# *Anemopsis californica* (yerba mansa) Monograph

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*Anemopsis californica* (yerba mansa), once known as *Houttuynia californica*, is a legendary medicinal plant that forms spreading stands in wetlands and riparian habitats in the arid American Southwest and Mexico. Its uniqueness is readily noticed by its gleaming white flowers composed of bracts that reflect the ever-changing layers of muted light characteristic of the desert landscape. Furthermore, it is one of only six plants in the global Saururaceae family and singular in the genus *Anemopsis*. Considered to be a paleo-herb, yerba mansa is ancient and believed to be close to the origins of monocotyledons (Carlquist et al. 1995). Its floral anatomy, morphology, growth, and development have been discussed by Quibel (1941) and Tucker (1985). In the Southwest yerba mansa is considered by many to be an essential apothecary remedy, a panacea, and a universally important herb of elevated stature (George 1877, Webster 1909, Munk 1913, Curtin 1965, Timbrook 1987, and others).

## Medical History

The history of medicinal use for yerba mansa is extensive throughout the plant's natural range and includes multi-cultural ethnobotanical, eclectic, and scientific sources of information regarding the continuum of use. Across the Southwest, numerous nations have documented uses for yerba mansa, which was frequently considered an herb for many ailments, especially for purification and the treatment of respiratory conditions and wound care. According to ethnobotanist Jan Timbrook, Chumash People have traditionally made tea of the root and rhizomes as a wash for wounds and a drink for colds, asthma, urinary disorders, venereal disease, and blood purification (1987). Dr. James D. Adam Jr. and Frank Lemos, who worked alongside Chumash healer Cecilia Garcia (1955-2012), echoed this in their piece *Healing Plants of the Chumash* (2003) and they added that the root and rhizome has also been traditionally prepared as a soak for arthritis or venereal diseases. Ethnographer John P. Harrington listed in an unpublished document an additional unclarified use of chewing or drinking the root or inhaling steam to strengthen and protect a person "carrying dangerous substances" (Timbrook 1987). Leland C. Wyman and Stuart K. Harris (1941) documented how Navajos traditionally use the herb as a diuretic for the treatment of venereal disease, hematuria, pelvic pain, bladder stones, and anuria. Pueblo People including the Tewa used a root decoction for stomach ache (Robbins et al. 1916) and in his

master's thesis, Volney H. Jones described how the Isleta use yerba mansa leaves powdered for burns and wounds or chewed fresh and applied as a poultice to burns (1931). George R. Swank documented similar uses for the herb by the Acoma and Laguna Peoples in his thesis *The Ethnobotany of the Acoma and Laguna Indians* (1932).

Ethnobotanists Julian Steward and Shirley C. Tucker (1933, 1941) took note of how Paiute, Shoshone, and Washoe Peoples traditionally boil the leaves as a bath for muscular pain and achy feet; mash the decocted roots and apply it as a poultice for swellings or used as an antiseptic wash; a root decoction for upset stomach, colds, or as a laxative; and root or leaf tea for gonorrhea. Meanwhile, Castetter and Underhill (1935) reported an interesting use for yerba mansa among the Papago. In their work *Ethnobiological Studies in the American Southwest II*, they describe how the Papago drank the leaf tea as an emetic and used it in purification rituals for men who had killed an enemy whereby other men would blow tobacco smoke over the person while holding the root in their mouths. Ethnobotanists Frank Russell and Leonora Scott Muse Curtin (1908, 1949-1984) described how the Pima, like many other Southwestern Indigenous Peoples, consider yerba mansa one of the most important of all plants and they reported numerous uses including preparing powdered roots as a poultice for upset stomach, root decoction or chewing roots for as an emetic or for coughs including tuberculosis treatments, and a root tea or root held in the mouth for colds and dry cough with itchy or sore throat. Curtin also documented that the Pima traditionally use it for colds by drinking tea while covered in blankets to increase diaphoresis, as a warm bath for revitalization when fatigued, syphilis wash, and for wound treatments by washing with a decoction or applying powdered roots and then bandaging with a leaf poultice (1949-1984). Costanoan People used yerba mansa similarly as a wound wash or powdered root poultice but also prepared root decoctions for menstrual cramps and general pain relief (Bocek 1984). In *Temalpakh (from the earth): Cahuilla Indian Knowledge and Usage of Plants* (1972), Lowell John Bean and Katherine S. Saubel both discuss how broadly used yerba mansa is among the Cahuilla for numerous conditions including decocting or powdering the

*As Anemopsis californica matures, it begin to redden. CREDIT: downtowngal, SOURCE: Wikimedia Commons*

root for the treatment of coughs and respiratory congestion and pleurisy as well as for ulcers and wounds. Marice L. Zigmond mentions similar uses among the Kawaiisu People in his book *Kawaiisu Ethnobotany* (1981) and Voegelin (193) noted that among the Tübatulabal People, the usual root decoction for colds was employed. He also noted the use of salt grass (presumably *Distichlis spicata*) crystals as a laxative. This is noteworthy in conjunction with the widespread reported use of yerba mansa as a laxative, emetic, or otherwise purifying treatment. The eclectic physician Joseph Amasa Munk describes the yerba mansa and salt grass co-occurring relationship: "the needle-pointed salt-grass often pierces entirely through the body of the [root]" (1909). This underground union of the two plants in the landscape and as healing remedies for people is a unique relationship that informs our use of their medicine. The electrolytes sodium and chloride occurring in salt crystals are commonly used to protect against dehydration, a perfect pairing when yerba mansa is used as a laxative or other systemic moving agent. Usage of yerba mansa certainly did not stop at the United States border. Indigenous Peoples throughout the southern part of Turtle Island (North America), including those in Mexico, used the plant similarly. Felger and Beck Moser (1985) documented uses among the Seri, who have traditionally prepared a number of remedies including: whole plant decoction as a wash or compress that was considered best medicine for treatment of sores; a tea held in the mouth for tooth infections, sometimes combining it with *Hyptis emoryi* (desert lavender) or *Opuntia fulgida* (jumping cholla); tea with *Mentha sp.* (mint species) taken to improve conception; or making a decoction along with *Hymenoclea salsola* (burrobrush) or *Koeberlinia spinosa* (crucifixion thorn) soak for aching legs. Although ethnobotanical documentation has been varied in its methodology, focus, and depth and is filtered through a specific cultural and personal lense, these reports collectively show a continuum of similar and overlapping uses among different groups of people across yerba mansa's historic range.

Yerba mansa retained its legendary status among Latino, Mestizo and southern Indigenous communities. Curtin (1965) noted that "among all of the Spanish-Americans in the region, no other plant enjoys so-wide a medicinal fame as yerba mansa, or a higher repute". Many of the traditional uses by Indigenous Peoples were adopted by Spaniards including preparing root and leaf tea for arthritis and for the treatment of wounds, rashes, ulcers, burns, and injuries of the mucus membranes such as in cases of oral, sinus, throat, vaginal, digestive, or hemorrhoidal irritation (Moore 1990). Leaf or root tea is also used for colic, upset stomachs, and fevers or applied topically for swellings or disorders of the blood (Steward 1933, Curtin 1965, Moore 1990). One unusual recipe documented by Curtin is an ointment for the treatment of piles: powdered native tobacco (presumably *Nicotiana attenuata*) with chewing tobacco and "a bit of old sole leather that has been heated in a fire until it has become red and then cooled and ground" all mixed together with yerba mansa root and beef drippings. Another recipe recorded by Curtin was for bloody dysentery: boil an egg soft enough that the white remains fluid, then remove top of the eggshell so that powdered yerba mansa root can be added and this is consumed directly from the shell.

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Yerba mansa was first described and brought to the attention of eclectic physicians in 1877 by Dr. W. H. George of Inyo County California, who reported in the Eclectic Medicine Journal that it was regarded as a panacea or universal remedy in the traditions of local Indigenous nations and Spaniards. George described it as having tonic, stimulant, astringent, carminative, antiemetic, and aromatic properties useful in treatments for bowel complaints, malarial fevers, coughs and lung ailments, sore throats, gonorrhea, and as a stimulant for the mucous membranes (Best 1921, George 1877, Felter and Lloyd 1989). He also sent the first sample of the plant to the Lloyd Brothers, who confirmed its botanical identity, commented on its strong aromatic qualities and its peppery taste, and conducted the first analysis revealing volatile oils and an astringent substance that was extracted into alcohol (Lloyd 1880). Dr. Edward Palmer also reported in 1878 that Indigenous Peoples of Southern California, Arizona and Sonora, Mexico made tea or powder from roots, which were used for topical applications to venereal sores and other wounds, and also wilted the leaves as a poultice for swellings (Palmer 1878). Other California physicians of the time including Drs. O. S. Laws, Fred. S. Oliver, John Fearn and Joseph

Amansa Munk all applied yerba mansa in their clinical practices and described its usefulness in a variety of conditions (Best 1921, Webster 1909). Fearn considered yerba mansa to be a top medicine and in 1880 predicted its widespread future use by physicians (Webster). He described it as astringent, antiseptic, aromatic, warming, and tonic for the digestive, respiratory, and renal organs (Fearn 1909). Fearn also indicated it for tuberculosis, weak mucous membranes, gonorrhea, dysentery or diarrhea with blood and mucus, typhoid, bruises, and syphilitic sores. King's American Dispensatory (Felter and Lloyd 1898) provided one of the earliest detailed entries for yerba mansa describing its botany, medicinal history, chemical composition, and medicinal uses. Dr. Munk also helped to popularize yerba mansa's use in American medicine in the early 1900s with his presentation to the Los Angeles County Eclectic Medical Society (Webster). He described it as a stimulant and an alterative and prescribed it for coughs, indigestion, wounds, and swellings (Munk 1909; 1913). Munk also considered it a specific treatment for colds, nasal catarrh, rhinitis, and sore throats and recommended preparing a nasal spray to induce copious nasal secretions thereby moving mucous and relieving congestion (1909; 1913). In 1909, he revealed the recipe for his famous nasal spray formula: fill a two-ounce tincture bottle with 5 to 30 drops of yerba mansa tincture, 1 dram of glycerin, and the rest with water. The Lloyd Brothers also produced an Anemopsis Specific Medicine in 1911, which Dr. W. P. Best (1921) described as having "a red color, a pungent, aromatic, pleasant odor, a sweet astringent taste, imparting a warm sensation and a pleasant tingling sensation to the tongue and membranes". Yerba mansa continued to be listed in later materia medicas such as those by Ellingwood (1919) and Felter (1922).

## Recent Research and Current Applications in Herbal Medicine

Yerba mansa's current use as a botanical medicine is heavily shaped by the underlying herbal traditions of Indigenous People of the Southwest, Latino and Mestizo communities, as well as the European settler physicians that followed. Modern herbal practices rely on yerba mansa as a botanical medicine with an affinity for the respiratory, digestive, and urinary systems and alterative actions that increase fluidity within the body by reducing inflammation and encouraging movement of vital forces. Southwestern herbalists have universally described these uses including Michael Moore (1989) who suggested that yerba mansa excretes uric acid through diuresis, thus benefiting conditions of physical stagnancy such as arthritis, gout, and other rheumatic complaints. Charles Kane (2011) attributed its healing actions primarily to yerba mansa's stimulating astringency and John Slattery (2020) described its decongesting activity by removing waste through the movement of blood and lymph. Thomas Avery Garran (2008) indicated yerba mansa for stagnant conditions that benefit from the clearing of cold and dampness. Other related actions include yerba mansa's anti-inflammatory and mucus-expelling affects in the sinus or lungs; its gentle warming, astringing, and stimulating action in the digestive system; or its ability to clear microbes in the treatment of urinary tract infections and other areas of the body. With tonifying effects in the mucus membranes, yerba mansa can protect against and heal infections similarly to *Hydrastis canadensis* (goldenseal) (Moore 1989). Roots and rhizomes are best prepared dried as a 70% tincture or liniment with 10% glycerin added to prevent precipitants from settling. In my experience, roots and rhizomes are also useful as a decoction for potent expectoration; ground into powder and applied as a paste or mixed with clay to disinfect and heal wounds; or gargled as tea or chewed for antiseptic and analgesic effects in oral or throat inflammations and infections (Saville 2021). Additionally, I have also used the fresh leaves and flowers as a bandage or soothing poultice. They can also be dried and prepared as an infused oil or salve for wound healing or pain relief.

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Ecological observations of yerba mansa in its riparian habitats illuminate the nature of this herb as a healing remedy. In the wild, it regulates the movement of waters carrying oxygen and nutrients through the land while aerating the soil and invigorating the wet, boggy, slow-moving environment. I have observed that yerba mansa acts similarly in our bodies. I feel it does this by regulating the flow of water and energy in the body, encouraging the movement of stagnant fluids, expediting the excretion of toxins, warming and invigorating sluggish bodily systems, and

*OPPOSITE: The beautiful bisexual flowers of Anemopsis californica grow in a conal shape. CREDIT: ksblack99, SOURCE: flickr*

acting as an alterative that revitalizes ecosystems in the land and in ourselves (Saville 2021). With these characteristics, yerba mansa retains its legendary status as a highly valued medicinal herb for the treatments of myriad health conditions including chronic inflammatory ailments, digestive disorders, skin issues, urinary infections, mucus-producing colds and sore throats, sinus infections, hemorrhoids, oral healthcare, fungal infections, and many others. Due to its drying effects, yerba mansa may not be appropriate for sustained long-term use.

Recent scientific research confirms traditional uses of yerba mansa as an antimicrobial and also suggests new potential applications. Early chemical analysis revealed 4-allylveratrole (Horton and Paul 1957), asarinin (Tutupalli and Chaubal 1971), thymol, methyleugenol, and piperitone (Acharya and Chaubal 1968) from roots and rhizomes. More recent studies identified sesamin and asarinin as antimycobacterial (Bussey et al. 2014) and numerous other compounds with elemicin being a major component of volatile oils from the leaf along with alpha-pinene, sabinene, beta-phellandrene, 1,8-cineole, piperitone, methyleugenol, (*E*)-caryophyllene (Medina et al. 2005). Fifteen additional compounds, some having antimicrobial activity, were identified from endophytic fungal organisms from wild roots (Bussey et al. 2015). Of the four most abundant medicinal compounds (piperitone, methyleugenol, thymol, and elemicin), concentrations of thymol and methyleugenol varied significantly in tested commercial products (Medina-Holguin et al. 2007). These variations could be caused by growing conditions or genetic differences in chemotypic populations, as discussed in the Wildcrafting and Cultivation section below, or by differences in processing and extraction methods. In vitro studies have shown yerba mansa to have antimicrobial activity against *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Geotrichum candidum* (Medina et al. 2005), *Pseudomonas aeruginosa* (Bussey et al. 2015), and five species of nontuberculous mycobacteria (Bussey et al. 2014). Additionally, research suggests that yerba mansa may be effective for enhancing cancer treatments with antioxidant and antimutagenic activity (Del-Toro-Sanchez et al. 2014). The roots have been shown to have antiproliferative activity against endometrial and cervical cancers cells in vitro (Medina-Holguin et al. 2008) and all plant parts, but most especially roots inhibited the growth and migration of breast cancer and colon cancer cells lines (Daniels et al. 2006, Van Slambrouck et al. 2007, Kaminski et al. 2010).

## Threatened Habitat and Population Pressures

Yerba mansa's range is characterized by desert habitats in the American Southwest and Mexico and in some neighboring dry zones. It is relegated almost entirely to moist habitats with alkaline soils such as riparian floodplains, springs, and associated wetlands within this arid region. Riparian forest (bosque) and spring-supported bog (ciénega) habitats cover only a very small percentage of land within its range. Desert bosque environments including the Rio Grande and the Colorado River are considered to be among the most severely altered and endangered ecosystems anywhere (Brinson et al. 1981, Crawford et al. 1996). More than two decades ago, Crawford et al. noted that "changes in the [Middle Rio Grande] bosque's ecological dynamics are rapidly leading to an ecosystem that, in terms of structure and functioning, will undergo irreversible change in the absence of a new management paradigm". The US Army Corps of Engineers (2003) reported that flood control measures and urbanization along the Rio Grande have resulted in 60% loss of habitat, river flows decreasing to 1/6 of their historic levels, a significant reduction in channels and wetlands, the invasion of many non-native species, increased wildfires, and a dramatic decline in the reproduction of the native keystone species. Riparian habitat loss is also well documented along the Colorado River with the Bureau of Reclamation estimating that a mere 6,000 acres of such habitat remains from what is thought to have been 400,000 acres before dams (Cohn 2001). The lower Colorado, once the most extensive wetlands in the Southwest, has been reduced to scattered relics of native riparian vegetation separated by vast dry barren expanses and a plethora of invasive species (Stromberg 2001). Ciénegas are also critically threatened environments. Sivinski and Tonne (2011) and others (e.g. Hendrickson and Minckley 1985, Unmack and Minckley 2008) have described their "almost universal destruction or diminution during the last two centuries". Climate change models add to the concerns around habitat degradation and loss of land. For example, Gutzler (2013) predicted the Rio Grande Basin (already at 1/6 historic flows) to have 14% less water within the next decade and as much as 29% less water by the 2080s. Furthermore, greater extremes in water availability are expected to become the norm and, as described below, yerba mansa's health and reproduction are dependent on reliable moisture.

Due to these extensive water diversions and environmental controls, wild populations of yerba

Anemopsis californica has basal leaves that have a unique smell and are alternate and simple. CREDIT: Calibas, SOURCE: Wikimedia Commons

mansa have been adversely affected. Botanist J. R. Watson (1912) described the riparian plant communities in north central New Mexico more than a century ago. He observed that *Populus deltoides* var. *wislizenii* forests (Cottonwood) and *Juncus-Houttuynia* (*Juncus balticus* or Mountain Rush) and Houttuynia californica, renamed *Anemopsis californica*, filled meadows were dominant in river valleys. Additionally, Watson (1908) documented the common plants of Bernalillo County in central New Mexico and described yerba mansa as "exceedingly common in alkali soil in the valley where it often forms a turf". Yerba mansa is no longer a dominant plant in this ecosystem today and these statements illuminate the population changes that have already occurred for this species. More than 70 years ago Curtin (1949-1984) reported that yerba mansa was "rapidly disappearing" from Pima reservations due to groundwater pumping. More recently, Adams and Lemos (2003) reported on yerba mansa populations in coastal California and stated: "This plant is found at alkaline seeps in the desert and used to be found in marine estuaries and sloughs. Unfortunately, as urban development occurs along the seashore, Anemopsis disappears." In addition to being relegated to wetland habitats within the desert Southwest, Kane (2011) noted that yerba mansa is locally abundant, but isolated in distribution. He further noted that "The plant's largest threat is not over-harvesting but habitat loss through development and lowering of the region's water table." He added that "vast expanses, stretching for scores of miles were once reported for this plant. Due to today's much lower water table these great yerba mansa swaths have been reduced to isolated pockets."

Baseline population information is based on generalized reports of local abundance in various ethnobotanical texts from the Southwest (e.g., Munk 1913, Romero 1954, and others) and some specific locations are documented by herbarium records. There is very little data regarding changes in wild populations over time. We simply do not know precisely how wild stands have fared as a result of all the habitat changes this species has experienced. What we do know is that the nature of this plant is to spread rhizomatously and stoloniferously, forming large stands when water requirements are met. Reliable and consistent water is necessary for this reproductive process and as Moore (1989) and others (e.g. Watson 1908) have observed, this species always grows in expansive stands. My observations are consistent with what Kane (2011) described in the previous paragraph. Although some large stands do exist in the Middle Rio Grande Bosque, most often I have observed small isolated patches of only a few plants. These appear to be remnant

*A ladybug strolling near one of Anemopsis californica's petal-like bract. CREDIT: C T Johansson, SOURCE: Wikimedia Commons*

populations that remain from wetter times in the floodplain. This is not what one would expect as a growing pattern for yerba mansa and such observations made by myself and others fuel a growing concern about the ongoing, under-recognized, and undocumented declines in wild populations that are occurring. There are additional concerns, too. As already noted, yerba mansa populations may be locally abundant but remaining stands are likely to be under water-related stress and are isolated from one another through loss of habitat. Local abundance creates a potentially false positive impression of the overall health of the species range wide. Furthermore, yerba mansa is known to be self-incompatible (Schroeder and Weller 1997), creating a reliance on cross-pollination from other populations to maintain species health and resiliency. As habitat conditions for individual stands continue to decline, the isolation that results from increasing habitat loss raises additional concerns about the ability of yerba mansa to adapt to escalating environmental pressures. Collectively, these circumstances combined with market demands

have earned yerba mansa a score of 41 and "to watch" rating with United Plant Savers. The largest number of points earned in this rating were derived from habitat threats (Castle et al. 2014), which are expected to escalate as the effects of intensified water use and increased temperatures of climate change converge.

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**Wildcrafting and Cultivation**

As with many botanical medicines, discussions on wildcrafting and cultivation are warranted with regard to concerns about environmental pressures on wild populations, meeting market demands, and maintaining quality of herbal products. As detailed in the previous sections, yerba mansa faces considerable threats to its wild habitats with obvious declines in populations and little realistic hope for changes to these circumstances. Yet wildcrafting of yerba mansa is a time-honored tradition in the Southwest that connects people to the land and to their ancestral lineages. Given the demand for yerba mansa in herbal commerce both within its natural range and beyond and the sensitivity of its natural desert wetland habitats, it is recommended for cultivation for the mass market. Currently, it is not widely cultivated and most roots and products on the herbal market are produced from wild harvested plants. Cultivation experiments in Las Cruces and Alcalde, New Mexico revealed harvests of 1.94 tons per acre of dried root (Kleitz et al. 2003) and 339.2 pounds per acre respectively (Martin and Steiner 2007). Although neither study tested crops for medicinal qualities, they do demonstrate that yerba mansa can be easily cultivated for herbal commerce with the potential to alleviate harvesting pressure from wild stands experiencing environmental stressors.

There are known to be differences between wild and cultivated sources of herbal materials, which are not always clearly understood and each species of medicinal plants has its unique set of considerations. Even among wild populations, there are known to be varied chemotypes of many medicinal plants including yerba mansa, which has three documented distinct chemotypic populations in New Mexico including those characterized by higher concentrations of elemicin, methyleugenol, and piperitone/thymol (Medina-Holguin et al. 2008). In the case of yerba mansa and other wetland plants, wild populations have been known to absorb arsenic (Del-Toro-Sanchez et al. 2013, Zurita et al. 2012) and other heavy metals (Karpiscak et al. 2001) from groundwater, which poses risks in areas where agricultural run-off, contamination from mines, or other potential pollutants may be high. Cultivation in controlled environments could reduce this risk. Also research by Medina et al. (2005) showed that greenhouse grown clones had identical phytochemical profiles to those of their wild parents, suggesting that medicinal properties for this species may be genetic traits (Medina-Holguin et al. 2007) and therefore less varied between wildcrafted and cultivated harvests. Further research by Medina-Holguin et al. showed that the quantities of several primary medicinal compounds (methyleugenol, thymol, and piperitone) in wild-harvested roots are known to vary in association with environmental conditions including temperature, precipitation, and elevation. This study also demonstrated that cultivated plants did not vary significantly in the production of known medicinal compounds although increased irrigation did produce elevated levels of thymol and piperitone. Medicinal activity is complex, however, and not necessarily limited to measured phytochemistry. Another factor illuminated by the research of Bussey et al. (2015) is that of endophytic fungi. This study documented that wildcrafted populations of yerba mansa harbored thirteen endophytic fungal strains with eleven unique genotypes in the roots. Of these organisms, four were shown to have antimicrobial activity against *Staphylococcus aureus* and three against *Pseudomonas aeruginosa*. Conversely, greenhouse cultivated roots had only two unique genotypes without any known antimicrobial actions (Bussey et al.). Clearly yerba mansa and other medicinal plants are complex and dynamic beings, whose lives and medicinal activity are influenced by their environmental conditions, ecosystem associations and functions, and through relationship with people.

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