm the plant. The jojoba bears low temperatures that may reach the freezing point for a short period. When choosing the Jojoba farming sites, avoid areas that are usually exposed to spring frosts, as this damages the plant's vegetative and zygote growth. Jojoba cultivation is common in warmer areas during the day (28-36°C) and slightly lower during the night (13-18°C), as temperature variations lead to more yields. It should be noted that it is not recommended to grow Jojoba in tropical regions where relative humidity is high because plants may grow greener but fruit is scarce or non-existent.

Irrigation: For Jojoba cultivation to be economically feasible, it is recommended to plant them in areas with a rainfall rate of 400-660 mm per year. There is no harm from increased rainfall if the soil is sandy with good ventilation and drainage. Good drainage is essential necessity for the success of Jojoba cultivation, where water is aggregated around the roots for a day or two is enough to damage the plant. Therefore, Jojoba should not be planted in the wetlands and areas prone to flooding. The drip irrigation is preferred, where an acre of Jojoba plant needs 3000-6000 m^3 annually depending on the location and nature of the cultivated soil.

Salinity: Jojoba plants resist salinity of water and soil to a large extent, depending on the plant variety as well as the type of salt. It has been found that some cultivars tolerate salinity of about 3000 ppm, while other saline tolerant varieties can reach about 7000 ppm.

Interval distances in agriculture: The best planting distance is 4 m x 2 m, to ensure that vegetation is not intertwined with each other, and to facilitate the manual collection of seeds during harvest.

Fig. 2. Interval between Jojoba seedlings during cultivation

Propagation methods of Jojoba plant

Sexual reproduction: Jojoba is very easily grown by seeds. Jojoba seeds retain their germination vitality for a period of up to five years. Seed germination occurs within two weeks. Cultivation by seed produces 50% male plant and 50% female plant. In order to accelerate the germination process, the soil is irrigated in a reasonable manner to maintain the moisture of the surface layer without swamping irrigation, as this will lead to rotting seeds or killing seedlings. After germination, irrigation periods can be spaced without allowing drying the soil.

Vegetative propagation: Reproduction in Jojoba is preferred than sexual reproduction for the following:

- Plant similarity and matching characteristics to mother

- Early production occurs within one or two years

- Increase yield

- Know the sex of plants without waiting until flowering

- Cultivate the required proportions of the male and female plants in the appropriate places

Reproduction by nodes: The method of reproduction by nodes is the most common method of commercial production in the United States of America and the rest of the world. The newly nodes (stem cutting) is used for this purpose, where the success rate is 80%. The node consists of 1 - 5 internode (terminal stem cutting). Terminal stem cuttings 3 to 6 inches long (depending on plant vigor) consisting of three nodes and internodes with green bark were made by cutting just below the lowest node. The node is taken during warm temperatures from the newly developed branches, which have not lost their green color yet, for the ease of reproduction.

Fig. 3. The Jojoba nodes are in the baskets of the nursery under foggy irrigation

The shoots is processed and placed in self-decomposing, self-contained baskets or paper containers filled with a mixture of perlite, fermicolite and bitmus. They are then placed in heated basins under 28°C in greenhouses for 8-10 weeks, and irrigated by programmed nebulizers for 2.5 seconds each five minutes, and the temperature of the greenhouse should not exceed 35 °C and not less than 25°C. After root formation, the seedlings are moved to the shade in shading houses under foggy irrigation for 8-10 weeks to be ready for transferring to their permanent planting site. Seedling needs 16-20 weeks to be ready for planting.

Reproduction by tissue culture: Jojoba is reproduced by tissue culture technique, where axillary buds are used for this purpose. This method of reproduction has the same benefits of reproduction, as by nodes, it is one of the methods of vegetative reproduction. The resulting plants are expected to be faster and more harvested. In addition, this method ensures that the genus of the planted plant is known, where a female plant, which produces the seeds that are the source of the economic importance of the plant.

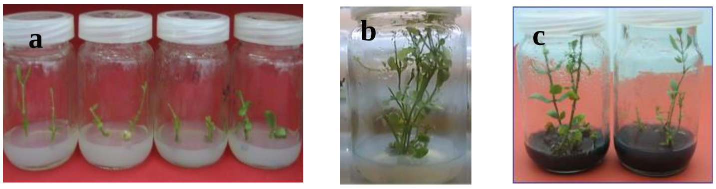

Fig. 4. Tissue culture: Shoot culture multiplication (a), shoot elongation (b) and root stage (c)

Harvesting and productivity of Jojoba seeds:

Seed is collected after it has been fully matured by hand or by special collection machines that take the seeds by suction, then they clean it by removing the soil and attached waste. At the time of collection, the Jojoba seeds have 12% moisture, so they should be dried or left to reach about 2-3% before they are stored or used to extract oil.

The jojoba shrubs start in economic production at the third or fourth year, where the production of each shrub (planted with female seedlings of high-production mothers propagated by nodes) is about 250-300 g on average per bush.

It is estimated that the production in the third year reaches about 200 kg of seeds per acre, which increases annually by 10-20%, reaching about 750 kg per acre in the eighth year of cultivation.

Extraction of oil from Jojoba seeds

The Jojoba seed contains 50% of its weight as oil. It is a special type of wax oil. Oil is extracted from the seeds by cold press similar to the traditional oily plants such as sesame and sunflowers. 75% of the oil is extracted in the first phase 10% is in the second phase and 15% is extracted using organic solvents. This oil is colorless and odorless, does not subjected to rancidity or oxidation, and its temperature resistance to

Fig. 5. Press machine used in oil extraction

heat is 390°C, and the melting point is up to 70 (For more details, see Table 3).

Table 3. Physical properties of Jojoba oil

Molecular weight	610
Freezing point	7-10.6°C
Refractive index	1.4650 at 25°C
Specific gravity	0.863 at 25°C
Smoke point	195°C
Flash point	295°C
Iodine number	82
Viscosity	50 sus at 25°C
Viscosity index (VI)	190-230

Utilizations of Jojoba Oil

First: Health benefits

There are many true clinical trials and some allegations about the use of Jojoba oil in medication, which need further studies and scientific research.

Jojoba oil is used extensively in cosmetics for skin and hair care and for treating skin problems. It is an effective treatment for skin scars and dry hair, due to its high content of long-chain unsaturated fatty acids, which penetrates easily through skin and scalp cells and helps maintain its softness and style.

It is also used in renewing the vitality of the skin and maintaining its health due to its content of fat-soluble vitamins such as vitamin E, which plays a role in protecting the skin and maintains its health and renewal. Jojoba oil also has the ability to fight free radicals and delay the appearance of wrinkles and aging of the skin because it is rich in antioxidants as well.

Jojoba oil also has anti-bacterial properties, so it is an effective treatment for wounds and pimples. In addition, it is used in the treatment of acne, soothe sensitive skin and sunburn.

Jojoba oil is available as a cosmetic products in form of pure oil, body moisturizer, body cream, lip balm, hair conditioner, body and hair oils, as well as facial and hair masks.

Fig. 6. Cosmetic and by-products of Jojoba oil

Despite Jojoba oil is rich in nutrients, but it is not edible or ingestion because the digestive system can not digest and absorb it properly. This means, it comes out with stool and may cause a condition called fatty steatorrhea. Large doses may also have toxic effects.

Second: Its uses in Industry

There are lab trails to use Jojoba oil in the engines of aircraft and diesel engines in order to increase its viscosity at 1000 °C. This is because of its high content of sulfur, and therefore does not form sulfur compounds. In addition, Jojoba oil is characterized by high iron absorption, which reduce friction and prevents rust and increases the life of the engine.

Table 4. Jojoba oil content of fatty acids

Fatty acid	**Numbers of carbon atoms and double bonds**	**Range**
Palmitic	C16:0	3.0 % max
Palmitoleic	C16:1	1.0 %max
Stearic	C18:0	1.0 %max
Oleic	C18:1	5.0 - 15.0 %
Linoleic	C18:2	5.0 % max
Linolenic	C18:3	1.0 % max
Arachidic	C20:0	0.5 % max
Eicosenoic	C20:1	65.0 - 80.0 % max
Behenic	C22:0	0.5 % max
Erucic	C22:1	10.0 - 20.0 % max
Lignoceric	C24:0	5.0 % max

Third: Its uses as animal feed

Jojoba forage is made from the remaining seeds after its processing by the cold press during the extraction of oil. The remains contain 24 - 33% protein (17 amino acids, including 7 essential amino acids), which are used as forage for animals and fish. It helps fish regain their luster and color after a period of time in water. (Ref)

Fourth: Its uses in natural pesticides

The Nat-1 was registered in the Egyptian Ministry of Agriculture in 2006 as a natural compound for the eradication of bugs, white fly insects, tunnel makers in fruits and vegetables. This pesticide contains 96 % Jojoba oil. It is produced by the company Kafr El-Zayat for Pesticides and Chemicals. This compound is one of the new and safe alternatives to control agricultural insects.

New applications of Jojoba oil and other Jojoba-based products may be formed in prospects and near future.

Potential use of novel cryo-protective compounds isolated from Jojoba (*Simmondsia Chinensis*) to improve islet cells/pancreas cryo- storage and therapeutic efficacy related to diabetes

Prof. Nigel Slater, Dr. Hassan Rahmoune Dr. Ibrahim Al-Mssallem and Noha AlOtaibi

Abstract
Cryo-storage of cells and/or organs is an important procedure for bio-banking industries that are estimated to be worth $5 billion. Cell based therapy have typically involved harvesting material such as islet cells for diabetes treatment. Currently used toxic agents (e. g. DMSO/Glycerol) affect cell integrity by causing oxidative damage. A recent review summarised the challenges and opportunities related to pancreatic islets cryopreservation aimed at the treatment of diabetes mellitus [**Organogenesis 5(3): 155-166. 2009**]. The aim here is to extract and characterise novel cryo-protective compounds isolated from Jojoba: i) to improve islet cells/pancreas cryo- storage; ii) and to assess their therapeutic efficacy related to diabetes by providing a means of preventing rejection and reducing the use of immunosuppression and/or to be used as an-add on therapy.
Recently, we have combined proteomic and biological platforms to investigate the use of a number of natural compounds as novel cryo-protective agents [**PLOSE ONE. 11(9):e0162748. 2016**]. Human nucleated cells were also used to screen for novel cryo-protective agents and these anti-oxidative compounds have a great ability not only to protect against cryo-damage but also enhanced cell quality and proliferation post thaw **[Patent application submitted. 2017]**. These findings leads us to propose the potential use for novel cryo-protective compounds (of carbohydrates [**J Chromatogr A. 977(2):257-64. 2002**] and/or phenolic oil [**Pharm. Sci. & Res. 8(6): 381-389. 2016**] nature) isolated from Jojoba to improving islet bio-preservation leading to a better regenerative medicine in the treatment of diabetes.
Here, we will be aiming to establish the molecular (“Omics platforms: Proteomics and Lipidomics) and the corresponding biological (Enzymatic/Functional assays) signatures associated with islets cell loss of functional properties during cryopreservation. In the second stage, we will be also investigating the effect of Jojoba active (e. g. carbohydrate/phenolic) components on reducing islets cell/pancreatic tissue (isolated from preclinical models [rodent/cells]) cryo-damage. Finally the suitability of newly screened Jojoba’s compounds will be modified and synthesised with the overall aim to scale up their production and to assess their therapeutic efficacy in the treatment of Diabetes. Dr Ibrahim Al-Mssallem’s group will be genetically modifying Jojoba with the overall aim to scalp up and enhance the quality of newly discovered cry-protective compounds.
Such a proposal also opens up a new avenue of translational research in the fields of other therapeutic areas such blood cell, stem cell, infertility treatment and potentially the use of these anti-oxidative compounds in food bio-preservation and healthcare products industries.

Effect of Seawater Irrigation on Growth and Some Metabolites of Jojoba Plants

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Jojoba (*Simmondsia chinensis*) is a plant that can grow semi-arid areas. Jojoba has very promising scope for cultivation in the desert even in the relatively hot weather. Its nature withstands the hot weather in summer, warm weather in winter, low fertility of soil and low water resources. Jojoba is considered one of the most practical solutions for desert plantation in Saudi Arabia, Egypt and other desert lands. Heat, drought and salt tolerance, lesser possibilities for infection, lesser need for fertilizers and generous financial income, are certainly the most encouraging goals to plant jojoba in Saudi Arabia. Seawater contains many dissolved substances and these add mass to the water within which they are dissolved, thereby producing a greater mass per unit volume, or a density, higher than that of pure water. This study was conducted to clarify the effect of irrigation with different levels of seawater on the germination, growth and metabolites of Jojoba (*Simmondisia chinensis*) at two periods (four weeks and six weeks after planting). At the two periods of growth, the results were the same. Leaf area was gradually decreased and recorded the smaller area at concentration of 100% which reached 0.047cm. The water content and fresh and dry weight showed a gradual decrease as compared to the control plants. The photosynthetic pigments content (Chl.a, Chl.b, Chl.a/b and carotenoids) were reduced at all levels of treatments as compared to the control. Results of soluble, non-soluble sugars and total carbohydrates described a clear evidence of increase accumulation of carbohydrates as compared to the control. Also, proline content was increased in shoots and roots of *Simmondisia chinensis* by treatment with sea water concentrations. The activity of catalase has been increased with seawater levels of 25% and 75%, while this activity was declined at high levels 50% and 100% as compared to control plants. Also, peroxidase activity was decreased in all the treatments with increasing salinity of seawater as compared to control. It can be concluded that diluted seawater may use as alternative sources of fresh water to grow jojoba plants under condition of Jeddah city.

Jojoba: It is Potential for Sustainable Development in Egypt and International Cooperation

Adel Hegazy, University of Sadat City

ABSTRACT

Whale sperm oil, human skin and Jojoba oil have the same unsaturated fatty acids structures. Since five decades, law prohibited sperm whale fishing. FAO predicted the global urgent needs of Jojoba oil instead of sperm oil. FAO in 1985 conducted project including Egypt in three locations (Ismailia, Al- Wahate and Sadat City). Unfortunately, propagation by seeds resulted low productivity tress. High yielding cuttings were the best for propagation. Recently, University of Sadat City secured the best 28 elite Jojoba clones worldwide from California University and USDA. Jojoba virgin and organic oil was exported to Japanese cosmetics companies. Collaboration with Toyota Toshio is underway via Japan International Cooperation Agency (JICA) in the crucial effort to switch their car design technology towards biofuel motor engines. It is known that fish do not have to spend more energy to utilize plant protein compared to fishmeal. An applied pioneer sustainable model of agriculture Integrative relationship were done; once fish waste is used for Jojoba fertilization, jojoba seed cake (protein 22 %) can be used for fish feed.

Energy for Transport

Gautam Kalghatgi, Saudi Aramco

Liquid fuels from petroleum currently supply around 95% of transport energy and even by 2040, this share is expected to be around 90%. Many of the alternatives to conventional transport energy are growing but they start from a low base and face barriers to rapid and sustainable growth. The global demand for transport energy will grow, mainly in developing countries and this growth will not be constrained by the supply of oil. However, the demand growth will be heavily skewed towards diesel and jet fuel rather than gasoline because there is far greater scope for reducing fuel consumption in the global light duty vehicle sector which predominantly runs on gasoline. Moreover, most rapidly growing alternatives, e.g. electric vehicles, are really relevant to small vehicles in the passenger car sector, and will further exacerbate this imbalance in demand growth. These changes will require big investments by the refining industry and will increase the availability of low octane gasoline-like components. It is important for auto and oil companies and other stakeholders to work together to develop highly efficient engine/fuel systems which can use such fuels. Future fuel properties will also be affected by engine development trends which need to meet increasingly stringent requirements on efficiency, emissions, cost and customer expectations. For instance, the optimum fuel for future spark ignition engines is gasoline with high RON and/or low MON and for compression ignition engines, low octane or low cetane fuel.

The talk will discuss these issues and also briefly discuss alternatives to conventional transport energy such as electric vehicles, biofuels, natural gas, hydrogen and synthetic fuels.

Jojoba Shrubs: A new hope for desert development The Egyptian Experience for plantation and developing applications

Nabil Sadek El Mogy, Chairman of Egyptian Natural Oil Co.

Jojoba shrubs are one of the most important new industrial crops for arid and semi- arid deserts. The international interest in Jojoba started at the beginning of 1970's after prohibiting hunting whales due to the fact that Jojoba oil is considered to be the best natural alternative for sperm whale oil. I read another article about new industrial crop “Jojoba” which suits our arid desert and has many advantages as well as producing a high value crop (jojoba oil/meal). FAO Regional Project introduced Jojoba plantation to some Middle Eastern countries, and the project planted 3 plots with Jojoba successfully in the Egyptian desert. However, the government and the private sector are not going to plant Jojoba (the new industrial crop) due to absence of local market for Jojoba oil/meal and absence of local researches on how to utilize the crop in the local industry.

Improving plant feedstocks for bioenergy and biomaterials

Robert J Henry

Queensland Alliance for Agriculture and Food Innovation, University of Queensland, Brisbane QLD, 4072 Australia

Plants can be utilized as a renewable resource to replace fossil oil in a wide range of applications. These include the production of transport fuels, industrial chemicals (e.g. feedstocks for plastics and fabrics) and high value chemicals. The key attributes of these crops are their biomass yield, the composition of the biomass and the ability to be produced in available environments. The total biomass yield varies widely with the highest yielding crops being trees like the eucalypts and grasses like sugarcane. The composition of the plant biomass is critical. Oil containing plants provide a direct or almost direct source of fuel. The oil may be produced in the seed (jojoba) or the leaves (eucalypts). Plants with high levels of sugars (sugarcane), starch (maize) or fructans (agave) provide a source of sugars (first generation) for fermentation to ethanol and other fuel molecules. The cell walls of plant especially woody plants are sources of lignocellulosic biomass that can be used to produce sugars (second generation) for fermentation and lignin for combustion to generate electricity or for other uses. The economics of production can be improved by utilisation of all parts of the plant biomass to produce co-products that add value. For example the residue following oil extraction from jojoba may be processed as a second generation feedstock. The suitability of plants as feedstocks can be enhanced by modifying their composition using available biotechnology tools. Genome analysis of feedstock provides a key platform for modification of biomass composition. Re-design of biomass composition can enhance the composition and aid efficient processing of the biomass to high value products.

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Genome editing of Jojoba with CRISPR/CAS9 technology to find and manipulate novel stress-related genes

Ibrahim S. Al-Mssallem[1], Ardashir K. Masouleh[2] and Mohammed Ba Abdullah[3,4]
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Drought, high temperature and salinity are major climatic constraints, and significant problems of agricultural production in Arabian Peninsula and worldwide. These constraints frequently occur during plant growth, development and production and drastically reduce the yield and economic benefits of farmers. Most cultivated crops in Saudi Arabia uses more water to produce yield, compared to other plant e.g. Jojoba. Furthermore, these crops are sensitive to water scarcity and high temperature, especially during reproductive stage (flowering to the grain filling). Jojoba or Hohoba (Simmondsia chinensis), also known as wild hazelnuts. It is grown on a commercial scale to produce Jojoba oil. Jojoba plants are plants that tolerate harsh environmental conditions such as salinity, drought and high temperature, and showed clear adaptation to the dominant environmental conditions in Saudi Arabia. Therefore, development of new plant varieties that can resist these stresses are essential to expand food production and preserve the environment. Unfortunately, most cultivated crops genotypes in Saudi Arabia have poor/narrow gene pool for resistance to drought and high temperature, as it naturally originates from tropical and sub-tropical regions with sufficient water availability. Jojoba species are underexploited or poorly-characterised genetic resources for application in breeding programs. They naturally grow under high temperature and drought conditions; hence, it is believed that they contain numerous beneficial genes, such as those resilient to climatic constraints. These new resistant genes can be potentially transferred to the cultivated crops through different breeding programs or genome editing programs e.g. CRISPR/Cas9. In this project, we will study the Jojoba at the genomics level (DNA polymorphism) to find and manipulate these novel stress-related genes/alleles that confer climatic resilience to the plant.

Bio-Fuels from Jojoba

Mohsen S. Radwan, D.Phil, Oxon Professor, Faculty of Engineering at Mattaria

University of Helwan, Cairo , Egypt.

In this work , the reasons for choosing Jojoba seeds as a non-edible fuel feedstock will be presented. Then the types of fuels prepared namely Jojoba bio-diesel, Jojoba bio-gasoline and Jojoba residual fuel will be illustrated. The residue of Jojoba seeds, a solid fuel, is to be used as the heating source for synthesizing the Jojoba fuels. Fuels analysis will be presented where it will be shown that Jojoba bio-diesel conforms to the American Standard D-6751 and the European Standard EN 14214. Also Jojoba bio-gasoline has an Octane number greater than 120 and thus is suitable for use as an Octane booster. Tests carried out on the fuels in a shock tube, combustion bomb and engine work will be briefly presented. It will be shown that Jojoba bio-diesel is a good gas oil substitute from the performance and emissions point of view. Also it will be stated that Jojoba bio-gasoline can be used as an Octane booster when added to normal gasoline. Economic studies have shown that Jojoba fuels can a viable economic proposition when Jojoba is grown on sewage treated water.

Exploring and editing novel heat and drought tolerance genes in plants using OMICS and CRISPR/Cas9 technologies

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Drought is a major constraint that limits crop production in Australia, Saudi Arabia and globally. Farmers are always looking for new varieties that can resist environmental stress and produce more yields under abiotic stress conditions. A great natural variation exists for native plants such as rice and date palm in the region. For example, more than 452 date palm cultivars exist in the region. The Saudi Arabian (Hassawi) rice is also important for the farmers of the region, which may contain many useful genes to explore. Discovery of novel genes responsible for high temperature and drought stress in plants is feasible using OMICS approaches. It is believed that native species have many uncharacterised stress-responsive genes as they grow normally under harsh conditions such as heat, drought, salinity, etc. Using a combination of next generation sequencing, gene editing (CRISPR-Cas), transcriptomics and bioinformatics analyses, we can find, characterize and edit the novel tolerant genes in native species of rice and date palm. These novel tolerance genes can be edited in a number of high yield/quality date palm and rice and genotypes using CRISPR/Cas9 technology. The end-product would be a number of highest quality rice and date palm cultivars (elite) with significantly higher drought tolerance potential cultivable in very harsh environments.

Plant biotechnology for sustainable production of energy and co-products from Jojoba

Mohei El-Din Solliman

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The physical separation of male and female plants from each other is usually referred to as sex determination. The mechanisms used for sex determination in different crop species have been documented in many reviews. The successful use of plant biomass for the sustainable production of energy and co-products such as chemicals is critically important for the future of humanity. Large scale exploitation of biomass is needed to decrease the production of greenhouse gases and help mitigate global warming, to provide energy security in the face of declining petroleum reserves, to improve balance of payment imbalances, and to spur local economic development. Dioecism, which is associated with sexual dimorphism, has always been a problem associated with cultivating many plant species, especially in woody trees such as the Jojoba. In the Jojoba, which is one of the most important crops in Middle Eastern countries, it is difficult to differentiate between male and female plants in the early stages of development. Hence, a proper population stand in terms of the male: female ratio is not almost possible to maintain in the field, leading to poorer production. For the first time, we identified a sex determination region of the Y chromosome (date- SRY) in the date palm using a new technique. Partial sequences of the date-SRY gene were amplified by nested PCR. Same technique is carried out on Jojoba and it showed promising data which will be published soon.

COMBUSTION JOJOBA DERIVED FUELS FOR FUTURE ENGINES

Mani Sarathy, Associate Professor of Chemical Engineering and Associate Director of the Clean Combustion Research Center (CCRC) at King Abdullah University of Science and Technology of Science and Technology (KAUST), Saudi Arabia

Understanding the combustion of bio-derive Jojoba fuels can aid in developing thermal conversion processes and in improving combustion applications. Optimization of engine performance requires an understanding of how a fuel's molecular structure affects important combustion properties. This presentation discusses the current state-of-the-art in comprehensive modeling of potential Jojoba derived fuels in various engine applications. In addition, important properties for Jojoba derived fuels will be discussed. The fundamental research involves the development of large databases of chemical reaction pathways with associated kinetic rate parameters, as well as thermochemical and transport properties for all reactant, intermediate, and product species. First, the mapping out of detailed reaction pathways at the temperatures and pressures relevant to engines will be discussed. The comprehensive models are validated against data from well-defined experimental configurations, such as zero-dimensional and one-dimensional reacting flows whose physics can be modeled exactly. These validated models are finally employed to determine fuel behavior practical engine applications. Real examples of detailed modeling for possible Jojoba fuels will be presented with the aim of displaying how such predictive tools can aid in designing Jojoba Fuels for Future Engines.

Utilization of Jojoba Oil as Bio-lubricant

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Abstract

Development of environmental friendly lubricants and industrial fluids became a major task of scientists all over the world. The challenge is to find suitable lubricants other than the conventional ones, which are classified as harmful and toxic materials that affect the environment. This proposal provides a suggested research work that could be carried out on Jojoba oil and its components, mainly tribotesters to investigate the effectiveness of Jojoba oil in suppressing wear and frictional force. Expected Results that could be obtained in this study are useful to explain the mechanism by which the Jojoba oil reduce friction and tool wear in machining. Intensive review of the previous works shows that the Jojoba oil in particular and vegetable oils in general have high potential to be used as lubricant and additive to replace conventional lubricants and additives.

Keywords Bio-additives · Bio-lubricant · Vegetable oil lubricant · Tribotesters, Palm oil lubricant

Prince Dr. Turki bin Saud bin Mohammad Al Saud. President of King Abdulaziz City for Science and Technology (KACST), Kingdom of Saudi Arabia. He has received his Ph.D in Aeronautics and Astronautics from Stanford University, USA. Dr. Al Saud serves as chairman of the board of trustees of the Custodian of the Two Holy Mosques Award for the Inventors and the Gifted. He is the chairman of the Supervisory Committee for the Custodian of the Two Holy Mosques Initiative for Solar Water Desalination, chairman of the Administrative Committee of the Saudi Energy Efficiency Center, and chairman of the Board of Directors of The Saudi Company for Technology Development & Investment (TAQNIA).

Dr Al Saud is member of the Board of Directors of Military Industries Corporation, member of the Civil Defense Council, member of General Commission for Survey, member of the International Advisory Council (IAC) for King Abdullah Petroleum Studies and Research Center (KAPSARC), member of the Board of Trustees for Al Faisal University, Riyadh, Saudi Arabia.

Dr. Ibrahim S Al-Mssallem has graduated from Cambridge University, England in Genetics (1988). He is an associate Professor of Molecular Genetic in King Faisal University (1998) and PI & Director in King Abdulaziz City for Science and Technology (KACST): Director of Joint Center for Genomic Research (Kacst - Chinese Academic of Science (CAS) 2008-2014 and Director of KACST-Cambridge research center(KCRS) (2010-2014). Consultant and General Director of Research Center of Ministry of Environment, Water and Agriculture, Riyadh (2015-2016).

Dr. Al-Mssallem has interests include research in Genetics, Biochemistry and Genomics, teaching, writing and translation. He had led and participated in many major projects in Saudi Arabia, including Date palm genome, Genetics Engineering as tool to identify Date palm cultivars, Genetics of Al-Hasswi Rice and Global Arabic Encyclopedia. All resulted in many publications in journals with good or high impact factors including; Nature, American Environmental Microbiology, Molecular Biology, PloSONE, Genomics and Genetics, The translated version of American scientific and Global Arabic Encyclopedia. He had published many scientific paper, translated articles and books e.g. Genetics, Dictionary of genetic engineering, Gene Cloning and what is life and the new revolution of Glucose. He worked as a scientific editor in Global Arabic Encyclopedia, Arab Journal of Biotechnology, Genomic and Bioinformatics and the translated version of American scientific, scientific reviewer for many journals including, PloSONE, BMC, Gene, Mol. Biol. He represented Saudi Arabia in many organizations e.g. Bioethics committee in UNESCO, France Arabian organization for culture, science and art, Tunisia and Arab Organization for Agricultural Development (AOAD), Sudan. He has more than 35-year experience in academic, research and leadership of a major international scientific research projects. He has an interest and contribution in Social, Educational, Public Services, Human rights and reform.

Professor Samira Bint Omar BaFeel is an academic professor at King Abdulaziz University in Jeddah, and Vice President of the Saudi Society for Life Sciences, King Saud University. She received her doctorate in plant physiology from the University of Mississippi State in the United States of America in 2005. She studied public biology and materials in the fields of botany and plant physiology, as well as communication and dialogue skills. She worked as a researcher and an associate researcher for several research projects in the field of plant physiology and the environment funded by King Abdul Aziz University. Many papers have been published in local and international journals.

She published a book “Jojoba Responses to Salinity”, and a paper entitled “Effect of Seawater Irrigation on Growth and Some Metabolites of Jojoba Plants”.

Dr. Habis S. AL-Zoubi obtained his B. Sc. (1993) and M Sc. (1996) Form Jordan University of Science and Technology, Jordan. He obtained his PhD in Chemical Engineering, University of Nottingham-UK (2007) and with thesis titled " Pretreatment in desalination: Prediction of Nanofiltration Membranes Performance using Atomic Force Microscopy and Modelling" , then he joined the engineering college in Al-Hussein Bin Talal University (AHU),Jordan in September 2007 chemical engineering department as an assistant professor. He was promoted to an associate professor in September 2012, then he joined the Environmental Engineering Department in Imam Abdulrahman Bin Fasial in Sep. 2013 till now**.**

Dr AlZoubi published around 25 papers in international journals and 6 papers in international conferences. He also obtained six research funds to carry out a research in water treatment and desalination fields.

Professor Gautam Kalghatgi is currently a principal professional at Saudi Aramco and is also a visiting professor at Imperial College, London and at Oxford University. He has held similar professorial appointments in the past at KTH, Stockholm; Technical University, Eindhoven and Sheffield University. He joined Saudi Aramco in October 2010 after 31 years with Shell Research Ltd. in the U.K. He is a fellow of the Royal Academy of Engineering, SAE and I.Mech.E. and is on the editorial boards of several journals. He has made significant contributions to combustion, fuels and engine research and transport energy issues and has published around 140 papers and a recent book, "Fuel/Engine Interactions".

He has a B.Tech. from I.I.T. Bombay (1972) and Ph.D. from Bristol University (1975) in Aeronautical Engineering. From 1975 to 1979, he did post-doctoral research in turbulent combustion at Southampton University with Prof. Ken Bray.

Professore Mohsen Salem Radwan is an academic professor at University of Helwan, Cairo, Egyp. He graduated from Oxford University, in Mechanical Engineering, Department of Engineering Science, England in 1975.

Mani Sarathy is an Associate Professor of Chemical Engineering and Associate Director of the Clean Combustion Research Center (CCRC) at King Abdullah University of Science and Technology of Science and Technology (KAUST). Mani was previously a Postdoctoral Researcher in the Combustion Chemistry group at the US Department of Energy Lawrence Livermore National Laboratory. During that time he held a prestigious fellowship from NSERC of Canada. Mani received his PhD and MASc degrees in Environmental and Chemical Engineering at the University of Toronto and his BASc in Environmental Engineering Chemical Specialization from the University of Waterloo.

Mani's research interest is in developing sustainable energy technologies with decreased net environmental impact. A major thrust of research is simulating the combustion chemistry of transportation fuels. The goal of Mani's research is study conventional and alternative fuels (e.g., biofuels, synthetic fuels, etc.), so the environmental impact of combustion systems can be reduced.

Dr Mohei El-Din Solliman. He Got his PhD in Genetic Engineering and Biotechnology from ICGEB- JNU in New Delhi, India in 2002. He was conference coordinator of 1st International Joint conference on Biotechnology, Nanotechnology and Material Science, - MNB 09 - Future Challenges, National Research Center, Cairo, Egypt from 4-6 Jan 2009. He has got first prize for Best Technology category on The **"**Khalifa International Date Palm Award**"**. UAE, 15, March 2015. The winner of the seventh session of the Khalifa International Date Palm Award in Abu Dhabi March 15 at Emirates Palace Hotel in the capital.

Also, he has got a prize for the first paper on The 7th National Congress of Biochemistry and Molecular Biology, "New strategy to regulate the expression of foreign gene in tissue specific manner in transgenic plant at high levels". The 7th National Congress of Biochemistry and Molecular Biology. Cairo, 5-7th, March 2006.

Professor Robert Henry is currently conducting research on the development of new products from plants. He is Professor of Innovation in Agriculture and Foundation Director of the Queensland Alliance for Agriculture and Food Innovation (QAAFI), a Research Institute of the University of Queensland established in collaboration with the Queensland Government. He was previously Director of the Centre for Plant Conservation Genetics at Southern Cross University, Research Director of the Grain Foods CRC and Research Program Leader in the Queensland Agricultural Biotechnology Centre. His current research targets plant genome sequencing for the capture of novel genetic resources for diversification of food crops to deliver improved food products.

Robert Henry has been involved in establishing several Cooperative Research Centres in Australia and has contributed to the management of research funding by Rural Research and Development Corporations.
He is a graduate of the University of Queensland (B Sc (Hons)), Macquarie University (M Sc (Hons)) and La Trobe University (Ph D). He was awarded a higher doctorate (D Sc) by the University of Queensland for his work on variation in plants, is a Fellow of the Royal Australian Chemical Institute and a recipient of the Guthrie Medal for his contributions to cereal chemistry. He is a Fellow of the Australian Academy of Technological Sciences and Engineering. Robert Henry was foundation senior editor of the Plant Biotechnology Journal. He is a highly cited scientist (ISI) in agriculture.

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