

This book was written as a project for the Latham Science Engagement Initiative. The LSEI's mission is to engage our community in thinking about how science impacts daily life, informs policy, and can be used to address societal challenges.

Introduction

Throughout history, cultures all over the world have used plants to heal various ailments. Through generations of experimentation, these groups developed plant-based traditional medicines to treat both innocuous illnesses such as the common cold and life-threatening illnesses such as cancer. In modern times, technological advancements have allowed scientists to modify the compounds from these traditional remedies into more potent, efficient pharmaceuticals. Though modern drugs enable doctors to treat a much wider variety of conditions, in some cases the body has difficulty processing the synthetic compounds, which results in side effects. This, coupled with the rising cost of healthcare, has prompted many people to consider natural alternatives and has inspired the growth of scientific research on medicinal plants.

This book is intended to teach readers who are interested in plant remedies about the connection between Western and Traditional medicine. Traditional medicine has a substantial impact on modern medicine – practices such as Ayurvedic medicine and Traditional Chinese Medicine often identified medicinal plants hundreds or thousands of years before they were investigated by Western medicine. This book describes the scientifically proven properties of eight medicinal plants, as well as how these properties were used by systems of traditional medicine. These plants can be found in the state of Iowa, though some are non-native. Illustrations of each plant, as well as descriptions of their appearance and preferred habitat types are provided with the text. Readers from Iowa are encouraged to explore local fields and hiking trails to find these plants in the wild!

Disclaimer: This book is not intended to serve as a medicinal plant guide, so please conduct further research or consult a doctor before treating an illness with these plants.

Chamomile

A Calmer



Matricaria chamomilla

Chamomile tea, which is made from dried chamomile flowers, was first used as a calming drink by the ancient Egyptians, Romans, and Greeks. Since then, the plant has been used in native traditions around the world to induce calm. Chamomile has also been used to treat muscle spasms and fever. In the Middle Ages, Europeans used chamomile essential oil for this, while African folk remedies use the chamomile flower¹.

Research in modern times shows that chamomile's calming properties have the potential to treat many conditions. Studies have found that chamomile reduces the physical and mental effects of Premenstrual Syndrome (PMS), a series of symptoms that commonly affect women during their periods. In particular, chamomile tea reduces stress and anxiety, as well as diminishing cramp-related pain². In addition to PMS,

studies suggest that chamomile could aid in treating mental health conditions. Chamomile extract capsules were found to decrease symptoms of General Anxiety Disorder³ and improve mood⁴, suggesting that chamomile may have antidepressant properties.

Appearance: Chamomile plants grow quickly from seed into 1 to 2-foot-tall plants with erect, branched stems. Roots are thin and shallow. Leaves are long (up to 3 inches) and narrow. Plants begin blooming in early summer. Flowers have a yellow central cone surrounded by 10-25 white petals²⁴.

Habitat Type: Prefers grassy areas with sandy soils²⁴.

Dandelion

A Detoxifier



Taraxacum officinale

The first documented use of dandelion's medicinal properties was in the 1500s, when German physicians used mixtures of dandelion leaves and roots to treat liver problems⁵. Various cultures have used dandelion's detoxifying properties in their traditional medicine. In traditional Chinese medicine, dandelion is used as a diuretic, or a substance that rids the body of excess salt and water by increasing urine production⁶. Turkish traditions also use dandelion as a laxative, while early Native American medicine used dandelion root extracts to treat indigestion⁵. So, dandelion's abilities to detoxify the body's liver and intestinal tract have been recognized for hundreds of years.

However, modern biomedical research has only recently begun to investigate the dandelion's medicinal properties. Recent research on dandelion leaf extract has supported the plant's role in Chinese medicine as a diuretic, which suggests that dandelion could be used to treat high blood pressure⁶. Diuretics like dandelion remove excess water and salt from the blood, resulting in lower blood pressure. Researchers also found that one of dandelion's active compounds – taraxasterol – prevents alcohol damage in the livers of mice. This finding could potentially assist in the development of protective treatments for liver damage due to alcoholism⁷.

Appearance: Grows from seed into small rosettes of leaves which are close to the ground. Leaves are deeply lobed and can grow up to 10 inches long. Roots are long and tapering and contain a milky fluid. Flowers begin blooming in May and are yellow with thin petals. Flowers grow from a hollow stem originating from the center of the rosette of leaves. Once flowers mature, petals are replaced with fluffy, white seed heads²⁴.

Habitat Type: Very adaptable and can grow in a wide range of habitats, but temperate regions are preferred²⁴.

Echinacea

A Treatment for the Common Cold



Echinacea purpurea

Different cultures recognize echinacea as a treatment for conditions that affect the lungs and breathing. Indian Ayurvedic medicine uses echinacea roots and extracts to treat respiratory viruses and boost the immune system. Similarly, traditional Chinese medicine uses echinacea to prevent and treat upper respiratory tract infections. Several Native American tribes also used Echinacea to lessen symptoms of the common cold and tonsillitis⁸.

Most research on echinacea focuses on its abilities to treat the common cold. Many studies have found that extracts and infusions of echinacea root can decrease the length of the common cold and lessen the chances of infection with a cold⁹. Echinacea treatments may also prevent respiratory conditions caused by bacterial infections, as researchers discovered that extracts of echinacea stop the growth of bacteria causing strep throat and pneumonia⁸.

Appearance: Grows from seed into strong, 2 to 4-foot-tall purplish stems with leaves that are tapered and hairy. Roots are tapering and cylindrical. Plants begin blooming in June with large flowers that have a cone-shaped center and purple, down-turned petals. After flower maturation, petals are shed and cone becomes a blackish-brown, spiky seed head²⁴.

Habitat type: Prefers open, sunny areas such as prairies and plains²⁴.

Jewelweed

A Poison Ivy Antidote



Impatiens capensis

Jewelweed has historically been used to soothe skin conditions. In Japanese traditional medicine, crushed jewelweed flowers are used to combat itching, while in traditional Chinese Medicine, jewelweed leaves are recommended as a treatment for pain and swelling. Native American tribes also use jewelweed as a medicine to treat skin rashes from poison ivy and stinging nettles, as well as insect bites¹⁰.

Researchers have found that mash made from blended jewelweed reduces rashes from poison ivy just as effectively as dish soap, which is another common treatment¹⁰. Jewelweed is effective at treating poison ivy rashes because it contains saponins, or compounds that behave like soaps. These compounds

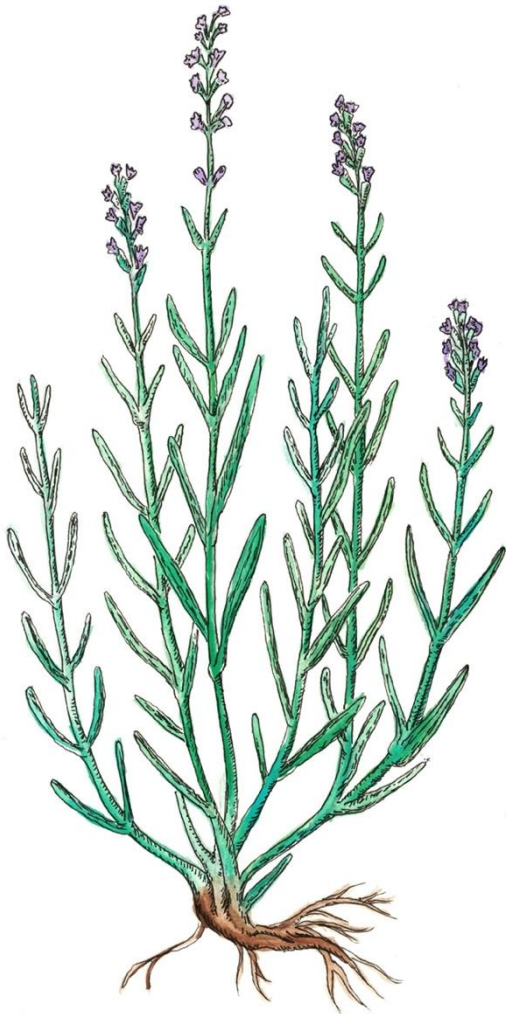
alleviate rashes by breaking down the oil that poison ivy deposits on the skin¹¹. So, in situations where soap is not on hand, jewelweed provides a quick remedy for poison ivy exposure. In addition, jewelweed usually grows near poison ivy plants, which makes it a convenient treatment. The plant also has anti-inflammatory properties, which explains its ability to treat poison ivy and suggests that it could treat other inflammatory conditions, such as rashes and infections¹².

Appearance: Jewelweed grows as a bushy, branched plant which is 2-5 feet tall. Leaves are oval shaped and shiny with a toothed edge. The roots consist of a shallow, branching taproot. Flowers begin blooming in mid-summer and are bright orange and yellow with a funnel shape. Flowers mature into green and brown seed pods which explode and scatter seeds when disturbed²⁴.

Habitat Type: Prefers moist, shaded areas such as forests, stream banks, and wet meadows²⁴.

Lavender

A Sleep Aid



Lavandula angustifolia

Lavender's ability to promote and enhance sleep has long been recognized by traditional medicine. In Europe, lavender-scented bath salts, teas, and laundry detergent are traditionally recommended for restless sleepers and those with difficulty falling asleep. In traditional Chinese medicine, lavender is said to relax the mind and relieve the body's tension, which can aid stress and sleep problems¹³.

In contemporary times, several studies have investigated lavender as a treatment for insomnia. Aromatherapy, or exposure to diffused lavender oil in the air, was found to increase blood melatonin levels in adults over the age of 60. Melatonin regulates a person's sleep and wake cycle, so this increase in melatonin levels indicates that lavender facilitates falling asleep and reduces sleep disorders. This is especially significant for older people, as insomnia becomes more prevalent with aging¹⁴. Smelling lavender essential oil was also found to increase sleep quality in patients with diabetes. Improved

sleep is especially important for diabetics – it can lead to reduced blood sugar, which lessens diabetes symptoms¹⁵.

Appearance: Plants are bushy, branched and 2-3 feet tall. Leaves and stems have a silvery-green color and are fuzzy in texture. Roots are shallow and branching. Flowers begin blooming in early spring and are composed of clusters of purple, tubular florets. Flowers mature into grayish-brown seed heads that maintain the shape of the florets²⁴.

Habitat Type: Grows best in full sunlight and hot, dry climates²⁴.

St. John's wort

A Natural Antidepressant



Hypericum perforatum

Though currently found worldwide, St. John's wort is native to Europe, which is where it was first used medicinally. In ancient Greece, St. John's wort was used for burns and open wounds, as well as insomnia. Beyond physical impairments, St. John's wort can be used to treat depression, the first documented instance of this being in 17th-century Germany¹⁶. Since then, it has become one of the most popular medicinal remedies for depression, with traditional Chinese Medicine and Ayurvedic medicine using St. John's wort to calm the mind and lift the spirits¹⁷.

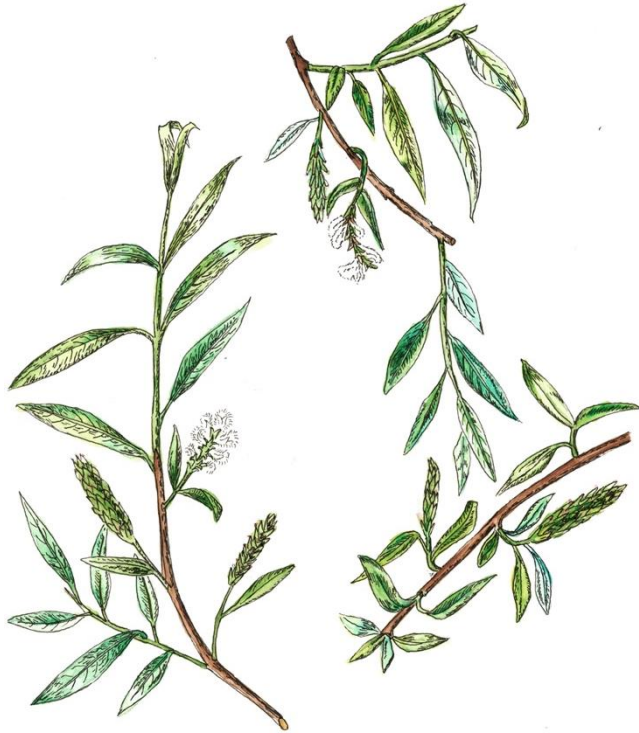
St. John's wort's function as an antidepressant has been extensively studied. Though the plant cannot treat severe depression, studies have found that it is effective in treating mild to moderately severe depression. Notably, researchers found that St. John's wort extract treats depression just as effectively as conventional antidepressant medications, with fewer side effects of anxiety, headaches and loss of appetite¹⁸. Studies have also shown that St. John's wort can treat Seasonal Affective Disorder, also known as seasonal depression^{3, 18}.

Appearance: Plants are bushy, branched and 1 - 3 feet tall. Leaves are yellowish-green and oval-shaped, and the root system is composed of a taproot and lateral roots. Flowers begin blooming in June and have a star shape with five yellow petals and yellow stamen. Flowers mature into green seed pods, which turn brown and woody over time²⁴.

Habitat Type: Prefers warm, temperate climates with lots of sunlight. Commonly seen in meadows, pastures, and ditches²⁴.

White Willow

A Natural Aspirin



Salix alba

Throughout history, willow has been commonly used as a pain reliever. Ancient Egyptians used extracts of willow leaves to treat nonspecific pains, while ancient Greeks used willow to lessen pains during childbirth¹⁹. Sumerians also used willow leaves to treat inflammatory and arthritic conditions. More recently, Native American tribes use willow to treat fevers, headaches, and arthritis²⁰.

In the 1900s, the active compound of willow, salicin, was modified to create aspirin. Because salicin is very similar to the active compound in aspirin, willow bark powder or extract could potentially be substituted for aspirin to relieve mild pain²¹. This

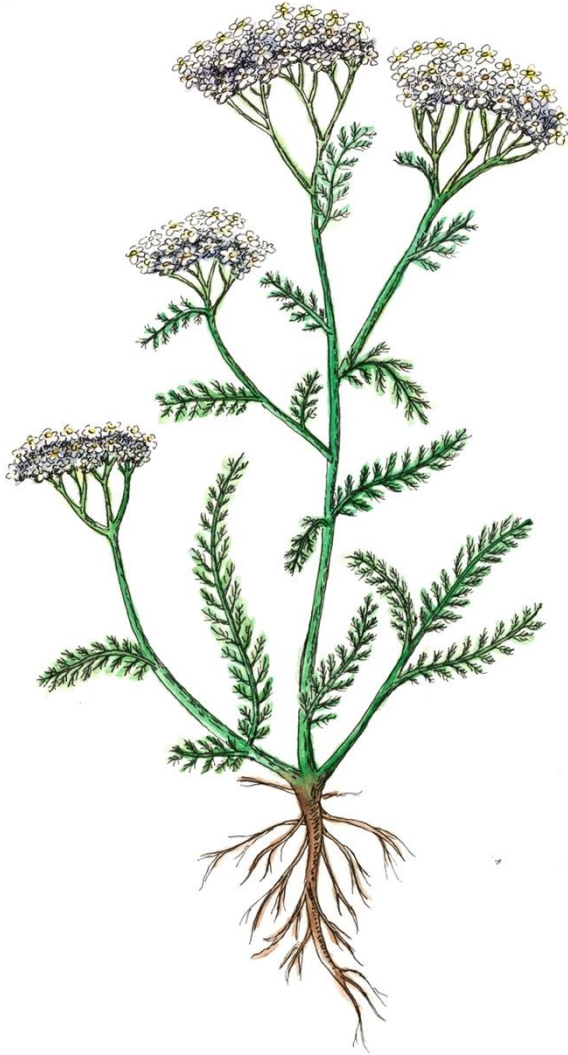
notion has not been thoroughly studied, but researchers found that willow bark extract can treat lower back pains, joint pains associated with arthritis, fever, and general body aches^{20, 21}.

Appearance: Trees can grow up to 80 feet tall and have furrowed, grayish-brown bark. Roots are shallow and spread horizontally for long distances. Leaves are pale green and long with a finely toothed edge. Flowers bloom in spring and grow in thin, cylindrical clusters that are pale yellow or green. Flowers mature into clusters of light-brown capsules that contain cottony seeds²⁴.

Habitat Type: Prefers temperate wetlands, can be found by bodies of water such as lakes and streams²⁴.

Yarrow

A Wound Healer



Achillea millefolium

Traditional medicines use yarrow to treat a variety of conditions, the most common being for healing wounds. In Hungarian traditional medicine, ointments made from yarrow leaves are used to treat burns and open wounds. European and Brazilian remedies use yarrow ointments and poultices to stop bleeding and treat skin rashes. Traditional Chinese medicine also treats wounds and bruising with yarrow, but additionally uses it for snakebites and varicose veins²².

Few large-scale studies have assessed yarrow's medicinal properties. However, in smaller studies yarrow has been found to promote quicker cell and tissue growth, which explains its role as a wound healer in traditional cultures²³. Yarrow also has anti-inflammatory properties, as it reduced swelling in women who had recently given birth as well as patients with mouth and throat inflammation²².

Appearance: Plants can grow up to 3 feet tall. Leaves are dark green, feathery, and

finely divided. Flowers bloom in June and grow in clusters at the top of each stalk.

Flowers can be various colors including shades of white, yellow, red and orange. Flowers mature into brown, papery capsules which contain seeds²⁴.

Habitat Type: Prefers temperate, sunny regions. Common in prairies and pastures²⁴.

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About the Author



Lorena is a second-year student at the University of Iowa studying Biomedical Engineering and Arabic. Outside of school, she researches pulmonary allergens and parasites in the university's Department of Internal Medicine. Lorena also tutors biology and volunteers with local clinics. As a Latham Fellow, Lorena hopes to teach others about science in the natural world, specifically with medicinal plants. In her free time, Lorena enjoys nail art, hiking, and biking. This is her first book.