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## Medicinal and high value native plants suitable for small farms and water deficit conditions of northern New Mexico

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### Abstract

Medicinal and aromatic plants have a wide range of uses, because they constitute the important raw material of pharmaceutical, food, beverage, cosmetic and many other industries. New Mexico is one of the most diverse parts of the continental United States, with five of the seven major hardiness zones in a single state. This gives growers the ability to raise an extremely wide range of medicinal herb species. Northern New Mexico has a long history of traditional use of medicinal herbs by Native American and Hispanic cultures. Also, northern New Mexico is faced with water deficit conditions especially in recent years due to climate change. Now traditional crops are no longer economical for the farmers, thus medicinal plants gain their importance. Medicinal plants have higher demand in the market and are quite suitable to northern New Mexico soils and weather conditions. This review manuscript provides further knowledge about some medicinal and high value plants that could be suitable for small farms and water deficit conditions of northern New Mexico.

**Keywords:** Northern New Mexico, Yerba del Manso, Oshá, Oshá del campo, Small farms, Medicinal and high value crops

### Introduction

Medicinal and aromatic plants have a wide range of uses, because they constitute the important raw material of pharmaceutical, food, beverage, cosmetic and many other industries.

Interest in traditional systems of medicine and herbal medicines has increased substantially in both developed and developing countries over the past two decades. Global and national markets for medicinal herbs have been growing rapidly, and significant economic gains are being realized (Bodeker *et al.*, 2005)<sup>[1]</sup>.

The cultivation of medicinal plants vs collecting them from wild populations can improve the protection of endangered species. The term medicinal plant refers to plants which contain secondary metabolites which can be used as active substances in disease treatment. These secondary metabolites include alkaloids, glycosides, coumarins, flavonoids, steroids etc., Aromatic plants are those which produce essential oil, and these essential oils are the odoriferous steam-volatile constituents of the aromatic plants. These essential oils are used in perfumery, cosmetic and pharmaceutical industries whereas the essential oils obtained from spices and condiments which impart the flavor and improve the taste of the food are used in several flavor industries (Zehtab Salmasi and Dast Borhan 2014)<sup>[2]</sup>.

It is estimated that the primary health care of over 80 per cent of the world's population still depends on plant based traditional medicines (WHO, 2004)<sup>[3]</sup>. Growing consciousness about health and side effects of modern medicines has again set the stage for innovation and use of herbal medicines. The global market for herbal products is continuously expanding and it is expected to touch the mark of US\$ 5 trillion by the year 2050, from the US\$ 62 billion in 2004 (Purohit and Vyas, 2004)<sup>[4]</sup>.

U.S. farmers are looking for new crops that will help diversify their farms and increase their profits. New Mexico is one of the most diverse parts of the continental United States, with five of the seven major hardiness zones in a single state. This gives growers the ability to raise an extremely wide range of medicinal herb species. Northern New Mexico has a long history of traditional use of medicinal herbs by Native American and Hispanic cultures. Growers are likely to find a ready market for familiar native medicinal herbs such as yerba de manso

(*Anemopsis californica*), osha (*Ligusticum porteri*), or cota (*Thelesperma megapotamicum*) (Ekor, 2014) [5].

Most irrigated agricultural land in the northern New Mexico is cultivated by small-scale farmers and ranchers with fewer than 20 acres. Also, northern New Mexico is faced with water deficit conditions especially in recent years due to climate change. Now traditional crops are no longer economical for the farmers, thus medicinal plants gain their importance. Medicinal plants have higher demand in the market and are quite suitable to northern New Mexico soils and weather conditions (Sachaible and Aillery 2012) [6].

Medicinal and aromatic plants have higher demand in the market and are found to be more lucrative than traditional dry land crops. Medicinal plants are quite suitable to our soils and climate, and with the low atmospheric humidity the crops have longer shelf life. The concentration of these secondary metabolites was reported to be higher under water stress conditions (Yaniv and Palevitch, 1982) [7]. Therefore, the rare quality of these crops is enhanced under dryland conditions (Pratibha and Korwar 2002) [8].

Farm residues are very effective supplements to supply nutrients as well as conserve moisture. Aromatic crops produce considerable distilled biomass which can be used economically for many purposes and reduce the cost of cultivation, reduce the weeds, as well as conserve soil moisture (Ramesh *et al.*, 2005) [9].

This review manuscript provides further knowledge about some medicinal and high value native plants that could be suitable for small farms and water deficit conditions of northern New Mexico.

### Yerba del Manso

*Anemopsis californica* (Nutt.) Hook & Am., a monotypic species in the family Saururaceae, or Lizard-tail Family, has many common names: Lizard tail, swamp root, shrimp root, yerba mansa, yerba del manso, or simply manso. For the purposes of this report yerba del manso will be used.

*Anemopsis californica* is a low-growing, deciduous herbaceous perennial with smooth, fleshy, ovate leaves on short stems radiating from the crown, and fleshy stolons likewise spreading in all directions from the original “mother” plant. It can spread profusely this way, along with rhizomes, and can fill in to become a dense ground cover wherever there is sufficient soil moisture. The stolons radiating out from the central crown give the appearance of lizard’s tails hiding from beneath the leaves, hence the English name, “lizard-tail”. The “flower” is a white, compound, fused, spiked conical inflorescence of multiple florets, erect on long stems. It blooms from spring to mid-summer. In the fall the entire plant turns an attractive brick-brown color, and the ovaries open to release many nearly microscopic seeds. The rhizome can become thick, up to an inch in diameter, and is pinkish when opened. The thin fleshy roots do not grow deeply.

The plant is distributed throughout northern Mexico and the American Southwest as far north as southern Colorado, east to Kansas, and west to California along riparian areas, marshy areas, and wet alkaline flats.

Yerba del manso prefers wet, soggy, even bog-like conditions and can live for short durations completely submerged during a monsoon or flooding conditions. It tolerates a wide range of soils irrespective of pH. It does not have fertility requirements and can grow in sandy, loamy, clay or even boggy soils, if it has access to moisture. It is found in the open sun or dappled shade beneath cottonwoods. It may die out during prolonged droughts if its roots are not able to access subsoil moisture.

Seeds are microscopic, take a long time to germinate and

grow, and are rarely used for commercial propagation. For commercial purposes, dormant crowns can be dug up from native stands in the early spring. Any node from a stolon that touches moist soil can take root and start a new plant, even staying attached to the “mother” plant. In some nurseries, this is the preferred method of propagation, cutting off nodes and rooting them in separate containers.

Water is the only requirement for yerba del manso to thrive. Yerba del manso may be irrigated via drip, overhead sprinkler, furrow, or flood, but the most practical way is by furrow irrigation. The plant’s growing habit is very similar to that of strawberries. Typically, dormant crowns from an established stand or growing area are planted on tops, or even the bottoms, of prepared furrow beds at a uniform spacing of one to three feet, and furrow irrigated. It is difficult to over-water yerba del manso, but if the young starts are allowed to dry out, they may die off. The amount of water does not seem to affect the chemical properties of the species (Medina-Holguin *et al.*, 2007) [10]. Yerba del manso is very competitive, needs little or no weeding after establishment, and once the plants spread and fill in, can choke out or tolerate other plants. It may have some undocumented allelopathic properties.

Harvesting and Post-Harvest Handling-All parts of the plant have medicinal compounds, but the mature (4+years) rhizomes and roots are the most valuable, medicinally and commercially.

Leaves and flowers may be picked in any season, including dead and dormant leaves in the fall, air-dried, crushed, and sold or used as tea. This is useful to know to the potential grower, as mature roots ideally take four or more years before harvest.

Mature rhizomes 4+years or older are hand-dug, washed, and air dried on a screen. Mechanized harvesters (i.e., potato diggers) have yet to be developed. Some traditionalists claim, “a little soil on the root never hurt” (David Salazar, personal communication) and may be part of the medicinal properties. This has not been formally verified. After drying, if the crop is to be sold soon, the rhizomes are broken into smaller pieces, packaged and sold by weight. Breaking or crushing the rhizome reduces potency and shelf life. Traditionalists will store the dried rhizomes whole and only break or crush the rhizome at time of use.

The market for yerba del manso is developed in Mexico, and commercial manso products are readily available. Marketing yerba del manso in the United States and rest of the world is in a conundrum, as the traditional knowledge of the plant has not accompanied its sale and use outside of Hispanic-speaking communities. Even then, modern pharmaceuticals have supplanted use of traditional herbs, so a younger generation may not be familiar with the herb. Most of the immediate growth in the market will remain in Hispanic communities in the U.S.

### Oshá de la sierra

True Oshá, *Ligusticum porteri*, Porter’s Lovage, Bear root, wild parsnip, or Oshá de la sierra, in the Apiaceae, must be distinguished at the outset from Oshá del campo, *Levisticum officinale*, European lovage, even though medicinally both may be used interchangeably by local New Mexico traditional residents (personal communication, David). Oshá de la sierra is native to North America, whereas Oshá del campo was introduced from Europe and became naturalized in New Mexico and elsewhere. Oshá de la sierra means “of the mountains”, referring to its natural habitat of altitudes 8000

feet and above; Oshá del campo, “of the fields”, can grow at elevations below 8000 feet, along streams and in moist roadside ditches. Oshá de la sierra is an alpine species, and prefers a cool, moist environment and dappled shade; Oshá del campo can grow in full sun and can tolerate slightly higher temperatures. Both are wild crafted in New Mexico, but only Oshá del campo has been cultivated both in Europe and North America. Oshá del campo, or lovage, is used more for culinary than medicinal purposes.

Additionally, wildcrafters need to be aware of a highly poisonous close relative, poison hemlock, *Conium maculatum*, also in the Apiaceae, and closely resembling Oshá de la sierra. Any novice should be accompanied first by an experienced person to help distinguish the difference between species. Misidentification and mishandling can be lethal.

Previous attempts to transplant and cultivate Oshá de la sierra have not been very successful or profitable. Mature roots five years old or older are preferable for their potency. Experiments at the NMSU Sustainable Agricultural Science Center at Alcalde bringing transplanted Oshá de la sierra down from a forest loam at the Canjilón Lakes area in New Mexico, elevation 8000+ feet, to grow in irrigated sandy loam soil at 5700 feet elevation at the Alcalde experiment station failed (<https://ofrrf.org/research/grant-awards/>). A small number of dormant crowns that were transplanted into a privately-owned irrigated parcel of land at 7600 feet survived but were extremely slow to recover from transplant shock. Attempts to stratify and germinate Oshá de la sierra seed under similar forest conditions failed (Amy Brown, personal communication). Oshá de la sierra is dependent on mycorrhizal fungi and attempts to artificially cultivate the plant outside of its habitat have not been successful (Tilford, 1923) [11]. If attempting to transplant from its natural surroundings, bring the intact plant and as much soil around and on the roots as possible. Cultivation in areas where oshá naturally grows has likewise been limited.

Further discussion will focus exclusively on Oshá del campo, lovage, *Levisticum officinale*.

Oshá del campo, Lovage, *Levisticum officinale*

Oshá del campo or Lovage is an erect, herbaceous, perennial plant growing to 1.8–2.5 m (6–8 ft) tall, with a basal rosette of leaves and stems with further leaves, the flowers being produced in umbels at the top of the stems. The stems and leaves are shiny glabrous green to yellow-green and smell somewhat like celery when crushed. The larger basal leaves are up to 70 cm (28 in) long, tripinnate, with broad triangular to rhomboidal, acutely pointed leaflets with a few marginal teeth; the stem leaves are smaller, and less divided with few leaflets. The flowers are yellow to greenish-yellow, 2–3 mm (1/16–1/8 in) diameter, produced in globose umbels up to 10–15 cm (4–6 in) diameter; flowering is in late spring. The fruit is a dry two-parted schizocarp 4–7 mm (3/16–1/4 in) long, mature in autumn (Interactive Flora of NW Europe). Oshá del campo looks and tastes like celery, only stronger, and has been used in cooking as a substitute for celery.

*Levisticum officinale* is native to Afghanistan and Iran (Plants of the World online, 1923) but has been introduced to most of Europe, and parts of South-East Asia, North and South America. It has been long cultivated in Europe, the leaves being used as an herb, the roots as a vegetable, and the seeds as a spice, especially in southern European cuisine (Huxley, 1992) [12]. It is toxic to dogs, cats, and horses (<https://www.aspc.org>).

Oshá del campo is easily propagated from seed, collected in late summer and is also available commercially in packets or in bulk. Seed can be direct-sown or started in flats and

transplanted into a well-drained loamy soil.

Oshá del campo prefers full sun and moist soil but can tolerate light shade. After it dies back in the winter, it can be top-dressed with compost. It is competitive but must be weeded for optimum growth.

Harvesting and Post-Harvest Handling – Leaves and stalks can be cut all summer long and used fresh or dehydrated for use later.

Fresh Oshá del campo is in demand as a culinary and confectionary herb and finds ready sales at local farmers’ markets, though because of its ease of cultivation, local growers often grow their own. High-end chefs may want a steady demand during the season and may purchase the dried leaves in the off-season.

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