Available online at
http://agrospheresmagazine.vitalbiotech.org/

ISSN (E): 2582 – 7022

Agrospheres:e- Newsletter, (2026) *7*(4), 23-28

Article ID: 940

Phytochemical Constituents and Pharmacological Potential of Sarpagandha

Kopal Mahlonia[1], Gyanendra Tiwari[2], Yogendra Singh[3*], Rahul Hedau [4] and Alin Meshram[5]

[1]M. Sc. Research Scholar, Department of Plant Physiology , JNKVV, Jabalpur (M.P)
[2]Professor & Head , Department of Plant Physiology , JNKVV, Jabalpur (M.P)
[3]Assistant Professor (Senior Scale)-Biotechnology, Department of Genetics and Plant Breeding, JNKVV, Jabalpur (M.P)
[4]M. Sc. Research Scholar, Department of Horticulture, JNKVV, Jabalpur (M.P)
[5]M. Sc. Research Scholar, Department of Mathematics & Statistics, JNKVV, Jabalpur (M.P)

*Corresponding Author
Yogendra Singh*

Article History
Received: 25. 3.2026
Revised: 30. 3.2026
Accepted: 4. 4.2026

INTRODUCTION

Herbal medicine has been gaining popularity as a natural, cost-effective alternative to modern medication. It aims to reduce side effects and cure diseases more effectively. The use of herbal remedies in evidence-based medicine is still up for discussion. The research of natural sources for bioactive substances has significantly pushed the search for novel treatments for a range of health diseases, despite concerns about the quality control and dependability of herbal medications. In traditional medicine, *Rauwolfia serpentina*, which is also known as Sarpagandha, Chandrabhaga, Snake root plant, Chotachand, Chandrika, and Harkaya, is highly valued for its medicinal qualities. The medicinal properties of *Rauwolfia serpentina* make it a significant component of traditional medicine. In India, the roots of *R. serpentina*, were used in traditional medicine to treat anxiety, psychotic behaviour, schizophrenia, insanity, sleeplessness, and epilepsy. It has been used as an anthelmintic and has been used to treat dangerous bites from snakes and insects, and treat intestinal diseases, cholera, and colic. Given the plant's significant traditional use and therapeutic potential, this review will look at the botanical description, chemical ingredients, and different medicinal applications of *Rauwolfia serpentina*. Evaluating *R. serpentina's* pharmacological and phytochemical qualities can help us comprehend its potential as a natural cure for many diseases.

Morphological Description;

- The plant is a perennial under shrub, growing to a height of 60-90 cm.
- Its leaves are simple, elliptic or lanceolate, glabrous, bright-green above and pale green beneath, pointed and occurring in whorls of 3-5.

ISSN (E): 2582 – 7022

- The inflorescence is a many flowered corymb with white or pink flowers. The fruit is a drupe, shiny black when fully ripe.
- The root system consists of a prominent, tuberous, soft tap root reaching a length of 30- 50 cm in a 2-year-old plant. Its diameter at the thickest portion varies from 1.2 to 2.5cm. The root-bark, which constitutes 40-60% of the whole root, is rich in alkaloids.
- The fresh roots emit a characteristic acrid aroma and are very bitter in taste. *Rauwolfia* root is the source of the important crude drugs used in modern medicine and also in Ayurveda, Unani and folk medicine. It is considered as one of the best- known medicinal plants in the world.

SARPAGANDHA PLANT

Source: Herbal Garden, Department of Plant Physiology, JNKVV, Jabalpur (M.P.)

Origin and Distribution:

- It is indigenous to India.
- It is distributed in the foot-hills of Himalayan range, deciduous forests of South-East Asia including Burma, Bangladesh, Sri Lanka, Malaysia, the Andaman Islands and Indonesia.
- In India, it is found in the central region, i.e. between Sirmaur and the Gorakhpur district of Uttar Pradesh, in shady, moist or sometimes swampy localities.

Availability in India

- *Rauwolfia serpentina* is indigenous to the various countries of South-East Asia.
- It is cultivated on a small scale in India and Bangladesh.
- In India it is found in central region, i.e. in some districts of UP, in east of Bihar, north Bengal and Assam.
- In the Western Ghats it occurs mostly in Goa, Coorg, in some districts of Karnataka and Palghat, in Kerala also.
- In Odisha, Andhra Pradesh and Himachal Pradesh the areas comprising the catchment of the Godavari are the richest source of the plant. In Odisha, its yield per hectare is 15-20 quintals and its price per kg is Rs. 50-60 in market. It is a very beneficial medicinal plant and has a high demand all over India.

Production in India

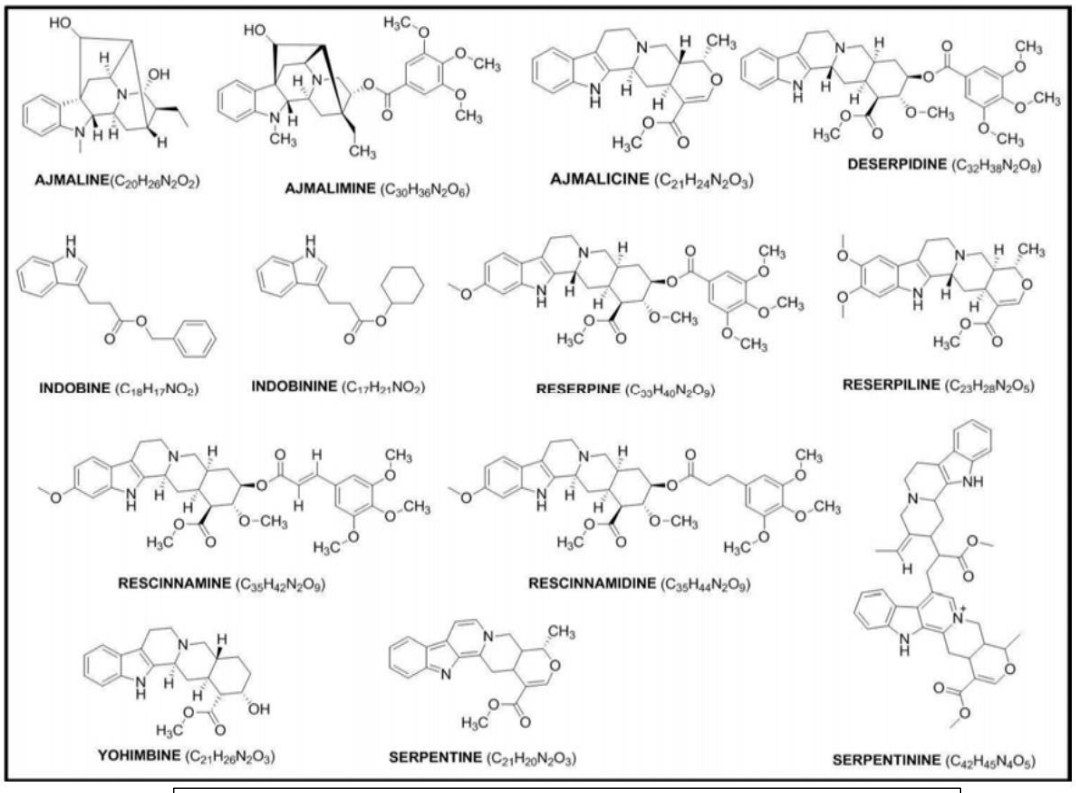
- The present-day commercial supplies of the roots of Sarpagandha are mostly from Uttar Pradesh, Bihar, Orissa, West Bengal, Assam, Andhra Pradesh, Tamil Nadu, Kerala, Karnataka and Maharashtra.
- The annual requirement of roots in the country for the manufactured Sarpagandha extracts total alkaloids, have been estimated at about 650 tons against the present annual supply of 30 tons from all the sources.
- There is also a great demand for the alkaloids as well as the raw drug in the

international market. The world requirement of dried Sarpagandha roots is around 20,000 tons/annum.

Phytochemistry of Sarpagandha

Rauwolfia serpentina is considered an ethnomedicinally valued plant due to its richness of many phytochemicals. Alkaloids, tannins, flavonoids, phenols are some of the key secondary metabolites found in *Rauwolfia serpentina* (Kumari et al., 2013; Perera et al., 2023).

- **Alkaloids-** Alkaloids are large group of organic molecules which contain a heterocyclic nitrogen ring. More than 50 types of alkaloids have been explored in this plant (Lobay, 2015). They are categorized as; Indole alkaloids, Indolenine alkaloids, Oxindole alkaloids and Pseudo indoxyl alkaloids (Srivastava et al., 2021). Out of these, indole alkaloids are the most crucial type. Reserpine, Ajmaline, Ajmalicine and Yohimbine are some of the identified alkaloids within this plant (Srivastava et al., 2006; Agrawal, 2019).
- **Reserpine-** Reserpine is one of the most crucial and prevalent alkaloids present in *Rauwolfia serpentina*. The amount of reserpine in roots is higher compared to leaves and stems of the plant (Lobay, 2015). The anti-hypertensive properties of *Rauwolfia* roots are attributed to reserpine (3,4,5-trimethyl benzoic acid ester of reserpic acid, an indole derivative of 18-hydroxy yohimbine type). This alkaloid has a higher neurotherapeutic effect and it is also used as a natural tranquillizer. It is effective in treating and management of cardiovascular diseases, hypertension and neurological diseases.
- **Ajmaline-** Ajmaline is derived from roots as a class I anti-arrhythmic agent utilized in diagnosing "Brugada Syndrome" and to differentiate the subtypes of patients having this syndrome. Ajmaline is given intravenously for such patients during the "Ajmaline test", causing sodium channels to be blocked instantly (Kumari et al., 2013).



Chemical structures of some alkaloids present in *Rauwolfia serpentina*

Source: Khan, F., Khan, M., & Parkar, A. (2025). A review on phytochemical, pharmacological and Therapeutic effects of *Rauwolfia serpentina*. *Journal of Pharmacognosy and Phytochemistry*, *14*(3), 277-284.

ISSN (E): 2582 – 7022

- **Ajmalicine-** Ajmalicine reduces blood pressure and even prevents strokes by acting on smooth muscles. It maintains the normal cerebral blood flow (Kumari et al., 2013).
- **Serpentine-** Serpentine is derived from oxidation of Ajmalicine by peroxidase enzyme. It is a type II topoisomerase inhibitor that shows anti-psychotic effects. It also possesses anti-hypertensive activity which is similar to that of Ajmaline (Kumari et al., 2013).
- **Rescinnamine-** Rescinnamine, a purified ester alkaloid of alseroxylon fraction in species of *Rauwolfia*. Rescinnamine inhibits angiotensin converting enzyme, peptidyl dipeptidase that catalyzes the conversion of angiotensin I to the vasoconstrictor substance, angiotensin II which stimulates aldosterone secretion by the adrenal cortex.
- **Flavonoids-** Flavonoids have anti-cancerous activity and also prevents oxidative damage of cells due to its anti-oxidative properties and free radical scavenging activity (Kumari et al., 2013). Kaempferol which is a flavonoid isolated in *Rauwolfia serpentina* leaves possesses both anti-oxidative activity as well as potent anti-inflammatory properties (Gupta et al.2025).
- **Phenols-** Phenols are secondary metabolites that prevent the growth of pathogens and pests. Hence, it has a potent to be utilized as an anti-microbial agent. *Rauwolfia serpentina* shows anti-diabetic and hypolipidemic effects due to presence of total phenolic compounds in higher amounts (Kumari et al., 2013).
- **Saponins-** Saponins are characterized by formation of foams in aqueous solutions, haemolytic activity, bitterness and cholesterol binding properties. They possess the anti-coagulating activity of red blood cells therefore, this plant is utilized to treat preventing of bleeding and wound healing due to its higher amounts of saponins in the plant (Kumari et al., 2013).

Chemical composition of *Rauwolfia serpentina*
(All the quantities are mg/100gm)

Phytochemicals	
Alkaloids	1.50 ± 0.02
Flavonoids	1.65 ± 0.12
Phenols	1.84 ± 0.11
Tannins	0.85 ± 0.20
Mineral composition	
Calcium	0.45 ± 0.10
Magnesium	0.10 ± 0.20
Potassium	0.05 ± 0.11
Phosphorus	0.18 ± 0.22
Sodium	0.03 ± 0.01
Iron	1.90 ± 0.20
Zinc	5.35 ± 0.11
Vitamin composition	
Ascorbic acid	41.04 ± 0.20
Riboflavin	0.52 ± 0.10
Thiamine	0.20 ± 0.02
Niacin	0.05 ± 0.10

Source: Khan, F., Khan, M., & Parkar, A. (2025). A review on phytochemical, pharmacological and therapeutic effects of *Rauwolfia serpentina*. *Journal of Pharmacognosy and Phytochemistry*, *14*(3), 277-284.

Pharmacological Properties of Sarpagandha

R. serpentina has been proven to have the following pharmacological properties:

- **Hypertension activity**

Ajmaline, an alkaloid, has been demonstrated to have the identical effects on systemic and pulmonary blood pressure as serpentine. It was reported that reserpine extracted from *R. serpentina* was used clinically to treat hypertension and reduce diastolic pressure (Shamon and Perez, 2016).

Anti-bacterial activity

The effectiveness of *R. serpentina* root extracts against *S. typhi*, in which the maximum activity was seen at low concentrations. Also, it was discovered that the leaf extract effectively inhibited the root's ability to proliferate.

- **Anti-inflammatory activity**

Antioxidants and flavonoids have been proved to have anti-inflammatory properties and are used in herbal therapy to treat numerous diseases. Rauvolfian, a pectic polymer derived from *Rauwolfia* callus, demonstrates anti-inflammatory activity. It was isolated from the dried callus of *R. serpentina* via a series of extractions using ammonium oxalate (0.7%). The extracts of R. serpentina, which have a high saponin concentration, are successful at stopping bleeding and healing wounds.

- **Anti-venomous activity**

The harmful effects of Naja Naja venom are greatly reduced by the ethanolic extract of the entire *R. serpentina* plant. Approximately 0.14 mg of *R. serpentina* extract totally negated the deadly effects of 2LD50 venom. *R. serpentina's* procoagulant and haemolytic characteristics enable its aqueous extract to neutralize venom. The harmful effects of the venom of *Daboia russelli* are significantly reduced by *Rauwolfia serpentina*.

- **Cardioprotective activity**

Flavonoids discovered in the intestinal system have been scientifically linked to a lower risk of heart disease. Reserpine is usually employed to treat illnesses of the cardiovascular system, blood vessels, and medical specialties.

- **Mental disease**

R. serpentina contains reserpine and alseroxylon, which have been clinically proven to effectively reduce anxiety in ambulatory people. The root extract of *R. serpentina* was used to treat excessive blood pressure, sleeplessness, and sedation. Reserpine is an antipsychotic medication derived from *R. serpentina* dried root and used to treat schizophrenia. Reserpine, ajmaline, and serpentine are antipsychotic (neuroleptic) chemicals found in *R. serpentina* root powder.

- **Anti-hyperglycaemia**

The ability of *R. serpentina* extracts to prevent hyperglycaemia, hematinic, and anti-oxidant dysfunction in a mouse model of diabetes produced by alloxan. Blood glucose levels were shown to have dramatically dropped when different amounts of *R. serpentina* extract were increased.

CONCLUSION

The plant's bioactive compounds, particularly alkaloids like reserpine and ajmaline, demonstrate efficacy in treating hypertension, diabetes, psychiatric disorders, and microbial infections. Additionally, its anti-oxidant, anti-inflammatory, and anti-cancer properties underscore its role in promoting overall health. While *R. serpentina* is effective as a natural remedy, challenges related to quality control, standardization, and potential side effects necessitate further research. Largescale clinical trials and improved cultivation practices are essential to validate its integration into modern evidence-based medicine.

REFERENCES

Behera, K. C. (2018). *Study The Existing Supply Chain Of Sarpagandha (Rauwolfia Serpentina) And Analyze Its Market Portfolio In Bargarh And Balangir* (Doctoral Dissertation, Orissa University Of Agriculture And Technology).

Mishra, S. P., Padhiary, A. K., & Nandi, A. Chapter-4 Production Technology, Post-Harvest Management and Value Addition of Sarpagandha. *ADVANCES IN HORTICULTURE*, *39*, 53.

Chauhan, P. S., Chaurasiya, R. K., & Chand, P. (2019). Chapter-6 Sarpagandha: An Overview. *Chief Editor*, *141*.

Shenya, S., Dinara, S., & Sohani, M. (2025). Phytochemical composition, medicinal applications, and

pharmacological insights: a comparative review of rauvolfia serpentina and rauvolfia tetraphylla. *Asian Plant Research Journal*, *13*(1), 46-55.

Khan, F., Khan, M., & Parkar, A. (2025). A review on phytochemical, pharmacological and therapeutic effects of Rauvolfia serpentina. *Journal of Pharmacognosy and Phytochemistry*, *14*(3), 277-284.

Kumari, B. Rathi, A. Rani, S. Bhatnagar (2013) *Rauvolfia serpentine* L. Benth ex Kurz phytochemical, pharmacological and therapeutic aspects

Int. J. Pharm. Sci. Rev. Res., 23 : 348-355

Jaya Gupta, Amit Gupta, A.K. Gupta (2015) Extraction and identification of flavonoid natural antioxidant in the leaves of Rauwolfia serpentine. International Journal of Chemical Studies 3(1): 35-37