

## MINI REVIEW

## MEDICINAL PROPERTIES OF ACORUS CALAMUS

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## ABSTRACT

In Ayurveda many medicinal plants are described and are widely used by traditional practitioners for curing and controlling various diseases. *Acorus calamus* is one of the important herbs known for its medicinal properties. In the ancient medicine it was mainly used for its effect on central nervous system. It is a perennial, aromatic herb with creeping rhizomes commonly known as sweet flag and contains a wide variety of phytoconstituents having different medicinal properties. Exploring these properties can lead to a path for new drug discovery. This review is an attempt to summarize the important pharmacological studies done on *Acorus calamus*.

**Keywords:** *Acorus calamus*, Sweet flag, Vacha, medicinal plants.

## INTRODUCTION

**Botanical name:** *Acorus calamus*

**Family:** Acoraceae

**Genus:** *Acorus*; **Species:** *calamus*

**Synonyms:** Vacha, sweet calomel, sweet flag, sweet sedge

**English:** Sweet flag, sweet sedge, myrtle flag.

**Hindi:** Vacha

**Sanskrit:** Haimavati, Vacha

Sweet flag has been known for its medicinal value. It originated in Europe but extensively used in Ayurveda, particularly to enhance memory. Vacha powder mixed with ghee is given ritually in India to improve the intellect and speech development. In china it is used in a similar way, to improve speech and aid recovery from stroke. When powdered, it can be of avail for depressed psychosis and dementia. Further indications include the loss of consciousness, confusion of the mind, forgetfulness, anorexia and epilepsy and as a traditional Ayurvedic medicine to treat memory loss (Howes and Houghton, 2003).<sup>1</sup> There are several polyploid varieties to be found, some of which do not contain the toxic constituents. Ayurveda has described *Acorus calamus* for prevention and treatment of a wide number of diseases.

## Botanical description:

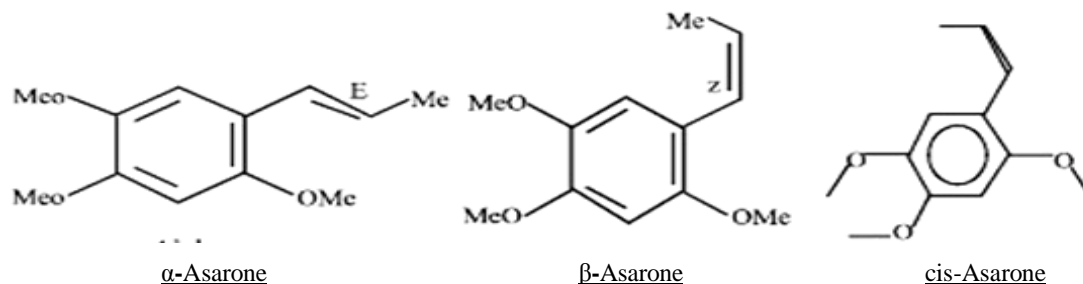
A perennial, aromatic herb with creeping rhizomes. The leaves are long, slender, sword-shaped and simple, arising alternately from the horizontal rhizomes. These are longitudinally fissured with nodes, somewhat vertically compressed and spongy internally. Flowers small, fragrant, pale green in a spadix, fruit are a three-celled fleshy capsule. In India it grows in marshy and humid land in many places. The root is about 1 cm thick, spreads within the soil and has distinct nodes and internodes. Numerous root fibres arise all over the internodes. During collection, the roots are removed from the soil, cut into 5 cm long pieces and dried. When powdered they produce a sweet and very pleasant aroma.

## Distribution:

*Acorus calamus* is now found across Europe, in southern Russia, northern Asia Minor, southern Siberia, China, India, Indonesia, Japan, Burma, Sri Lanka as well as southern Canada and Northern USA.<sup>2</sup>

## Major chemical constituents:

$\beta$ -Asarone (isoasarone) is usually the major constituent.  $\alpha$ -Asarone, elemicine, cis-isoelemicine, cis and trans isoeugenol and their methyl ethers, camphene, P-cymene,  $\beta$ -gurjunene,  $\alpha$ -selinene,  $\beta$ -cadinene, camphor, terpinen-4-ol,  $\alpha$ -terpineol and  $\alpha$ -calacorene, acorone, acorenone, acoragermacrone, 2-deca-4,7-dienol, shiyobunones, isohyobunones, calamusenone, linalool and pre-isocalamendiol are also present.<sup>3</sup>



## Other chemical constituents:

Acoradin, galagin, 2,4,5-trimethoxy benzaldehyde, 2,5-dimethoxybenzoquinone, calamendiol, spathulenol and sitosterol have been isolated from *Acorus calamus*.

Dried rhizomes (roots) are mainly used for medicinal purpose. When grinded they produce a yellowish brown sweet smelling coarse powder.

## Uses:

## Parts used:

Sala et al. (1993) list the plant with traditional uses as an intellect-promoting agent against depression, mental disorders and general debility. *Acorus calamus* is also combined with *Polygala* root to help maintain mental and intellectual health of the elderly (Hou and Jin, 2005). When powdered, it can be of avail for depressed psychosis and dementia. Further indications include the loss of consciousness, confusion of the mind, forgetfulness, anorexia and epilepsy and as a traditional Ayurvedic medicine to treat memory loss (Howes and Houghton, 2003). *Acorus calamus* is registered in the Pakistani Materia Medica where both the roots and rhizomes are used for nervous diseases and disorders, whereas the rhizome is especially indicated in cases of neurological symptoms of the brain (Said and Ahmad, 1986).<sup>1,2,3</sup>

*Acorus calamus* shows neuroprotective effect against stroke and chemically induced neurodegeneration in rats. Specifically, it has protective effect against acrylamide induced neurotoxicity.<sup>4</sup>

*Acorus calamus* extract is also used in traditional Chinese prescription and its beneficial effects on memory disorder and learning performance, by decreasing brain lipid peroxide content have been reported.<sup>5</sup>

#### Other effects of *Acorus calamus*

##### Antiulcer and cytoprotective activity:

The ethanolic extract of the rhizome was studied in rats, for protection of the gastroduodenal mucosa against injuries caused by indomethacin, reserpine and cysteamine, and also in a pyloric ligation model. The extract produced a marked reduction in the volume and acidity of basal gastric secretions and ulcer index and helped to protect against chemically induced lesions.<sup>6</sup>

##### Antispasmodic activity:

Experiments on the ileum, uterus, bronchial muscles, tracheal chain and blood vasculature showed the relaxant and antispasmodic activity of  $\beta$ -asarone and essential oil of the rhizomes. The rhizomes is useful in the treatment of diarrhea and dysentery, combined with ginger for relief in flatulent colic.<sup>7</sup>

##### Analgesic activity:

The essential oil and alcoholic extract of the rhizomes were shown to possess analgesic property and also mild hypotensive and sedative action.<sup>6</sup>

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##### Anti-inflammatory activity:

An extract of the rhizome was studied in acute, chronic and immunological model of inflammation; including carrageenan- induced rat paw edema, and compared with the activity of the hydrocortisone. The extract showed significant anti-inflammatory activity with the reduction of 44%. The essential oil is also an effective anti-inflammatory agent and coconut oil extract of the rhizomes produced a 45% inhibition of carrageenan-induced rat paw edema and 61% inhibition using the granuloma pouch method.<sup>8,9</sup>

##### Anticonvulsant activity:

A polyherbal compound containing rhizome of *Acorus calamus* as one of the ingredients has been reported clinically to reduce epilepsy attacks in patients by up to 50%. Treatment continued for 6 month resultant in cure in 66 out of 88 patients and no repeat in episodes were reported after 2 years of treatment. The isolated constituents of the rhizomes, asarone and  $\beta$ -asarone, showed anticonvulsant activity in experimental model. There was a decrease in sociability scores with a reduction in anticholinergic action. Experiment on animal model also revealed the depression action of the essential oils and the crude extract of the rhizomes.<sup>10</sup>

##### Antibacterial activity:

Growth of cultured Gram-negative organism was inhibited significantly by an extract of the rhizome. A standard cultured of staphylococcus aureus, Escherichia coli and shigella flexneri was observed after treatment with the essential oil.<sup>11</sup>

##### Safety profile:

Although, a few earlier reports have shown that ethanolic extract of rhizome of this plant may possess immunosuppressive, moderately hypotensive and respiratory depressant properties, no serious health hazards or side effects are known with the administration of designated therapeutic dose. Some *in vitro* and *in vivo* studies have shown *Acorus calamus* oil to induce malignant tumours, due to  $\beta$ -asarone. In view of toxicity, products should contain no or a negligible amount of  $\beta$ -asarone, such as that from the *Acorus calamus* var. *americanus* (Singh et al., 2001).<sup>12</sup>

But, Shah et al (2012), reported that ethanolic extract of *Acorus calamus* (upto a dose of 600mg/kg BW) lacked any potential toxicity, as it neither caused any lethality nor changed the general behaviour in both acute and chronic toxicity studies in rats.<sup>8</sup>