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Corresponding author
Dr. Syed Rizwan Abbas
Email: dr.syedrizwan@kiu.edu.pk

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# Medicinal significance of *Elaeagnus angustifolia* [A review]

**Syed Rizwan Abbas and Abida Khanum**

Department of biological sciences; Hunza campus; Karakorum International University; Gilgit.

**Abstract**
Whenever we wonder our nature we found a lot of blessings .God is so kind to us in context of natural world. Every disorders regarding to skin disease, cardio vascular disease and respiratory disorder can be treated by many natural ways. The Russian olive which is scientifically known as Elaeagenus angustifolia from the family of riparian's which grow in hard and dry climates. It can also grow at river banks. This plant has more than 900 species regarding to a research of 2019. Elaeagenus angustofolia is native plant of western and central Asia, it also found in Asian countries like Pakistan, Iran Uzbekistan, and also famous in America, Russia and many other European countries. This plant is traditionally famous because of its medical importance. All parts of plant are used in different remedies. Regarding Osteo disorders and above mentioned disorders. Zizipn and Hydroxypilin are secondary compounds of Elaeagenus angustofolia which help in nitrogen fixation. These secondary compounds also found in fruits which medically used to treat respiratory problems. It has also healing power. Russian olive is traditionally used as anti-fugal, anti-bacterial, anti-inflammatory and anti-oxidant.

**Keywords:** Elaeagenus angustofolia; Riparian's vegetation; Zizipn; Hydroxypilin; Anti-fungal

## Introduction

Russian olive is a hard condition growing plant; it belongs to riparian family which grows near roads banks of rivers and grows in pastures. It is mostly found in central Asia including Iran, Uzbekistan, and china etc. Russian olive has three genera along with 50 species. People love the wow factor of Russian olive (Worbes et al., 2006).

Elaegnus angustifolia and E. pungens are partially adapted to the center of Asia. Shepherdia canadensis belongs to the Unites-states and Canada. Hippophae rhamnoides is endemic in Europe.

Elaegnus spp. (Plantae>Rosales>Elaeagnaceae>Elaeagnus).

Russian olive is a deciduous and fast growing plant; sometimes its height reaches to 24 to 26 ft tall. With Throney fruits and it having alternate leaves with sliver powder and hairs on it. (Suttie et al., 2003)

Phytochemical studies of E. angustifolia L. fruit extract indicate the presence of flavoniods compounds, polysaccharides, sitosteroles, cardiac glycosides, terpenoids, coumarone, phenol carboxylic acids, amino acids, saponins, carotenoid, vitamins, and tannin.

Russian olive has yellow flowers and its fragrance in simple words Wow! Its flowers are liked umbrella type cluster these flowers has a bell like calyx .In some areas Elaeagnus roots are involved in nitrogen fixation with bacteria frankia. Russian olive segregated by seeds, which can be stored up to 03 years. The dominancy of seed depends on the propagation area. (Hamidpour et al., 2017)

Many studies prove the health benefits of condensed tannins which are present in teas, red wines and some fruits and vegetables, have been proven. Tannins have been shown to have anti-cholesterol, anti-inflammatory, anti-cancer, cardio protective and chemo preventive effects in our body, and in addition increase the angiogenesis activates in the wounded area of skin tissues which assist to lessen the healing time.

Traditionally, it has been used as an analgesic, antipyretic and diuretic herbal medicine. A large number of compounds have been derived from Russian olive and made this plant a source of flavoniods, alkaloids, minerals and vitamins. This review will help us to study the traditional use, the new drug formulation by using the active ingredients (Delgado et al., 2017).

**Secondary compounds / active ingredients**

Flavoniods, Alkaloids, steroids, fatty acid and many other ingredients are found in Russian olive. These compounds are found in aqueous and non-aqueous form of elaegnus angustifolia (Tehranizadeh et al., 2016).

**Flavoniods**

Flavoniods or bioflavonoid comes from a Latin word flavus, meaning yellow, their color in nature .these are a class of polyphenolic secondary metabolites found in plants and thus commonly consumed in diets. Flavoniods are found in the fruit of Russian olive and many other medicinal plants; we can say Flavoniods are simply vitamin p. flavoniods are group of natural substances with variable phenolic structures are found in Russian olive fruit and over all fruits of any medicinal plant , flavoniods also found in vegetables ,grains , bark, roots, stems , flowers, tea and wine. These natural products are well known for their beneficial effects on health and efforts are being made to isolate the ingredients so called flavoniods (Alamgir et al., 2018).

**Chemical structure of flavonoids**

Flavonoids have the general structure of a 15carbon skeleton, which consist of two phenyl rings (A and V) and a heterocyclic ring (C). This carbon structure can be abbreviated C6_C3_C6. According to the IUPAC nomenclature, they can also classified into

- Flavonoids and bio flavonoids
- Iso flavoniods derived from 3 phenylchromen-4-one (3-phenyl-1,4-benzopyrone) structure.
- Neo flavoniods, derived from 4-phenylcoumarine (4-phenyl-1, 2-benzopyrone) structure.

Above three structures of flavoniods carry ketone compounds (Ibrahim et al., 2016).

**Sterols**

Sterols are also known as steroids alcohols are a sub group of steroids and an essential class of organic molecules. They naturally occurred in plants, animals and fungi with the most familiar type of animal sterol being cholesterol .Sterols are found in Russian olive and as secondary metabolites it used as medicines; plant sterols are taken by mouth to control cholesterol level and also help to prevent cardio vascular disorders (Moreau et al., 2002).

The most significant sterol of Russian olive is β-sitosterol. It is found mainly in seeds, leaves and tree branches. Elaeagnoside with a sterol-like structure is derived from the name of this family and present in the fruits of Russian olive .Plant sterols are also known to be used to treat some cancers such as stomach cancer, colon cancer and rectal cancer. These sterols are also used for reduce weight. Sterols are found in seed of Russian olive and it also found in vegetables fruits wheat, germs, whole grains beans sunflower seeds and many vegetable oils (Sabouri et al., 2020)

**Steroids**

Steroids are secondary compounds found in Russian olive. Plant steroids are unique class of chemical compounds that are found throughout the animal and plant kingdom. Some glucocorticoids are steroidal agents used to treat inflammatory disorders; on long term treatment it produces severe side effects. To overcome these adverse effects investigations have to be made to identify the exact or new phytochemicals with therapeutic potentials with no or significantly reduce the side effects .steroids has the fundamental structure of four carbon rings called the steroid nucleus (Albert et al., 2012).

**Fatty acids**

Fatty acid is an essential component of lipids in plants, animal and microorganisms. Fatty acids are found in the fruit, seeds and leaves of Russian olive. As we know it plays a vital role in the storage of energy in our body. The amounts of fatty acids found in plants are dependent on the mass of the plant, the texture of soil and the environment in which the plant is grown (Hildebrand et al., 2010)

**Carbohydrates**

Carbohydrates represent a large group of substances which include sugars, starches, gums and cellulose. Carbohydrates are usually found in the fruit of Russian olive, fructose and glucose are pre dominant monosaccharaid. The dry fruit weight contains 32%, to34% and 23% to 24% of fructose and glucose respectively. During the ripening process of Russian olive the sucrose cleavage into the fructose and glucose (. Myroshnyk et al., 2013)

**Alkaloids**

Alkaloid any of a class of natural occurring organic nitrogen containing bases. Alkaloids have diverse and important physiological effects on humans and on other animals. Morphine, strychnine, quinine, ephedrine and nicotine are well known Alkaloids. These are detected by TLC (Thin Layer Chromatography) of different fractions of Russian olive (Roy et al., 2017).

In Russian olive is elaeagnin or calligonin which is structurally a tetrahydroharman .In the bark of this plant N- Alkaloids are found in roots, bark and aerial parts of the plants. The well-known alkaloid found methyl harmol , N-methyl tetrahydroharmol,Harman, dihydroharman , 2-methyl-1 ,2,3,4- tetra hydro- β-carboline , harmine and harmol are available as well (Tehranizadeh et al.,2016)

**Other ingredients**

Minerals and vitamins play a vital role in the medicinal usage of elaegnus angustifolia .In flowers of Russian olive vitamin A, K and B help in traditional remedies regarding human health.

Potassium is also found in high concentration of 8504mg /kg in plant of E. angustifolia. Phosphorus, sodium, and calcium (flowers) these compounds also found in different parts of Russian olive plant (Farzaei et al., 2015).

**Traditional Remedies which used to treat disorders**

Overall there are many traditional remedies regarding Russian olive , some of the famous and commonly used remedies are discuss below, every part of Russian olive like leaves, flowers, pulp, fruit , bark , and seeds are used to treat many disorders. This is the Wow Factor of Russian olive (Alam et al., 2008).

**In Turkey**

The leaves and fruits of the plant were also famous as diuretics and antipyretic agents. In Turkey, it was common to eat the fruits an hour before the meal as an appetizer. Russian olive was used to treat ulcer or we can say it is anti- ulcer. This remedy was used to cure wounds. It was also used to treat gastric problems. In turkey Russian fruits are also famous to treat kidney stones, also used as anti-inflammatory and anti diarrhea (Usman et al., 2015)

**In Iran**

In Iranian folk medicine, fruits have been used for the relief of pain and inflammation in patients with rheumatoid arthritis and for accelerating the wound healing process in an injured area (Derakhshanfar et al., 2019)

**In Asia**

The most famous remedies regarding cardio vascular disorder were made by the traditional practitioners of china. The silvery powder on leaves help to treat the asthma .the flowers are used to make cosmetics and medicines related skin problems. Many of the plant species growing in Gilgit-Baltistan are used by local people as food, fodder, timber wood, fire wood, and medicine. The famous remedy of Russian olive in Pakistan is two tea spoon of dried pulp powder mixed in glass of milk to treat arthritis problems, backbone pain and to treat colon disorders. In mountainous areas of Pakistan (Gilgit baltistan) leaves of Russian olive stored to feed cows and goats to increase the quality and quantity of milk. In ancient time the barks were used to make tea .before the introduction of tea. The fruits are dried to use as anti-inflammatory, anti-cancer, and also used to treat cardiovascular problems. These plants are also planted to control soil erosion .Overall every part of the plant is used to treat problems regarding our health (Salehi et al., 2018).

**In Russia**

In Russia it is used as appetizer before meal and it also used to treat jaundice and fever. The yellow flowers are used as fragrance and the petals of Russian olive are used to make remedies among skin treatments (Memariani, et al., 2020)

**Russian olive as anti-inflammatory and anti-analgesic**

As we know that animal studies have shown the efficiency of the aqueous and ethanol extract of Russian olive in pain and inflammation treatment. Flavoniods play the main role in this matter although anthocyanins, saponins38 and terpenoids may take part as well. There is also a debate on the success of the extract of this plant on acute or chronic pain (Deligiannidou et al., 2020).

There are many tests done by technicians for e.g.: Formalin test is one of the trustworthy tests in both acute and chronic pain. In the first phase of formalin test, 5 minutes after injection, the direct persuade of the compound on the pain fibers is tested and mostly called as an acute phase. 20 to 30 minutes after injection, the chronic phase or the inflammatory pain starts. As morphine and codeine with a central effect both phases can be suppressed but for some others like non steroid anti-inflammatory drugs (NSAIDs) and steroids only the chronic phase can be effected. As morphine and codeine with a central effect both phases can be suppressed but for some others like non steroid anti-inflammatory drugs (NSAIDs) and steroids only the chronic phase can be effected (Singh et al., 2019 ) .

**Russian olive as gastro intestinal healer**

The Russian olive fruits are broadly used in some parts of Europe and Central Asia for the treatment of peptic ulcer since these extracts increase the development of wound healing tissue in the intestines. In some studies the carotenoid fraction of the fruit oil proved to have a defensive effect against GI ulcers (Dandin et al., 2017).

The result of another study suggests that after applying the methanolic fruit extract of E. angustifolia L. in rats with ethanol induced ulcer, a strong gastro defensive activity was observed in the tissue after conducting the histopathological examination and ulcer index determination. Also a drug called pshatin which is made of E. angustifolia L., a concentration of the fruit polyphenolic compounds, has been used for a long time for the treatment of colitis and other GI tract diseases in Armenia. Further studies are suggested on the pharmacological aspects and mechanism of actions of E. angustifolia L. extract on neurons, in addition to the inhibitory effects of the extract on vascular and respiratory smooth muscle cells (SMC). The advanced phytochemical studies would facilitate and determine the major substances incorporated in variety of biological activates of this plant (Yadav et al., 2018).

**Russian olive as muscle relaxant**

An in vivo study on mice to investigate such effects showed that polar extracts of this plant can exhibit dose dependent effects comparable to diazepam (2 mg/kg). It was suggested that flavones available in such extracts possess a partial agonistic effect on benzodiazepine (BDZ) receptors.

Russian olive flower, leaf and fruits have been used traditionally for the healing a variety of muscle pain related ailments. The use of oleaster flower to treat tetanus in traditional medicine can also be the signal of the muscle relaxant activity of this plant (Wang et al., 2005).

**Russian olive as cardio protective agent**

Elaeagnin, one of the alkaloids of E. angustifolia, was reported as a blood pressure optimizer. It has a tetrahydroharman structure resembling reserpine on the basis of overlay studies of bioinformatics (Torbati et al., 2016).

It can bind reversibly or irreversibly to the human monoamino oxidase A (MAO-A) active site and lower the blood pressure. As elaeagnin can fit with X-ray structure of harmine in MAO-A active site, theoretically, it would be effective as a blood pressure controller like reserpine

(harmine in white and elaeagnin in yellowo harman structure resembling reserpine on the basis of overlay studies of bio informatics (Faramarz et al., 2015).

**Russian olive to treat osteoarthritis**

The traditional practitioners use brewed Russian olive as an analgesic agent to cure or relief pain in rheumatoid arthritis patients. Many studies have shown that flavoniods in extract have, anti-inflammatory effects. It has also components related to muscle relaxants and to treat musculoskeletal disorder (Chang et al., 2018).

**Russian olive also helps in nitrogen fixation**

As we know planting nitrogen-fixing tree species on the distraught lands or inter-planting them with some other crops is a common way to increase the nutrient supplies and bring the efficiency back to the region. E. angustifolia L. which is a salt-tolerant and native to the Central Asia has been used for a long time for many purposes such as fruit, firewood, nectar and honey production, and also for medicinal purposes. E. angustifolia L. is able to cultivate and spread in extensive range of climatic and soil conditions especially in distressed areas (Wu et al,.2018) .In an experiment, the nitrogen-fixation property of E. angustifolia L. in a mixed plantation with a few non-fixing plants was studied in saline and phosphorous-deficient soil conditions. The result showed that with each growing season the amount of nitrogen, organic carbon and plant-available phosphorus increased in the soil significantly. This improvement of the soil fertility is the indication of suitability of the species for the process of a forestation in some distressed lands. The hydroxypolin and zizipn help in nitrogen fixation in plants of Russian olive (Girvan et al., 2003).

**Russian olive as Anti-tumor**

There are several species of Elaeagnus family which are known for their cytotoxic activities against cancer cells such as E. angustifolia L., Elaeagnus umbellate, Elaeagnus pungens and Elaeagnus glabra. There are some bioactive components like triterpenoid, flavonoid, lignanoid and bezenoid isolated from these species which could be responsible for their antitumor activates (Nazir et al., 2020).

**Side effects**

Based on the study, no harmful side effects such as growth delayed or induction of abnormalities were observed in humans or rats, even with the use of high dosages of the extracts. A report explains some allergic patients irritates from pollen of Russian olive (Sellami et al., 2018).

**Conclusion**

Over all the elaegnus angustifolia have been used to cure many disorders like osteoarthritis and cardio vascular disorders. There are many compounds like flavoniods, sterols and minerals etc help to cure many diseases .according too many reports Russian olive is traditionally used as anti-oxidant, healer, and anti-tumour.

Russian olive also used to prevent soil erosion and also help in nitrogen fixation which helps plants to gain more minerals and ingredients (Chang et al., 2018).

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