

Chemical and Biological Uses and Functions of Extracted Essential Oil of Indigenous Medicinal Plant *Ferula Oopoda*. A Review

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Abstract

Ferula Oopoda-an indigenous medicinal plant has been part of the lives of people and all other living organisms for years in Iran, Afghanistan and Pakistan for different reasons for treating of plant leaves affected by double spotted apple mites. In research based study

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*the essential oil of *Ferula Oopoda* is extracted by the method of steam distillation through the Clevenger apparatus. Many dilutions of the pure essential oil of this plant has been produced along with solvent and checked on various life cycle stages of double spotted mites that are eggs, nymphs and adults at different intervals of time. Essential extracted oil dilutions are arranged at different ratios ranging from 1:10ml to 1:100000ml. The hatching rates of eggs, mortality rates of nymphs and adults has been analyzed at different intervals of time from 12 hours to 72 hours. Furthermore, Control group, Propagate, Hatching and Mortality Rates have been compared with the extracted essential oil of indigenous medicinal plant *Ferula Oopoda*. The research based studies showed that the extracted essential oil of *Ferula Oopoda* has shown a little bit tendency to kill bacterium, virus and fungus which have been hazardous to the health of human beings and all other living organisms for years. Actually the results of extracted essential oil of *Ferula Oopoda* at various dilutions to nymphs and adults of double spotted mites exceeded more other than green pesticides. In long term research based studies, it will be helpful to pave path for future medicinal plants based miticides for broad sale utilization and this study will also be helpful for the new generation.*

Keywords: *Ferula Oopoda*, Indigenous Medicinal Plant, Extracted Essential Oil, Hydro-distillation, Clevenger Apparatus and Double Spotted Apple Mites.

INTRODUCTION:

Ferula Oopoda belongs to the *Apiaceae Family* which is commonly used for medicinal purposes internationally and it is naturally occurring and is available all around the Central Asian Countries such as Afghanistan, Iran and Pakistan¹. *Ferula* famous plant of family *Apiaceae Family* and these plant genera have great active substance esquiterpene. This plant is used as we know in today's world for such harsh diseases and many of the medicines have negative effects on our health and as well as on our atmosphere that is why herbal and natural plants have key role in the field of health

and pharmaceutical industries ². In Iran chemists and botanists have worked for a long time to find out the oils from this plant and its other family members it has got monoterpene biterpenes, triterpenes, sesquiterpenes, besides that it has glucosides which are of very much importance ³. The compounds found in *Ferula Oopoda* is approximately eleven, including monoterpene glucosides, four five sesquiterpenes, one phenolic acid glucoside and uridine. So far one dimensional and two dimensional Nuclear Magnetic Resonance Spectroscopy techniques have been applied and the data is saved in various research articles by different authors. Moreover, its chemotherapeutic importance has also been indicated ⁴. *Ferula* is the most important genera of Umbelliferae family and has 133 species which are distributed throughout Mediterranean as well as Central Asian areas respectively ⁵. The flora in Iran contains of 30 species of *ferula* and in which fifteen are endemics and popular Persian name “Koma” is given to these endemics species ⁶. Some of the *Ferula Oopoda* species has been used since ancient times in folk medicines for the purpose of their sedative, tonic, aphrodisiac and digestive qualities ⁷. Some of the species of *Ferula Oopoda* have also been used for the remedy of intestinal worms and piles at various regions of Turkey ⁸. Some of the sesquiterpene lactones have also been isolated and reported from the seeds and roots of *Ferula Oopoda* plant ⁹. *Ferula Oopoda* is also found in temperate zones of Northern Baluchistan which grows to the maximum height of two meters ¹⁰. Commonly *Ferula Oopoda* has about 170 species in the largest genera known as *Apiaceae Family* ¹¹.

CHEMICAL AND BIOLOGICAL SIGNIFICANCE OF ESSENTIAL OIL OF *FERULA OOPODA*:

The essential oil of *Ferula Oopoda* species are vital source of aromatic resins which made them more important and useful for industries of cosmetics ¹². Sesquiterpenes Lactone which is the class of Terpenoids made up of isoprene units having molecular formula (C₅H₈) has bitter, stable and colorless properties ^{13,14}. *Ferula Oopoda* is the secondary metabolites with the lipophilic role and isolated from *Apiaceae Family* plant with which *Ferula Oopoda* belongs at

concentration of exceedingly 1% of dry weight of plant ¹⁵. Sesquiterpene lactones are the active constituents of the variety of medicinal plants and traditionally used as medicine for the treatment of inflammatory disorders or diseases ¹⁶. Sesquiterpene lactones also possess huge varieties of pharmacological and biological qualities including antibacterial, cytotoxic, antiviral, antifungal and anti-inflammatory activities ^{17,18}. Terpenoids were actually extracted from the upper most portion of *Ferula Oopoda* boiss and the elucidation of their structures was done by the methods of 1dimensional and two dimensional Nuclear Magnetic Resonance Spectroscopy and all these terpenoids have their various qualities of antiviral, antifungal, antibacterial and anti-inflammatory treatment measures for years ^{19,20}. Two newly sesquiterpenes were also reported in the extracted essential oil of indigenous medicinal plant *Ferula Oopoda* namely Feruhodin-A and Feruhodin-B ²¹. The structures of the two newly reported compounds were elucidated through NMR spectral lines in accordance with other sesquiterpenes ²². In the last ten years the events of the fungal infections in living organisms including human being specially those who were suffering in the skin disorders has increased in numbers. This incident occurred in the tropical and as well as subtropical states of the world; dermatophytes have been the most frequent pathogens. Furthermore, there was also increase in the number of cases of immune-compromised affectee which then frequently flourished profited and as well as superficial skin diseases reported as well ²³. Fungi created such serious conditions of skin disorders in individuals and then all of them were suggested to transplantation of organs was given to all those with the acquired immunodeficiency syndrome was reported as well in persons and patients in intensive care units among others ²⁴. Thus the fungal disorders have emerged as important health problem of public with a high economic cost in last years but various antimycotic remedies or treatments are present in the modern era or period and all these medicines uses are limited due to number of factors such as low solubility, lessened potency, emergency of resistant strains and medicines toxicity in parts of their intensive prophylactic utilizations ²⁵. Hence, despite the development in medicines, there is transparent

need for the discovery of alternatives as novice, safe and most antifungal agents from medicinal plants such as *Ferula Oopoda* ²⁶.

CHEMICAL AND BIOLOGICAL USES AND FUNCTIONS OF ESSENTIAL OIL OF *FERULAOPODA*:

Those plants which have been used in traditional medicines usually contains an important source of new biologically active compounds such as sesquiterpene lactones from the aerial parts of *Ferula Oopoda* plant ²⁷. All the natural products which are standardized extracted materials of plants which provide or release unlimited ways for the productivity of medical items due to the contrast presence of chemical innovations ²⁸. Recently several researches on the evolution of anti-fungal qualities of plants extracted items have been brought out and a number of reports on new anti-fungal items from plants extracted items were reported ²⁹. The extracted essential oils of indigenous medicinal plants constitute one of the most dominant groups, not only for their activity but the synergic effect of it as well when combined with prepared medical doses ³⁰. Many of the species of *Apiaceae Family* in which *Ferula Oopoda* is one of the species of this family are source of the resins of gums used for medicinal purposes due to which the species of *Apiaceae Family* used as traditional medicines for dermatic diseases, stomach disorders and as well as high temperature of the bodies ³¹. Anti-carcinogenic, toxicity of cells or tissues and as well as hormonal effects have also been observed in plants of the *Apiaceae Family* and some of the properties and activities of the derivatives of the genus concerned such as sesquiterpene lactones which acts as an adverse agent the receptors ³². The extracted essential oil of plant materials which is considered as metabolic are now considered as invaluable constituents that have vigorous therapeutic potentials ³³. It is observed that naturally occurring metabolic agents present in plants have pharmacological qualities that have been used by man since last decade and is now the main and dominant aim of drugs or medicines flourishment ³⁴. With an increasing rate and of medicinal plant internationally, the rate of extracted materials of plants have been rised up ³⁵. All the bioactive compounds have been reported to decrease post state hyper-glycemia

by the way of inhibition of carbohydrates digestion catalyst or enzyme, therefore to delay the absorption of glucose. It has been observed that the glucose digestion inhibition and subsequent absorption in the intestinal tract would be useful for the patients of diabetes to regulate glucose level of blood during abnormal conditions³⁶. The controlling of cholinesterase has been noted and reported positively impact or effect on the long term or long period progression of neuro degenerating diseases and in this regard the extracted compounds of plants help to inhibit such type of disorders³⁷. One of the extracted compounds of plants that is from the plant of *Galanthus Woronoeii* and this compound is used for the remedy and treatment of the neuro diseases or disorders³⁸. *Ferula Oopoda* which is an important medicinal plant and specie of *Apiaceae Family* has been used as traditional medicines for years for many of the other remedies such as severe cough, suffocation, respiratory diseases, intestinal worms, piles or hemorrhoids, and as well as all the digestive problems³⁹.

CONCLUSION:

The extracted essential oil of *Ferula Oopoda* is important and vital source of aromatic resins which is used in cosmetic industries. Besides this the essential oil also contains different types of terpenoids such as sesquiterpenes lactones which is the main and dominant compound obtained from essential oil of *Ferula Oopoda* traditionally acts as medicines for bacterial, viral, inflammatory, cytotoxic as well as fungal disorders or diseases in living organisms including human beings. The essential oil extracted from *Ferula Oopoda* through steam distillation is most active in first 12 to 24 hours but with passage of time the extracted oil of *Ferula Oopoda* plant becomes weak in activity due to high volatility rate. The activity of extracted essential oil also decreases with increasing dilutions ratios from 1:10ml to 1:100000ml for various chemical and biological purposes. The extracted essential oil of *Ferula Oopoda* acts as secondary metabolites with lipophilic character at concentration exceedingly 1% of dry weight of the plant of *Ferula Oopoda*. The extracted essential oil has also been showed a little bit tendency to kill the eggs, nymphs and

adults of two spotted apple mites. In long term research based studies, the extracted essential oil of *Ferula Oopoda* has an enormous role and importance for the lives of living organisms and further research based study will also be helpful for the new generation in future.

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REFERENCES:

1. Chemical constituents from *Ferula Oopoda* (Boiss. & Bush) Boiss Sheikh Zain Ul Abidina, Abidah Parveena, Raees Khana, Mushtaq Ahmada, Ikhlas A. Khanb (2013),14%,503-531X.2013.
2. Chemical Composition of the Essential Oils of *Ferula Oopoda* (Boiss. & Buhse) Boiss. And *Ferula badghysi* (Korovin.) from Iran M.R. Akhgar , M. Moradalizadeh , A. Faghihi-Zarandi b & P. Rajaei c a Department of Chemistry, Faculty of Science, Kerman Branch , Islamic Azad University, Kerman , Iran (2015),10.1080/0972060X.2015.
3. Jamal Kasaian, Milad Iranshahy, Milena Masullo, Sonia Piacente, Fatemeh Ebrahimi & Mehrdad Iranshahi (2014) Sesquiterpene lactones from *Ferula Oopoda* and their cytotoxic properties, Journal of Asian Natural Products Research, 16:3, 248-253, DOI
4. Mehrdad Iranshahi1, Farhad Kalategi2, Amirhossein Sahebkar3, Alireza Sardashti2, and Bernd Schneider4, 10.1016/J.inderop.2018.12.012,129,(350-394), (2019).
5. Mozaffarian, V.(1983). Family of Umbelliferae in the Iran, keys and distribution. Research Institution of forests and rangelands press, Tehran, pp.114-116.
6. Mozaffarian, V. (1996). Dictionary of of Iranian Plant names. Farhang Moaser, Tehran, pp. 228-230.
7. M.R. Akhtar, M. Moradalizadeh a , A. Faghihi-Zarandi b & P. Rajaei c a Department of Chemistry, Faculty of Science, Kerman Branch , Islamic Azad University , Kerman , Iran, (2018) 21:2, 420-429.
8. Serkerov, S.V., Rikhlevska, U., Aleskerova, A.N. *et al.* A new guaianolide — Opoferzin from the roots of *Ferula Oopoda*. *Chem Nat Compd* **27**, 274–275 (1991). <https://doi.org/10.1007/BF00630307>.

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9. Serkerov, S.V. Badkhyssidin — A new sesquiterpene lactone from the roots of *Ferula Oopoda*. *Chem Nat Compd* **8**, 181–183 (1972). <https://doi.org/10.1007/BF00565296>.
10. Sayed Majid Bagheri, Amir Hussain, Ahmed Reza Goheri, Maryam Malmir and Mehrdad Iranshahi, 'Evaluation of cytotoxicity of Iranian Medicinal ferula species' *Pharmaceutical Biology*, 48(3), 242-246, 2010.
11. Younus Panahi, Saadat Hussaini, Nahid Khalili, Effat naimi, Muhammad Majeed, Amir Hussain , 34(6),1101-1108, December 01,2015.
12. M.G Pimenov, M.V Loonov, *Turk. J. Bot.* 2004, 28, 139.
13. E. Rodinguez, G.H.N. Towersa, and J.C. Mftcheu, *Phytochemistry* **15**, 1573 (1976).
14. S.V Serkerove , A.N Alskerove , D.M Akhmedove and F.A Rasulove, *Chem. Not. Comp.* **28**, 248 (1992).
15. M. Iranshahi, S.T Hosseni. A.R shahverdi, K. Molazade, S. Suleman khan and V.U Ahmedm, *Phytochemistry* **69**, 2753 (2008).
16. A. Ghantous, H. Gali Muhtasib, H. Vuorela, N.A Saliba and N. Darwiche, *Drug Discov. Today* **15**, 668 (2010).
17. D. Chauterverdi, Sesquiterpene lactones structural diversity and their biological activities, opportunities, challenges and scope of natural products in medicinal chemistry, 1st ed., (research Singpost, Kerala, 2011).
18. M.R.O Kreuger, S. Grootjans, M.W. Biawatti, P. Vandenebeelee, and K. D'Herde, *Anti-Cancer Drugs* **23**, 883 (2012).
19. Shazia Iqbal, Sultana Arifeen, Ali Akbar, Shaista Zahoor, Saima Maher, Noreen Khan, Hafsa Anwar and Asif Sajjad, *Phytochemical Screening and Antibacterial Assay of the crude extracts and fractions of Ferula Oopoda*, *Pure and Applied Biology*, 8(1), 742-749, 2019.
20. Tokur-Olmez, Kaplaner E, Ozturk M, Ullah Z and Duru M.E, *Fatty Acid Profile of four Ganoderma species collected from various host trees with chemometric approach*, *Biochemical Systematics and Ecology*, **78**, 91-97, 2018.
21. C.V Haaftan, C.C Duke, A.M Weerheim, N.P.M Smith, P.M.M Van Haard, F. Darroudi and B.J.M.Z Trimbos, *J. Exp. Clin. Cancer Res.* **30**, 29 (2011).
22. A.A Sallan, Y. Hitptsuyanagi, E.S Mansour, A.F Ahmed, S. Gedara, H. Fukaya and K. Takeya, *Helv. Chim. Acta.* **93**, 48 (2010).
23. Pfaller and M.A Dickema, 2007. *Epidemiology of invasive candidiasis, a persistent public health problem*, *clinical microbial review.* **20**, 133-136.
24. Mathew , B.P Nath. 2009. *Recent approaches to antifungal therapy for invasive mycoses*. *Chemical Medical Chemistry* **4**. 310-323.
25. Bestert, J. Schaller, M. Korting, H.C Evans-2001. *Current and future approaches to antimycotic remedy in the era of resistant fungi*. *International Journal Of Antimicrobial Agents.* **17**, 81-91.
26. Abad, M.J. Ansuategi, M.Bermejo 2007. *Active Antifungal Substances From Natural Sources*, *Arkivok* **7**, 116-145.
27. Portillo, A. Vila R. Adzet T.Cafigueral s. 2001. *Antifungal activity of Paraguayan plants used in traditional medicines*. *J. Ethnopharmacol.* **76**, 93-98.
28. Cos. P. ,Vlietinck, D. Maes and Vander Berge, 2006. *Anti infective potential of natural products*, *Ethnopharmacol.* **106**, 290-302.

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29. Aqil, F., Zahin M., Ahmed I. Awais, M. Khan, M.S.A Bansal, S.S. Farooq. 2010. Antifungal Activity of Medicinal plant extracts and phytocompounds.
30. Rosato, A., Vitali, C. Gallo, D., Balenzano, I., 2008. The inhibition of *Candida* species by selected essential oils and their synergism with phytomedicine 15, 615-618.
31. Gamal-Eldeen, A. Hegazy. 2010. A crystal lapiferen derived from *ferula vesceritensis* induces apoptosis pathway in MCF-7 breast cancer cells, Nat. Prod. Res. 24, 246-257.
32. Zanolli P., Rivasi M., Zawatti M., Brusianii F., Vezzalini F. 2005. Activity of single components of ferula on male rate sexual behavior. Int. J. Impot. Res., 17, 513-518.
33. R. Delgoda, J.E. Murray, Chapter 7- Evolutionary Perspectives on the role of plant secondary metabolites, Pharmacognosy, Academic Press, Boston, 2017, pp- 93-100.
34. E. Patridge, P. Gareiss, M.S. Kinch, D. Hoyar. An analysis of FDA approved drugs, Natural products and their derivatives. Drug Discovery Today 21(2) (2016) 204-207.
35. S.M. Jeelani, G.A Rathar, A. Sharma, S.K Lattoo, In Perspective of Potential Medicinal Plant resources of Kashmir Himalayas, their domestication and cultivation for commercial exploitation. Journal of Applied Research on Medicinal and Aromatic Plants 8 (2018) 10-25.
36. E. Thilagam, B. Parimaladevi, C. Kumarapan, S. Chandra Mandal, alpha-Glucoside and alpha-Amylase inhibitory activity of senna surattensis, Journal of Acupuncture and Meridian Studies 6(1) (2013) 24-30.
37. C.G Ballard, N.H Greig, A.L Guillozet-Bongaarts, A. Enz, S. Darvesh, Cholinesterases: roles in the brain during health and disease, Current Alzheimer's Disease Research 2(3) (2005) 307-318.
38. M.B Colovic, D.Z Krastic, A.M Bonzdic, V.M Vasic, Acetylcholinesterase Inhibitors, Pharmacology and Toxicology, Current Neuropharmacology 11(3) (2013) 315-335.
39. S.Z Ul Abidin, A. Parveen, R. Khan. Z. Ali. Chemical Components from *Ferula Oopoda* (Boiss and Bushes) , Biochemical Ecology and Systematics. 79 (2018) 48-50.