

**REVIEW ON RHODIOLA: A WONDER HERB SOLO****Sakshi R. Yadav*, Dinesh M. Biyani and Milind J. Umekar**

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ABSTRACT

Rhodiola is a genus of perennial plants in the family Crassulaceae. The aim of this review article was to summarize the information of India's Wonder herb. It has different names like Golden root, Rose root, King's crown etc. Latin Name of Rhodiola is Rhodiola rosea. Roseroot is a typical stonecrop plant, with a sturdy stem, succulent leaves and a waxy covering to reduce evaporation. This plant is easy to spot as it is somewhat tall and it is a succulent. The flowers are yellowish and can have reddish tips. Roseroot flowers are usually dioecious. Leaves are alternate and stalkless. Rhodiola roots contain phenols, rosavin, rosin, rosarin, organic acids, terpenoids, phenolic acids and their derivatives, flavonoids, anthraquinones, alkaloids, tyrosol, and salidroside. It is a popular plant in traditional medical systems in Eastern Europe and

Asia, with a reputation for stimulating the nervous system, decreasing depression, enhancing work performance, eliminating fatigue, and preventing high altitude sickness. "Our research reveals its potential for anti-aging, tissue regeneration, protecting neurons during lack of oxygen, and cognitive improvement," said Sunil Hota, who is investigating medicinal properties of the plant at DIHAR. "While its adaptogenic qualities can help the soldiers in adjusting to the low pressure/low oxygen environment, the plant has also been found to have anti-depressant and appetizer properties," claims Srivastava. This review article will help to use Rhodiola (solo) in pharmaceutical dosage form for their wide uses.

KEYWORDS: Rhodiola, king's crown, dioecious, salidroside, adaptogen, enhance memory.

INTRODUCTION

Rhodiola is a genus of perennial plants in the family Crassulaceae^[1] that resemble Sedum and other members of the family. Like sedums, Rhodiola species are often called stonecrops. Some authors merge Rhodiola into Sedum. **Rhodiola Rosea** is a perennial flowering plant found in cold and in highland regions, is nothing less than a wonder in itself.

Table 1: Scientific Classification.

Kingdom	Plantae
Clade	Angiosperms
Clade	Eudicots
Order	Saxifragales
Family	Crassulaceae
Genus	Rhodiola
Species	R. rosea
Binomial name	Rhodiola rosea L.

Table 2: vernacular names.

Common name (synonym)
Solo in Ladhak (India)
Arctic root
Rhodiola roanensis (Britton) Britton
Golden root
Roseroot
Sedum rhodiola DC.
S.rosea (L) Scop.
S.rosea var. roanense
S. roansense Britton

This herb has extraordinary ability to heal the diseases. It has different names like Golden root, Rose root, King's crown etc. Latin Name of Rhodiola is Rhodiola rosea. The most important quality of this plant is that it can **protect from the "Radioactivity"**, It contains secondary metabolites and phytoactive elements which can mitigate the effect of gamma radiations and thus provides protection against the radioactivity.

In India, it is found in **Ladakh** region where locally called as "**Solo**" and the local people there used to eat its leafy parts. The Defence Institute of Higher Altitude Research (DIHAR) is doing research on this wonder herb regarding to its therapeutic values. This wonder herb is gaining importance in defence field.



Fig.no 1: Tibetan Rhodiola grows in the snow, above the Himalayan snowline.

Many countries like USA, China, India etc are engaged in the research on Rhodiola and trying drive its application in Pharmaceutical as well as in Defence also but not approved by the **Food and Drug Administration (FDA), USA** to utilize to cure any disease. In India, the Leh based lab of Defence Research and Development Organization (DRDO) is researching on this wonder herb for longer period so that it can help the soldiers to adjust in the low pressure regions and where oxygen availability is low.

Leh: In the high hostile peaks of the Himalayas where sustaining life is a challenge in itself, Indian scientists say they have found a “wonder herb” which can regulate the immune system, help adapt to the mountain environment and, above all, protect from radioactivity.

Rhodiola, a herb found in the cold and highland climate, has led India’s leading scientists to wonder if it is the end to the quest for ‘Sanjeevani’, the mythical herb that gave renewed life to Ram’s brother Lakshman in the epic Ramayana.

"A concerted effort involving conservation, propagation and sustainable utilisation of this unique medicinal herb will surely result in rediscovery of Sanjeevani for the troops deployed in extreme climatic condition along Himalayan frontiers," added Srivastava.

Plant Description^[2]

Some Species of Rhodiola are listed below

R. rosea	R. kirilowii
R. alterna	R. pinnatifida
R. brevipetiolata	R. quadrifida
R. coccinea	R. sachalinensis
R. crenulata	R. sacra

R. ellipticum	R. wolongenensis
R. fastigita	R. yunnanensis
R. gelida	R. heterodonta
R. henryi	



Fig.no 2: Morphology of Rhodiola.

Distinguishing Features

Roseroot is a typical stonecrop plant, with a sturdy stem, succulent leaves and a waxy covering to reduce evaporation. This plant is easy to spot as it is somewhat tall and it is a succulent. The flowers are yellowish and can have reddish tips.

Flowers

Roseroot flowers are usually dioecious. The corolla is regular, yellow, and measures about 0.5 to 1 cm (0.2–0.4”) broad. There are four petals measuring about approx. 3.5 mm (0.14”) long on staminate flowers, 2.5 mm (0.1”) long on pistillate flowers. The calyx is fused, 4-lobed, lobes 2.5 mm (0.1”) long, yellow. It is a staminate flower with eight stamens. Inflorescence is a dense, hemispherical cyme. Roseroot flowers bloom from July to August.

Leaves

Leaves are alternate and stalkless. Lowest leaves can be scale-like. Stem leaf blade elliptic–obovate, sharp-tipped, blunt-toothed, flat, glabrous, slightly fleshy, bluish.

Height: Roseroot grow to 40 cm (15") tall. The stem is erect.

Habitat

Roseroot is typically found in crevices of mountain rocks and on sea cliffs. It also grows along stream banks, snow-bed sites, rock shelves, and is an ornamental. It favours growing in the Arctic and coastal regions of North America, regions of Asia, and Europe including the UK.

Edible parts: Young succulent leaves and shoots are eaten raw or cooked. They have a slightly bitter taste. Roseroot leaves can be made into a sauerkraut. Stems can be steamed (or cooked) like asparagus. Root can be used raw or cooked.

Chemical constituents

- About 140 chemical compounds are in the subterranean portions of *R. rosea*. *Rhodiola* roots contain phenols, rosavin, rosin, rosarin, organic acids, terpenoids, phenolic acids and their derivatives, flavonoids, anthraquinones, alkaloids, tyrosol, and salidroside.
- The chemical composition of the essential oil from *R. rosea* root growing in different countries varies. For example, rosavin, rosarin, and rosin at their highest concentration according to many tests can be found only in *R. rosea* of Russian origin; the main component of the essential oil from *Rhodiola* growing in Bulgaria are geraniol and myrtenol; in China the main components are geraniol and 1-octanol; and in India the main component is phenethyl alcohol. Cinnamyl alcohol was discovered only in the sample from Bulgaria.
- Although rosavin, rosarin, rosin, and salidroside (and sometimes *p*-tyrosol, rhodioniside, rhodiolin, and rosiridin) are among suspected active ingredients of *R. rosea*, these compounds are mostly polyphenols. There are no peer reviewed studies demonstrating that these chemicals have any physiological effect in humans that could prevent or reduce risk of disease.
- Although these phytochemicals are typically mentioned as specific to *Rhodiola rosea* extracts, *rosea* and other.
- *Rhodiola* species contain many other constituent polyphenols, including proanthocyanidins, quercetin, gallic acid, chlorogenic acid and kaempferol.

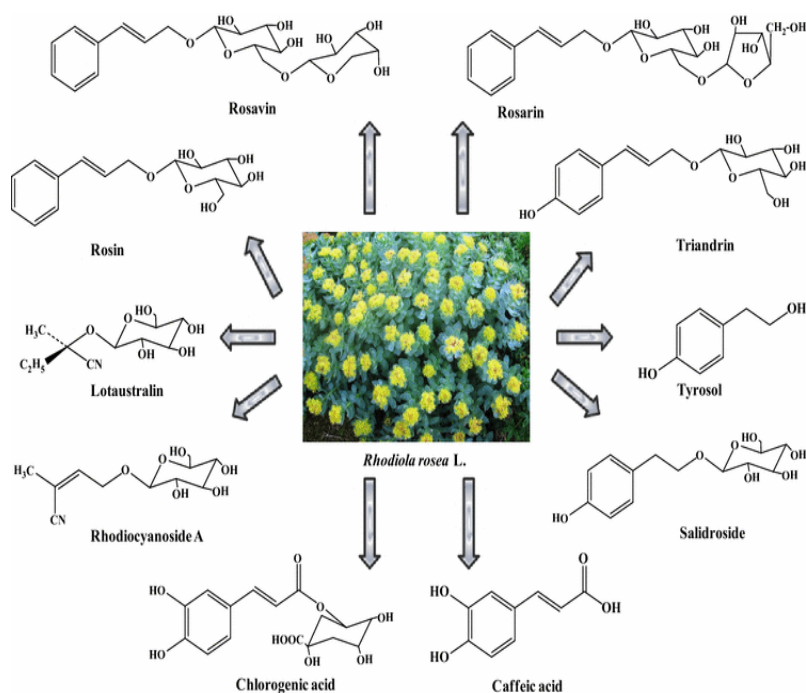


Fig.no. 3: chemical constituents.

The investigation of the phytochemistry of *R. rosea* root has revealed the presence of six distinct groups of chemical compounds.^[1]

Table 3: Chemical constituents.

Phenylpropanoids:	rosavin, rosin, rosarin (specific to <i>R. rosea</i>)
Phenylethanol derivatives:	salidroside (rhodiolside), tyrosol
Flavonoids:	rodilin, rodionin, rodiosin, acetylrodalgin, tricin
Monoterpenes:	rosiridol, rosaridin
Triterpenes:	daucosterol, beta-sitosterol
Phenolic acids:	Chlorogenic and hydroxycinnamic, gallic acid

Geographical Distribution and Taxonomy of *Rhodiola rosea*

Rhodiola likes to grow in sandy soil. It is a plant that lives for more than 2 years, known as A Perennial Plant. It grows naturally at high altitudes, in very cold areas such as Britain, Asia and North America.

Rhodiola is usually found in cold places of Central Asia, North America, Arctic region and highlands of Europe. This plant has wonderful quality of adaptogenic which means it can survive in difficult climatic conditions. It contains more than 140 chemicals due to which it has immense ability to reduce the depression level and regulate the immune system. The most important quality of this plant is that it can **protect from the “Radioactivity”**, It contains

secondary metabolites and phytoactive elements which can mitigate the effect of gamma radiations and thus provides protection against the radioactivity.



Figure 4: Rhodiola.

Locally called ‘Solo’ in Ladakh, the qualities of Rhodiola were largely unknown so far. The leafy parts of the plant were used as vegetable by locals. However, research by the Leh-based Defence Institute of High Altitude Research (DIHAR) is exploring the therapeutic values of the herb that shows it can do wonders for the troops posted in difficult high altitude areas like the 5,400-metres-high Siachen glacier.

While Rhodiola as a genus may have originated in the mountainous regions of Southwest China and the Himalayas,^[3] botanists have established that various species of the genus Rhodiola naturally display a circumpolar distribution in mountainous regions in the higher latitudes and elevations of the Northern Hemisphere. In Central and Northern Asia, the genus is distributed from the Altai Mountains across Mongolia into many parts of Siberia.^[4] According to Hegi, its distribution in Europe extends from Iceland and the British Isles across Scandinavia as far south as the Pyrenees, the Alps, the Carpathian Mountains and other mountainous Balkan regions. Several varieties of Rhodiola species have also been identified across Alaska, Canada, and the northern mountains of the continental United States.^[5] In fact, the world database of botanical literature shows many citations identifying a broad range of species of the genus Rhodiola, in some cases including *R. rosea*, in many diverse locations in northern latitudes.

The current taxonomical status of the genus Rhodiola has become quite complex. Before World War II, some taxonomists separated different species of Rhodiola into an independent genus, belonging to the subfamily Sedoidae.

Then *Rhodiola* was reclassified as a subgenus of the larger genus *Sedum*, which contained about 10 species. In 1963 Hegi identified more than 50 species of *Rhodiola* and re-established them as a separate genus.^[5] Due to their morphological similarities, they form a distinct *Rhodiola* group.^[6] There are still differing opinions among specialists about which new species should or should not be included in the genus *Rhodiola*. The rationale and defining criteria for the boundaries of the genus remain somewhat controversial. This is not, in itself, necessarily counterproductive, since the acquisition of botanical knowledge inevitably stimulates new understanding and insight, creating the need for revised systems of classification. In the case of *R. rosea*, however, this taxonomic ambiguity may have unexpected and potentially negative consequences.

Popularizing a phytomedicinal plant like *R. rosea* can create confusion when the public is offered a variety of "Rhodiola" products using the general plant family name instead of the full botanical name of the particular species. For example, products called "Rhodiola spp., Tibetan Rhodiola or Indian Rhodiola" may incorrectly imply equivalence with *R. rosea* extract. Because of significant species-dependent variation in phytochemistry and pharmacology, the use of "Rhodiola" as a general term is inaccurate and misleading. The correct identification of all *Rhodiola* species according to precise and generally accepted botanical, phytochemical, and genetic taxonomic criteria is not merely an abstract intellectual exercise. It is critical for both scientific and phytopharmacological accuracy, as well as for product labeling for the public. Consumers may need professional guidance to avoid purchasing ineffective brands, particularly those that do not provide full information, including the complete botanical name of the plant species. Companies may change their suppliers over time. Therefore, consumers should periodically check independent sources of product evaluation, as well as requesting information about quality control and content from manufacturers.

The pharmacological and medicinal properties of *Rhodiola* are species-dependent phenomena.^[7] Of all the *Rhodiola* species, *R. rosea* has been the predominant subject of phytochemical, animal, and human studies. Approximately 51 percent of all animal studies and 94 percent of all human studies^[9] conducted on plants in the genus *Rhodiola* are on the species *R. rosea*. Only *R. rosea* has passed extensive toxicological studies and has been certified safe for both animals and humans.^[10]

Rhodiola is also found in the US and China, where the herb is used in traditional Chinese medicine for combating altitude sickness. In Mongolia, physicians prescribed it for tuberculosis and cancer. Additionally, researchers in Russia studied its impact on athletes and cosmonauts.

It is a popular plant in traditional medical systems in Eastern Europe and Asia, with a reputation for stimulating the nervous system, decreasing depression, enhancing work performance, eliminating fatigue, and preventing high altitude sickness.

Pharmaceutical uses^[11]

Though little known as a medicinal plant, rose root has been used in traditional European medicine for over three thousand years, mainly as a tonic. Modern research has shown that it increases the body's resistance to any type of stress by regulating the body's hormonal response. Its use has been shown to have a protective effect upon the neurotransmitters such as serotonin and dopamine in the brain. It improves neurotransmitter activity by inhibiting their enzymatic destruction and preventing their decline caused by excessive stress hormone release. Rose root also enhances the transport of serotonin's precursors into the brain and studies have shown that use of this herb can increase brain serotonin by up to 30%. The root is adaptogen. It has an enhancing effect upon physical endurance and sexual potency. A decoction of the flowers has been used to treat stomach aches and intestinal discomfort. The raw flowers have been eaten in the treatment of tuberculosis. Also it has different properties adaptogenic, anti-ageing, anti-cancer, anti-depressant, anti-mutagenic, anti-oxidant, cardioprotective.

Benefits

Rhodiola rosea is a remarkable herb that has a wide and varied history of uses.

It is thought to strengthen the nervous system, fight depression, enhance immunity, elevate the capacity for exercise, enhance memory, aid weight reduction, increase sexual function and improve energy levels.

It has long been known as a potent adaptogen. Adaptogens are substances that increase the body's overall resistance and help to normalise bodily functions.

Rhodiola has a legendary history dating back thousands of years. In 77 A.D., the Greek physician Dioscorides documented the medical applications of the plant, which he then called *rodia riza*, in his classic medical text *De Materia Med.*

The Vikings depended on the herb to enhance their physical strength and endurance, while Chinese emperors sent expeditions to Siberia to bring back "the golden root" for medicinal preparations.

The people of central Asia considered a tea brewed from *Rhodiola rosea* to be the most effective treatment for cold and flu. Mongolian physicians prescribed it for tuberculosis and cancer.



Figure 5: Benefits.

Indicated for

Amenorrhea, asthenia, cancer, cardiac problems, colds and flu, debility (symptoms of asthenia), depression, enhancing thyroid and thymus gland function and immune system, fatigue, headaches, hypertension, improving hearing, improving sexual function. Increasing attention span, mental performance, alertness and memory, physical exercise ability, strength and mobility. Insomnia, maintaining energy levels, premature ejaculation, preventing stress-induced cardiac damage, protect the liver from environmental toxins, quicker muscle recovery, regulating blood sugar levels for diabetics, SAD (seasonal affected disorder), schizophrenia, sexual dysfunction (male), stress, weak erections.

Researching rhodiola

Rhodiola is locally known as 'Solo' in Ladakh, a region that falls under Indian state of Jammu and Kashmir.

The leafy parts of the plant were used as a vegetable. But research by Leh-based Defence Institute of High Altitude Research (DIHAR) has shown the herb can help military troops working in high altitudes, such as the 54, 000m Siachen glacier, located in the eastern Karakoram range of the Himalayas.



Fig.no 6: Rhodiola with roots.

"Rhodiola is a wonder plant that has immunomodulatory (enhancing immune), adaptogenic (adapting to difficult climatic condition), and radio-protecting abilities, due to the presence of secondary metabolites and phytoactive compounds unique to the plant," R.B. Srivastava, director, DIHAR, has been quoted saying to IANS.

This is not the first research related to Rhodiola, the Leh-based lab of the Defence Research and Development Organisation (DRDO) has been researching on the herb for more than a decade.

Qualities of Rhodiola

The Rhodiola herb can reduce the effects of gamma radiation used in nuclear bombs.

The other qualities of the plant include accelerating recovery after heavy exercise, enhancing memory, and reducing cardiac stress.

"Our research reveals its potential for anti-aging, tissue regeneration, protecting neurons during lack of oxygen, and cognitive improvement," said Sunil Hota, who is investigating medicinal properties of the plant at DIHAR.

"While its adaptogenic qualities can help the soldiers in adjusting to the low pressure/low oxygen environment, the plant has also been found to have anti-depressant and appetizer properties," claims Srivastava.

Rhodiola has 7 top health benefits

1. Fights depression
2. Reduces stress
3. Aids muscle recovery
4. Enhances memory
5. Effective for cardiac problems
6. Increases body's resistance to toxins
7. Stimulates and protects immune system

Rhodiola pharmacological uses^[12]

Depression

In animal studies, extracts of rhodiola, seem to enhance the transport of **serotonin** precursors, tryptophan, and 5-hydroxytryptophan into the brain. Serotonin is a widely studied brain neurotransmitter chemical that is involved in many functions including, smooth muscle contraction, temperature regulation, appetite, pain perception, behavior, blood pressure and respiration. When balanced, it imparts a sense of contentment and mental ease. Either too much or too little serotonin on the other hand has been linked to various abnormal mental states such as clinical depression. Thus rhodiola has been used by Russian scientists alone or in combination with antidepressants to boost one's mental state, a boon in countries and seasons where one is deprived of adequate sun over prolonged periods of months. This leads to a condition known as SAD or Seasonal Affective Disorder, common to Northern European countries.

Stress

Rhodiola rosea has long been known as a potent **adaptogen**. Adaptogens are natural plant substances that increase the body's non-specific resistance and normalise the functions of the body. When a stressful situation occurs, consuming adaptogens generates a degree of

generalised adaptation (or non-specific resistance) that allows our physiology to handle the stressful situation in a more resourceful manner. It is believed that adaptogens work by increasing the ability of cells to manufacture and use cell fuel more efficiently.

Since *Rhodiola rosea* administration appears to impact central monoamine levels, it might also provide benefits and be the adaptogen of choice in clinical conditions characterised by an imbalance of central nervous system monoamines. This is consistent with Russian claims for improvements in depression and schizophrenia. It also suggests that research in areas such as seasonal affective disorder, fibromyalgia, and chronic fatigue syndrome, among others, is warranted.

There have also been claims that this plant has great utility as a therapy in asthenic conditions (decline in work performance, sleep disturbances, poor appetite, irritability, hypertension, headaches, and fatigue) developing subsequent to intense physical or intellectual strain, influenza and other viral exposures, and other illness. Two randomised, double-blind, placebo-controlled trials of the standardised extract of *Rhodiola rosea* root (SHR-5) provide a degree of support for these claimed adaptogenic properties.

Muscle Recovery

Rhodiola rosea has been shown to shorten recovery time after prolonged workouts, to increase attention span, memory, strength, and anti-toxic action. *Rhodiola rosea* extract increases the level of enzymes, RNA, and proteins important to muscle recovery after exhaustive exercise. It also stimulates muscle energy status; glycogen synthesis in muscles and liver; muscle protein synthesis and anabolic activity.

Memory

Studies using proofreading tests have demonstrated that *Rhodiola rosea* enhances memorisation and concentration ability over prolonged periods. It increases the bioelectrical activity of the brain which improves memory and brain energy.

In one study, forty students were randomised to receive either 50 mg standardised *Rhodiola* extract or placebo twice daily for a period of 20 days. The students receiving the standardised extract demonstrated significant improvements in physical fitness, psychomotor function, mental performance, and general wellbeing. Subjects receiving the *Rhodiola rosea* extract also reported statistically significant reductions in mental fatigue, improved sleep patterns, a

reduced need for sleep, greater mood stability, and a greater motivation to study. The average exam scores between students receiving the *Rhodiola rosea* extract and placebo were 3.47 and 3.20, respectively.

Cardiac Problems

Rhodiola has also been shown to be effective for cardiac problems caused or aggravated by stress. Its action for these conditions is in its ability to decrease the amount of catecholamines and corticosteroids released by the adrenal glands during stress. The abnormal presence of these stress hormones will subsequently raise blood pressure, cholesterol, **potassium** levels and increase risk factors for heart disease. *Rhodiola* has been found to decrease harmful blood lipids and thus **decrease the risk of heart disease**. It also decreases the amount of cyclic-AMP (c-AMP) released into cardiac cells. Cyclic AMP is related to ATP (adenosine triphosphate), the body's primary energy molecule. C-AMP acts as a 'second messenger' or liaison between the outer and inner environments of the cell. It assists in the uptake of more intracellular **calcium** into the heart thus promoting a greater potential for heart muscle contraction. *Rhodiola* thus regulates the heartbeat and counteracts heart arrhythmias.

Cancer

Rhodiola has been shown to increase antitumor activity by increasing the body's resistance to toxins. A range of antioxidant compounds have been identified in *Rhodiola rosea* and related species and significant free-radical scavenging activity has been demonstrated for alcohol and water extracts of *Rhodiola*. *Rhodiola rosea* might be useful in conjunction with some pharmaceutical anti-tumour agents. According to the information from Russian researchers have found that the oral administration of *Rhodiola* inhibited tumour growths in rats by 39% and decreased metastasis by 50%. It improved urinary tissue and immunity in patients with bladder cancer. In other experiments with various types of cancer, including adenocarcinomas, the use of extracts of *Rhodiola Rosea* resulted in significant increased survival rate.

Immune System^[13]

Rhodiola both stimulates and protects the immune system by reinstating homeostasis (metabolic balance) in the body. It also increases the natural killer cells (NK) in the stomach and spleen. This action may be due to its ability to normalise hormones by modulating the release of glucocorticoid into the body.

Bipolar Disorder

Two sources warn against rhodiola use in persons with bipolar disorder. But some experts (Brown et al.) believe, based on clinical experience, that moderate doses of rhodiola can be helpful in persons with bipolar disorder who are taking mood stabilizers and whose mood swings are primarily depressive with only occasional mild hypomanic symptoms. This requires working closely with a physician if there is any chance of bipolar "cycling."

Adjunctive Use

When combined with tricyclic antidepressants, rhodiola use has been associated with reduction of antidepressant side effects, particularly sedation fatigue and sexual dysfunction, as well as an improvement in depressive symptoms. Brown et al. state that they use rhodiola as an adjunctive treatment in depression because it "increases mental and physical energy" and "improves mood and stress tolerance."

Anxiety

Brown et al. note that rhodiola also can be useful in the treatment of anxiety, and a recent open-label study supports this use.

Chronic Fatigue Syndrome, Fibromyalgia Syndrome, and ADHD

Brown et al. add that their clinical experience shows rhodiola to be beneficial in chronic fatigue syndrome and fibromyalgia syndrome. It is also a useful adjunctive treatment in attention deficit disorder (ADHD), since it activates cognition and tends to improve accuracy, alertness and attention.

Exhaustion, Decreased Motivation, Daytime Sleepiness, Decreased Libido, Sleep Disturbances, and Cognitive Complaints

Iovieno et al. state that rhodiola is effective in treating physical deficiencies such as exhaustion, decreased motivation, daytime sleepiness, decreased libido, sleep disturbances, and cognitive complaints such as concentration deficiencies, forgetfulness, decreased memory, susceptibility to stress, and irritability.

Other Benefits

Many other benefits from the use of Rhodiola has been found including its ability to improve hearing, to regulate blood sugar levels for diabetics and protect the liver from environmental toxins. It has been shown to activate the lipolytic processes (fat breakdown) and mobilise

lipids from adipose tissue to the natural fat burning system of our body for weight reduction. It can also clinically enhance thyroid function without causing hyperthyroidism, enhance thymus gland function and protect or delay involution that occurs with ageing. It can also improve your adrenal gland reserves without causing hypertrophy. Throughout the years it has shown to substantially improve erectile dysfunction and/or premature ejaculation in men and normalises their prostatic fluid.

Rhodiola Herb Side Effects^[11]

Rhodiola's 3 main side effects

- Increased blood pressure
- May thin blood
- Nervous Excitability

Rhodiola has few side effects; however, some people report increased blood pressure. Rhodiola may thin your blood, so discontinue use before surgery and consult your doctor if you take blood-thinning medications like Coumadin (warfarin) or supplements like vitamin E.

Although rare, certain individuals who experience nervous excitability, feverish states, and hypertension, should not use rhodiola unless supervised by a qualified practitioner. Persons who experience coronary spasm and fluctuations in arterial pressure should also use under supervision.

To date, the medical literature has not reported any adverse effects related to foetal development during pregnancy or to infants who are breast-fed. Yet little is known about the use of this dietary supplement while pregnant or breast-feeding. Therefore, it is recommended that you inform your healthcare practitioner of any dietary supplements you are using while pregnant or breast-feeding.

To date, the medical literature has not reported any adverse effects specifically related to the use of this dietary supplement in children. Since young children may have undiagnosed allergies or medical conditions, this dietary supplement should not be used in children under 10 years of age unless recommended by a physician.



Benefits and evidence^[14,15]

The evidence for *Rhodiola rosea*'s health claims varies. The following are some of its popular uses and what research says about each one. The health benefits of this herbal root are probably linked to anti-inflammatory properties it may have.

Stress

Rhodiola rosea is a flowering herb that has been used in traditional medicine for many years. One of the best-known claims about *Rhodiola rosea* is its power as a substance that helps the body adapt to stress, otherwise known as an adaptogen.

Its specific abilities and qualities, however, have not yet been scientifically proven with enough well-designed studies.

A report published in *Alternative Medicine Review* found that *Rhodiola rosea* shows promise as an adaptogen. Based on evidence from several small studies, the author states that the plant's extracts provide benefits for mental health and heart function.

Another 2005 article describes *Rhodiola rosea* as "a versatile adaptogen," stating that the herb can increase resistance to stress. In particular, the authors state that it holds promise as a possible treatment for reducing stress hormone levels and stress-induced heart problems.

Physical and mental performance

Some people take *Rhodiola rosea* to enhance physical performance before exercise or as a way to improve concentration and thinking. There are also claims that it helps reduce physical and mental fatigue.

A number of studies touch on these claims. They include the following

- Some review that states *Rhodiola rosea* may hold promise as an aid for enhanced physical and mental performance.
- A study in 2009 found that women who took a high dose of *Rhodiola rosea* were able to run faster than those who got a placebo. The study examined 15 college-age women.
- Another study suggests that taking a standardized extract of *Rhodiola rosea* may improve concentration and reduce fatigue. The research looked at 60 men and women, who took an extract called SHR-5. The dosage given for these effects was 576 milligrams (mg) per day.



Depression and anxiety

One study found evidence to suggest that *Rhodiola rosea* may reduce symptoms of generalized anxiety disorder. Ten people were included in this study, and they took 340 mg of *Rhodiola rosea* extract for 10 weeks.

Another study in *Phytomedicine* found that *Rhodiola rosea* reduced symptoms of depression, but its effects were mild. The herb did not reduce symptoms as effectively as sertraline, a prescription antidepressant, although it had fewer and milder side effects.

The authors of this 2015 study concluded that, as it may be better tolerated by some people and did provide benefit, *Rhodiola rosea* may be suitable as a treatment for mild to moderate depression. The study included 57 people who took the herb for 12 weeks.

Stress-induced eating disorders

An active ingredient in *Rhodiola rosea* known as salidroside, was studied for its effects on binge eating. This study, published in *Physiology & Behavior*, was done using rats. It found

that a dry extract of *Rhodiola rosea* that included 3.12 percent salidroside did help reduce or eliminate binge eating in the animals.

The rats that took *Rhodiola rosea* also had lower blood levels of a stress hormone that may play a role in binge eating.

Another study in the *Journal of Psychopharmacology*, similarly conducted on rats, determined that *Rhodiola rosea* may reduce stress-induced anorexia. The authors say their findings provide evidence to support claims that the herb has anti-stress properties.

How to take it^[12]

Rhodiola rosea is available in many forms. Any side effects experienced will likely be mild. Like many herbs, *Rhodiola rosea* is available in the form of capsules, tablets, dried powder, and liquid extract.

The dosage and amount of extract varies between brands and product types.

Herbs and supplements are regulated as food, not drugs, by the United States Food and Drug Administration (FDA).

As a result, knowing what dose to take and how much is included in the product is not always clear. There may also be issues with quality or purity.

Although some studies have listed dosages used for specific purposes, it appears that the herb may be taken at different strengths to treat different problems. In the Alternative Medicine Review article, the author says the dosage may vary, depending on how much standardized extract it contains. Rosavin, in particular, is one of the compounds named as having an effect on reducing stress.

CONCLUSION

Rhodiola is a wonder herb belonging to family Crassulaceae. *Rhodiola rosea* is a flowering herb that has been used in traditional medicine for many years. *Rhodiola* is a very promising treatment for stress and mild to moderate depression and as a neuroprotectant and is promising for a number of other mental health conditions. The risk of drug interactions and side effects is minimal. This herb has extraordinary ability to heal the diseases. It having about 140 chemical compounds are in the subterranean portions of *R. rosea*. *Rhodiola* roots

contain phenols, rosavin, rosin, rosarin, organic acids, terpenoids, phenolic acids and their derivatives, flavonoids, anthraquinones, alkaloids, tyrosol, and salidroside. The most important quality of this plant is that it can **protect from the “Radioactivity”**, It contains secondary metabolites and phytoactive elements which can mitigate the effect of gamma radiations and thus provides protection against the radioactivity. As rich of all the important, the Rhodiola commonly considered as Wonder herb will be useful for preparation of pharmaceutical formulation to treat many diseases. Its potential for anti-aging, tissue regeneration, protecting neurons during lack of oxygen, and cognitive improvement, Its formulation will be useful for our Soldiers for providing benefits to them.

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