

**Monograph of medicinally important plant *Catharanthus roseus***

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**Abstract:** *Catharanthus roseus* commonly known as sadabahar is a well known plant for its abundant growth and flowers in many parts of world. However the plant also possesses several medicinal properties such as anti-cancer, anti-diabetic, antifungal activity, antibacterial activity, etc. This medicinal potential of the plant can be attributed to presence of several bioactive phytochemical compounds synthesized in the plant. Among different metabolites alkaloids are the most important class of compounds synthesized in almost all parts of the plant including root, stem, leaves and flowers. Besides having medicinal potential plant has also been characterized to be toxic. .

**Keywords:** *Catharanthus roseus*, Morphology, medicinal value, phytochemistry

## INTRODUCTION

*Catharanthus roseus* is an important medicinal plant. It is commonly known as Madagascar periwinkle, or sadabahar. It is widely distributed in India, China, Indonesia, Phillipines, Madagascar, South Africa, USA and Australia. It is found in rainforest of south eastern and eastern Madagascar in tropical and subtropical areas of world. It is well grow in Australia. It grows well in sandy loam soil (Sain and Sharma 2013). The plant is found in subtropical and tropical regions where temperature is never below 5-7°C, also the plant naturally occurs as a warm season bedding plant in temperate region. Plant survives in hot and humid habitat and exhibits normal growth in area of full sun as well as in shady region. However the propagation of plant is sensitive to excessive watering. Also the plant is unable to tolerate frost. The plant is known to be propagated through seeds as well as by cuttings. This plant is commercially cultivated for medicinal as well as for ornamental purpose.



**Fig. 1: Images of different types of flowers of *Catharanthus roseus***

Table 1(a) represents taxonomic position and table 1 (b) represents various regional name by which *C. roseus* is known in different languages.

Table 1(a) **Taxonomic position**

Table 1(b) **Regional name**

Kingdom	Plantae	Common name	Periwinkle
Phylum	Angiosperms	Hindi	Sadabahar
Class	Asterids	Bengali	Nayantara
Order	Gentianales	Oriya	Visayan
Family	apocynaceae	Punjabi	Rattan jot
Genus	Catharanthus	Malayalam	Shavam naari
Species	<i>C. roseus</i>	Marathi	Sadaphuli

### **Morphology of *C. roseus***

*C. roseus* is evergreen small shrub whose shoot length has been reported to be upto 1m. Leaves of the plant are oval to oblong in shape which are 2.5-9 cm long and 1-3.5 cm broad, glossy green in colour with pale midrib and short petiole which are arranged in opposite pair. Stems are somewhat cylindrical which are either longitudinally ridged or narrowly winged. Stem are green or dark red in colour and are pubescent in nature atleast when they are young. Variation in pattern of flower colour have been reported in plants grown in different regions but in common flowers are white to pink, somewhere they are purplish. Flowers are pollinated by insects (moth,

butterfly). The plant also exhibits self pollination. As indicated by its common name sadabahar the plant is known to flower throughout the year. However summer season from June to frost is most appropriate time period for flowering. Fruit is a pair of follicles 2-4 cm long and 3mm broad. Sepals 5, 2-6 mm long, narrow, usually with hairs (pubescent). Corolla is present with long and narrow tube and lobes which are spread perpendicular to the tube. corolla tube are generally possess a minimum length of 2.2 cm long and are green in colour. Lobes present in corolla are five in number and either pink to white or pinkish purple in colour. Anthers are five in number which are attached to the inside of the corolla tube in the upper portion and concealed within it.

### Phytochemistry of *C. roseus*

In *Catharanthus roseus* each part of plant has been reported to possess several bioactive compounds belonging to different classes such as alkaloids, flavanoids, terpenoids and tannins. All these compounds exhibit one or the other biological activity. The flower part contains more amount of tannins and triterpenoids and alkaloid compounds which have been very effective for wound healing and antidiabetic property. Leaves are rich in carbohydrate and alkaloids, whereas roots and stems of plant have rich content of quinones which has antibacterial property. The root part of *C. roseus* is rich in ajmalicine and serpentine which are used as anti-hypersensitive drug. Among different types of compounds alkaloids are most important bioactive metabolite of *Catharanthus roseus*. Table 2 and 3 represent different alkaloid produced by different part of the plant and role of different alkaloids respectively.

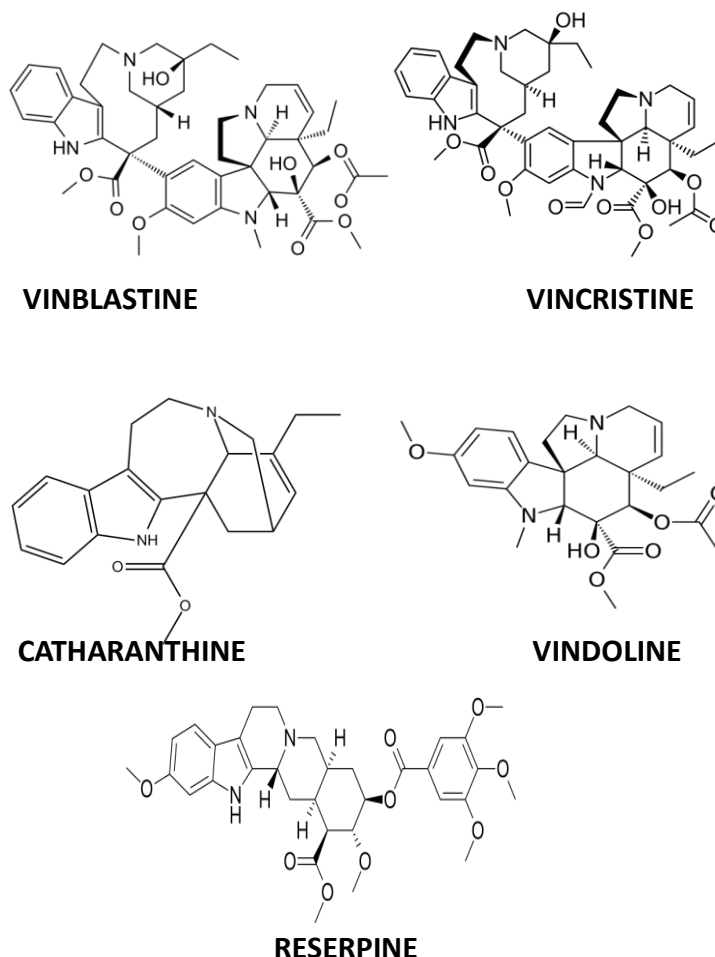
**Table2: Different alkaloid present in various parts of *Catharanthus roseus***

Parts of plant	Biochemical compounds (alkaloid)
Leaf	Catharanthine, vinblastine, vincristine, leurosine ,lochnerine, vindoline
Stem	Leurosine, lochnerine, catharanthine, vindoline.
Root	Catharanthine , vindoline, leurosine, reserpine, alstonine
Flower	Catharanthine, vindoline, leurosine , lochnerine, triclin
Seed	Vingramine, methylvingramine

**Table 3: Role of various alkaloid found in *Catharanthus roseus***

Alkaloid	Role
Vinblastine	Helpful in treatment of number of types of cancer
Vincristine	Also treat various cancer like acute myloid leukemia, hodgkin's disease, neuroblastoma and small lung cancer
Catharanthine	Catharanthine is precursor pf anti-tumor drugs vinblastine and vincristine

Leurosine	Precursor precursor of anti-tumor activity
Vindoline	Chemical precursor to vinblastine
Reserpine	Use for the control of high blood pressure , controlling heart rate



**Fig. 2: Some important alkaloid/ metabolite found in *Catharanthus roseus***

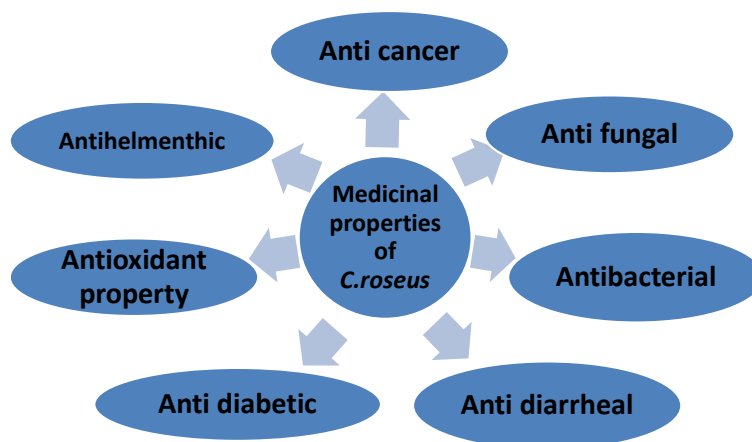
### Medicinal properties

Several studies conducted have reported the plant to possess many medicinal properties. In traditional uses, it is used to treat wasp sting with its juice. The extracts prepared from root and shoots of the plant are utilized in treatment of several diseases, the most important one includes cancer. Present of bioactive metabolites vinblastine and vincristine have been reported to possess anticancer activity. Among different alkaloids produced synthesized in *C. roseus* vinblastine increase chance of surviving childhood leukemia while vincristine is utilized in treatment of Hodgkin's disease. The plant has also been reported to improve blood supply to brain and increase level of oxygen and glucose utilised by brain. Plant has also been found to be effective in prevention of abnormal blood clotting.

The plant is known to possess antifungal properties. Kumara and Gupta (2013) reported antifungal properties of *C. roseus* against different fungal species including *Fusarium moniliforme*, *Candida albicans*, *Aspergillus niger* and *Aspergillus fumigatus*. In this study it was reported that organic solvent exhibited better antifungal activity as compared to aqueous extract. Along with antifungal the plant extract is effective to restrict growth of several bacterial species as well. Ethalsha and Ratna (2014) evaluated antibacterial activities of *C. roseus*. Chloroform extract has been reported to be most effective as compared to other extracts. Also antibacterial activity of plant is more effective against gram positive bacteria as compared to gram negative bacteria. In another study Prajakta *et al* (2010) also reported antibacterial activity of the plant against bacterial species *Salmonella typhimurium*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. Plants possessing antioxidant properties have gained importance in recent past. *C. roseus* is one such plant which also possesses antioxidant activities. Patharajan and Abirami (2014) reported antioxidant potential of *C. roseus*. The plant is reported to be a source of natural antioxidants. Ethanolic extract prepared from leaves of *C. roseus* has been reported to exhibit antidiarrheal activity. (Sain and Sharma 2013).

Aruna *et al* (2015) have documented several medicinal uses of *C. roseus* in different parts of the world. In Africa leaves of the plant are used in treatment of rheumatism and menorrhagia. In India leaves of plant are applied on skin for numbing and for neutralizing effect of bee and wasp sting. In regions of Madagascar leaves of plant are utilized to induce vomiting, roots are used in treatment of toothache for hemostatic and anti-helminthic purposes. In Malaysia, *C. roseus* is utilized to reduce hypertension, in diabetes, insomnia and treatment of cancer. In Hawaii prepared plant extract is boiled and utilized to stop bleeding. In region of Nigeria as well as West Indies the plant is used for the treatment of diabetes. Plant is utilized for treatment of flatulence, tuberculosis and asthma. Plant extract is gargled in region of America during sore throat laryngitis. The plant has also been reported to possess antidiabetic activity (Brahim *et al* 2011). Agarwal *et al* 2011 in their study *Pterithema posthuma* was utilized as a model study. Nayak *et al* 2007 reported wound healing properties of *C. roseus*.

Besides these several medicinal properties the side effect of plant includes poisonous nature of plant due to presence of specific phytochemical compounds like vindoline, leurosine, catharanthine etc. Along with above mentioned medicinal properties plant has also been reported to possess phytoremediation potential as exposed *Catharanthus roseus* accumulates heavy metal like cadmium (Sain and Sharma 2013).



**Fig.3 : Medicinal properties of *Catharanthus roseus***

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