Unviersity of Kashan
Essential Oils Research Institute

Iran Golab

Book of Abstracts

Rosa damascena 2021

Book of Abstracts

Rosa damascena 2021

The Third International Conference & Workshops on *Rosa damascena*
8-9 September 2021, University of Kashan, Qamsar, Iran

In the Name of God

شناسه: گل محمدی (سومین کنفرانس بین المللی، ۱۴۰۰: قمصر)

Rosa damascena 2021 (3rdInternational Conference, 2021: Qamsar)

عنوان کتاب و نام پدیدآور: The Abstract Book of 3rd International Conference of *Rosa damascena* / Maryam Akhbari, Seyed Mojtaba Naseri.

مشخصات ظاهری: ۱۲۳ ص: الکترونیکی.

وضعیت فهرست نویسی: مصور، فیپا.

زبان نوشتار: انگلیسی

عنوان فارسی: مجموعه خلاصه مقالات سومین کنفرانس بین‌المللی گل محمدی ۱۴۰۰.

موضوع: شیمی گیاهی، گیاهان دارویی – کنفرانس‌ها

سال: ۱۴۰۰

The Abstract Book of 3rd International Conference of *Rosa damascena*

Abstracts and Author Index

Chief Editor: Dr. Maryam Akhbari

Publisher: Essential oils Research Institute

Date of Creating: September 2021

University of Kashan
Essential Oils Research Institute

Raheb Industrial Group

Rosa damascena-2021

3rd International Conference on

Rosa damascena

8 – 9 September 2021

University of Kashan
Essential Oils Research Institute

Raheb Industrial Group

Essential Oils Research Institute, University of Kashan;

Qamsar,Kashan,Iran

Financial support:

Raheb Industrial Group; **Iran Golab Co.**

Dear colleagues,

It is our great pleasure to welcome you in the Third International Conference of *Rosa damascena: Rosa damascena* 2021. The conference is held in the Essential Oil Research Institute, University of Kashan, Qamsar, Iran, from Wednesday, 8th September through Thursday 9th September 2021. The conference provides an international forum to share knowledge and discuss ideas with colleagues from Universities as well as research and industrial centers from all over the world.

The program covers a large variety of topics about *Rosa damascena*, including Cultivation, Technology, Regulations, Marketing, Health & Beauty Products and all subjects related to the *Rosa damacsena* with presenting 16 lectures and 3 workshops by the foremost professors and specialists from Iran and other countries.

The scientific and organizing committees would like to express their gratitude to all authors for their contribution in this conference.

I would like to sincerely appreciate Prof. Dr. Ebrahim Naderali from Hope Liverpool University and Dr Seyed Alireza Salami from University of Tehran for the very valuable scientific cooperation.

I am thankful from Dr. Hossein Zeinali, the head of scientific committee. Many thanks to the Prof. Abbas Zeraat, president of University of Kashan, and all the university board members as well as the members of the scientific and organizing committee, specially Mrs. Asma Mazoochi for their great cooperations. I have a special thanks to Mr. Seyed Mojtaba Naseri for his great assistance to the conference and help for preparing this book.

Finally I should be thankful from Mr. Majid Raheb and Mr. Hamidreza Momenian from Raheb Industrial Group; Iran Golab Co. for their helps and Financial support of the Conference.

With the best wishes,

Maryam Akhbari

Scientific Committee

Committee Head:

Dr. Hossein Zeinali

Executive Manager of Medicinal Plants Project, **Iran.**

Prof. Dr. Ebrahim Naderali

Faculty of Science Liverpool Hope University, **UK.**

Prof. Dr. Mohammad Bagher Rezaee

Department of Medicinal Plants, Research Institute of Forests and Rangelands, **Iran.**.

Prof. Dr. Rene Smulders

Wegeningen University, **Netherland.**

Prof. Dr. Ibrahim Baktir

Cyprus International University, **Turkey.**

Dr. Federico Martinelli

University of Florence, **Italy.**

Dr. Kamkar Jaymand

Department of Medicinal Plants, Research Institute of Forests and Rangelands, **Iran.**.

Dr. Othman Abdullah Fuad

Salahaddin University-Erbil, **Iraq.**

Dr.Ali Mostafavi

Shahid Bahonar University of Kerman, **Iran.**

Dr. Fatemeh Sefidkon

Department of Medicinal Plants, Research Institute of Forests and Rangelands, **Iran.**

Dr. Mohammad hasan Asareh

Medicinal plants and traditional medicine science and technology development headquarters, **Iran.**

Dr. Seyed Alireza Salami

Faculty of Science and Agricultural Engineering University of Tehran, **Iran.**

Dr. Naghdi Badi, Hasanali.

Medicinal plants and traditional medicine science and technology development headquarters, **Iran.**

Dr. Mohammad Bagher Bahardar

Davis University of California, **USA**

Dr. Mohsen Taghizadeh

Vice Chanceller for Food & Drug, Kashan University of Medical Scinces and Health Services, **Iran.**

Dr. Abdolrasol H. Ebrahimabadi

Essential Oils Research Institute, University of Kashan, **Iran.**

Dr. Ebadi, Mohammad Taghi

Faculty of Science University of Tarbiat Modares, **Iran.**

Dr. Ayyari, Mahdi

Faculty of Science University of Tarbiat Modares, **Iran.**

Dr. Akhbari, Maryam.

Essential Oils Research Institute, University of Kashan, **Iran.**

Dr. Mohadese Mahboubi.

R&D Manager, Tabib Daru Pharmaceutical Company, **Iran**

Dr. Amir Rahimi.

Faculty of Agriculture, Urmia University, **Iran.**

Dr. Seyed Hossein Hosseini

Barij Essance Pharmaceutical Company, **Iran.**

Organizing Committee

Committee Head:

Dr. Maryam Akhbari

Essential Oils Research Institute, University of Kashan, **Iran.**

Members:

Mr. Seyed Mojtaba Naseri

University of Kashan, **Iran.**

Dr. Asma Mazoochi

University of Kashan, **Iran**

Mrs. Azam Ghorbani

University of Kashan, **Iran**

Mrs. Elahe Rahimzade

University of Kashan, **Iran.**

Mr. Amir Hossein Firouzi

University of Kashan, **Iran.**


Iran Golab
University of Kashan
Essential Oils Research Institute
Rosa damascena 2021
The Third International Conference & Workshops on Rosa damascena
8-9 September 2021, University of Kashan, Qamsar, Iran
RICeST
Barij
ISC

Posters

Changes in the concentration of free amino acids in Damask rose (*Rosa damascena* Mill.)under drought stress

Nader Adamipour[1], Morteza Khosh-Khui[1] & Hassan Salehi[1]

[1]Department of Horticulture Science, College of Agriculture, Shiraz University, Shiraz, Iran.

Introduction

Plants are exposed to biotic and abiotic stresses such as salinity, oxidative stress, drought, high light, heavy metals and UV radiation throughout their life cycle. They employ various mechanisms at the cellular and molecular levels in response to adverse environmental conditions. One of the most important of these mechanisms is accumulation of free amino acids. The role played by accumulated amino acids in plants varies from acting as osmolyte, regulation of ion transport, modulating stomatal opening, and detoxification of heavy metals. Hence, our aim in this study is to investigate changes in concentrations of free amino acids under drought.

Methods

In order to evaluate the amino acids content under drought stress, a research conducted with three irrigation levels (100, 50 and 25% field capacity) at 1, 3, 6 and 12 days in a completely randomized design factorial arrangements with three replications on *Rosa damascena* Mill. The amino acids of contents were measured by high-performance liquid chromatography (HPLC) method as previously described by Manivannan et al.

Results

The results showed that arginine, ornithine, citrulline, proline, lysine, aspartic acid, glutamic

acid, asparagine, serine, glutamine, glycine, threonine, alanine, methionine, valine, phenylalanine, leucine, isoleucine, tryptophan and histidine contents had not any significant differences under the condition of 100% FC during sampling days. Content of amino acids (except for tryptophan and histidine) significantly increase by decreasing field capacity from 100 to 25%.According to the results, the contents of arginine, ornithine, citrulline, proline, lysine, aspartic acid, glutamic acid, asparagine, serine, glutamine, glycine, threonine, alanine, methionine, valine, phenylalanine, leucine and isoleucine had an increasing trend in both 50 and 25% FC, so that, the highest accumulation of them was observed at 12 d.

Discussion

Generally, our findings showed that amino acids contents involved in the pathways of polyamines synthesis, nitric oxide synthase, osmolytesproduction and modulating stomatal opening were increased under drought stress.

Keywords

Rosa damascena, amino acids, drought stress

References

1- Alexieva, V., Sergiev, I., Mapelli, S., & Karanov, E., 2001. The effect of drought and ultraviolet radiation on growth and stress markers in pea and wheat. *Plant, Cell & Environment,* 24(12): 1337-1344 .

2- Rai, V., 2002. Role of amino acids in plant responses to stresses. *Biologia Plantarum,* 45(4): 481-487 .

3- Manivannan, P., Jaleel, C.A., Somasundaram, R., Panneerselvam, R., 2008. Osmoregulation and antioxidant metabolism in drought-stressed Helianthus annuus under triadimefon drenching. *C. R. Biol*. 331: 418–425.

Polyamines metabolism in Damask rose (*Rosa damascena* Mill.) plant under drought stress

Nader Adamipour[1], Morteza Khosh-Khui[1]& Hassan Salehi[1]

[1]Department of Horticulture Science, College of Agriculture, Shiraz University, Shiraz, Iran.

Introduction

Drought is considered the most important stress contributing to yield and economical losses in many regions worldwide.Drought, as other environmental stresses, elicits profound changes in the plants at genes, proteins and metabolites as they either succumb to its effects or deploy tolerance mechanisms. One of the most important mechanisms is accumulation of compatible osmolytes such as polyamines.Polyamines are involved in a wide range of biological processes such as cell division, floral initiation and development, senescence and rooting, as well as against biotic and abiotic stresses including drought, salinity and nutrient deficiencies. They are positively charged at physiological pH and are capable the interacting with negative charge molecules such as phospholipids, nucleic acid, proteins and cell wall pectin.

Methods

To assess the polyamines content under drought stress in *Rosa damascena* Mill., a study was performed at three irrigating levels (25, 50 and 100% field capacity) at 1, 3, 6 and 12 daysin a completely randomized design factorial arrangements with three replications.The polyamines of contents were measured by high-performance liquid chromatography (HPLC) method as previously described by Fontaniella et al.

Results

HPLC results showed that there was no significant difference in the content of putrescine, spermidine and spermine under 100% FC at different days.Putrescine accumulation occurred on the 1 day and then decreased on the other days under 50and 25% field capacity. Spermidine accumulation under both 50 and 25% field capacity occurred on the 6 days and then decreased in the other days.According to the results, contents of spermine had an increasing trend in both 50 and 25% field capacity, so that, the highest accumulation of it was observed at 12 days.

Discussion

Generally, spermine accumulated more than other polyamines under 50and 25% field capacity. On the other hand, spermine has more effective role under biotic and abiotic stresses in comparison to other polyamines.

Keywords

Rosa damascena, polyamines, drought, putrescine, spermidine, spermine

References

1- Do, P.T., Degenkolbe, T., Erban, A., Heyer, A.G., Kopka, J., Köhl, K.I., Hincha, D.K., Zuther, E., 2013. Dissecting rice polyamine metabolism under controlled long-term drought stress. *PLoS One,* 8(4): e60325.

2- Singh, M., Kumar, J., Singh, S., Singh, V.P., Prasad, S.M., 2015. Roles of osmoprotectants in improving salinity and drought tolerance in plants: a review. *Rev. Environ. Sci. Bio/Technol.* 14(3): 407-426.

3- Fontaniella, B., Mateos, J. L., Vicente, C., & Legaz, M. E., 2001. Improvement of the analysis of dansylated derivatives of polyamines and their conjugates by high-performance liquid chromatography. *Journal of Chromatography A*, 919(2): 283-288.

Local knowledge for the use of *Rosa damascena* waste

Qazaleh Qaffari[1], Abbas Ali Rezaei Nia[2]

[1]Faculty of Archaeology, University of Kashan, Kashan, Iran

[2]Assistant Professor, Department of Archaeology, University of Kashan (Corresponding Author)

Email: rezaeinia@kashanu.ac.ir

Introduction

Ghamsar rose water has historical and world fame. But less attention has been paid to the local technology of providing other items from damask rose waste. For a long time now, the people of Ghamsar, after taking rosewater from damask rose, make optimal use of their waste. After the damask rose pulps are removed from the rosewater-making pot using a mold, the pulp is so-called bricked and exposed to the heat of the sun to dry. These bricks are used in many ways, such as winter fuel, fuel for the rosewater-making pot in the next year, cooking, especially bread, animal feed such as horses and donkeys, and as fertilizer on farms. The wastewater of cooked flowers has also been used to make calligraphic inks.

Methods

In this paper, using a descriptive-analytical method, the method, and steps of molding and drying of pulps and also providing ink from damask rose waste is described and its various applications are explained.

Results

The result of this research shows that the wastes obtained from the rosewater-making of damask

rose have had several uses in people's lives. The intelligent use of dried damask rose pulp and the providing ink of damask rose wastewater indicate that rosewater making technology is not the end of the production cycle and a variety of products are obtained from this agricultural raw material and changed to several products. These products are unseen capacities that can contribute to the economic prosperity of Qamsar.

Discussion

Paying attention to the revival and development of local knowledge in the field of *Rosa damascena* can provide the basis for the production of various products. The long tradition of exploiting damask rose in Ghamsar region shows that this complementary industry is a suitable platform for its sustainable development.

Keywords

Ghamsar, rosewater picking, local technology, processing, agricultural products.

References

1- Kardvani, P.,Ghaffar, A.H., 2004.Investigating the importance of Damask rose extraction and its importance in Qamsar section of Kashan, *Geographical Researches*, 47: 95-109.

Effect of NaCl-induced Salinity on Mineral Nutrients and Phosphorus in *Rosa damascena*

Motahareh Beiki[1], Hamid Sodaiezadeh[2], Mohammad Ali Hakimzadeh[3*] and Motahareh Esfandiari[4]

[1]MSc. Student of Desert Management, Department of Natural Resources &Desert Studies, Yazd

[2, 3]Associate Professor, Department of Natural Resources &Desert Studies, Yazd, Iran

[4]Postdoctoral Researcher in Combat Desertification, Department of Natural Resources &Desert Studies, Yazd, Iran.

*Corresponding Author: Hakim@yazd.ac.ir

Introduction

Salinity is a major stress factor for plants in many parts of the world. It limits plant growth and metabolism. Soil salinization is one of the problems in arid and semi-arid areas, and its containment requires the adoption of proper management. *Rosa damasce*na as an ornamental plant is commonly known as "Gole-Mohammadi" in Iran. *Rosa damascena* is traditionally used for treatment of abdominal and chest pains, strengthening the heart, menstrual bleeding, digestive problems and constipation. The antimicrobial, antioxidant, analgesic, anti-inflammatory, anti-diabetic and anti-depressant properties of *Rosa damascena* have been confirmed

Methods

In this research, the effect of salinity stress onthe R. *damascena* was assessed in a factorial trial based on a completely randomized design, with four replications per treatment. Treatments included four levels of salinity (0, 2, 4, and 6 dS/m), these treatments continued during 80 days with irrigation water. Finally, uptake and transport of ions (Na^+, K^+, Ca^{2+}, $Mg^{2+}$and, P) were

measured.

Results

The results showed that with increasing sodium chloride concentration in irrigation water, the amount of Na, in the tissues increased but amount of Ca^{2+}, Mg^{2+}, K^{+} andP of the tissues decreased, at higher levels of salinity, due to the saturation of root cells with Na, transportation of Na occurred from root to aerial parts.

Discussion

High concentration of sodium ions causes osmotic and ionic stresses. In contrast, the amount of phosphorus was significantly reduced. Attributed salinity stress. Another reason for phosphorus depletion is its chloride ion competition, which reduces the uptake of phosphorus in plants.The amount of ions, potassium, magnesium and calcium also had a decreasing trend. The highest value is related to the control treatment and the lowest value is related to the salinity level of 6 dS/m. It seems that by increasing the amount of sodium ions and competing with the elements potassium, magnesium and calcium has reduced the absorption of these ions, which ultimately leads to a general decrease in the growth ofRosa*damascena*,butRosa*damascena* has been able to reduce salinity to 6 dS/m. Tolerate that it can be concluded that this plant is tolerant to salinity.

Keywords

Rosa damascena, Irrigation, Salinity stress.

References

[1]Farahani, H., Sajedi, N. A., Madani, H., Changizi, M., &Naeini, M. R. (2020). Physiological and biochemical responses of Damask rose (*Rosa damascena* Miller) to potassium silicate application under water deficit stress. *NotulaeBotanicaeHortiAgrobotanici Cluj-Napoca*, *48*(3),

1560-1572.

[2] Miura, K. (2013). Nitrogen and phosphorus nutrition under salinity stress. In *Ecophysiology and responses of plants under salt stress* (pp. 425-441). Springer, New York, NY.

Study of phytochemical content and antioxidant activity of some *Rosa damascena* cultivars in Golestan province

Mehdi Hamzeh Mohamadabadi[1]*, Alireza Ladan Moghaddam[2], Elham Danaee[3] & Sophia Soroori[4]

[1, 4] Department of Horticultural Sciences, Aliabad katoul Branch, Islamic Azad University, Aliabad katoul, Iran

[2, 3]Department of Horticultural Sciences, Garmsar Branch,Islamic Azad University, Garmsar, Iran

Introduction

Rosa damascena Mill.is an important rose species that is one of the oldest medicinal and aromatic plants in the world.Phenolic and flavonoid compounds are the most important groups of secondary metabolites in plants that are widely distributed throughout the plant and have several biological effects such as antioxidant and antibacterial activity and environmental factors significantly affect their quantity and quality. The present study was conducted to study the phytochemical content and antioxidant activity of 4 cultivars of *Rosa damascene* (Azearan, Kashan 93, Keshtebaft Karaj and Markaze tahghighat Karaj) in Golestan province.

Methods

This study was performed as a randomized complete block design with three replications in Gorgan (Ziarat village). The seedlings were transferred to the land in March 2019 and harvested in May 2020 at the flowering time and then the traits of phenol, flavonoid, anthocyanin and total antioxidant activity (DPPH) were evaluated.

Results

The results showed that phenol, flavonoid and anthocyanin were significant at the level of 1% and total antioxidants at the level of 5%. The highest amount of phenol (1.27mgg^{-1}DW) was obtained in Kashan 93 cultivar and the highest amount of flavonoids (0.79 mgg^{-1}DW), anthocyanin (0.14 mgg^{-1}FW) and total antioxidant activity (34.68%) was observed in Azearan cultivar, which was not significantly different withKashan 93 cultivar.

Discussion

Studies have shown that *Rosa damascena* has significant diversity and differences in most traits, and on the other hand, various factors such as genetics, climate, geographical location and soil also play a role in the occurrence of this diversity. Therefore, according to the obtained results, cultivation of Azearan and Kashan 93 cultivars is recommended to obtain the highest phytochemical content and antioxidant activity in Golestan province.

Keywords

Antioxidant, Anthocyanin, Flavonoid, Phenol, *Rosa damascena*

References

1- Kodori, M., Tabaei-Aghdaei, S., 2007. Evaluation of flower yield and yield components in nine *Rosa damascena* Mill. Accessions of Kerman Province, Iranian *Journal of Medicinal and Aromatic Plants Research*, 23(1): 100-110.

2- Sheikhi, R., ZabihZadeh, S.M., Nazarnejad, N. and Ebrahimzadeh, M.A., 2014. The importance of plant antioxidants and the need to research and develop them. The first

national Conference of *Medicinal herbs, Traditional Medicine and Organic agriculture.* Hamadan, Iran.

Rose Oil Production

At Industrial Scale

Sayed Abdollah Hoseini

Bokhar Taghtir Co. Shiraz, Iran

Introduction

Sometimes we like to separate the second essential oil from a hydrolate or rose water, which is available in liquid form. This second essential oil is "**Aroma**". The combination of the first essential oil or the first oil and the second essential oil or aroma, which is the result of first distillation, is called Rose Whole Essential Oil.

Process description

At the first, rose water is prepared by distillation. The heart of this stage is a device known in the industry as tall form distillation, or two-component column distillation or aroma distillation. Then, rose water is stored in the primary storage tank and some is injected into the feed evaporation tank.

By opening the steam valve, the rose water begins to boil inside the evaporation tank and moves upwards inside a vertical column under the atmospheric conditions. The produced steam is containing aromatic essential oils at a temperature of 100 degrees.

At the same time, a cold rose water in the storage tank is pumping from the bottom and inside the tubes of a shell-tube heat exchanger and exits from the top of it. By spraying of this rose water on the steam, the temperature of steam reduces. Adjusting the steam and adjusting the flow rate of rose water and reaching a temperature of 80 degrees above the distillation column

allows the essential oil to pass through the channel above the column and instead water falls to the bottom of the column and in this column two-phase separation is practically performed. The vapors containing a high percentage of essential oil then enter the shell of the tube- shell heat exchanger and are pushed down. At the end, the second rose water goes to the decanter and separates easily.

The output of this device will be the second essential oil or aroma. And its effluent is used to extract phenyl ethyl alcohol. It should be noted that if we combine the first essential oil from the first distillation machine with the essential oil extracted from the tall form distillation machine, the "**whole essential oil"**is obtained.

In Iran, less than 5% use this system because they have not obtained the full essential oil market, while in global markets they are looking for this type of essential oil, especially in rosemary and lavender.

Keywords

Rose water, Aroma, Aroma distillation, Whole essential oil

References

1-Agaoglu, Y. S., 2000. Rose oil industry and the production of oil rose (*Rosa damascena Mill*.) in Turkey. *Biotechnology & Biotechnological Equipment*, 14(2): 8-15.

2- Kovacheva, N., Rusanov, K., & Atanassov, I., 2010. Industrial cultivation of oil bearing rose and rose oil production in Bulgaria during 21st century, directions and challenges. *Biotechnology & Biotechnological Equipment*, 24(2), 1793-1798.

The Process of Rosewater and First Oil Production in Iran

At Industrial Scale

Sayed Abdollah Hoseini

Bokhar Taghtir Co. Shiraz, Iran

Introduction

Hydro-distillation of aromatic plant parts yields two final products. The first is a large volume of aromatic water, which in the processing of rose flower is also called rose water. This output product is the raw material of the herbal beverage production line, which is marketed in different packages. The second product is a high quality essential oil called the first oil, wax or fat. Below we describe this method at industrial scale.

Process description

Initially, the entering plant may be either dry or fresh. If the plant is fresh and has aromatic substances, they are processed in the early hours. In *Rosa damascena*, the plant will stored under the shade to maximize its secondary metabolites. The plant is then putted into the pot of the distillation machine. Distillation device at this stage is Hydro distillation and Steam distillation. After plant loading, 3 to 5 times the water with low hardness, is pumped to the boiler.

As water evaporates, the steam, while carrying volatile oil molecules, is directed to a shell-tube condenser. The steam is converted to a liquid. This condensate is called aromatic water. In the discussion of *Rosa damascena*, it is called rosewater.Aromatic water is slowly directed to a decanter or separator to allow light oils to come to the surface. These oils are called essential

oils, fats, and waxes. Aromatic water collected under the oil is directed to the storage tank for packaging. It should be noted that in commercial language, the distillation machine at this stage is called the first distillation machine.

In industry, the first distillation device is used in proportion to variety of plants. The average amount of aromatic water output from each device during processing is about one third of the loading capacity of that device.

Keywords

Aromatic plant, Rosewater, First oil, Aromatic water, Hydro-distillation, Steam distillation

References

1-Baydar, H., 2006. Oil-bearing rose *(Rosa damascena Mill*.) cultivation and rose oil industry in Turkey. *Euro Cosmetics*, 14(6): 13.

2-Younis, A., Khan, M. A., Khan, A. A., Riaz, A., & Pervez, M. A., 2007. Effect of different extraction methods on yield and quality of essential oil from four *Rosa* species. *Floriculture and Ornamental Biotechnology*, 1(1):73-76.

The Process of Extraction from Plants Using Water At Industrial Scale

Sayed Abdollah Hoseini

Bokhar Taghtir Co. Shiraz, Iran

Introduction

In this process, the goal is to extract effective soluble materials in water as a cheapand safe solvent. Often these active ingredients are less sensitive to temperature, like licorice root.

Process description

At first, the dried plant turned into small pieces. The small pieces of the plant are transferred to the extractor or cooking pot and water with the amount of 5 to 9 times the weight of the plant, with low hardnessis injected. The cooking is done at 95 ° C and pressure of 1 to 3 times the atmosphere pressure for 3 hours (these numbers are average). The final extract is then filtered by a filter-press. The filtered extract, can be pasteurized and packaged.

The technique we acquired and developed in the medicinal plant processing industry is the deposition of solutes and heavy metals through electro coagulation, which has recently been applied in the wastewater industry.In purpose of concentrating the crude extract without any change inphysic-chemical properties of the feed, the feed is directed to the vacuum concentrator. The extract from this system can be obtained up to 50% concentration. If there is a tendency to produce bulk from the extract, the concentration should be continued. In this case, byusing a paddle concentrator and a finisher, the concentration is increased to 80 to 85%. The extract is then emptied into small containers and allowed to cool. Then, the extract will be cooled, hard

and brittle, which can be ground into a powder.

If we want to produce a uniform powder, the extract does not need to be concentrated to a high concentration, with a concentration of 35 to 45%, it can be transferred directly to the spray dryer. In this case, the feed is sprayed into the hot air chamber.The production powder is collected from the bottom of the chamber and separated by a cyclone and dust collector.

This production method is used in most of the pharmaceutical industry.

Keywords

Medicinal plants, Water, Extraction

References

[1] United Nations Industrial Development Organization, Handa, S. S., Khanuja, S. P. S., Longo, G., & Rakesh, D. D. (2008). Extraction technologies for medicinal and aromatic plants. Earth, Environmental and Marine Sciences and Technologies.

[2] Handa, S. S. (2008). An overview of extraction techniques for medicinal and aromatic plants. Extraction technologies for medicinal and aromatic plants, *1*, 21-40.

Concrete and Absolute Extraction Process

At Industrial Scale

Sayed Abdollah Hoseini

Bokhar Taghtir Co. Shiraz, Iran

Introduction

Concrete and absolute are the active ingredients of *Rosa damascena* which are obtained at room temperature using hexane solution. When the resulted solution is stored at a temperature below zero degrees Celsius, a portion amount of it is freezed, which is named concrete. If we add what is still liquid to ethanol, we will get an aromatic liquid called absolute.

Process description

The fresh rose flowers is weighed and put into the percolator. Then, at a ratio of 3 times the weight of the flower, hexane is pumped into it. The percolator, after loading material and hexane, is stirring its blades. This operation is performed at the room temperature for about an hour. The hexane solution, which we call the extract here, is then drained and enters the storage tank. The percolator is again filled with fresh hexane. This operation is repeated three times in total.All extracts are directed to the storage tank. The residual hexane in the pulp is also heated, evaporated and collected.

Now in the storage tank, we have an extract that contains the active ingredients of flowers. At this stage, the filtered extract enters in the hexane evaporator. More than 80% of hexane is evaporated, condensed and recycled. The remained extract is transferred to the decanter at and with its weight equivalent ethanol is added and stirred.

As the solution is mixed, is cooling to a freezing point of wax and grease. In this case, fats,

waxes, and non-polar oils dissolved in hexane are cooled and solidified. The polar aromatic substances of the extract also dissolve in ethanol. At the end we have 3 outlets: ethanol solution, residual hexane and frozen waxes called: **"concrete"**.

Then the ethanol solution is pumped into another evaporator under vacuum. Evaporated ethanol is liquefied and recycled.At the end of the work, what remains in the evaporator tank is a liquid that is a combination of polar aromatic substances with 20% ethanol, which is called: **"absolute"**.

Keywords

Concrete, Absolute, Herbal extract, Ethanol solution, Hexane solution

References

1-Kurkcuoglu, M., & Baser, K. H. C., 2003. Studies on Turkish rose concrete, absolute, and hydrosol. *Chemistry of natural compounds*, 39(5): 457-464.

2-Aydinli, M., &Tutaş, M., 2003. Production of rose absolute from rose concrete. *Flavour and fragrance journal*, 18(1): 26-31.

Extraction of Phenyl Ethyl Alcohol from Rose Essential Oil At Industrial Scale

Sayed Abdollah Hoseini
Bokhar Taghtir Co. Shiraz, Iran

Introduction

One of the aromatic substances in *Rosa damascena* is phenyl, which evaporates with the evaporation of water (during hydro distillation) and distilled and has a molecular bond with water due to its polarity. Separation of phenyl by evaporation and distillation with water is practically impossible. Therefore, another option should be considered.

Process description

In order to extract phenyl, the third effluent from the tall tower distillation machine must be cooled if it isintended to be processed immediately. For this purpose, the effluent first enters a condenser and reaches to the normal temperature. The cooled effluent then is pumped from the bottom of a hollow column containing macro porous adsorption resins and leaves all its solutes on the surface of these resins.Since this effluent has been evaporated and distilled several times in the previous stages, it does not have any impurities and hardness and has no solids except phenyl. After almost all the effluent was passed through the column, the transfer operation is stopped and the column is emptied of the remaining effluent, and the effluent is transferred to the storage tank or transferred to the line for reuse.

After this, about 2000 liters of ethanol is passed through the column by a pump.After solving the phenyl in ethanol, the solution is proportionally evaporated under vacuum to evaporate the ethanol at a maximum boiling temperature of 60 ° C. Evaporated ethanol is liquefied and

recycled by a cold shell-tube condenser. At the end of the work by turning off the system, what remains in the evaporator tank is a liquid that is a combination of phenyl with 20% ethanol, called "**phenyl ethyl alcohol"**, which has a wide range of cosmetic applications.

Keywords

Phenyl ethyl alcohol, Rose essential oil,Aromatic substances, Extraction

References

1-Scognamiglio,J., Jones, L., Letizia, C. S., &Api, A. M., 2012. Fragrance material review on phenylethyl alcohol. *Food and chemical toxicology*, 50:S224-S239.

2- Brandt, K., 1990. Final report on the safety assessment of phenethyl alcohol. *Journal of the American College of Toxicology*, 9(2): 165-183.

The Process of Extraction from Plants Using Alcohol

At Industrial Scale

Sayed Abdollah Hoseini

Bokhar Taghtir Co. Shiraz, Iran,

Introduction

In the pharmaceutical and cosmetic industries, they are looking for extraction of the effective substances from medicinal plants by using this method. Because it can be said that all the useful elements of the plant are extracted and used. The use of organic solvents varies according to the type of extraction we want.

Process description:

The dried plant containing the active ingredient is weighed and put into the percolator. Then, in the ratio of 1-3 times the weight of the plant, organic solvent is pumped into it. This solvent can be (ethanol, methanol, propylene glycol, hexane, or a combination of them with water, etc.)After loading the plant and solvent, the contents are stirred by the blades. This operation is performed at the room temperature for about an hour. It is possible to heat the solvent as well. Then the solvent solution, which we call crude extract, is drained and enters the storage tank which contains between 1 and 3% of dry matter.

The residue in the percolator is fed into a high-pressure hydraulic press (40bar) to drain the remaining active material.

If the final target is to produce a powder from an organic extract, the organic solution is proportionally evaporated under vacuum. The evaporated solvent is converted to liquid and recycled by a shell-tube condenser. The final extract with a concentration of 30 to 45% is

removed from the evaporator under vacuum. This extract also can be considered as a final product. But if we want to have a cake or powder, it is necessary to direct this extract into a vacuum dryer. In this system, under vacuum and low temperature, the extract is stirred and its moisture (solvent) is taken to reach a humidity of less than 5%. Moisture is collected in a shell-tube condenser. In order to prevent the transfer of food and powder to the condenser, a dust collector and cyclone should be install in the air path. The output powder of the sieve is made to the desired granulation.

Although the manufacturers, both domestic and foreigners, each followed their own technique, the general process is the same and the difference is in the details.

Keywords

Medicinal plants, Organic solvent, Extraction, Alcohol

References

1-Handa, S. S., Khanuja, S. P. S., Longo, G., & Rakesh, D. D. 2008. *Extraction technologies for medicinal and aromatic plants*. Earth, Environmental and Marine Sciences and Technologies, United Nations Industrial Development Organization.

2- Zhang, Q. W., Lin, L. G., & Ye, W. C. 2018. Techniques for extraction and isolation of natural products: A comprehensive review. *Chinese medicine*, 13(1):1-26.

Biochemical diversity of *Rosa damascena* landraces in Iran

Azizollah Khandan-Mirkohi[1*], Mohammad Omidi[2], & Zabihollah Zamani[3]

[1,2&3]Department of Horticultural Sciences, Faculty of Agricultural Sciences and Natural Resources, University of Tehran, Karaj

Corresponding author: khandan.mirkohi@ut.ac.ir

Introduction

Rosa damascena Mill. (Damask rose) is cultivated for essential oil production. Iran is mentioned as the genetic diversity center and origin of the *Rosa damascena* Mill. Therefore, the present study was carried out to determine the variations in essential oil content of Iranian Damask rose landraces.

Methods

The research materials consisted of 26 Damask rose landraces belonging to all parts of Iran, cultivated in a randomized block design with three replications. Variation and diversity in essential oil content of these landraces were evaluated on two different collecting times of early morning and late evening.

Results

The result revealed that in most damask rose landraces, early morning harvested petals had higher oil content. However, in G1, G2, and G4 the amount of essential oil content was the same for the morning and evening time harvesting petals and for G22 and G24 the oil content in dry petals was higher for the evening harvesting time.

Discussion

It was found that flowers harvested in early morning have more essential oil content. Some reports indicate that the oil content of the rose flowers was depending on the time of harvesting. The results revealed that a large difference exists between accessions for color properties and essential oil content.

Keywords

Diversity, Essential oil, Flower, Perfume

References

1- Mohamadi, M., Mostafavi, A., &Shamspur, T., 2011. Effect of storage on essential oil content and composition of *Rosa damascena* Mill. Petals under different conditions. *Journal of Essential Oil Bearing Plants*: 14(4): 430-441.

2- Nasri, F., Fadakar, A., Yousefi, B., &Zahedi, B., 2016. Evaluation of Genetic Diversity of Some Damask Rose (*Rosa damascena* Mill.) Genotypes of Kurdistan Province Using Morphological Traits. *Journal of Ornamental Plants*, 6(4): 237-243.

Utilizing of analytical chemistry techniques for recognizing of cheats in Golab

Sayedeh Mansoureh Memarzadeh [1,2], Ali Gholami[1], Abdollah Ghasemi Pirbalouti[3], & Sayed Ahmad Nourbakhsh[2]

[1]Department of Analytical Chemistry, Faculty of Chemistry, University of Kashan, Kashan, Iran

[2]Deputy of Food and Drug, Shahrekord University of Medical Sciences, Shahrekord, I.R. Iran

[3]Research Center for Medicinal Plants, Shahr-e-Qods Branch, Islamic Azad University,Tehran, Iran

Introduction

Golab or *Rosa damascena* water is an expensive natural food additive that is used in the kinds of traditional and industrial foods. The natural *Rose pelargonium* (Sweet-Rose geranium) essential oil is not only similar to *Rosa damascena* essential oil but also cheaper than it. Pakestanian Rose is the synthetic compound with the same characteristics too. Therefore, some speculators may adulterate the production of Golab or *Rosa damascena* essential oil. We decided to distinguish and control these scams.

Methods

pH, acidity index, Iodic index was measured and also methods of instrumental analytical chemistry GC, UV, GC/MS was used .

Results

Natural Golab had pH = 3.8-5, acidity index 1-5, high iodic index was the best index to distinguished of natural Golab from synthetic or similarity natural compound.

Discussion

GC/MS results showed, the ratio of Citronelol/Geraniol was more than double in the fake Golab, there was the high amounts of Phenyl ethyl alcohol in the natural Golab and Nerol compound was in the natural Golab and was absent in the others.

Keywords

Rosa damascena, Analysis, Essential oil,GC/MS, Phenyl ethyl alcohol

References

1- M. Akhbari, S. Masoum, F. Aghababaei, S. Hamedi, 2018. *J. Food Sci. Technol*., 55: 2197-2207
2- Mirza Mehdi et al,1386. *Journal of medicinal and aromatic plants*, 3:375-381.
3- Standard operating procedure of food and drug deputy,1399; Shahrekord University of Medical Sciences, Shahrekord , I.R.Iran.

Investigation effects of activated characol on rooting of in-vitro Cultured *Rosa damascena* Mill.

Mirzaei Leila [1], Nasiri Ziba[2]

[1]Royanpazhuhesh Azerbaijan Co.WestAzerbaijan, Urmia, Iran.

[2]Departeman of Horticulture,Faculty of Agriculture,Urmia, University.Urmia, Iran.

Introduction

In vitro culture technique is an alternative method for plant propagation. Activated charcoal is usually used in culture media to enhance the growth and development of in vitro plants.

Methods

The purpose of this experiment was to increase the quality and quantity of rooting. values of 0.2 and 0.4g was used in four levels of(0-0.25-0.5-0.75) with two different hormones IBA, NAA.

Results and Discussion

This suggests that AC can adsorb comparatively high concentrations of growth regulators and make them unavailable to tissue explants. AC increased the length of root and it showed little effect on the number of roots. The best treatment for rooting of this plant was the use of 0.2 g/L of activated charcoal at hormonal levels.

Keywords

Rosa damascena, Micropropogation, Activated charcoal, Rooting

References

1-Careli,B.P and S.Echeverrigary,2002.An improved system for the in vitro propagation of rose cultivars.*ScientiaHorticulturea*, 92;64-74.

2-Trigiano, R. Gray, D., 2005. Plant Development and Biotechnology. Boca Raton: London New York.

Adsorption of Copper(II) Ion from Waste Water Using *Rosa damascena* Pomace as Bio-Adsorbent

Elham Sadat Moosavi[1*], Azadeh Zamani[1]

[1]Imam Khomeini International University, Buein Zahra Higher Education Center of Engineering and Technology, Chemical and Materials Engineering Department

[*]Corresponding author Email address:

e.moosavi@bzte.ac.ir

Introduction

Wastewater and its related pollution management is among important issues for the societies to be rigorously addressed. One of the most long-standing points of concerns has always been the existence of some heavy metals components like copper (Cu(II)), that need to be removed from waste water in order to prevent them from releasing into the environment as it imposes harmful environmental and health related consequences.

Among the existing waste water treatment methods, the adsorption process can be considered as a proper one having a couple of important benefits such as cost affordability, flexibility of implementation and facility of its operation, that has made it a wise choice in this regard.

Here, considering the aforementioned method, rose waste biomass was investigated as a bio-sorbent material that facilitates the removal of copper metal from aqueous solution.

Methods

In this study, rose water residue was considered as adsorbent while aqueous solution of copper metal was taken to be as adsorbate.

The effect of three important parameters including pH (2, 4.2 and 5); adsorbent dose (0.05, 0.1 and .3gr); contact time (0.5, 3 and 5 hrs.) was investigated on batch adsorption by rose water

waste.

Results

The results showed that the optimum pH was 5, the optimum contact time was observed to be 5 hrs. and the optimum adsorbent dose was 0.1 gr, respectively.

Discussion

Rosa damascena pomace is a left over waste component of the rose watering process which is usually spared in the process of rose watering. It is shown here that it can be used as a cheap adsorbent, as it is observed that these components have a great potential to be considered as a strong adsorbent in the removal process of lead and copper metals from aqueous solution. The adsorption method also is proved here to be an effective and economically affordable method compared to other methods that are usually more expensive and complex.

Keywords

Adsorption, Copper, WasteWater, Rose damascena Pomace, Biomass

References

1-IftikharA.R., Bhatti H. N., HanifM. A., Nadeem R., 2009. Kinetic and thermodynamic aspects of Cu(II) and Cr(III) removal from aqueous, solutions using rose waste biomass, *Journal of Hazardous Materials*, 161: 941–947.

2-Nasir M. H., Nadeem R., Akhtar K., HanifM. A., Khalid A. M. 2007. Efficacy of modified distillation sludge of rose (*Rosa centifolia*) petals for lead(II) and zinc(II) removal from aqueous solutions, *Journal of Hazardous Materials,* 147: 1006–1014.

3-Nguyen T.A.H., Ngo H.H., GuoW.S., Zhang J., Liang S., Yue Q.Y., Li Q., Nguyen T.V. 2013.

Applicability of agricultural waste and by-products for adsorptive removal of heavy metals from wastewater, *Bioresource Technology*, 148: 574–585.

4-RamrakhianiL., HalderA., MajumderA., Mandal A. K., MajumdarS., Ghosh S., 2017. Industrial waste derived biosorbent for toxic metal remediation:Mechanism studies and spent biosorbent management, *Chemical Engineering Journal*, 308: 1048–1064.

Applicability of *Rosa damascena* Pomace for adsorptive removal of Lead(II) Ion from waste water

Elham Sadat Moosavi[1*], Kimia Salimi[1]

[1]Imam Khomeini International University, Buein Zahra Higher Education Center of Engineering and Technology, Chemical and Materials Engineering Department

[*]Corresponding author Email address:

e.moosavi@bzte.ac.ir

Introduction

There are different types of pollutions within the wastewater, amongst them contaminations and pollutants stemming from some heavy metals, e.g. Pb, Cd, Cu, Zn, etc., components are the ones that are mostly hazardous and harmful needing to be seriously managed. Hence, removal of these non-biodegradable, non-thermodegradable pollutions from wastewater is a major concern to be addressed that has different environmental and health-related benefits. As lead metal is highly dangerous for human health and the environment, it is very important to remove it from the sewage and prevent it from entering the environment by means of a cheap and appropriate way. Biosorption is a process for removal of these heavy metal contaminants, which uses a kind of bio-adsorbent material mostly originating from agricultural leftovers, e.g. *rosa damascena* pomace. That has proved to be an appropriate and environmentally friendly method for this purpose.

In this study, *Rosa damascena* pomace biomass (rose water residue) was taken as a bio-sorbent material in a biosorption process that allowed for the removal of lead metal from aqueous solution.

Methods

Rosa damascena pomace biomass (rose water residue) was washed with distilled water to remove particulate material while oven dried at 100 ◦C for 24 h, then dried biomass was ground. Batch biosorption studies of lead(II)'s aqueous solution with dried rose pomace biomass were performed, in order to investigate the influence of different parameters like pH(2, 5 and 9), adsorbent dose(0.05, 0.1 and 0.3 gr) and contact time(0.5, 2 and 3 hrs.). In all adsorption experiments fixed volume (50 mL) of lead(II) was mixed with bio-sorbent at pre specified conditions.

Results

The obtained results showed that for lead ions the optimums of the pH, contact time, and adsorbent dose were 9, 3 hrs. and 0.1gr respectively.

At pH below 4, the concentration of positive H ions in the solution is high, so the adsorbent surface has a positive charge. Competition between positive H ions and metal ions in adsorption on the adsorbent surface and on the other hand the repulsion of metal ions and positively charged adsorbent particles on the other hand, reduces the adsorption capacity of adsorbent.

Discussion

Biosorption has introduced as an efficient process that has shown great potential to be used for the removal of heavy metals from wastewater. Taking this method, we also used the rose pomace biomass that has proved to be a low-cost, easily accessible biosorbent according to our results.

Keywords

Biosorption, Lead, Wastewater, *Rosa damascena* Pomace

References

1-Iftikhar A.R., Bhatti H. N., Hanif M. A., Nadeem R., 2009. Kinetic and thermodynamic aspects of Cu(II) and Cr(III) removal from aqueous, solutions using rose waste biomass, *Journal of Hazardous Materials*, 161: 941–947.

2- Nasir M. H., Nadeem R., Akhtar K., Hanif M. A., Khalid A. M. 2007. Efficacy of modified distillation sludge of rose (*Rosa centifolia*) petals for lead(II) and zinc(II) removal from aqueous solutions, *Journal of Hazardous Materials,* 147: 1006–1014.

3- Nguyen T.A.H., Ngo H.H., Guo W.S., Zhang J., Liang S., Yue Q.Y., Li Q., Nguyen T.V. 2013. Applicability of agricultural waste and by-products for adsorptive removal of heavy metals from wastewater, *Bioresource Technology,* 148: 574–585.

4-Ramrakhiani L., Halder A., Majumder A., Mandal A. K., Majumdar S., Ghosh S., 2017. Industrial waste derived biosorbent for toxic metal remediation: Mechanism studies and spent biosorbent management, *Chemical Engineering Journal*, 308: 1048–1064.

Determining the peak flowering of *Rosa damascena* Mill. in Torbat Heydariyeh

Mahboobeh Naseri*

Assistant Professor, Department of Plant Production, University of Torbat Heydariyeh

M.naseri@torbath.ac.ir

Introduction

Rosa damascena Mill is a shrub of Rosaceae. Iran has also been mentioned as the origin of this plant. Different parts of *Rosa damascena* Mill., especially its flowers, have value and application in pharmaceutical, food, health, cosmetic and aromatic (essential oil) industries. *Rosa damascena* Mill essential oil is used in perfume therapy and perfume and cosmetics industries. *Rosa damascena* cultivation has been developed due to adaptation to climate conditions, low cost, significant profitability, beauty of the countryside and rural landscape. Iran is also mentioned as the origin of this plant. The cultivation area of *Rosa damascena* in Iran is about 24,000 hectares (18,000 hectares irrigated and 6,000 hectares rainfed).The most important weaknesses in the development of this crop are the short harvest season, the shortage of workers at the time of flower harvest, and the lack of initial planning to provide workers for flower harvest during the harvest seasons. In this regard, this study was conducted to evaluate the amount of *Rosa damascena* flower harvest in different days and years of harvest. So it can be reduced waste and costs with proper management of manpower and there was an increase in yield.

Methods

This study was conducted to evaluate the yield of *Rosa damascena* flower in different years

after planting and different harvest days on a farm located in Torbat-Heydariyeh city during 2017, 2018, 2019 and 2020.Data analysis was performed with Sigma Plot software.The figures were also drawn with Excel and Sigma Plot softwares.

Results

The yield of *Rosa damascena* flowers in the first, second and third years after planting was 0, 66, 2248 and 3413 kg per hectare, respectively. The yield of each shurb in the second, third and fourth years was 33, 1146 and 3482 grams on average, respectively. In the present study, the passion for flowering (peak flowering) was 9 in the second year, 12 in the third year and 8 days after the beginning of flowering in the fourth year. According to the results of this study, the economic performance of *Rosa damascena* started from the third year and lasted between 20 to 25 days after the beginning of flowering. Considering that the average yield of irrigated flower gardens in the country is 2249 kg per hectare and the yield in the fourth year of garden in TorbatHeydariyehis 3413 kg per hectare (Statistics of the Ministry of Jihad Agriculture, 1397).

Discussion

It can be concluded that the yield of *Rosa damascene* in Torbat Heydariyehis one of the high performance in the country. Considering that this plant is perennial, its planting is very important in addition to the economic aspects of flower production from the aspects of soil and water protection, which was recently included in the order. Also, this plant has a special place due to its currency and export value as a strategic plant in the support and employment of rural youth with the development of small industries.

Keywords

Dried flower bud, Flower yield,Harvesttime,Peak flowering.

References

1-Akhtar, G., Akram, A., Sajjad, Y., Farooq, A., Balal, R.M., Younis, A. and Lim, K.B. 2016. Improving Flower Yield of Two Essential Oil-Bearing Rosa Species through Pruning Severity. *Pakistan Journal of Nutrition*, 15(4): 328.

2-Agricultural Statistics. 1397. Ministry of Jihad Agriculture, Volume II: Horticultural Products.

3-Majd, M., Khoshhal, J., Rahimi, D., Rahimi, D., Khoshhal, J. 2014. Analayzing the phonological growth stages and required temperature rate of GoleMohammadi. *Geography and Environmental Planning*, 24(4): 169-178.

4-TabaeiAghdaei, S. R. 2004. Evaluation performance and morphological traits in a number of plants Damask rose genotypes. *Iranian Journal of Medicinal and Aromatic Plants*, 20(1): 111-122.

Comparison of essential oil content and acidity of rose water from different regions of Qamsar and Barzok, Iran

Maryam Akhbari*[1], Nahid Mirzaei[2], Elahe Rahimzade[1]

[1]Essential Oil Research Institute, University of Kashan, Iran,
[2]Department of Agriculture Engineering, Azad University of Mahallat, Iran

Email: m_akhbari@kashanu.ac.ir

Introduction

The *Rosa damascene* Mill is regarded as the most important rose species (king of flowers) which belongs to the Rosaceae family. Iranian people called this plant, the flower of prophet "Mohammad". Damask rose is commonly used for commercial purposes to produce rose oil and rose water. It is not valuable just for having aromatic properties but also having great biological properties such as antiviral, antibacterial, antioxidant and anti-inflammatory activities. The hydrosol of this plant has been used in religious ceremonies like washing the HOUSE GOD in Mecca. Rose water which is known as *Golab* is a colorless liquid that has calming and relaxing effects as well as flavoring properties in food industry.

Methods

Rose water was extracted by hydro-distillation method from *Rosa damascena*, harvested in Qamsar regions (Kamoo and Qamsar) and Barzok regions (Azeran, Barzok, SedeBarzok and Sede), Isfahan province, Iran in July 2018.

250 ml of each sample was subjected to extract essential oil via the method, reported in number standard1487 text of national standards of Iran. Briefly, the rose water sample was extracted using 33 ml n-pentane, by a

separator funnel apparatus. The yellow colored oil remained after evaporation of solvent was weighted using by an analytical balance.

To evaluate acidity of the samples, based on the methods from number 5759 standard text of national standards of Iran; pH evaluation and measurement of acidic number was considered.

To evaluate acidic number, 50ml of rose water was titrated by sodium hydroxide aqueous solution (0.01N). pH values was measured by digital pH meter.

Results

According to the results obtained, the pH of rose water batch in Barzok and Qamsar were 6.175 and 6.35 respectively. The average yield of essential oil from rose water was 24.076 in Qamsar and 23.684 in Barzok. However, there were a significant difference between Qamsar regions (Qamsar: 33.422, Kamoo: 14.730). Acidity index among all locations were within normal range, which was 4.32 and 3.72 (mg acetic acid/100ml) for Barzok and Qamsar respectively.

Discussion

The analysis show that there is no significant difference between essential oil content derived from rose water between four regions of Barzok and two regions of Qamsar. However, there is an obvious difference between samples from different regions of Qamsar (Kamoo: 14.730, Qamsar: 33.422). Samples from Qamsar, also showed the higher amount of essential oil. pH values were almost similar in Qamsar and Barzok. However, there is a slight disparity in acidic number for two mentioned areas. Finally, pH in Barzok and Qamsar was higher than normal range, defined at the standard text. However, Acidity number for both regions was normal.

Keywords

Rose water, *Rosa damascena*, essential oil, acidity, pH

References

1- Akram M. *et al.*, 2020. Chemical constituents, experimental and clinical pharmacology of *Rosa damascena*: a literature review," *J. Pharm. Pharmacol.*, 72(2): 161–174.

2- Mahboubi M., 2016.*Rosa damascena* as holy ancient herb with novel applications, *J. Tradit. Complement. Med.*, 6 (1): 10–16.

3- Agarwal S. G., Gupta A., Kapahi B. K., Thappa B. R. K., and Suri O. P. 2005. Chemical composition of rose water volatiles," *J. Essent. Oil Res.*, 17 (3): 265–267.

4- Moein M., Zarshenas M. M., and Delnavaz S., 2014. Chemical composition analysis of rose water samples from Iran, *Pharm. Biol.*, 52 (10): 1358–1361.

Investigation of qualitative aspects of rose water from *Rosa damascena,* cultivated in Natanz and Bidgol gardens, Kashan, Iran

Maryam Akhbari[1], Nahid Mirzaei[2], Elahe Rahimzade[1]

[1]Essential Oil Research Institute, University of Kashan, Iran,

[2]Department of Agriculture Engineering, Azad University of Mahallat, Iran

Corresponding email address: m_akhbari@kashanu.ac.ir

Introduction

Rosacea is a family of more than 5000 species. Among them the genus *Rosa* encompasses about 200 species and more than 18000 cultivators.Damask rose Damask rose with the scientific name of *Rosa damascena* is an important ornamental and medicinal plant of Rosaceae family known as “GoleMohammadi” in Iran, which is also widely cultivated in Turkey, Bulgaria,India, Egypt, France, China and Morocco. Rose water (a hydrosol of *R. damascena*) is a natural product of *Rosa damascene* that has been used traditionally as a flavor and aromatic drink, named *Golab* in Iran.In this study, some quality aspects of *Golab* from AranvaBidgol and Natanz regions from Isfahan province is investigated.

Methods

In this study, the flower of *Rosa damascene* were collected from Aran va Bidgol and Natanz regions in flowering period. The Rose water was extracted by hydro-distillation from *Rosa damascena*, cultivated in two regions of Natanz and one region of Ararn va Bidgol, Isfahan province, Iran in July 2018. Separator funnel apparatus was used for the extraction of oil, using 250ml rose water in addition to 33ml n-pentane via the method, reported in 1487 text of national standard of Iran. The yellow colored essential oil was obtained after evaporation of solvent

using an analytical balance. pH of *Golab* was measured by digital pH meter. Moreover, Acidity index was calculated based on the method from 5759 standard text of national standard of Iran, by titration of 50ml of rose water with sodium hydroxide aqueous solution (0.01N).

Results

Significant differences were observed between the essential oil content from Aran va Bidgol region (15.37) in comparison with Natanz regions, including Chime (35.408) and Bidhand(31.785).pH number was slightly different, which was 5.4 for Natanz area and 6.1 for Aran va Bidgol.Samples from Natanz and Aran va Bidgol regions had an obvious differences in acidic index (Natanz: 2.28 and Aran va Bidgol: 3.96).

Discussion

According to the results, there were obvious differences in the amount of essential oil between Aran va Bidgol and Natanz regions. pH of sample from Aran va Bidgol was above normal range for Rose water based on national standard of Iran. Acidity of samples in Ararn va Bidgol region, however, was slightly more than Natanz regions (Chime, Bidhand).Acidic number of samples from Natanz were a little lower than standard defined number for rose water. Moreover, pH of sample from AranvaBidgol was above normal range for rose water based on national standard of Iran.

Keywords

Rosa damascena, pH, Rosaceae, Rose water, essential oil

References

1- Moein M., Zarshenas M. M., and Delnavaz S., 2014. Chemical composition analysis of rose water

samples from Iran," *Pharm. Biol.*, 52 (10): 1358–1361.

2- Verma R. S., Padalia R. C., Chauhan A., Singh A., and Yadav A. K., 2011.Volatile constituents of essential oil and rose water of damask rose (*Rosa damascena* Mill.) cultivars from north indian hills, *Nat. Prod. Res.*, 25 (17): 1577–1584.

3- Mahboubi M. 2016., Rosa damascena as holy ancient herb with novel applications," *J. Tradit. Complement. Med.*, 6 (1): 10–16.

A novel *Rosa damascena* skin mask formulation

Elham Rashidi

Essential Oil Research Institute, University of Kashan, Iran

Introduction

In Iranian medicine, great importance has been given to the significant effects of medicinal plants on improving skin damage. *Rosa damascena* is commonly known as Gole-Mohammadi in Iran is the most popular of the Rosaceae family. Some of its ingredients are reported to function as skin conditioning agents such as skin regenerating and anti-aging effects. The aim of this study is to report the effect of a new formulation for Rose water based mask to improve some skin disorders.

Methods

In the study, a skin care mask based on rose water was formulated. Rose water was obtained by hydro-distillation of *R. damascena* petals. About 20 to 30% of rose water, less than 50% of *Aloevera* and a certain amount of herbal gum such as tragacanth was mixed together. The formulation was adjusted to obtain a gel with the appropriate viscosity. After that, less than 5% levigated pearl powder was added to the gel base in a certain ratio. Also, trace amount of a type of B vitamin with a certain percentage was used in the mask formulation. Finally, the gel form of the mask was stabilized.

Results

In this study an attempt was made to formulate a skin care mask using rose water. The mask was tested on the skin of 10 people with dry skin and 10 people with oily skin. They were asked to

hold the mask on their skin for 20 minutes each timeper day. This test was performed on their skin twice a week for a month. According to the results of this study on people with different skin type it was indicated that the formulation mask makes freshness and lifts their skin.

Discussion

It appears to on the use of *R. damascena* products as rose water in cosmetics formulation can have satisfactory results on the skin and boost the cosmetics industry.

Keywords

Rosa damascena, Formulation, Essential oil, Skin, Cosmetics.

References

1- Baydar, N. G., & Baydar, H. 2013. Phenolic compounds, antiradical activity and antioxidant capacity of oil-bearing rose (*Rosa damascena* Mill.) extracts. *Industrial Crops and Products*, 41: 375-380

2- Georgiev, V., Slavov, A., Vasileva, I., & Pavlov, A. 2018. Plant cell culture as emerging technology for production of active cosmetic ingredients. *Engineering in Life Sciences*, 18(11): 779-798.

New perfume formulation based on *Rosa damascena* Oil

Elahe Rahimzade[1]*, Fateme Ghiasy[1], Hooriyeh Sabahi[2]

[1]Essential Oil Research Institute, University of Kashan, Iran

[2]*Department of Chemistry, faculty of chemistry, University of Kashan, Kashan, Iran*

*Corresponding E-mail: Eliiirahimzade@gmail.com

Introduction

Within Rosaceae family, *Rosa damascene* Mill (commonly known as damak rose) is an ornamental plant with more than 200 species. The Oil of Damask rose has been regarded as one of the most expensive base material in flavor and fragrances industry, such as perfumery. Monoterpene alcoholics group(geraniol, nerol, citronellol, linalool and phenyl ethyl alcohol) contribute mainly to the perfumery of rose oil, however, some minor components such as damascanone and rose oxide has had the main aroma impression (90% of total aroma) in the essential oil derived from *Rosa damascena*. This research aims to introduce new formulation of perfume based on rose oil.

Methods

In this study, new formula of perfume obtained based on some criteria such as longevity, stability, diffusion and toxicity of new perfume. Ethyl alcohol and water was used as the solvent of perfume, which constitute more than 70% of total product. Synthetic aromatic chemicals and natural essential oils comprise less than 20% of *Edu perfume*, furthermore fixatives and stabilizer were added in negligible amount. Some safe chemical substances like EDTA (2,2',2",2"'-(Ethane-1,2-diyldinitrilo) tetra acetic acid) and PEG (Poly Ethylene Glycol) were added to give stability and longevity to final product (less than 1%).

Results

Many experiments have been done to reduce evaporation, increase perceived odor strength, and improve stability in the perfume**.** Rose oil was the main aroma after 6 hours, which was the middle note of perfume; neroli and lemon verbena was the top and base note of perfume respectively. Moreover, Perfume was almost stable for 48 hours in dark place.

Discussion

Perfume longevity and diffusion was tested on 10 people by asking about the performance of the product. According to the results, the product has not had any side effects on cloths and skin of the people, moreover, perfume was remained more than one day on the cloths and more than 6 hours on the skin.

Keywords

Rosa damascena, rose oil, perfume, perfumery, longevity, fixative, stability

References

1-Moein, M., Etemadfard, H., & Zarshenas, M. M. 2016. Investigation of different Damask rose (*Rosa damascena* Mill.) oil samples from traditional markets in Fars (Iran); focusing on the extraction method. *Trends in Pharmaceutical Sciences*, 2(1): 51-58.

2-Mirzaei, M., Sefidkon, F., Ahmadi, N., Shojaeiyan, A., &Hosseini, H., 2016. Damask rose (*Rosa damascena* Mill.) essential oil is affected by short-and long-term handling. *Industrial Crops and Products*, 79:219-224.

A novel *Rosa damascena* skin toner formulation

Elham Rashidi

Essential Oils Research Institute, University of Kashan, Iran

Introduction

Rosa damascena is the most populated species of the Rosaceae family in the world. It has been used in food, cosmetics, and the pharmaceutical industry. Rose essential oil and hydrosol which is famous as rose water, are two products which are produced by distillation from rose petals. Theiringredients are effective to eliminate skin inflammation. The purpose of this port is to introduce the rose water and rose essential oil based toners and their effects on skin dryness.

Methods

In this study, the anti-drought activity of *R. damascene* essential oil and rose water based toners were evaluated.Accordingly the toner based on water was formulated. In the formulation of this toner *R. damascena* petals, Rose water and essential oil were used. Rose water was used as the main component of the toner with about 70% in the formulation along with10 to 20% *Equisetum arvense*hydro glycolic extract and *Salixa egyptiaca* water. Also water-soluble vitamins and less than 5 % glycerin were added to the mentioned mixture. At the end, 2 to 5 drops of *R. damascena* essential oil were added in order to make it more fragrant and more effective on skin.

Results

The formulated toner was tested on 15 people with dry skin for 2 weeks. During this

experiment, people were asked to spray the toner on their face 2 to 3 times a day. After 2 weeks, it was observed that the dry skin of the subjects was about 70% cured. According to this study on people with dry skin it was found that as it is reported already in the literature, different formulation of toners, based on *R. damascena* ingredients could have anti-drought effect and hydrate the skin.

Discussion

It appears to on the use of *R. damascena* products as rose water in cosmetics formulation can have satisfactory results on the skin and boost the cosmetics industry.

Keywords

Rosa damascena, Formulation, Essential oil, Skin, Cosmetics,

References

1- Baydar, N. G., & Baydar, H., 2013. Phenolic compounds, antiradical activity and antioxidant capacity of oil-bearing rose (*Rosa damascena* Mill.) extracts. *Industrial Crops and Products*, 41: 375-380

2- Georgiev, V., Slavov, A., Vasileva, I., & Pavlov, A., 2018. Plant cell culture as emerging technology for production of active cosmetic ingredients. *Engineering in Life Sciences*, 18(11): 779-798.

Isolation and identification of Eugenol Glycoside from *Rosa damascena* cultivated in Alborz province

Fereshteh Heydari, Mona Ghiaci Yekta, Matin Mahinzare, Mehrdad Kashefi, Seyed Vahid Ghasemi, Saeed Tavakoli and Reza Ghafarzadegan*

Institute of Medicinal Plants, ACECR, 55th Kilometer of Tehran-Qazvin Freeway, Karaj,

E-mail: Reza.ghafary@yahoo.com

Introduction

Rose flower is a familiar and beloved name of Iranians that is currently cultivated in different regions of Iran such as Kashan, Ghamsar and regions of Fars, Azerbaijan and Qazvin provinces.

Botany: Gol-mohammadi is one of the species of red flower (rose) and in terms of appearance; it is a small and thorny tree with a height of 1 to 2 meters that has many branches and small razor-shaped blades. Its leaves have 5 to 7 toothed leaflets and its flowers are pale pink and very fragrant.

Pharmacological research results

Aqueous extract of rose flower reduces kidneys due to gentamicin. Extracts prepared from the leaves of this plant can also have an antioxidant effect like its flowers. The results of a recent studies show that the antioxidant activity of the methanolic extract of the leaves of this plant is even higher than synthetic antioxidants. Aqueous extract and alcoholic extract of rose flowers increase the induction of sleep and sleep duration due to pentobarbital in mice. This hypnotic effect can be measured by the effect of diazepam. Chromatography on alcoholic extracts showed combinations of phosphoglycoside compounds may play a role in the hypnotic effect of rose

flowers.

In a comprehensive study, 51 different extracts of 14 medicinal plants were prepared and their antimicrobial properties were investigated. Of these extracts, the most antimicrobial properties were related to rose flower butanolic extract. This extract significantly inhibited the pathogens of typhimurium, cereus, B and Candida.

Rose flower essential oil has inhibitory properties on small intestinal contraction. This effect may be caused by the geraniol and citronellol present in this plant.

Although rose petals are one of the first sources in which aromatic glycoside precursors have been identified, the process of producing the main constituents of rose essential oil remains unclear. Recently, glycoside bond forms of C13-norisoprenoids have been isolated from roses as monoterpenoids and have been introduced as the key producer of aromatic compounds in rose essential oil. Also, polyhydroxy latedterpenoids, also called polyols, which they are an other effective group of aroma precursors in roses that lead to compounds such as rose oxides and nerol oxides are introduced, which are the mselves the main cause of flower essential oil odor.
In the present article, Isolation and identification of Eugenol Glycoside from *Rosa damascena as* the rose perfume precursors was investigated

Methods

Rose flowers (*Rosa damascena* Mill. 2 kg) were harvested at full bloom stage in Institute of medicinal plants, karaj, Alborz, Iran.
Purification and separation of AROMA precursors:
2 kg of rose flowers were mixed with 80% aqueous methanol. After concentrating the methanolic extract and removing methanol from the resulting solution, lyophilized methanolic extract was used as an aqueous solution for reverse column chromatography. The column was

first washed with water then with methanol to form a combination of essential oil precursors. The different fractions were separated, isolated and identified by changing the polarity of the solvent and by liquid chromatography using the ODS column and gradient elution with different ratios of acetonitrile, methanol and Water. Detector wavelength was 205 nm. Eugenol was detected in several sections and used for further purification.

The isolated compounds were dissolved in methanol and analyzed by NMR and 2D NMR.

Results

The results are reported based on the Instrumental Analysis by NMR respectively.

Based on the results, one of the Eugenol disaccharides was isolated from rose methanolic extract using reverse column chromatography. Its structure was identified by two-dimensional NMR techniques called Eugenyla-L-arabinopyranosyl-(1+6)-~D-glucopyranosid.

Discussion

In our study of rose perfume precursors, glycoconjugation was identified and an explanation of the structure of this conjugated eugenol disaccharide from aromatic compounds was reported in the present article.

Keywords

Rose water, Methanol, NMR and Eugenol Glycoside

References

1-Khaliq T., Mumtaz F., Rahman Z.U., Javed I., Iftikhar A. 2015. Nephroprotective potential of *Rosa damascena*Mill flowers, Cichoriumintybuslinn roots and their mixtures on gentamicin-induced toxicity in albino rabbits. *Pak Vet J.* 35(1): 43-7.

2-Baydar NG.,Baydar H. 2013. Phenolic compounds, antiradical activity and antioxidant

capacity of oilbearing rose (*Rosa damascena* Mill.) extracts.*Ind Crops Prod*. 41: 375-80.

3-Hongratanaworakit T. 2009. Relaxing effect of rose oil on humans. *Nat Prod Commun*. 4(2): 291-6.

4-Talib WH., Mahasneh AM. 2010. Antimicrobial, cytotoxicity and phytochemical screening of Jordanian plants used in traditional medicine. *Molecules*, 15(3): 1811-24.

5-Sadraei H., Asghari G., Emami S. 2013. Inhibitory effect of *Rosa damascena* Mill flower essential oil, geraniol and citronellol on rat ileum contraction. *Res Pharm Sci*. 8(1): 17-21.

Determination and quantitative comparison of methanol and ethanol in three famous brands of Rose water in Iran, analyzed using gas chromatography with flame ionization detector (GC-FID)

Mehrdad Kashefi, Seyed Vahid Ghasemi, , Zahra Tarassoli, Meraj Najafi, Mir Mohammad Amin Ghasemi, Saeed Tavakoli*

Institute of Medicinal Plants, ACECR, 55th Kilometer of Tehran-Qazvin Freeway, Karaj,

E-mail: Saeedtavakoli18@gmail.com

Introduction

In recent years, the occurrence of nervous blindness caused by drinking some types of herbal distillate water, especially rose water, has caused serious concerns. One of the factors leading to this accident is the unwanted drinking of methanol through these herbal distillate waters. Unlike alcoholic beverages, methanol production in herbal distillate waters results from the plant's metabolic processes during growth and even after harvest until the sweat is prepared. Therefore, growth in plants is the main source of methanol production in nature and its release into the atmosphere.

The presence of methanol and ethanol in plant products is natural, so that according to American standards, the presence of an average of 140 micrograms per milliliter of methanol in fresh canned fruit juices (such as orange juice and grapefruit juice) is allowed.

Methods

Methanol and ethanol measurements are also performed by methods based on kits based on

chromotropic acid method and spectrophotometric method, which is the method of using gas chromatography flame ionization detector (FID) in this study has higher accuracy and precision.In this research, it has been tried using gas chromatography to measuring amount of methanol and ethanol in the three brands of rose water in the market, which will be reported with codes 1, 2 and 3.

Results

The results are reported based on the standard chart of methanol and ethanol, based on the amount of methanol and ethanol in each brand, respectively.

Code 1: Methanol 40.11 ± 0.11ppm, Ethanol 510.64 ± 20.83ppm

Code 2: Methanol 120.37 ± 9.08ppm, Ethanol 742.89 ± 47.52ppm

Code 3: Methanol 337.18 ± 4.96ppm, ethanol 2532.02 ± 54.50ppm

Discussion

Based on the results, two brands with codes 1 and 2 are within the allowable level in terms of methanol content, but the brand with code 3 is out of range of methanol levels.

Keywords

Rose water, Methanol, Ethanol, Chromatography gas flame ionization detector (GC-FID)

References

1-Solhi H., Delavar M., CheshmeJahanbinA., Abdollahi M. 2009. Comparison of methanol concentration in herbal essences produced in Arak city with industrial produced herbal essences with different commercial brands. *Arak Med U J.* 12: 85-91.

2-Rafizadeh A., Shariati SH., Pourmohammad L., Fooladmehr S. 2010. Application a colorimetric method for qualitative analysis of methanol. *Scin J Forensic Med*., 16: 94-89.

3-Rafizadeh A., Nasiri Fard R., Nasoori Gazni M.,Haghshnace M., Jmali. Biverzani F., Pourmohammad L. 2013. The effectiveness of whole Concentration ofhomemade herbal distillates on the result of qualitative methanol detection by the chromotropic acid method. *Journal of Ornamental and Horticultural Plants,*3: 105-109.

Lectures' Summaries

The Plenary Lecture:

ICRD: Step Towards Appreciating the Mother Nature

Prof. Dr. Ebrahim Naderali

Faculty of Science, Liverpool Hope University, Liverpool, UK

It is a sad reality that the environment faces significant challenges in terms of global warming. Changes in the Earth system affecting, the land, oceans, atmosphere, polar regions & life, planet's natural cycles and deep Earth processes, ultimately affecting the life as we know it. This in turn, negatively impact the biodiversity, further risking creation of an environment not suitable for living. Greenhouse gases such as CO2, methane, and nitrogen oxide together with water pollutants are seriously endangering nature, and all the living creatures on earth. Greenhouse gas emissions have profoundly increased within the last 50 years by >500%c- a serious cause for concern. Sustainable tree plantation could significantly reverse greenhouse effects. Since 2018, ICRD conference became a platform for knowledge exchange on projects throughout Iran, to plant sustainable *Rosa damascena*. This has remarkably reinvigorated several barren mountainous sites in Ghamsar creating hope for a cleaner environmental as well as giving a helping hand to Mother nature to protect the living creatures.

Keywords

Environment, Global warming, Greenhouse gases, *Rosa damascena*

References

[1]Rao, K. P. C., Verchot, L. V., & Laarman, J. (2007). Adaptation to climate change through

sustainable management and development of agroforestry systems. *Journal of SAT agricultural research*, *4*(1), 1-30.

[2] Zomer, R. J., Trabucco, A., Bossio, D. A., & Verchot, L. V. (2008). Climate change mitigation: A spatial analysis of global land suitability for clean development mechanism afforestation and reforestation. *Agriculture, ecosystems & environment*, *126*(1-2), 67-80.

The Keynote Lecture:

Advances in genetics and genomics of rose and their use inbreeding

Prof. Dr. M.J.M. (René) Smulders

Wageningen University & Research, Wageningen, The Netherlands

rene.smulders@wur.nl

In the last decade, high-quality genome sequencesof rose species have been generated, and other genomic tools have also become available, including transcriptomics data, a high-density SNP array, and software to perform linkage and QTL mapping and association analysis in diploid and tetraploid roses.We can use these tools to investigate the diversity in cultivated and wild roses to answer fundamental scientific questions. We should also consider how this diversity can best be exploited through breeding. Important traits include the induction of flowering, the number of petals, disease resistances, and biochemical composition. Once genes or QTLs have been identified, we can estimate the effect of favorable SNP marker haplotype(s) (plus-alleles). In several cases we see a dosage effect, where the phenotype depends not only on the presence of a plus-allele, but also on the number of alleles in tetraploid rose. In rose breeding, the challenge is how to use these tools and technologies in a cost-effective way. Points to be addressed include: (1) which step of the breeding process may benefit most from marker information, (2) what is the value of the identified plus-alleles for the trait, (3) where in the breeding germplasm do these plus-alleles occur, and (4) how can plants carrying these plus-alleles be selected efficiently.

Keywords

Rose species, Genetics, Genomics, Breeding process, Tetraploid rose

References

1-Folta, Kevin M., Susan E. Gardiner, eds. 2009. *Genetics and genomics of Rosacea*. Vol. 6. New York: Springer.

2-Bendahmane, M., Annick D., Olivier R., Manuel Le B. 2013. Genetics and genomics of flower initiation and development in roses. *Journal of experimental botany* 64 (4): 847-85

The Keynote Lecture:

EPI-CATCH Cost Action: an example of international project for the study of molecular responses to environmental stresses in *Rosa damascena* Mill.

Dr. Federico Martinelli

Department of Biology, University of Firenze, Italy

federico.martinelli@unifi.it

Although epigenetic modifications have been intensely investigated over the last decade due to their role in crop adaptation to rapid climate change, it is unclear which epigenetic changes are heritable and therefore transmitted to their progeny. The modulation of plant epigenetic responses to environmental stresses linked to climate change is a hot research topic. The identification of epigenetic marks that are transmitted to the next generations is of primary importance for their use in breeding and for the development of new cultivars with a broad-spectrum of tolerance/resistance to abiotic and biotic stresses. However, research initiatives dealing with these aspects are still rare for crops such as *Rosa damascena* Mill. This plant species is well-known for the antimicrobial, anti-inflammatory, antioxidant, anticancer and protective activities against neuronal, cardiac, gastrointestinal and hepatic diseases. The development of future research projects on genomic and epigenomic characterization of this crop in relation to environmental stresses will be of high benefit for the development of future genetic improvement programs. In this oral presentation, aims, objectives, structure of EPI-CATCH, an international COST action funded in 2020 will be presented. The aims of this international consortium are: (1) to define standardized pipelines and methods used in the study of epigenetic mechanisms in plants, (2) update, share, and exchange findings in epigenetic

responses to environmental stresses in plants, (3) develop new concepts and frontiers in plant epigenetics and epigenomics, (4) enhance dissemination, communication, and transfer of knowledge in plant epigenetics and epigenomics.

Keywords

Rosa, Global warming, Epigenetic, Drought

References

1-Houneida, A., Al-Yasi, H., Alamer, K., Esmat, F., Hassan F., ElshazlyS., Hessini, K., 2020. Induced anti-oxidation efficiency and others by salt stress in *Rosa damascena* Miller. *ScientiaHorticulturae* 274: 109681.

2-Adamipour, N., Khosh-Khui, M., Salehi H., Razi H., Karami A., Moghadam. A. 2020. Role of genes and metabolites involved in polyamines synthesis pathways and nitric oxide synthase in stomatal closure on *Rosa damascena* Mill. under drought stress. *Plant Physiology and Biochemistry* 148: 53-61.

3- Hassan, F. A. S., Ali, E. F., Alamer.K. H. 2018. Exogenous application of polyamines alleviates water stress-induced oxidative stress of *Rosa damascena* Miller var. trigintipetalaDieck. *South African Journal of Botany* 116: 96-102.

The Keynote Lecture:

The role of medicinal plants in healthcare

Prof. Dr. Ebrahim Naderali

Faculty of Science, Liverpool Hope University, Liverpool, UK

Historically, herbs have been used either to maintain health or to cure ailments/diseases ranging from masking bad breath (mint as a mouthwash) to hypnotics (rosa damascena). It is vitally important to bear in mind that medicinal herbs unlike chemically synthesized laboratory-based medicines often have been used for more than one and sometime several indications. For example, mint is used to improves irritable bowel syndrome (IBS), helps to relieve indigestion, improve brain function (prevent or improve AD), help decreasing breastfeeding pain, and improves cold symptoms amongst many other potential uses. Most importantly, herbs constitute roots of many modern laboratory-based medicines. Therefore, knowledge of herbal medicine could potentially assist discovery of newer medicines for human and animal health. The World Health Organization (WHO) reports that approximately 80% of population in some Asian and African countries use herbal medicine for some aspect of primary health care. The reasons for such an extensive use of herbal medicine in those countries are multi factorial but lower cost, easy access, lack of trust in laboratory-based medicine, and following ancestral tradition are significant factors.

It is crucially important to note that herbs often constitute 100's of chemicals, each having different effect. The composite effect for any given herbal medicine indicates their benefit or detrimental consequences. Thus, there is an enormous risk of herbal medicines being used in

indications that are not suitable. Therefore, to protect patients and health care services, appropriate regulations are required to ensure their safe use and well-being of the end users.

Keywords

Herbal medicine, Rosa damascena, Medicinal plants, Healthcare

References

[1] Srivastava, J., Lambert, J., & Vietmeyer, N. (1996). *Medicinal plants: An expanding role in development* (Vol. 320). World Bank Publications.

[2] Maikhuri, R. K., Nautiyal, S., Rao, K. S., & Saxena, K. G. (1998). Role of medicinal plants in the traditional health care system: a case study from Nanda Devi Biosphere Reserve. *Current Science*, 152-157.

Methyl eugenol in rose oil, effective factors, acceptance limit and its effect on international market of rose oil

Dr. Mohaddese Mahboubi

Research and Development Department of Tabib Daru Pharmaceutical Company, Kashan, Iran

Tel: +983155541000-71000; E-mail: Mahboubi1357@yahoo.com; m_Mahboubi@tabibdaru.com

Methyl eugenol is a natural compound found in herbs and spices, fruits, and a number of essential oils including the rose oil. Methyl eugenol is produced by the methylation of Eugenol. The annual production of methyl eugenol is high, which is used as flavoring agent, fragrance ingredient and as insect attractant in different industries. During the last three decades, Methyl eugenol was considered as the agent, which can cause cancer in rodents. In 2001, the Food European Commission released its opinion on the genotoxic and carcinogenic of methyl eugenol. Both IFRA and the SCCNFP have indicated that methyleugenol should not be added to cosmetic products, but the certain maximum concentrations are acceptable for essential oils containing methyleugenol. At present, any reduction in the methyleugenol content in cosmetic and especially in food products is a matter of substantial interest. Methyl eugenol is a problem only in the European countries. Rose oil is one of the essential oils containing methyl eugenol that its percentage can increase up to 5.0%, especially in the rose oils distilled from long-term fermented flowers (1).Late harvest of full-blown flowers (2), distilled with pure water (3), long distillation time (4), picking of rose flower buds during the entire rose flowering period (5), soil profiles (EC, sand, gypsum, clay, silt contents, pH) (6) can have effect on methyl eugenol content of rose oils. A low content of methyleugenol and a high content of geraniol guarantees safe application of *R. alba*, *R. gallica*, *R. centifolia*. The high values of paraffins make these oils undesirable for perfumery purposes. Therefore, production of rose oils with low content of methyl eugenol, make it suitable for International market, especially European market.

Keywords

Rose oil, Methyl eugenol, Geraniol, International market, European market.

References

1-Baydar H., Schulz H., Krüger H., Erbas S., Kineci S. 2008. Influences of Fermentation Time, Hydro-distillation Time and Fractions on Essential Oil Composition of Damask Rose (*Rosa damascena* Mill.). *Journal of Essential Oil Bearing Plants*.11(3):224-32.

2- Rusanov K., Kovacheva N., Rusanova M., Atanassov I. 2012. Reducing methyl eugenol content in *Rosa damascena* Mill rose oil by changing the traditional rose flower harvesting practices. *European Food Research and Technology*. 234:921-6.

3-Kara N., Erbb_ S., Baydar H. 2017. The Effect of Seawater Used for Hydrodistillation on Essential Oil Yield and Composition of Oil-Bearing Rose (*Rosa damascena* Mill.). *International Journal of Secondary Metabolite*. 4:423-8.

4-Baydar H., Schulz H., Krüger H., Erbaş S., Kineci S. 2013. Influences of Fermentation Time, Hydro-distillation Time and Fractions on Essential Oil Composition of Damask Rose (*Rosa damascena* Mill.). *Journal of Essential Oil Bearing Plants*. 11:224-32.

5-Rusanov K., Kovacheva N., Rusanova M., Atanassov I. 2012. Reducing methyl eugenol content in Rosa damascena Mill rose oil by changing the traditional rose flower harvesting practices. *European Food Research and Technology*. 234(5):921-6.

6-Ghavam M. 2021. Relationships of irrigation water and soil physical and chemical characteristics with yield, chemical composition and antimicrobial activity of Damask rose essential oil. *PLOS ONE*. 16(4):e0249363.

OMICS Approaches in Rosa: Putting the *Rosa damascene* Data at Work

Dr. Seyed Alireza Salami

University of Tehran
asalami@ut.ac.ir

Rose genetics and genomics researches and breeding programs have advanced during the last two decades. Alongside many new roles in supplying foods and medicine, advances in technologies including molecular markers, map-based cloning, tissue and cell culture, deep sequencing, and gene and genome editing has accelerated breeding programs in *Rosa*. This report focuses on the current status of knowledge based on OMIC Sciences related to *Rosa damascena*, a species which belongs to the Damask group of roses with high economic importance in Iran and several other countries. Damask rose is used not only as an ornamental plant but also for extracting essential oils, rose water, rose concrete and rose absolute for being applied in foodstuffs, perfumery and cosmetics, and pharmaceutical industry. Biotechnology provides a modern tool for food quantity and quality improvement. In this report, we aimed to highlight the OMICS approaches and tools towards putting *Rosa* data at work. Breeding of *R. damascena* and its relatives needs rich genomic background and a considerable genetic diversity. Collecting and screening the *R. damascene* populations adapted to different climate conditions is always a good start to select the superior genotypes towards breeding for resistant to powdery mildew, abiotic stresses particularly drought and salinity, higher essential oil yield and quality, and better chemical composition, etc. The ultimate phenotype ofDamask roseis consequent of a series of cellular and molecular processes at genomic, transcriptomic, post-transcriptomic, proteomic and metabolomics levels. Several molecular markers were used to study the genetic diversity, population structure and cloning the genes or QTLs in *Rosa*. In the recent years, huge amounts of genomics and transcriptomics data were generated using different

Next Generation Sequencing (NGS) platforms which have changed our insights of gene structure and function and their related biological pathways. Today, the need to create a dedicated database for *R. damascene* is more than ever. Such a database enables researchers and users to have access to comprehensive set of OMICS data which facilitate data integration and breeding programs using conventional tools or new approaches such as CRISPR-Cas9.

Keywords

Damask rose; Genomics; Transcriptomics; Metabolomics; Breeding; Database; CRISPR

References

1-Folta, Kevin M., Susan E. Gardiner, eds. 2009. *Genetics and genomics of Rosaceae*. Vol. 6. New York: Springer.

2-Bendahmane, M., Annick D., Olivier R., Manuel Le B.2013. Genetics and genomics of flower initiation and development in roses. *Journal of experimental botany* 64 (4): 847-857.

3-Debener, Th, M. Linde. 2009. Exploring complex ornamental genomes: the rose as a model plant.Critical reviews in plant sciences 28(4): 267-280.

Living soil, source of life.

Dr. Mohammad bagher Bahardar[1]

[1]Institute of Health, Rosa Research, Any University, California, USA,

Soil as the most important input for life on the surface of earth is not valued as it should. Soil is a limited resource.Collection of available information on the value of living soil, components of it, effective work of mycorrhizae fungi and mycorrhizae bacteria in living soil, is done.

Soil is holding 3 trillion trees that provide consistent oxygen for other creatures. It is the main provider of food for all living. Microorganisms in the soil provide food for the trees through symbiotic relationship.

Keywords

Living soil; Mycorrhizae bacteria. Mycorrhizae fungi, Symbiotic relationship.

References

1- Science, April 15, 2016 FAO data on cropland per capita Soil Health Care visualized description

Taste, Smell, Flavor and Fragrance

Dr. Abdolrasoul H. Ebrahimabadi,

Associate Professor, Essential Oils Research Institute, University of Kashan, Kashan, I.R. Iran

aebrahimabadi@kashanu.ac.ir

Senses are nerve pathways for collecting information from environment. Information are collected by sensory receptors located on the surfaces of sensory nerve cells. Sensory receptors are normally classified according to the type of their exiting stimuli: photoreceptors, thermos receptors, mechanoreceptors, pain receptors and chemoreceptors. Chemoreceptors sense chemical stimuli in the environment and include taste buds on the tongue (taste sense) and olfactory epithelium in the nose (smell sense). Gustation, the sense of taste, is evoked by receptors on the taste cells in barrel-shaped taste buds. Located on surface of the tongue, each taste bud consists of 50 to 100 specialized epithelial cells with long microvilli that extend through a pore in the taste bud to the external environment, where they are bathed in saliva. Four different categories of taste are traditionally recognized: salty, sour, sweet, and bitter. There is also a more recently discovered fifth category of taste, termed umami (a Japanese term for “savory” related to a meaty flavor), for the amino acid glutamate. Although scientists long believed that different regions of the tongue were specialized for different tastes, this is no longer believed to be true. All areas of the tongue are able to respond to all five categories of taste. This is true even for a single taste bud, which can contain taste cells sensitive to each category of taste. However, a particular taste cell is sensitive to only one category of taste and activates a sensory neuron that transmits information regarding that specific taste to the brain. Smell is another chemoreception which gives organisms information about changes in the

chemistry of their environment; therefore, it gives warning of dangers such asfire, bad food, and predators and also alerts to opportunities such asgood food, potential mates, and social organization. For most mammals, smell is more important than sight. They use about twice as many different types of smell receptors as human do. Only a few primates (humans, gorillas, orangutans, chimpanzees, and rhesus macaques) and diurnal birds rely more on sight than other senses. Despite this, smell is still important for humans and also forms the basis of fragrance industry. Molecule can only be detected by the olfactory receptors if they can reach and connect to them. Thus, molecules must be volatile enough to produce a sufficient concentration in the air entering the nose. This means that they must have molecular weights below 300 Da. This roughly consists of molecules containing fewer than 20 carbon atoms. Volatility is also depends on polarity. Odorous molecules generally have log P values in the range 2–7. Only about 15 % of molecules meet these circumstances and are odorous and 85 % of them are practically odorless. The gene family coding for the olfactory receptors is the largest in the genome and contains information for synthesis of over 1000 different G-protein coupled super family receptors (GPCRs). About half of about 800 known GPCRs in the body are located in the nose and belong to olfaction, thus, nose is the king of receptor containing organs. Olfaction is a combinatorial phenomenon. Each odorant molecule activates a range of olfactory receptor types, and each type of olfactory receptor responds to a variety of odorant molecules. According to European Flavor Association (EFFA) definition, flavorings are products used to impart or modify the odor and/or taste of foods(Regulation (EC) No 1333/200818). Fragrances are plant and/or animal extracted or synthetic volatile chemical compounds capable of binding to and exciting of olfactory receptors located in the nasal cavity. Successful perfume formulation needs knowledge, art, creativity, and of course, patience. Expert perfumers mix fragrance raw materials in hundreds and even thousands of compositions and proportions and carefully select the best of them as a fine fragrance for launching to the market.

Keywords

Taste, Smell gestation, Olfaction, Flavor, Fragrance, Perfume.

References

1- Dixit, S. 2006. "Specifications in the flavor & fragrance industry. *SH Kelkar& Company P. Ltd,* 5.

2- Frey, C. 2005. Natural flavors and fragrances: chemistry, analysis, and production. 2005

Rosa damascena Research and Profile of Iranian production

Prof. Dr. Mohammad bagher Rezaee

Research institute forest and rangelands

Medicinal and aromatic plants are offered in a wide variety of products on the world market. Iran, located in Middle East, played a key role in connecting various cultures and civilizations. Ethno-herbal and phyto- chemical dates back to a long time ago and a number of writings regarding this issue are left by great physicians e.g. Avicenna and Rhazes. Iranian botanists have recognition of around 1450 genera and 8000 species which nearby 2000 species are endemic. Iranian traditional medicine had cited pharmaceutical dosage forms, e.g. powders, syrups, ointment, extracts, powders, mucilage's, nectars, etc. In this presentation Phyto-chemical screening of Aromatic plants, e.g. *Rosa damascena*, reviewed. *Rosa damascena* cultivated in extensive zone of Iran and produce rose water and essential oils out of it. The samples of essential oil were extracting by different methods, e.g. traditionally, industrial and laboratory scales. Samples of oil were analyzed by GC and GC/MS. The main constituents of Laboratory essential oils samples were extracted by two hydro distillation method which designed by authors in Research Institute of Forests and Rangelands which were named plan-1 and plan-2. The main isolated constituents in plan-1 were geraniol (21.8%), n-nonadecane (21.3%); citronellol (12%), with yield of (0.015%) and in plan-2 were n-nonadecane (21.8%); geraniol (19.1%), citronellol (15%), with yield of (0.023%).in other studies, investigated the effect of storage and time on essential oil composition in normal temperature of *Rosa demascena* were down. We used different vessels e.g. glass, color glass and aluminum quality. Main components of Primary essential oils were citronellol (33.5%), cis-p-menth -2-en-1-ol (7.3%) and geraniol (7.2%). Storage in three months in simple glass in refrigerator were better than others methods.

Storage of essences in six months of periods of time in simple glass and normal temperature is better than other.

Keywords

Rosa damascena, Hydro distillation method, Essential oil composition, Geraniol, Citronellol

References

1-Hristina,N., and Graça Miguel, M.2017. *Rosa damascena* essential oils: a brief review about chemical composition and biological properties. *Trends in Phytochemical Research* 1 (3): 111-128.

2-Mohammed,A., Sultana, S. and Jameel. M. 2016. Phytochemical investigation of flowers of *Rosa damascena* Mill. *Int. J. Herbal Med* : 179-183.

Rosa in Iran

Prof. Dr. V. Mozaffarian

A member of scientific board of Research Institute of Forests and Rangelands, Department of Botany, Retired

Scientific name *Rosa* spp. Or Rose, remember other persian equivalent of rose such as GoleMohammadi, GoleSorkh, Nastaran, Nasrin, Ward ... In Iran, it refers to shrubs and generally prickly plants that have given a special feature to the land of Iran with their beautiful flowers.

The history of rose cultivation in Iran dates back to unknown precise ancient times, because the Iranian People (rulers and kings) were interested in having beautiful gardens and gardens with more or less permanent flower bearing plants, and for this reason, they started to establish Rose gardens in which one of the most beautiful flowers was planted.

During many years and the transfer of people from one country to another, foreign roses, especially of ornamental and double flowering varieties, have been imported to Iran, the origin of which is mostly unknown, and determination of their scientific names seems almost impossible**.** Meanwhile, the land of Iran includes 18 wild-growing species of Roses that are spread in different temperate and cold temperate regions of Iran and often grow in the form of prickly shrubs. One of the most common types of wild-growing Roses in Iran is *Rosa persica* (rose Irani, warak). A plant that has a wide geographical distribution and can be found almost throughout the Azerbaijan, Alborz, N. Khorasan, North and East of the Zagros and sometimes in the highlands of central Iran Provinces.

It indicates deep destroyed Ranges and the presence of soft and permeable mother rock that

lacks sufficient nutrients. This species of Iranian plant with its very deep roots goes to the depths of the earth to absorb water and nutrients, and at the same time has a short flowering period and its flowers have rather considerable beauty. And then we can mention wild growing *Rosa canina* (Gole sag, Nastaranevahshi) and *Rosa foetida* (Rose Moattar, Nastaranezard, Goleduru), which have almost a wide geographical distribution. It should be said that *Rosa canina* is a species that is now planted in different places in order to use it as a stock for grafting ornamental foreign roses, or at least its cuttings are used for this purpose.

Other species of roses in Iran are: *Rosa abrica* (Rose Abri), *Rosa asperrima* (Rose Boirahmadi), *Rosa Beggeriana* (Rose sefid), *Rosa Boissieri* (Rose Sahandi), *Rosa caryophyllacea* (Rose Gorgani, Rose Ziarati), *Rosa elymaitica* (Rose Ilami, NastaraneKuhi), *Rosa Freitagi* (Rose Ghaeni), *Rosa hemispherica* (Rose zard), *Rosa iberica* (Rose Ghafghazi), *Rosa kokanica* (Rose AsiayeMianeii), *Rosa orientalis* (Rose Sharghi, Rose Pa Kutah), *Rosa pimpinellifolia* (Rose Rubahi, Rose Kharalud, Moshkeje), *Rosa pulverulenta* (Rose Gardalud), *Rosa villosa* (RoseKorkalud), *Rosa Webbiana* (Rose Khorasani), and 2-species of them are Endemic to Iran.

Wild roses in Iran often grow in the foothills of the mountains and sometimes in forest shrublands. From ancient times to the present day, the name Nastaran is often associated with trailing roses, and it can be said that one of the most well-known Nastaran in Iran is NastaranShirazi, Rose Anbar or Rosa moschata, which was planted in Iranian gardens and homes from a long times ago. Today in among the trailing cultivated roses, one of the most beautiful soon flowering roses called Rosa Banksiae (AbshareTala) has been imported to Iran, which generally blooms in Tehran in early spring and presents its golden yellow flowers to people as a gift for a short time. The history of the arrival of double-flowering roses in Iran is not known, but among the European people, Iranian rose gardens have a special reputation.

And the reason is the existence of suitable climatic conditions for growing roses. Today, when

you enter the parks, gardens and backyards of different regions of Iran, the first flowering shrub that attracts attention is the Rose, and its double-flowering varieties have a great variety of colors. While they are not odorant and most of their beauty is related to the variety of colors and their durability and the ability to rejuvenete and repeat the flowering, so that in temperate regions they grow and flowering through a long times of a year. And may have derived from Rosa gallica complex (including Rosa provincialis, Rosa centifolia, Rosa pumila and Rosa pygmaea).

Today, Iran is known by *Rosa damascena* (Gole-Mohammadi, Gole-Golab, Gole-sorkh), so that persian rose or Damask rose have become world famous because of rose water or attar of roses production and from the distant past, Iranian rose water were used for perfume in the house of Kaaba. The history of the arrival of Persian rose in Iran probably dates back to Ottoman times or the arrival of Islam in Iran, which established contacts and travels between Islamic countries (especially Iraq and Syria). And this connection caused *Rosa damascena* (Gole-Mohammadi) to enter Iran from Syria or Damascus and to be planted in temperate and cold temperate places, and may become naturalized. so that rose water of Ghamsare Kashan is world famous.

Today, with the research done on *Rosa damascena* and extensive advertisements that have been used for human health, relatively large gardens of *Rosa damascena* have been created in different parts of Iran and rose water-making factories in cities such as Ghamsar Kashan, towns and villages west of Kashan. Meymand in Fars, Lalehzar in Kerman, Garhban in Kermanshah were established and are engaged in rose water production. We are reminded of the distant past of the people of Europe, especially the French of fragrant roses such as Rosa alba (White rose), Rosa gallica (French rose) Rosa centifolia (Rose hundred leaves) They were used to prepare perfumes and fragrances, and today France is known as the cradle of perfumes and colognes.

In addition to preparing rose water from *Rosa damascena*, other uses such as using dried petals

to flavor clothes and preparing jams are common. And the provinces of West and East Azarbaijan use and prepare rose jam and has a special place among the people of that land. Nowadays, Research Institute of forests and Rangelands and his Provincial Research centers have been established that have tried for many years to improve *Rosa damascena* in order to produce more flowers for export and medicinal use, but it should be said that the biggest problem of *Rosa damascena* compared to other roses is its short and limited flowering period. It can be used for a short time of the year.

We said Rosa species generally grows in temperate and cold temperate regions, 18 wild growing rose species grows in Iran and when compare with other neighbor countries In Afghanistan: grows 10 species, 7 of them also in Iran, In Pakistan: 8 species, 5 of them also in Iran, in Iraq: grows 10 species, 5 of them also grows in Iran, In Turkey 24 species, 8 species also in Iran, in the whole Eruropean countries about 47 species which 3 species of them are very variable and including about 29 complex species , 3 of them also grows in Iran. We did not talk about Rose cultivation methods here because of our main purpose is to introduce Iranian roses and not its horticulture, although no description of each has been given. But we are reminded of today there are many organs which are engaged to breeding or Micro propagation method for arriving to High yielding cultivars of *Rosa damascena*.

Keywords

Rose cultivation history, Roses species, *Rosa damascena*, Iranian roses.

References

1-Samiei, L., Naderi, R., et al. 2010. Genetic diversity and genetic similarities between Iranian rose species. *The Journal of Horticultural Science and Biotechnology* 85 (3): 231-237.

2-Karami, A., Z. Parviz, Khosh-Khui, M., Salehi, H., Saharkhiz. M. J. 2012. Analysis of essential oil from nine distinct genotypes of Iranian Damask rose (*Rosa damascena* Mill). *Journal of Medicinal Plants Research* 6 (42): 5495-5498.

In vitro Propagation of Gül-ü Muhammedi (*Rosa X damascena*): Advantages and Disadvantages

Prof. Dr. Ibrahim BAKTIR

Cyprus International University, Lefkoşa/TRNC

Rosa damascena, more commonly known as Damask rose, oil rose, Gül-ü Muhammedi, Isparta Gülü or sometimes as the rose of Castile, is a rose hybrid, derived from *Rosa gallica*and *Rosa moschata.* More likely Damask rose is native to Central Asia and Iran, naturalized and commercially cultivated in many countries as Turkey and Bulgaria.

Conventional ways of propagating Damask roses are; hardwood cuttings, layering and division. These methods are commonly applied to propagate Damask roses in mass amounts. Including viral diseases, a number of various diseases are problematic for this particular species, which reduce both quality and quantity considerably. Tissue culture propagation methods have been appliedto many cultivated plants in great extent.

A number of researches have been conducted in many countries including Iran to propagate Damask roses through tissue culture propagation techniques. Despite promising results, not yet implemented in commercial scales mainly due to the higher costs and limited plantlets in number in a given time period. At least more than six new plantlets should be propagated in two-week intervals for the commercial purposes. It doesn't mean that it can't happen. One way or another, promising results will be happened in a near future as long as dedicated researches go on in right laboratories and in right locations such as free-zones to reduce costs. Finally, constant and sufficient demands are indispensable for the tissue culture works.

Keywords

Damask rose, tissue culture propagation

References

[1]Jabbarzadeh, Z., & Khosh-Khui, M. (2005). Factors affecting tissue culture of Damask rose (Rosa damascena Mill.). *Scientia horticulturae*, *105*(4), 475-482.

[2] Noodezh, H. M., Moieni, A., & Baghizadeh, A. (2012). In vitro propagation of the Damask rose (Rosa damascena Mill.). *In Vitro Cellular & Developmental Biology-Plant*, *48*(5), 530-538.

[3] ALLAHVERDI, M. B., Ghorbanli, M., Assareh, M. H., & GHAMARI, Z. A. (2011). In vitro propagation of three Damask Roses accessions.

Rose oil market in perfume industry

Dr. Zahra Sahebnazar

AtrYar Aria Co, Kashan, Iran

Email: zm.sahebnazar@gmail.com

Rose oil is the essential oil extracted from the petals of various types of rose. Between first oil, second oil and total rose oil, total rose oil being used more commonly in perfumery. Even with their high price and the advent of organic synthesis, rose oils are still perhaps the most widely used essential oil in perfumery. Majority of rose oil is used in perfumery, however, rose oil also finds its application in skin care, medicine, and aromatherapy.

Health benefits associated with rose oil such as anti-inflammatory, acne-preventing, anti-aging, moisturizing, rejuvenating, stimulating, and harmonizing properties of rose oil have resulted in the growth of global rose oil market over the forecast period. In this paper we consider the rose oil market and its application in perfume industry.

Based on done researches for Rose Oil Market Size, Share and Trends from 2019 to 2025, the global rose oil market size was valued at USD 278.7 million in 2018 and is estimated to expand at a CAGR of 6.8%. Organic rose oil is the fastest growing segment, expanding at a CAGR of 8.7% from the year 2019 to 2025.

Between producer countries, Europe and Asia pacific produce most rose oil. In Europe, Bulgaria is the major producer of rose oil and exports around 30% of its total exports to France.

In terms of value, Europe held the largest share of 40.2% in the year 2018. Europe is the largest market for natural fragrance ingredients. Such as France, Germany, and the U.K.

Asia Pacific is expected to register the highest CAGR of 8.0% over the forecast period on account of rising sales of pharmaceutical products in countries such as China, Australia, India, and Japan.

The value of essential oil exports in Turkey reached approximately million US $ 9 in 2001, an increase of 3.5% over 2000. The major Turkish essential oil export is rose oil. In terms of volume, rose oil accounted for 67% of the total essential oils exports.

Essential oils are mainly exported to European Union countries and North America. Major export locations are France, Germany, Switzerland and USA. These four countries combined buy 94% of Turkish origin essential oils.

Various luxury brands are offering scents in rose texture to attract mostly women consumers. Perfumery using rose oil is as follows:

- ✔ Top note
- ✔ Middle note
- ✔ Base note

- ✔ In the top note, mostly the light and citrusy components as well as aromatic herbs are used, like orange and lemon essence. This note can be sweet or bitter.
- ✔ In the middle note, floral components are utilized like *Rosa dama*cena. This note makes up 70% of a scent.
- ✔ The base note forms the scent's foundation. It is rich, heavy and long-lasting, even to 6 hours or more.

For construction of each scent, the perfumer has to know the all components and mixed them based on the three notes properties.

Keywords:Rose oil, Market, Perfume

References

1- https://perfumerflavorist.texterity.com.

2- Surge in usage of rose oil in perfumes, due to its fragrance is anticipated to fuel the market growth of rose oil during the forecast period of 2018 to 2023.

3- https://www.persistencemarketresearch.com.

4- www.grandviewresearch.com.

5- www.fragrantica.com.

Intraspecific variation of different populations of *Rosa damascena* Mill. from Kashan

Dr. Zeinab Toluei

Department of Cell and Molecular Biology, Faculty of Chemistry, University of Kashan, Kashan, Iran

One of the major and popular growing regions of Damask rose is Kashan and its rose essential oil has unique scent and global reputation. The aim is to compare the essential oil constituent, morphological and genetic variation that naturally exists in different populations of *Rosa damascena* Mill. from Kashan.

Different populations of *R. damascene* were collected from fifteen important rose oil production regions of Kashan. Fifty-two quantitative and seventeen qualitative morphological characters were measured. The whole rose flowers (petals and sepals) were harvested at the time of full bloom. The essential oil content (w/w) of flowers was assayed after extraction in Clevenger apparatus. The essential oils were analyzed with gas chromatography–mass spectrometry (GC/MS) for identifying the essential oil components. Genetic variations were investigated by genomic fingerprints using Start Codon Targeted (SCoT) marker. Twenty-three SCoT primers were tested for DNA amplification Ten SCoT primers, which generated sharp and reproducible bands, were selected for the final amplification and data analysis.

The morphological variance analysis showed significant differences among populations of *Rosa damascena* for 28 morphological characters such as stem length, leaf length and number of flowers per plant. Cluster analysis of morphological characters showed that the fifteen populations could be divided into two major groups including five subgroups.

A total of fifty-five compounds were identified and quantified by GC–MS analysis in the rose

oil. The essential oil contents (w/w) were ranged from 0.0020% to 0.0190%. The major components of the oil contained limonene (0.4–12.8%), 2-phenylethyl alcohol (1.0–1.3%), citronellol (16.2– 57.8%),geraniol (0.9–14.1%), methyleugenol (0–2.5%), heptadecane (0.8–3.0%), 1- nonadecene (2.1–7.5%), nonadec-9-ene (14.9–30.2%), eicosane (1.0–3.3%), heneicosane (5.8–18.6%), tricosane (0.9–5.2%),and pentacosane (0.3–2.1%). Based on the dendrogram obtained from cluster analysis of chemical component data, fifteen *R. damascena* populations were grouped into three clusters.

Based on the genetic results, totally 106 bands were observed by 10 selected primers which 43 bands were polymorphic (40.5%). Significant differences were observed by AMOVA that showed 45% variation for genetic polymorphism among the groups of populations. Information content of the SCoT markers was 0.59, high genetic differentiation (GST =.0.69), Moderate SCoT polymorphism (<50%), and low gene flow (Nm = 0.11) show significant genetic variation in *R. damascena* groups. Neighbor joining tree of 15 *R. damascena* populations based on SCoT marker is indicative of two main groups and four sub clusters. The essential oil of Josheghan was considered to have a high quality in terms of richness in citronellol, geraniol, and 2-phenylethyl alcohol monoterpenes.Correlation results showed that there is a significant relationship between some morphological characters and essential oil content. calyx length had a significant positive correlation with the essential oil content, while a significant negative correlation was observed for pedicle length and receptacle glandular length with the essential oil content. The results of such study provide the practical information for future collection of Damask rose germplasm and breeding program.

Keywords

Rosa damascena, morphology, Genetic, essential oil

References

1- TolueiZ., Hosseini Tafreshi A.&Arefi M. 2019. Comparative Chemical Composition Analysis of Essential Oils in Different Populations of Damask Rose from Iran. *Journal of Agriculture Science and Technology*, 21 (2): 423-437.

2- Toluei Z., Arefi M.& Hosseini Tafreshi A. 2019. Evaluation of morphological variation of different populations of *Rosa damascena* Mill. from Kashan and its correlation with essential oil content. *Journal of Plant Research (Iranian Journal of Biology)*, 33 (1): 167-178.

3- Clevenger JF. 1928. Apparatus for the Determination of Volatile Oil. *The Journal of the American Pharmacists Association*, 17: 346 p.

4- Collard B.C., Mackill D.J. 2009. Start Codon Targeted (SCoT) polymorphism: A simple, novel DNA marker technique for generating gene-targeted markers in plants. *Plant Molecular Biology Reporter*, 27: 558-562.

5- Zavarreza M. 2017. The study of genetic variation of *Rosa damascena* Mill. in Kashan township using SCOT marker. [M.Sc. Thesis]. University of Kashan, Kashan.

6- Arefi M. 2017. Morphological and essential oil characterization of different populations of *Rosa damascena* Mill. in Kashan and optimization of tissue culture conditions for the best populations. [M.Sc. Thesis]. Payame Noor University, Branch of Tehran-Shargh, Tehran.

Influential factors on the lack of production development and processing of medicinal plants in West Azerbaijan province

Amir Rahimi[1,*], Roghayeh Vahedi[2]

[1] Assist. Prof., Dept. of Plant-Production and Genetics, Faculty of Agriculture, Urmia University, Urmia, Iran.,

[2] PhD Student of Soil Science, Department of Soil Science, Faculty of Agriculture, Urmia University, Urmia, Iran.

*Corresponding Author E-mail: r.amirnia@urmia.ac.ir

Introduction

Medicinal plants have long been an important medicinal plant in the treatment of many diseases. Today, basic and clinical studies have shown the effectiveness of herbal compounds in many diseases such as diabetes, malignancies, neurological disorders and other diseases (1,2). Mohammadi flower with the scientific name of *Rosa damascena* Mill. belongs to the rose family (*Rosacea*) (3). Which is usually known as *Damask Rose* and is known in Iran as Gole-mohammadi (4).Historical documents show that the original birthplace of this flower is the ancient land of Iran and of course other regions of the Middle East. Mohammadi flower (*Rosa damascene* Mill.*)* is a familiar and beloved name of Iranians that is currently cultivated in different regions of Iran such as Kashan, Ghamsar and regions of Fars, Azerbaijan and Qazvin provinces. Various products including rosewater, essential oil and perfume are prepared from this flower (5-7). Also, various compounds of alkanes, alcohols, phenols, terpenes and terpenoids are present in Rose damascene (8).Some of the alkanes identified in this plant are: Pentadecanes, heptadecans, octadecans, nonadocans, Eicosanes and Heneicosane. Quercetin, Kaempferol, gallic acid and syringic acid are phenolic compounds in *Rose damascena* (4,6). As

with other plants, the percentage of compounds present in *Rose damascena* varies in different geographical areas. West Azerbaijan province has become a showcase of various medicinal plants due to its geographical conditions, diversity of climate and suitable rainfall. Medicinal species of West Azerbaijan are of great importance and can be effective in the health, livelihood and economy of the people. The province of demographic, cultural and special conditions. It also has extensive natural and agricultural fields. The potential to expand the use and cultivation of medicinal plants. West Azerbaijan has been a place for growing *Rose damascena* for many years. Another of the most important advantages of *Rosa damascena* is the low water content of this agricultural product, so that its water requirement is much less than other products and its income is estimated in some cases, especially if it is processed much more. The three main axes of "supply of medicinal plants", "processing of medicinal plants" and "marketing of medicinal plants" form the value chain of medicinal plants. It seems that the lack of sufficient information for the cultivation of different cultivars of medicinal plants and the ambiguity in the economic efficiency and product market is one of the reasons for the lack of development of cultivation of medicinal plants in the province. Therefore, this research was aimed to investigate the influential factors on the lack of production development and processing of medicinal plants in West Azerbaijan province.

Methods

Statistics and information used in this study were using the study of topographic and geographical maps of the region and also using the information of local farmers. Also, information was collected through library methods such as Internet, field studies (observation and interview), and applied research.

Discussion

The three main axes of "supply of medicinal plants", "processing of medicinal plants" and "marketing of medicinal plants" form the value chain of medicinal plants. In the following, more details were given to the mentioned contents.

Marketing of medicinal plants

Marketing of medicinal plants in the province is one of the problems. There is not guaranteed purchase by the government system for medicinal plants. Furthermore, many factories buy cheap.Also, traditional markets have limited consumption.

High quality seeds providing

Medicinal plants collected from natural and there is no need to their cultivation. Industrial production of the plants, has made inevitable to produce on agricultural lands. The providing of high quality seeds whose confirm in terms of authenticity and health is very important affair. Of course, the lack of medicinal plants breeder seeds is a problem in all producing countries, but in our country, especially in West Azerbaijan province is an important issue.Some of these countries have strong genetic resources. Some also solve this problem by importing high potential seeds. In parallel with the production of the seeds from our country's genetic resources, the import of the seeds can also be considered.

Spatial planning for medicinal plants in West Azerbaijan province

Some medicinal plants are produced in areas that reduce the content of active components. The climatic conditions of the province are suitable for some medicinal plants and unsuitable for

some of them.On the other, Different regions of the province have significant variances in different aspects such as climate.

Extracting of active components

There are not new methods of extracting in the factories of the province or are operating with minimal capacity due to financial problems. Despite the production of raw materials of medicinal plants in different part of the province such as towns, the lack of any processing facilities is another problem against the development of this industry in the province.

Promotion the cultivation of medicinal plants

The farmers in the province do not have enough knowledge to produce medicinal plants or do not know the local place to obtain the necessary information. Many farmers even claim that the experts are lack of sufficient information in this regard. Retraining courses for the experts in this field can significantly help increase farmers' knowledge. During the meetings we had with the promotion department, according to them, even the promotion budget has been drastically reduced compared with previous years.

Mechanization of medicinal plants production

One of the reasons for the lack of mechanization development is related to the small size of agricultural parts dedicated to in the province. If larger agricultural lands are allocated, the development of mechanization can also be hoped for.

Basic research in the field of medicinal plants

Research on the province's native medicinal plants has not been conducted or not applied.

Among the researches that can be invested in the future are the cultivation of native medicinal

plants of the province, understanding their ecological conditions, how to propagation, active compounds, and etc.

Harvesting medicinal plants from natural resources

Many of medicinal plants in the province are harvested from natural resources, so the production of medicinal plants in agricultural lands does not seem economically reasonable.

It will be serious danger of extinction. Cultivation of medicinal plants in agricultural lands can prevent improper harvesting of these natural resources. Educating the people who harvest medicinal plants from natural resources is another way that can prevent the extinction of these plant species.

People's goals of medicinal plants cultivating in the province:

Bidemeshk and baderashbou, which are important medicinal plants in the province, are used to make local drinks; while these plants can be used in the production of important herbal medicines as well as new products by creating special brands.Some medicinal and aromatic species are used as vegetables, spices and food by the locals.Some are used to create protection for farms and lands.

Monetization from medicinal plants

In terms of economics, medicinal plants are very different; some herbs are expensive and some are cheap. According to studies, the value of medicinal plants varies from year to year in the province. In the province, most of the medicinal plants have less economic value; this led to farmers' frustration.

Statistics of profitability of medicinal plants

There are no statistics on the profitability of medicinal plants in the province.

Private sector investment

The private sector has little incentive to invest in the production of medicinal plants in the province.

Bank credits

Producers of the medicinal plants industry have often produced in the province with their own funds. Credits are considered for the growth of this industry, but the lack of information to farmers and administrative problems related to receiving credits, has led to problems in the use of bank credits by farmers.

Quality of products

We have focused more on the production of medicinal plants in quantitative terms, so the quality has not been considered.

Organic cultivation of medicinal plants

International export markets medicinal plants attach special importance to the organic production of these products.

Competitors of medicinal plants

Rival provinces and countries are increasing. Naturally, the provinces and countries that enter quickly will be more successful.

Parallelism of organs and institutions

In the field of production and processing of medicinal and aromatic plants, parallel work is done by different organs and institutions. These organs act as islands, do not have the necessary coordination with each other and cause a waste of the country's energy. If these activities are concentrated, we will see a significant increase in this industry.

Results

The development of cultivation of medicinal and aromatic plants is necessary in order to develop and advance national and regional goals. This goal is possible by solving the problems in the field of production development and processing of medicinal and aromatic plants in West Azerbaijan province.

Keywords

Rosa damascena, supply of medicinal plants, processing of medicinal plants, marketing of medicinal plants

References

1- Androutsopoulou, C., Christopoulou, S.D., Hahalis, P., Kotsalou, C., Lamari, F.N.,

Vantarakis, A.,2021. Evaluation of Essential Oils and Extracts of Rose Geranium and Rose Petals as Natural Preservatives in Terms of Toxicity, Antimicrobial, and Antiviral Activity. *Pathogens*, 10: 494.

2- Batooli, H., Safaei-Ghomi, J., 2012. Comparison of Essential Oil Composition of Flowers of Three *Rosa damascena Mill*. Genotypes from Kashan.*Journal of Medicinal Plants*, 2 (42): 157-66.

3- Ghorbani, A., 2013. Phytotherapy for diabetic dyslipidemia: evidence from clinical trials. *ClinLipidol*, 8(3): 311-319.

4- Hosseini, A., Ghorbani, A., 2015. Cancer therapy with phytochemicals: evidence from clinical studies. *Avicenna Journal of Phytomedicine*,5(2): 84-97.

5- Kumar, N., Bhandari, P., Singh, B., Bari, S.S., 2009. Antioxidant activity and ultra-performance LC-electrospray ionization-quadrupole timeof-flight mass spectrometry for phenolics-based fingerprinting of Rose species: *Rosa damascena*, *Rosa bourboniana*and *Rosa brunonii*. *Food and Chemical Toxicology*, 47(2):361-7.

6- Mileva, M., Ilieva, Y.,Jovtchev, G., Gateva, S., Zaharieva, M.M., Georgieva, A., Dimitrova, L., Dobreva, A., Angelova, T., Vilhelmova-Ilieva, N., Valcheva, V., Najdenski, H., 2021. Rose Flowers—A Delicate Perfume or a Natural Healer? *Biomolecules*, 11(1): 127.

7- Ramezani, R., Moghimi, A., Rakhshandeh, H., Ejtehadi, H., Kheirabadi, M., 2008. The effect of *Rosa damascena* essential oil on the amygdala electrical kindling seizures in rat. *Pakistan Journal of Biological Sciences*. 11(5):746-51.

8- Verma, R.S., Padalia, R.C., Chauhan, A., Singh, A., Yadav, A.K., 2011. Volatile constituents of essential oil and rose water of damask rose (*Rosa damascena*Mill.) cultivars from North Indian hills.*Natural Product Research*. 25(17): 1577-84.

Damask rose:
Innovation, Commercialization and Market Development, Why and How?

Dr. Hossein Khassaf Mofrad

[1]Aromede Co., Kashan, Iran

Rosa damascena has widespread usage in different industries. Iran, Turkey and Bulgaria are the main producers of damask rose products in the world. Between them, Iran is the biggest producer of damask rose flower. In this lecture we follow up a comparative study on main countries which are engaged in this industry in three axis: knowledge, industry and market. We discussed two main approaches (internationalization and localization) in market axis and to reach the goal of commercialization and market development we advised some strategies:

1. To adopt sectorial innovation system toward damask rose industry comparing to linear strategies,
2. Focus on final and high value-added products (commercialization),
3. Pay more attention to international markets,
4. using interdisciplinary approaches toward this industry,
5. and developing innovation intermediaries in the country.

Keywords

Commercialization, market development, *Rosa damascene*, damask rose industry

References

1. Howells, Jeremy. 2006a. Intermediation and the role of intermediaries in innovation, Research policy 35 (5): 715–728.

2. ERBAŞ, Sabri: The researches about Increasing of yield and quality in rose at GULAR. SuleymanDemirel University. Isparta, Turkey, 2016.
3. KhassafMofrad Hossein, Danaeifard, Hasan, The desired functions of innovation intermediaries for increasing innovational capacity of knowledge-based firms, Science and technology policy, 26, 2016.

Investigation of current situation of Damask rose in Iran and in the world and the most important barriers to export Damask rose products

Dr. Katayoun Ahmadi

Export Consultant for Organic Medicinal Plants and Damask rose

Tehran, Iran

Email: katyahmadi@gmail.com

Rosa damascena with exception of Bushehr is cultivated in all provinces of Iran. The total cultivation area of this plant was 28,000 hectares in 2020. Fars has the largest area, 9500 hectares or 34% of the total cultivation area in the country and Hormozgan province has the lowest area, 9 hectares. The other important provinces are Kerman with an area of 4460 hectares and Isfahan with an area of 4200 hectares are the third place. The major area of rain-fed fields are located in Fars province (5500 hectares), so the average yield of the fields in this province is approximately low; 1.4 tons per hectare, whereas Isfahan province with the yield of 3 tons per hectare has the highest yield.

Iran has the largest cultivation area in the world. About 70% of flowers goes to rose water in industry, while Bulgaria and Turkey have the highest production of rose oil, concrete and absolute. Approximately 90% of the Bulgarian flowers are being used for oil rose production, only 5 to 6% of the flowers goes to concrete and 3 to 4% become rose water. In Turkey about 55% of the flowers produced in this country goes to rose oil, 40% become concrete and absolute, and only a small part, 5% of the flowers, are being used in rose water production.

The use of high-yield genotypes, pruning after harvest and applying proper fertilizers are the efficient ways to increase field Productivity.

High amount of methyl eugenol in rose oil is one of the main obstacles to export rose oil. High

interval between harvest and distillation could reduce rose oil quality. Furthermore, failure to follow technical instruction after harvesting and during the processing could result in unwanted compounds and increase the amount of methyl eugenol and consequently reduces rose oil quality too.

Color is the main factor determining the quality of dried petals and buds. Usually the market looking for darker dried products. Appling proper drying methods and using cultivars with darker color would affect the quality of dried products.

Chlorpyrifos is an organophosphate pesticide used on crops, but currently many countries including EUs band importing the products which have above 0.01 mg / kg of this pesticide. Unfortunately, many farmers are still using this pesticide in their farms.

As organic products are getting popular, encouraging the farmers to produce organic products is critical to meet this growing demand and produce the products without use of any chemical input.

Keywords

Rosa damascena, Cultivation, Methyl eugenol, Dried petals, Chlorpyrifos, Organic products

References:

[1] Statistics 1399, Medicinal Plants Plan of the Ministry of Jihad Agriculture

[2] Sharma, Saurabh, and Rakesh Kumar.2016. "Effect of temperature and storage duration of flowers on essential oil content and composition of damask rose (Rosa × damascena Mill.) Under western Himalayas." Journal of *Applied Research on Medicinal and Aromatic Plants* 3.1: 10-17.

[3] Mirzaei, Maryam, et al. 2017. "Evaluation of Some Postharvest Storage Approaches on Essential Oil Characteristics of Fresh Organic Damask Rose (Rosa damascena Mill.) Flowers." *Horticulturae* 3.1 : 16.

[4] Mohamadi, M., A. Mostafavi, and T. Shamspur. 2011. "Effect of storage on essential oil content and composition of Rosa damascena Mill. Petals under different conditions." Journal of *Essential Oil Bearing Plants* 14.4: 430-441.

[5] Zhang, Min, Bhesh Bhandari, and Zhongxiang Fang, eds. 2017.Handbook of drying of vegetables and vegetable products. CRC Press.

Workshops' summaries

Combining Science, Technology & Commerce

Prof. Dr. Ebrahim Naderali

Faculty of Science, Liverpool Hope University, Liverpool, UK

Science, technology and commerce are often considered as three most important pillars of human progression. Science is a body of knowledge. The process and application of scientific knowledge for practical purposes, especially in industry represents technology, whilst commerce is primarily representing activities of buying and selling, especially on a large scale. When science, technology, and commerce work together the outcome is astonishingly beneficial to human well-being. It creates an environment of responding to existing challenges and exploring potential opportunitiesultimately paving the way for structural and social progression. History has shown that science and technology cannot function in isolation and must be linked extremely closely with commercial activities. Therefore, this paper proposes 3 S's as the key to success: **S**hare your knowledge, **S**eek Support and **S**ell- unification of Science, technology and commerce.

Keywords

Science, Technology, Commerce

References

[1]Meng, X. (2010). Study on Combining of E-commerce and E-marketing. *J. Softw.*, *5*(5), 546-553.

[2] Schafer, J. B., Konstan, J. A., & Riedl, J. (2001). E-commerce recommendation applications. *Data mining and knowledge discovery*, *5*(1), 115-153.

Equipmentand Technology for the Processing of Damask Rose and other Medicinal and Aromatic Plants

Mr. Sayed Abdollah Hoseini

CEO, Bokhar Taghtir Co.Shiraz,Iran

Extracts and products of roses and other plants are valuable and are used as medical and natural products and are usually taken into concideration.

Most of the research done so far has been on fundamental and laboratory cases and has rarely been concidered from an industrial point of view. The workshop sought to explore the industrial machines and procedures available in Iran and are capable of producing a wide range of herbal products such as rosewater and different kinds of rose oils.

The subjects that have been reviewed include:

1-Rose oil production at industrial scale

2-The process of rosewater and first rose oil production in Iran

3-The process of extraction from plants using water at industrial scale

4-Concrete and absolute extraction process at industrial scale

5-Extraction of phenyl ethyl alcohol from rose essential oil

6-The process of extraction from plants using alcohol at industrial scale

And the types of devices introduced in the workshop are as follow:

First distillation machine, second essential oil distillation, hydro distillation, steam distillation, extractor, cooking pot, vacuum concentrator, spray dryer, evaporator, tall tower distillation machine, vacuum dryer, shell-tube condenser.

Holding such workshops can be worthwile in making a connection between individuals at university and industry.

Keywords

Concrete, Absolute, Rosewater, Aroma, Phenyl ethyl alcohol, Rose essential oil, Extraction, Alcohol, Industrial scale, Distillation machine, Extractor

References

[1] Agaoglu, Y. S. (2000). Rose oil industry and the production of oil rose (*Rosa damascena Mill*.) in Turkey. *Biotechnology & Biotechnological Equipment*, *14*(2), 8-15.

[2] United Nations Industrial Development Organization, Handa, S. S., Khanuja, S. P. S., Longo, G., & Rakesh, D. D. (2008). *Extraction technologies for medicinal and aromatic plants*. Earth, Environmental and Marine Sciences and Technologies.

[3] Baydar, H. (2006). Oil-bearing rose *(Rosa damascena Mill*.) cultivation and rose oil industry in Turkey. *Euro Cosmetics*, *14*(6), 13.

[4] Kurkcuoglu, M., & Baser, K. H. C. (2003). Studies on Turkish rose concrete, absolute, and hydrosol. *Chemistry of natural compounds*, *39*(5), 457-464.

[5] Scognamiglio,J., Jones, L., Letizia, C. S., &Api, A. M. (2012). Fragrance material review on phenylethyl alcohol. *Food and chemical toxicology*, *50*, S224-S239.

[6] Zhang, Q. W., Lin, L. G., & Ye, W. C. (2018). Techniques for extraction and isolation of natural products: A comprehensive review. *Chinese medicine*, *13*(1), 1-26.

Role of chiral gas chromatography in authenticity of essential oils and rose water

P.Soleimani dinani[1], K.Eshghi[2]

[1]Kimia Shangarf Pars Research Company,Tehran,Iran

[2]Kimia Shangarf Pars Research Company,Tehran,Iran

Introduction

Rosa damascena is an important ornamental and medicinal plant and a source of fragrance. Rose water and rose oil are used in the perfume, cosmetic, pharmaceutical and food industries. Rose oil and its hydrosol is traditionally and industrially produced by distillation.

The increase in market demand has led to production of inferior products for rose-water that contain synthetic essences or essential oils of other plants, or that have been diluted with water. Fake products often may be distinguished via its color,taste and other physical properties. However, details need to be determined by chemical structural analysis. Aplication of the chiral gas chromatography in flavor and fragrance analysis is a valuable technique to characterize fake and real samples.

The present workshop briefly shows the role of chiral gas chromatography in authentication of essential oils and rose-water samples.

GC/MS and chiral-GC-FID were applied for identification and confirmation of fake and natural samples.

Keywords

Adulteration, GC/MS, Chiral, natural, essential oil, rose water

References

1. Schurig, V., Separation of enantiomers by gas chromatography. *J. Chromatogr. A* **2001,***906* (1-2), 275-299.
2. Schurig, V., Chiral separations using gas chromatography. *TrAC, Trends Anal. Chem.* **2002,***21* (9/10), 647-661.
3. Morrison, C. In *Chromatographic separations and analysis: chiral gas chromatography*, Elsevier B.V.: 2012; pp 333-353.
4. Bicchi, C.; Cagliero, C.; Liberto, E.; Sgorbini, B.; Martina, K.; Cravotto, G.; Rubiolo, P., New asymmetrical per-substituted cyclodextrins (2-O-methyl-3-O-ethyl- and 2-O-ethyl-3-O-methyl-6-O-t-butyldimethylsilyl-β-derivatives) as chiral selectors for enantioselective gas chromatography in the flavour and fragrance field. *J. Chromatogr. A* **2010,***1217* (7), 1106-1113.
5. Ohtani, S.; Yamamoto, T., Age estimation by amino acid racemization in human teeth. *J Forensic Sci***2010,***55* (6), 1630-3.
6. Gaspar, E. M.; Santana, J. C.; Lopes, J. F.; Diniz, M. B., Volatile organic compounds in paper-an approach for identification of markers in aged books. *Anal. Bioanal. Chem.* **2010,***397* (1), 369-380.

Unviersity of Kashan
Essential Oils Research Institute

Iran Golab

Rosa damascena 2021

The Third International Conference & Workshops on *Rosa damascena*

8-9 September 2021, University of Kashan, Qamsar, Iran

Abstract Submission Deadline: Wednesday, 16th August

The event will be held as an online conferance

- General aspects in medicinal & aromatic plants
- Cultivation & Technology
- Products
- Regulations
- Marketing

Scientific Committee Head:
Hossein Zeinali, Executive manager of medicinal plants project, Iran

Organizing Committee Head:
Maryam Akhbari, University of Kashan, Iran

https://icrd.kashanu.ac.ir

Email: icrd@kashanu.ac.ir

RICeST Barij ISC LIVERPOOL HOPE UNIVERSITY Union of Iranian Medicinal Plants society IMP Iranian Institute of Medicinal Plants Lorestan University University of Kurdistan Urmia University Tabib daru طبیب دارو RIMBT شورای اسلامی شهر قمصر Ministry of Agriculture - Jahad