The Healing Power of Plants

Pre and Post Field Study Packet

Field Study Orientation

Throughout human history, humans have depended upon plants to heal their bodies, minds and spirits. Today, more than 40% of the prescription drugs contain at least one compound derived from nature and at least 25% contain an ingredient that comes from plants. During your Healing Power of Plants field trip students will discover some of these plants and plant chemicals and how to identify them. They will learn about the history of medicinal plants from around the world as well as uses for many plants that you can grow or find here in Georgia. Students will also assemble their own herbal first-aid kit containing herbal capsules, a salve with essential oils and a medicinal tea. Activities will take place in the Garden's classroom as well as in the herb and medicinal plant garden.

A Field Study for Grades 4-8

The State Botanical Garden of Georgia

Revised 11/2007

The Healing Power of Plants
Field Study Manual

CONTENTS

Essential Questions

Why are plants important for my health?

What are some medicines that come from plants?

From where in the world do medicinal plants come?

How did humans come to know what plants are medicinal?

Major Concepts

- Many medicines come from plants.
- Protecting native plants is important for preserving possible sources of medicines.
- Plants are vital to human survival.
- Many plants contain chemicals that can be used as medicines.
- Native medicinal plants are threatened by habitat loss, over collecting, herbicide and pesticide use.
- Conservation is necessary to protect the long- term health of ecosystems and survival of individual plant species.
- How to grow a plant from a seed.
- The desire for herbs and spices drove exploration historically.

Standards addressed by The Healing Power of Plants Field Study

Science

4L1. Students will describe the roles of organisms and the flow of energy within an ecosystem.

c. Predict how changes in the environment would affect a community (ecosystem) of organisms.

d. Predict effects on a population if some of the plants or animals in the community are scarce or if there are too many.

S4L2. Students will identify factors that affect the survival or extinction of organisms such as adaptation, variation of behaviors (hibernation) and external features (camouflage and protection).

b. Identify factors that may have led to the extinction of some organisms.

S5L1. Students will classify organisms into groups and relate how they determined the groups with how and why scientists use classification.

b. Demonstrate how plants are sorted into groups.

S5L3. Students will diagram and label parts of various cells (plant, animal, single-celled, multi-celled).

a. Use magnifiers such as microscopes or hand lenses to observe cells and their structure.

b. Identify parts of a plant cell (membrane, wall, cytoplasm, nucleus, chloroplasts) and of an animal cell (membrane, cytoplasm, and nucleus) and determine the function of the parts.

S5L4. Students will relate how microorganisms benefit or harm larger organisms.

a. Identify beneficial microorganisms and explain why they are beneficial.

b. Identify harmful microorganisms and explain why they are harmful.

S6E5. Students will investigate the scientific view of how the earth's surface is formed.

i.Describe methods for conserving natural resources such as water, soil, and air.

S6CS2. Students will use standard safety practices for all classroom laboratory and field investigations.

b. Demonstrate appropriate techniques in all laboratory situations.

S7CS9. Students will investigate the features of the process of scientific inquiry.

Students will apply the following to inquiry learning practices:

a. Investigations are conducted for different reasons, which include exploring new phenomena, confirming previous results, testing how well a theory predicts, and comparing competing theories.

S7L4. Students will examine the dependence of organisms on one another and their environments.

c. Recognize that changes in environmental conditions can affect the survival of both individuals and entire species.

S8P1. Students will examine the scientific view of the nature of matter.

d. Distinguish between physical and chemical properties of matter as physical (i.e., density, melting point, boiling point) or chemical (i.e., reactivity, combustibility).

SB4. Students will assess the dependence of all organisms on one another and the flow of energy and matter within their ecosystems.

d. Assess and explain human activities that influence and modify the environment such as global warming, population growth, pesticide use, and water and power consumption.

e. Relate plant adaptations, including tropisms, to the ability to survive stressful environmental conditions.

Social Studies

SS4H1 The student will describe how early Native American cultures developed in North America.

b. Describe how the American Indians used their environment to obtain food, clothing, and shelter.

SS4H2 The student will describe European exploration in North America.

a. Describe reasons for, obstacles to, and accomplishments of the Spanish, French, and English explorers: John Cabot, Vasco Nunez Balboa, Juan Ponce de Leon, Christopher Columbus, Henry Hudson, Jacques Cartier.

SS4H3 The student will describe the factors that shaped British colonial America.

b. Describe colonial life in America as experienced by various people, including large landowners, farmers, artisans, women, indentured servants, slaves, and Native Americans.

.**SS4G2** The student will describe how physical systems affect human systems.
c. Explain how the physical geography of each colony helped determine economic activities practiced therein.
a. Explain the process for making and enforcing laws.
SS4CG4 The student will explain the importance for Americans to share certain central democratic beliefs and principles both personal and civic.
SS4CG3 The student will describe the functions of government
c. Explain the necessity of obeying reasonable laws/rules voluntarily, and explain why it is important for citizens in a democratic society to participate to in public (civic) life (e.g., staying informed, voting, volunteering, communicating with public officials).
SS4E1 The student will use the basic economic concepts of trade, opportunity cost, specialization, voluntary exchange, productivity, and price incentives to illustrate historical events.
c. Explain how *price incentives* affect people's behavior and choices (such as colonial decisions about what crops to grow and products to produce).
SS4E2 The student will identify the elements of a personal budget and explain why personal spending and saving decisions are important.
SS5E3 The student will describe how *consumers* and *businesses* interact in the United States economy across time.
a. describe how *competition*, *markets*, and *prices* influence people's behavior.
b. describe how people earn *income* by selling their labor to businesses.
SSWG2 The student will explain the cultural aspects of geography
a. describe the concept of place by explaining how the culture of a region is product of the regions physical characteristics
SSEF1 The student will explain why limited productive resources and unlimited wants result in scarcity, opportunity costs and trade offs for individuals, businesses and governments.
a. define scarcity as a basic condition which exists when limited productive resources exceed unlimited wants
SSEF5 The student will describe the roles of government in a market economy.
b. give examples of government regulation and deregulation and their effects on consumers and producers.

S1CS5. Students will be able to communicate scientific ideas and activities clearly.
a.Describe and compare things in terms of number, shape, texture, size, weight, color, and motion.
b. Draw pictures (grade level appropriate) that correctly portray features of the thing being described
c. Use simple pictographs and bar graphs to communicate data.
S1L1. Students will investigate the characteristics and basic needs of plants and animals.
a.Identify the basic needs of a plant.
Air, Water, Light, Nutrients
b. Identify the basic needs of an animal.
Air, Water, Food, Shelter
M1M1. The student will compare and/or order the length, weight, or volume of two or more objects by using direct comparison or a nonstandard unit
MKM2. The student will compare and/or order objects on the basis of quantitative attributes (length, height, area, volume, and weight,) through direct comparison**.**
ELA1RS1 The student uses resources such as pictionaries, the Internet, software, trade books, and magazines to gather information pertinent to a topic, sort it into major categories, and report it to others. The student begins to use a dictionary or thesaurus.
ELA1H1 The student prints legibly and spaces letters, words, and sentences appropriately.

The Healing Power of Plants
Pre-Field Study Activities

Introduction to Medicinal Plants

by Dr. A. Jefferson Lewis III, Director
The State Botanical Garden of Georgia

From very early times a variety of herbs were used as healing agents. Herbalists abound in many ancient cultures although not always held in good repute--the Greek satirist Lucian has Hercules address Aesculapius as a "root digger and a wandering quack." Herb gatherers often fenced their craft in superstitions handed down by word of mouth, the implication being that herb collecting was too complicated and dangerous a pursuit for the uninitiated! Directions were sometimes quoted with ridicule--to obtain peony root, it was advised to dig only at night, because if done during the day and observed by a woodpecker, one risked the loss of his eyesight.

Despite the lurid tales and mystery surrounding many herbs, herbs then as now were an important source of medicine. Stimulated by the reliance on herbal medicines in the 16th and 17th centuries, European medical schools founded botanical gardens devoted mainly to medicinal species. The gardens were used for training medical students, to grow plants from which to extract medicines and conduct research.

Modern pharmaceuticals are often meant to work like "bullets," relying on highly purified and potent chemicals to achieve specific effects. Herbal remedies are more like food supplements or vitamins. Many have been used for centuries to fight infection, boost immunity, and restore lost vigor. The effectiveness of many of these natural tonics is suspect and unproven; few have been as rigorously tested as modern drugs.

Some currently popular natural remedies include Cat's Claw, a rainforest herb used to treat asthma, ulcers and cancer; Echinacea, a North American species used as an antiviral agent to lessen severity of colds and flu (claims that it fights cancer and AIDS are unconfirmed); Garlic said to fight bacterial infections, help lower cholesterol and blood pressure, and reduce risk of cancer; *Ginko* used for conditions associated with aging such as memory loss, poor circulation and impotence; Ginseng said to boost the immune system, increase stamina, resist stress, and enhance virility; *Ma huang* used for weight control and as an energy booster; and Saw Palmetto said to improve urinary flow and ease pain from enlarged prostates.

Today approximately 80% of the population in developing countries remains totally dependent on medicines derived from plants and other living organisms. Chinese medicine, for example, remains deeply rooted in herbal healing. Forty to fifty of all medicinal drugs originate in wild plants. Approximately 25% of all prescriptions written annually in the United States contain chemicals from plants, yet only a very small percentage of the world's plant species have been analyzed for even a single chemical or group of chemicals.

Our dependence and fascination with medicinal plants continues unabated. Natural remedies and herbal medicines, real or imagined, are enjoying a resurgence of interest. Old wives' tales continue to intertwine with proven medicinal benefit. Plants remain the basis of our modern pharmacopoeia--and the source of myth, legend and folklore.

The Healing Power of Plants
Pre- Field Study Activities

The following activities were designed to prepare your students for their Medicinal Plants field trip at the State Botanical Garden of Georgia.

The Researching Medicinal Plants activity can be considered an ongoing activity. Some research of medicinal plants should happen before the field trip to familiarize students with the subject and to therefore maximize their understanding of the information given them during the field trip.

The Origami Box can be constructed to hold the Medicinal Plant First Aid Kit that will be made during their field trip. The box can then be decorated with dried plant material or with prints made from leaves or other natural materials. If the students do not have origami boxes, their first aid kits can be put into zip-lock bags.

Have a wonderful time on your field trip at the State Botanical Garden!

Researching Medicinal Plants

Essential Questions:
What are some other interesting facts about medicinal plants?
How can find out more information about medicinal plants?

As the primary producers in every food chain, plants are the foundation for life on Earth. Plants provide food, shelter, and oxygen. They also clean the air, provide a variety of useful products to humans, heal our bodies, and make the world more beautiful.

Researching the healing properties of plants provides learners with an opportunity to view plants from a different perspective. What makes them medicinal?

In addition to being useful to humans, medicinal plants are often excellent sources of nectar and pollen to pollinators. Learning more about individual plants deepens our understanding of the interconnections between people, plants, and our environment.

Getting Ready:
Have some reference materials available for student research. At the end of this activity there is a list of several books that are great sources of information regarding uses of plants medicinally and otherwise. They include additional facts about their growth requirements, native habitats, and history. Students can also easily access research information from the internet. A helpful website is www.botanical.com.

Location: classroom and library at school

Objectives: *Learners will:*
1) research medicinal plants commonly grown in Georgia.
2) learn more about the uses of these medicinal plants.
3) share what they have learned with the class.

Skills: uses reference tools to answer questions, uses tools for collecting data, writes and uses instructions, researches for information, uses technology

Concepts: Habitats, Interdependence, Life cycles

Supplies:
- blank Amazing Medicinal Plant Card templates
- pencil or pen
- books on medicinal plants or internet access

Subject: science

Time: 2 hours (can be broken up into 30 minute or hour intervals)

Instructors should emphasize that all medicines, including plant medicines, should only be taken when prescribed by a doctor.

Procedure:
1. Each learner, or group of learners, will pick a medicinal plant. Provide each learner or group with a card to fill out about their plant. (Template for Amazing Medicinal Plant Cards included.)
2. Learners should use resources in the classroom, at the library, or on the internet to complete the cards. They should include information on propagation or seed germination about their chosen plant. They should also be prepared to provide interesting facts or other mnemonic devices that can be used to help remember specific plant names and their healing properties.

3. Information gathered by each group (or individual learner) should be shared and used to fill in cards. Each group (or individual learner) will then have a completed set of Amazing Medicinal Plant Cards containing all plants that were researched.

Discussion/Assessment:
When researching your plant, did you discover some interesting scientific information regarding the life cycle or structure of the plant?

Did you find interesting historical information regarding the use of the plant?

Was your plant used by Native Americans or early settlers? (They were able to get all of their necessities from their environment, even medicines.)

Where did the plant you researched originally come from? (In other words, what is its country of origin?)

Are there animals that depend on this plant for food or other basic resources?

Are there animals involved in its life cycle?

Who do you think is its pollinator?

What kind of soil does the plant that you researched prefer?

Do you think other creatures may think of your plant as food?

How do you think your plant will change with the seasons?

Digging Deeper:
Learners can pick one plant to research further and present what they have learned to the class. Often there is interesting historical information to be discovered about a particular plant – its country of origin, its uses through time, the meaning of its name, etc.

Seeds can be obtained for plants and sown. The plant can be grown inside or out. It should be observed at different growth stages and observations recorded in journal entries, and/or in charts and graphs. Encourage botanical illustrations.

Useful sources of Medicinal Plant Information

Chevallier, A. 1996. *The Encyclopedia of Medicinal Plants.* Dorling Kindersley Limited, London.

Midgley, Jan. 1999 . *Southeastern Wildflowers.* Crane Hill Publishers, Hong Kong.

Ody, Penelope. 1997. *Medicinal Herbs* . Dorling Kindersley Limited, London.

Rodale's Encyclopedia of Herbs. 1987. Claire Kowalchick and William H. Hylton, editors. Rodale Press, Emmaus, Pennsylvania.

Pre Field Study Activity
The Healing Power of Plants
State Botanical Garden of Georgia

Amazing Medicinal Plant Card Template

Common Name: _____

Scientific Name: _____

Plant family: _____Place of origin: _____

Description: _____

Medicinal Uses: _____

Part of the plant used for medicine: _____

Type of remedy (preparation):_____

Interesting facts: _____

_____

Common Name(s): _____

Scientific Name: _____

Plant family: _____Place of origin: _____

Description: _____

Medicinal Uses: _____

Part of the plant used for medicine: _____

Type of remedy (preparation): _____

Interesting facts: _____

_____

Amazing Medicinal Plant Cards Examples

Non-native Medicinal Plants

Horsemint
Scientific name: *Monarda punctata*
Plant family: Lamiaceae, Mint Family
Place of origin: North America
Description: Perennial, grows 2-5 ft. with pale yellow flowers with purple spots above pink or white bracts.
Medicinal use(s): For colds (steam from tea), for nausea and insomnia (tea).
Part(s) of the plant used for medicine: Leaves, flowers and essential oil
Preparation: Tea
Interesting facts: loved by bees (Bee Balm is common name of Monarda didyma), common remedy of Native Americans

German Chamomile
Scientific name: *Matricaria recutita*
Plant family: Asteraceae, Sunflower Family
Place of origin: Europe and western Asia
Description: An annual herb, 1.5 feet tall, with white and yellow daisy-like flowers.
Medicinal use(s): For digestive disorders, tension, wounds, burns, asthma and hayfever
Part(s) of plant used for medicine: Flowers
Preparation: Infusion, inhalations, essential oil
Interesting facts: Roman Chamomile (*Chamaemelum nobile*) and German Chamomile are two different species of plants but are both known as Chamomile. They have similar medicinal properties.

Calendula
Scientific Name: *Calendula officinalis*
Plant family: Asteraceae, Sunflower Family
Place of origin: Southern Europe
Description: An annual herb, 2 ft. tall, with vivid orange flowers similar in structure to daisies.
Medicinal use(s): Inflamed or minor wounds, skin rashes and sunburn
Part(s) of the plant used for medicine: Flowers
Preparation: Infusion, cream, ointment, tincture, infused oil
Interesting facts: Calendula is one of the birth month flowers for October, and the flowers are edible.

Lavender
Scientific Name: *Lavandula angustifolia*
Plant family: Lamiaceae, Mint Family
Place of origin: Southern Europe and the Mediterranean
Description: An evergreen shrub, about 4 feet tall, with blue-purple flowers.
Medicinal use(s): Sedative, headaches, burns, bites, antiseptic
Part(s) of the plant used for medicine: flowers, essential oil
Preparation: infusion, infused oil, essential oil,
Interesting facts: The name lavendar is derived from the Latin verb *lavare*, to wash. It was used by the Romans to scent bath water.

Other important non-native medicinal plants:
feverfew, garlic, lavender, peppermint, rosemary, thyme

Southeastern Native Medicinal Plants

American Ginseng
Scientific name: *Panax quinquefolius*
Plant family: Araliaceae
Place of origin: eastern North America
Description: deciduous perennial growing to about 1 ft. tall, smooth stem, leaves with oblong, oval leaflets, small greenish-white flowers, kidney-shaped scarlet berries
Uses: panacea, adaptogen, calming sedative, tonic for stamina and energy and for treatment of poor sleep, nervous exhaustion and short-term stress
Part used: root
Preparation: raw root is chewed, capsules, tea, tincture

Bloodroot
Scientific name: *Sanguinaria canadensis*
Plant family: Papaveraceae, Poppy Family
Place of origin: eastern North America
Description: perennial plant growing to 6 inches in height, leaf stalks and flower stalks grow from underground stem, leaves irregularly lobed (puzzle piece like), flower with 8-12 petals
Uses: antiviral, antibacterial, used as an ingredient in toothpaste to fight plaque, traditional Native American remedy for fevers, rheumatism and as an expectorant
Part used: rhizome
Preparation: fresh root, ointment, gargle, powder

Blue false indigo
Scientific name: *Baptisia australis*
Plant family: Fabaceae
Place of origin: Eastern and Central North America, Pennsylvania to Georgia, west to Texas, Nebraska and Indiana
Description: tall perennial, growing 4-6 feet with grey-green foliage, leaves are divided into clover-like leaflets that are obovate, flower spikes (upright racemes) of deep blue to violet flowers appear in June, fruit is bluish-black, oblong, ending in a sharp tip, about 1 1/2-2 inches long and rattles when shaken
Uses: Antibilious, cathartic, hydragogue, purgative, stimulates immune responses to infection, is used for ear nose and throat problems, laryngitis, tonsillitis, toothache, as a wash for mouth ulcers and as a dye
considered toxic
Part used: bark, leaves, root
Preparation: tea, decoction

Eastern Red Cedar
Scientific name: *Juniperus virginiana*
Plant family: Cupressaceae
Place of origin: Central and Eastern N. America from Canada south to Georgia and Texas
Description: Woody evergreen perennial with slow growth rate and potential of reaching 60 feet by 25 feet or more
Uses: abortifacient, anthelminthic, antiseptic, aromatherapy, cancer, diaphoretic, diuretic, emmenagogue, rubefacient, stimulant, coughs, colds, general weakness, skin disorders and chest complaints
* potentially toxic*
Part used: fruit, leaves, young twigs, essential oil
Preparation: fruit can be eaten raw or cooked, can be crushed and used as a flavoring in soups and stews, a tea is made from the fruit

Butterfly weed

Scientific name: *Asclepias tuberosa*
Plant family: Asclepidaceae
Place of origin: North America, S. Ontario and New York to Minnesota, south to Florida and Colorado, most abundantly southward and southwestward
Description: handsome, fleshy rooted, perennial plant, growing 1 to 1 1/2foot high and bearing corymbs of deep yellow and orange flowers in September
Uses: common name of pleurisy root comes from its use by native Americans and settlers to treat pleurisy, which is inflammation of the membranes that line the chest and cover the lungs, may reduce the thickness of mucus and encourage coughing, therefore helped to relieve pleurisy and other respiratory conditions such as bronchitis, contains chemicals that may increase sweating, so it also may have helped to lower fever associated with infective diseases, antispasmodic, carminative, cathartic, diaphoretic, diuretic, expectorant, tonic, vasodilator, poultice
*causes diarrhea and vomiting in large doses
Part used: root, flowers, seed pods, shoots
Preparation: poultice of dried roots used in the treatment of swellings, bruises, wounds, ulcers, lameness**,** tea

Foam flower

Scientific name: *Tiarella cordifolia*
Plant family: Saxifragaceae
Place of origin: Eastern North America, Nova Scotia to Ontario and Minnesota, south to Michigan, Georgia and Virginia
Description: evergreen perennial growing to 6 inches by 1.5 feet, can grow in full shade (deep woodland) or semi-shade (light woodland) and requires moist soil
Uses: whole plant is diuretic, hepatic, lithontripic and tonic, used in the treatment of bladder and liver problems and also indigestion and dyspepsia. Leaf tea used as mouthwash (removes white coating from tongue) and as a wash for sore eyes, root tea treats diarrhea in children and crushed roots can be used as a poultice
Part used: whole plant
Preparation: tea, infusion

Goldenseal

Scientific name: *Hydrastis canadensis*
Plant family: Ranunculaceae, Buttercup Family
Place of origin: eastern North America
Description: small herbaceous perennial with thick yellow root and erect stem growing to 1 foot tall
Uses: used by Native Americans as a woman's herb, has sedative properties, soothes inflammatory and rheumatoid arthritis, high blood pressure, tinnitus, whooping cough and asthma
Part used: rhizome
Preparation: capsules, tincture, decoction, infusion

Wild Geranium,

Scientific name: *Geranium maculatum*
Plant family: Geraniaceae
Place of origin: eastern and central North American woodlands
Description: perennial growing to 2 feet, cleft leaves , pink-purple flowers, beak-shaped fruit
Uses: sore throat, canker sores, infected gums, diarrhea, internal bleeding, irritable bowel syndrome, hemorrhoids, used to staunch wounds
Part used: aerial parts, root
Preparation: The root is powdered; an infusion or poultice is made from the whole plant or the roots

Wild Yam

Scientific name: *Dioscorea villosa*
Plant family: Dioscoraceae
Place of origin: Eastern N. America from New England to Minnesota and Ontario, south to Florida and Texas; found growing in damp woods and swamps, thickets, roadside fences and hedges
Description: perennial climbing vine with heart-shaped leaves with prominent veins which run lengthwise from the center top out into a fan pattern
Uses: medicinal herb used by the Aztec and Mayan peoples to treat female problems and to relieve the pain of child birth, used for symptoms of menopause and PMS such as hot flashes, night sweats, mood changes, also irritable bowel syndrome, gastritis, gall bladder complaints, spasmodic cramps and in small doses is especially helpful in treating the nausea of pregnant women
Part used: root
Preparation: infusion, decoction, tea

Yaupon Holly

Scientific name: *Ilex vomitoria*
Plant family: Aquifoliaceae
Place of origin: Southeastern North America, Virginia to Florida, west to Texas and Arkansas.
Description: evergreen shrub growing to 18 feet, flowers from April to May,(flowers are dioecious - individual flowers are either male or female, only one sex is found on each plant), seeds ripen from October to December, grows in sun or semi-shade and requires moist soil
Uses: emetic used as a purification rite by several North American Indian tribes; leaves were toasted over fire then boiled for several hours resulting in a thick black liquid which was drunk followed by immediate vomiting. Today, leaves can be roasted and or steeped in first ice cold and then boiling water to make a mildly stimulating and intoxicating tea. The leaves also used to flavor ice cream and soft drinks.
Part used: leaves
Preparation: decoction, tea

Maidenhair fern

Scientific name: *Adiantum pedatum*
Plant family: Polypodiaceae
Place of origin: North America, Alaska to Quebec and Nova Scotia, south to California and Georgia
Description: perennial fern with fronds about 1 foot long, leaves are not typically elongated but are rounded, toothed, and fan-shaped and covered with hairs at the base, produces brown, hairy rhizomes, slender roots, and erect stems that can grow to a height of ten inches, requires moist, well-drained soil, can grow in semi-shade.
Uses: antirheumatic, astringent, demulcent, emmenagogue, expectorant, febrifuge, haemostatic, pectoral and tonic, used in treatment of asthma, of nasal congestion, sore throats, ague, fever, rheumatic joints. The North American Indians chewed the fronds and then applied them to wounds to stop bleeding.
Part used: root, fronds
Preparation: tea, syrup, decoction, infusion

Sassafras

Scientific name: *Sassafras albidum*
Plant family: Lauraceae
Place of origin: eastern and southern United States and into Mexico, ranges as far west as Texas and Iowa
Description: medium sized, deciduous shrubby tree that may grow 60' to 80' tall, with a cylindrical trunk and twisted branches, common name of Mitten Tree refers to usually 3 lobed leaf shape
Uses: aromatic, stimulant, pain reliever, astringent and treatment for rheumatism, skin eruptions, syphilis and to break tobacco habit, was original root beer, considered blood purifier in moderation
Part used: root, leaves, bark, seeds, stems
Preparation: tea, decoction, infusion

Passion flower

Scientific name: *Passiflora incarnata*
Plant family: Passifloraceae
Place of origin: Eastern North American, Virginia and Kentucky, south to Florida and Texas
Description: perennial vine with showy fragrant flowers, white with lavender and flesh-colored crown that blooms in the summer, spreading two to three inches in diameter followed by fleshy, green, oblong fruit with yellow pulp
Uses: pain relief, antispasmodic, astringent, diaphoretic, vasodilator, a non-addictive sedative that does not cause drowsiness used in the treatment of insomnia, nervous tension, irritability, neuralgia, irritable bowel syndrome, premenstrual tension and back pain; useful in treatment of epilepsy and showing promise in fighting Parkinson's Disease, cancer, HIV, leukemia, and more; fruit and flowers can be eaten raw or cooked in jellies, jams, young leaves are used as a cooked vegetable or eaten in salads
Part used: aerial parts, leaves, fruits, stems, flowers
Preparation: infusion, tea, decoction

Bee Balm

Scientific name: *Monarda didyma*
Plant family: Lamiaceae, Mint Family
Place of origin: North America
Description: perennial, grows 3-4 ft., bright red flowers that attract bees, hummingbirds and butterflies
Uses: steam inhaled for colds, tea for nausea, fever and insomnia
Part used: leaves, flowers, essential oils
Preparation: tea, poultice

Purple Coneflower

Scientific name: *Echinacea* spp.
Plant family: Asteraceae, Sunflower Family
Place of origin: Central U.S.
Description: Herbaceous perennial with daisy-like purple flowers and leaves covered in coarse hair
Uses: Capsules for colds, flu and infections
Parts used: Roots, flowers, stems and leaves
Preparation: Tincture, decoction, capsules of powdered root

Slippery Elm

Scientific name: *Ulmus rubra*
Plant family: Ulmaceae, Elm Family
Place of origin: U.S. and Canada
Description: Large Tree
Uses: Powder for coughs and digestive upsets, diarrhea
Part of the plant used: Inner bark of 10-year old tree
Preparation: infusion, poultice, and capsules of powdered bark

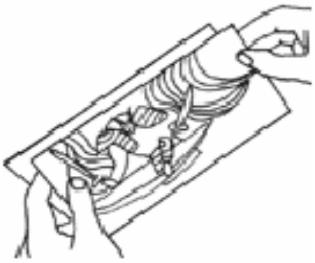
Witch Hazel

Scientific name: *Hamamelis virginiana*
Plant Family: Hamamelidaceae, Witch hazel Family
Place of origin: Eastern U.S. and Canada
Habit: A small deciduous tree, 15 ft. tall, with oval leaves edged with teeth, small flowers appear before leaves in winter
Uses: Distilled water for healing cuts and scrapes
Part of the plant used: Leaves and bark
Preparation: Tincture, distilled, ointment

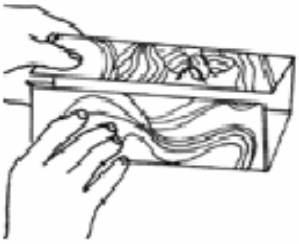
Making a Medicinal Plant First Aid Kit Origami Box

Procedure:

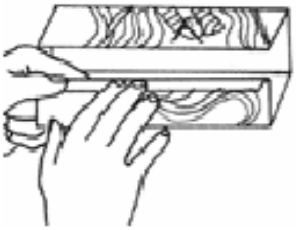
1. Give each student 2 pieces of cardstock.
2. Explain to the students that they will create a Medicinal Plant First Aid Kit Origami Box to contain the medicinal plant preparations.
3. To create the box:



- Fold one sheet in half the long way. Make all folds as flat as possible for sharper edges.



- Open the sheet and fold each half into the middle.



- Make a thin fold back out on each side.

Location: indoors

Level: grades 4 - 8

Objectives: *Learners will:*

1. create and decorate an origami box which can hold a medicinal plant first aid kit.

Skills: following instructions, practicing spatial relation skills

Supplies:

- 2 sheets of 8 1/2 x 11 cardstock, the heavier the better, for each student.
- materials to personalize the outside of Medicinal Plant First Aid Kit including: markers, paint, crayons, glue, leaves, sticks, pressed flowers, stickers, leaf stamps (made from actual leaves and paint or ink), etc.

Subjects: art, geometry

Time: 15 minutes to fold, 15 minutes to decorate

Making a Medicinal Plant First Aid Kit Origami Box
Continued

- Fold in all four corners and tuck them under the thin fold.

- Put your fingers in the corners and pull the box into shape so the sides stand up.

- This is a completed half of the box.

4. Repeat with second sheet of cardstock. Slip one half over the other.

5. Personalize the outside of the box.

Note: If cardstock is not available, students can glue two sheets of paper together.

The Healing Power of Plants

Field Study at The State Botanical Garden of Georgia

Introduction

The field study begins with a brief introduction to the State Botanical Garden of Georgia and a discussion of the importance of plants. Then the topic of medicinal plants is presented. Questions addressed are:

- Where do medicines come from today? Where have they come from in the past?
- How did people begin to use plants as medicine?
- Do any of us use plant medicines today? What are some commonly used medicinal plants?
- What parts of the plant are used to make medicines?
- Why do plants have medicinal properties?
- Are any medicinal plants native to the Southeast?

Paper Chromatography Experiment

Chromatography is a method used to analyze the compounds in a substance. The word chromatography means color writing. There are different types of chromatography, such as gas, liquid, and paper, that are used to analyze different kinds of substances. We used paper chromatography to separate colored chemicals, called pigments, in leaf material. We compare the pigments present in different species of leaves.

Forest and Field Scavenger Hunt

In the past, forests and fields were like pharmacies. The source of our medicines is very different today. The design of the Herb Garden at the Botanical Garden is influenced by Medieval monastic gardens. During the Middle Ages, knowledge of plants and their medicinal uses was preserved by monks at these gardens. People would go to these gardens to learn what the plants looked like and how to grow them. These monastic gardens were the forerunners of botanical gardens and medical schools. The initial research in genetics was conducted at such a garden. To learn more about some common herbs and their uses we will have a scavenger hunt in the Herb Garden.

Collection Game

In the past, native remedies were very plentiful. However, now native wild-grown medicinal plants can be rare. These medicinal plants can be sold for money and are often collected by less fortunate people. Many of these plants could easily become endangered and possibly extinct. It is important for collectors to know the growth cycles and requirements of these plants in order to collect in a sustainable way. This game examines over-harvesting and stresses the importance of conservation.

Herbal First Aid Kit

We will assemble an herbal first aid kit. Gelatin capsules will be filled with powdered ginger for motion sickness and upset stomachs. Tea bags will be made with chamomile flowers and/or peppermint leaves. Chamomile and Peppermint teas are calming and help with digestive problems. A

Salve will be made containing lavender and tea tree oil. It has antiseptic qualities and is soothing to the skin.

Medicinal Plant Geography Game

(may not be part of the field study; directions are included in this packet and can be played as a post field study activity)

The students will be sent on a quest by the queen to find a group of plants that occur around the world. An expedition was sent before them, but the crew has been lost – only their journal remains. Each group must fill in the missing parts of the journal using a set of medicinal plant descriptions as clues. As they fill in the blanks, they chart the course that they would follow to collect all of the plants on their map. The first group to find all of the plants wins.

The Healing Power of Plants
Post-Field Study Activities

After your visit to the State Botanical Garden, refresh your students' memories of their field trip and what they learned by reviewing and expanding their medicinal plant knowledge with these post-trip activities.

The post-trip version of the Forest and Field Scavenger Hunt involves using the School Site Herbal found at the end of the Scavenger Hunt activity write-up. The Herbal can be photo copied, cut out along the black lines and stapled. The plants of the Herbal are commonly used in schoolyard plantings or are naturally occurring weeds. If the plants used in the Herbal are not found on your school site, the Herbal can still be used and flags made up with the names of these plants. Students will simply be asked to look for the flag and not the actual plant. Students could research to find pictures and descriptions of these plants to find out what they look like. Or in a reverse fashion, they could identify actual plants found on the school site, look up any medicinal properties that these plants may have and make an herbal of their own. You may be surprised about the chemical content of very common plants!

Another activity that would be easy to replicate away from the Botanical Garden is the Medicinal Plant Geography Game. Learning about the plants from around the world mentioned in the game can lead to many educational explorations of the origins of medicines and everyday household products made from plants. Students can trace the history of these plants through research. They could also venture into the field of ethnography by interviewing their older relatives and neighbors to learn about remedies of the not so distant past. The possibilities are endless!

And of course, there is no better teacher than hands-on experience. We hope the details included in the Growing Medicinal Plants in the Classroom and on the School Site can guide you in the cultivation of your own garden.

Thank you for visiting the State Botanical Garden of Georgia. We hope to see you again soon!

Medicinal Plant Geography Game

Location: indoors or outside

Objectives: *Learners will:*
1) study the origins of plants and some of their uses.
2) increase their awareness of world geography and trade routes.

Skills: writes and uses instructions, uses map

Concepts: Interdependence, Map skills

Supplies:
- world map
- letter from the Queen
- extracts from Explorers' Journal worksheet
- 12 plant information cards (plant name, origin and use)
- pencil
- non-permanent marker

Subjects: science, geography, social studies

Time: 30 minutes

Essential Questions:
What are some plants that can be used for medicines?
What are the geographic origins of certain medicinal plants?

Background:
During the Middle Ages, trade greatly increased between Europe and Asia. Crusaders returned to their homelands with riches from faraway lands. Some of these riches were spices and exotic new herbs. These luxuries changed life for the people of feudal Europe. Trade routes developed around the desire for these plants.

As trade expanded, a wide variety of useful herbs for preserving food, fragrance, medicines, and ornamental purposes became available. These herbs included ginger, cardamom, nutmeg, turmeric, cinnamon, and senna.

In the 15th and 16th centuries, the search for new ways to control the trade of herbs and spices led to the conquest and colonization of Central and South America by the Spanish and Portuguese explorers. Like other explorers, when the conquistadores returned to Europe, they brought with them new crops and medicinal plants that were added to Old World apothecaries.

In the early 17th century, European medical schools founded gardens for the study of the growth habits and properties of herbs that were used medicinally. The plants were also used as a source of extracts. As new plants were discovered and brought back to the Old World, they were added to the European pharmacopeias and planted in physic gardens so that they could be studied.

Getting Ready:
Print a world map for each group and one more for reference. Review the locations of the 12 destination countries and mark them on the reference map.

Procedure:
1. Learners work in small groups of 2-4 students.
2. Tell learners that in the past, plant explorers were sent on voyages to locate medicinal plants. Explain that they will be sent on such a quest.
3. Give each group a bag or envelope containing a letter from the Queen outlining the quest, a map, a set of plant information cards, a marker, and a pencil. Explain that countries on cards have modern names to help learners find them on the map.
4. Read the Letter from the Queen with the learners (aloud or silently). Be sure they understand the task. Hint that it is easier if they plot the route on the map as they fill out the worksheet.
5. The group that fills out the worksheet first wins.

Variation:
Instead of filling in the worksheet, learners can plot the quickest route on the map to collect each of the plants. Learners can write on a blank piece of paper the order in which they will visit the countries. The voyage should start and finish in the Queen's own country of Spain. Use as many or as few of the Plant Information Cards as you like.

Discussion/Assessment:
What are some of the plants the students collected? While reviewing plants, ask what ailment each would be used for.

Who were some great world explorers of the past? Are there still explorers today? Are they needed to find medicinal plants?

What were some obstacles the early explorers overcame to get where they needed to go?

What were some plants that drove exploration?

How did people long ago hear about medicinal plants in other parts of the world?

How can plants from one part of the world grow in a completely different climate?

Digging Deeper:

Ask students to pick one of their favorite things to eat and research its origin or the origin of its ingredients.

Ask students to look in their medicine cabinets and pantries at home and compose a list of plant products whose origins and histories might be investigated.

Dear Loyal Subjects:

Big Castle, Spain

Five years ago it was brought to my notice that my Royal Botanical Garden was lacking some important medicinal herbs. It was essential that I have a source of these incredible plants so that they could be used if anyone in my kingdom became ill. I, therefore, hand-picked a group of fit young men and women to travel to the four corners of the Earth in order to collect and bring to me these plants I so needed.

The group set off four years ago from a port in Spain, but sadly these brave explorers have never returned. Only some excerpts of their journal have been found. I have therefore selected your fine group to take up the challenge of collecting these plants and find out what happened on the original trip.

First, you must work out where the explorers went. I have enclosed a copy of the journal excerpts found, but unfortunately, due to water damage, some of the words are missing. I have also given you a copy of the plant cards given to the original group and a map of the world.

Use these tools to discover the missing explorers' route. Fill in the missing words and plot the route on the map using a marker. When you have finished, raise your hand and pass your answers to my ambassador (your teacher). The first group to finish will be granted knighthood! (They will also be considered the winner of the Medicinal Plant Geography Game.)

Good Luck,

The Queen

The Year of our Lord 1607.

Please bring me **Eucalyptus** from **Australia**

Latin Name: *Eucalyptus globulus*
Plant Family: Myrtaceae
Native to: Australia
Parts Used: leaves
Uses: Eucalyptus is a traditional Australian Aboriginal remedy for a variety of ailments. Today, it is used worldwide in pills, liquids, inhalers, salves, and ointments for many common problems. Internally, **Eucalyptus appears to help relieve symptoms of colds, flu, chest congestion, sore throat, bronchitis, pneumonia, and respiratory infections**. For internal use, Eucalyptus can be made into a tea or tincture. Externally, the antiseptic, slightly anesthetic, anti-bacterial, and warming properties of Eucalyptus make it a valuable resource for the treatment of burns, sores, ulcers, scrapes, boils, and wounds.

A

Please bring me **Coffee** from **Ethiopia**

Latin Name: *Coffea arabica*
Plant Family: Rubiaceae
Native to: East Africa
Parts Used: seeds
Uses: Coffee contains caffeine which is the most widely consumed drug in the world. Caffeine acts as a stimulant of the central nervous system and as a diuretic (increases rate at which body rids itself of fluids). **It temporarily improves perception and physical performance**, increases heart output, and stimulates digestive juices. Unripe seeds can be used for headaches. Coffee has also been used by women to help relieve the discomforts of menstruation.

B

Please bring me Cacao from Brazil

Latin Name: *Theobroma cacao*
Plant Family: Sterculiaceae
Native to: Brazilian Amazon
Parts Used: seeds
Uses: Seeds contain small amounts of endorphins, which are powerful painkillers that occur naturally in the body. Since Cacao contains fat, sugars, carbohydrates and protein, it has historically been used as energy food – its energy content is high, 18500 kj/kg (2000 kcal/lb). It also contains high levels of fiber, carbohydrates, B vitamins and anti-oxidant-like substances. Calcium, Phosphates, Vitamins A, C, and D occur in smaller quantities.

C

Please bring me Cardamom from Sri Lanka

Latin Name: *Eletteria cardamomum*
Family Name: Zingiberaceae
Native to: Southern India and Sri Lanka
Parts Used: seeds
Uses: Cardamom is used to treat asthma, bronchitis, consumption (tuberculosis), cough, flatulence (passing of gas), indigestion, tumors, and kidney stones. When the seeds are chewed singly in the mouth, they can also help to hide bad breath.

D

Please bring me Ephedra from Mongolia

Latin Name: *Ephaedra sinica*
Plant Family: Ephedraceae
Native to: Northern China and Mongolia
Parts Used: stems
Uses: Used primarily to treat asthma or bronchitis, ephedra is also prescribed for symptoms of cold and flu including nasal congestion, cough, fever, and chills. In addition, **ephedra is sold commercially as an energy-booster**, weight-loss supplement, and athletic performance enhancer. Ephedrine-containing products are banned from amateur sporting events and evidence of ephedra on drug testing will likely disqualify athletes from competition.

E

Please bring me Senna from Nigeria

Latin Name: *Cassia senna*
Plant Family: Fabaceae
Native to: Tropical Africa
Parts Used: leaves, pods, flowers, seeds
Uses: Senna was first used medicinally by Arabian physicians in the 9th century A.D. Senna **has always been specifically used for constipation**. In Latin America, the pulpy seeds have been eaten as a laxative or steeped in water for the same use. Syrup made with the flowers has also been used as a laxative.

F

Please bring me **Kava kava** from **Fiji**

Latin Name: *Piper methysticum*
Plant Family: Piperaceae
Native to: Pacific Islands
Parts Used: root
Uses: Kava is perhaps best known for its relaxing qualities. Kava is said to elevate mood, well-being, and contentment, and produce a feeling of relaxation. **Several studies have found that kava may be useful in the treatment of anxiety, insomnia**, and related nervous disorders. In addition to its anxiety-reducing (anxiolytic) and sedative properties, active compounds in kava are reputed to help prevent seizures and relieve muscle spasms. Also used for pain relief, arthritic conditions, and to counter urinary tract infections.

G

Please bring me **Vanilla** from **Costa Rica**

Latin Name: *Vanilla planifolia*
Family Name: Orchidaceae
Native to: West Indies, Central and South America
Parts Used: stems, leaves, flowers
Uses: Vanilla's mellow fragrance enhances a variety of sweet dishes. In the past it has been used to treat hysteria, low fevers, and impotency. Vanilla may also aid in digestion. Today, however, it is rarely used for medicinal purposes other than as a flavoring for medicines.

H

Please bring me **Aloe vera** from **Zanzibar**

Latin Name: *Aloe vera*
Family Name: Liliaceae
Native to: Eastern and Southern Africa
Parts Used: Leaves
Uses: Aloe Vera juice can be used both externally and internally. In capsule form, it is used as a natural laxative. The gel, when squeezed from a freshly picked leaf, **can be used to aid in the healing of burns, scars, and skin rashes**. In tablet form, this herb has been known to aid kidney infections, and to help relieve arthritis and ulcers. Used in cosmetics, it has been added to anti-wrinkle creams and make up. It is also beneficial to the hair and scalp.

I

Please bring me **Ginger** from **Thailand**

Latin Name: *Zingiber officinale*
Family Name: Zingiberaceae
Native to: Tropical Asia
Parts Used: Rhizome
Uses: **Ginger has been found to stop nausea and vomiting**, prevent coronary artery disease, and heal (and prevent) arthritic conditions and stomach ulcers. It has also been shown to be effective against tumor growth, migraines, and rheumatism; help digestion; and stimulate blood circulation.

J

Please bring me Calumba from Madagascar

Latin Name: *Jeteorhiza palmata*
Plant Family: Menispermaceae
Native to: Mozambique, Madagascar
Parts Used: Root dug during dry weather in early spring
Uses: A profoundly bitter herb, the root of the Calumba vine is an East African herbal remedy traditionally used as a digestive tonic, and **to treat a variety of digestive infections**, including dysentery. Calumba stimulates the appetite and digestive activity, making it a valuable herbal medicine in the treatment of anorexia nervosa. Calumba has a soft, slippery texture and, as might be expected, a strong bitter taste.

K

Please bring me Cloves from the Philippines

Latin Name: *Eugenia carophyllata*
Plant Family: Myrtaceae
Native to: Molucca Islands, Indonesia, Philippines
Parts Used: Unopened flower buds
Uses: Perhaps the best known and **most popular medicinal use of clove is for toothache**. The numbing agent dentists use before giving you a shot is derived from cloves. It's also used for mouth and throat inflammation and as a soothing treatment for insect bites. Cloves may also have antiseptic, antibacterial, antifungal, and antiviral properties.

L

EXCERPTS FROM THE EXPLORERS' JOURNAL

Day 1 – We set off from the Spanish port, and the crowds were out to wave goodbye. We were all sad to leave our friends and families but very honored to be chosen for this noble and important voyage.

Day 50 – Great excitement! We have at last reached our first destination. Having traveled around the west side of Africa we collected S_____ from N_____. Constipation will not be a problem on our voyage.

Day 72 – Our first major disaster - many of the crew have food poisoning from some fish that was eaten at supper time. We have decided to change our route slightly. We are going to travel around the South tip of Africa to an island called M_____ so that we can collect some C_____ which is good for digestive tract infections.

Day 152 – Are still in Africa but at last we have our third plant. One of the kitchen hands in the galley burnt his hand so we were able to apply the A_____ _____ from Z_____ as soon as we got back to the boat.

Day 203 – One of the navigators on board has been suffering from toothache. We headed North East to collect C_____ from the P_____.

Day 291 – Sailed back toward Africa. Everyone on board is getting tired. Having observed the habits of the local people of E_____, once back on board the boat we have managed to roast some of the beans from the C_____ plant. This allowed us to produce a drink which, temporarily, has improved both the perception and physical performance of the crew. Hopefully this will help us make up some time lost due to illness.

Day 358 – All this sea air is not doing our lungs much good. Many of us on the boat are suffering from colds, sore throats, respiratory infections, and chest congestion. Have therefore decided to travel South East to collect E_____ from A_____.

Day 395 – Some of our crew have insomnia and the lack of sleep is slowing us down. It all started when we were attacked by some Koala Bears while collecting our last plant. It is the only thing they like to eat, and they were unhappy about us taking some. We are heading to F_____ for the remedy - a plant called K_____ _____.

Day 420 – A problem with fresh water we collected on the last island has lead to many of the crew suffering with nausea and vomiting. Have sailed through many small islands to reach T_____ so that G_____ can be collected.

Day 628 – Traveled on horseback through China to collect the E_____ from M_____. Luckily we were able to use it to give us energy for the trip back to the boat.

Day 687 – Ahhh, at last no more bad breath. Have collected the C_____ from S_____. Just wish it would work on smelly feet!

Day 670 – Are heading towards the Americas now. First stop is South America to collect my favorite plant, C_____ from B _____. It contains small amounts of Vitamins A, C, and D but I am not sure it is really very good for you once it has been made into Chocolate. We will then go to C _____ R_____ and pick up the last plant on our list, V_____. I am hoping we will not have any more problems, but storms have been predicted.

Map of the World

Growing Medicinal Plants at School or at Home

Location: indoors and outside

Objectives: *Learners will:*
1) research medicinal plants that can grow on their school site or at home.
2) learn about the uses of these plants and share what they have learned with their classmates.
3) grow medicinal plants from seed.

Skills: uses tools, describes changes, compares physical attributes, organizes data into graphs, tables, and charts

Concepts: Habitat quality, Georgia environment, Life cycles, Environmental issues (Erosion)

Supplies:
- seeds or transplants of selected medicinal plants
- compost
- shovel, trowel, pitch fork, spading fork or rake
- mulch
- water source

Subject: science

Time: Soil preparation – 1 hour: Caring for plants – 15 minutes, ongoing as needed

Essential Question:
How can I grow my own medicinal plant?

Growing plants and working with soil provides an opportunity to develop a closer relationship with the environment. It provides an opportunity for learning about such topics as plant life cycles and growth requirements, seasons, water and nutrient cycles, climate, geography and how it determines plant types, and the history of agriculture.
This activity will instill a sense of stewardship for the garden site that will stay with the learners into the future and carry over to other environments.

Getting Ready:
Depending on your climate, it may be best to start seeds indoors. Learners can watch them grow in the classroom or the home and plant them outside after they become a little stronger. If this is the case, materials would be required such as pots, soil and a sunny location or lights. There are businesses and special interest groups in many areas that enjoy donating seeds, plants or needed materials to projects such as this.
After learning about specific plants (this can be done in conjunction with Researching Medicinal Plants found on page 7), learners may be able to find existing plants from which to collect seed in their neighborhoods or in other places they visit.

Procedure:
1. Read attached Cultivation of Medicinal Plants background information sheet.
2. Choose a site and determine predominant soil type – clay, loam or sand. Planting beds should be at least 2 feet wide to reduce water loss. If space is limited and the ground is compacted, consider raised beds. For predominately clay soils, aerate soil with a pitchfork or spading fork.
3. Remove all existing plant material.
4. Dig down at least 8 inches throughout the entire area and break up any large clumps.
5. Add amendments 3 inches thick and work in with a shovel. Repeat until the desired texture is obtained (soil is light, fluffy, arable and brown to black in color). Organic matter, like compost or earthworm castings, is the remedy for both clay and sand.
6. Add lime, lightly covering the area.
7. Till amendments and lime into the soil by hand or use a tiller and level surface with a rake.
8. Place seed or plants in the soil. Seeds should only be covered at a depth that is twice the size of the seed. Place plants in the soil level with the crown. Plants placed too deep with soil too high on the stem can cause it to rot.
9. Mulch the planting bed with 2-4 inches of leaves or pine straw.

10. Water thoroughly after planting and monitor for water needs. Healthy, well-drained soil should get 1 inch of water per week. Sandier soil will require more water as will shallow-rooted plants.
11. Maintain by weeding, controlling pests and diseases, fertilizing and deadheading.
12. Refer to attached Getting to Know Your Medicinal Plant information sheet as you watch it grow, enjoy its healing properties and watch the other members of your school site ecosystem enjoy it.

Discussion/Assessment:

When preparing your site for planting, what did your soil look like, feel like, smell like?

Was it easy to dig?

Did you see any earthworms or other creatures that live in the soil?

What amendments did you add?

Do you think other creatures may think of your plant as food?

How do you think your plant will change with the seasons?

Can you or do you already do this at home?

How does the school site soil compare with your soil at home?

Digging Deeper:
Growth of seeds and plants can be charted and graphed. Include observations of pollinators, herbivores, tracks and weather conditions.

A chart for the care of the plants and seeds can be incorporated, emphasizing responsibility and group participation.

Conduct experiments to see the effects of fertilizers, different colored lights, different soil types, etc. Observations can be graphed.

Students can grow food or cut flowers to share with other students.

Permanent (or semi-permanent) garden art of some sort could result from a craft activity – perhaps out of recycled materials.

Cultivation of Medicinal Plants

When selecting the site for your medicinal plant garden, consider drainage and soil fertility. Drainage is probably the most important single factor in successful medicinal plant growing. If the garden area is poorly drained, you will have to amend the soil for better success. To improve drainage at the garden site, remove the soil to a depth of 15 to 18 inches. Place a 3-inch layer of crushed stone or similar material on the bottom of the excavated site. Before returning the soil to the bed area, amend with compost, sphagnum peat, sand, composted pine bark, or leaf mold to lighten the soil texture. Adding several bushels of peat or compost per 100 square feet of garden area will help improve soil condition and retain needed moisture.

What is Soil?

Soil = 50% solids + 50% pores filled with air or water
= (inorganic matter + organic matter + living organisms) + (air + water)

Solids

- 95-98% ground-up fragments of rock (**inorganic matter)** the smallest of which my be microscopic
- 2-5% decaying matter that consists of compounds formed from carbon and derived from living (animal or vegetable) matter **(organic matter)**. As the animal or vegetable matter decays, it creates **humus** which acts as a glue sticking inorganic particles together and replaces nutrients taken out during its life.
- **Living organisms** – bacteria, fungi, algae, microscopic animals, and other larger animals, such as earthworms.

Pores

- 50% = macropores for **air**
- 50% = micropores for storage of **water**

Soil Types – classified by particle size

- **Clay** - .002mm and smaller
  It consists of tightly packed particles impeding water passage; macropores are clogged with water and drainage is poor.
- **Loam (Silt)** - .06mm-.002mm
- **Sand –** (fine to course) .2mm-.06mm; 2mm-.2mm
  It has lots of air spaces (macropores) and few micropores; water passes through quickly leaving dry soil.

Particle size determines:

- Drainage
- Aeration
- Water- and plant-holding ability
- Workability

A particle of sand is 100 times larger than a particle of clay!

Soil Amendments

- **Sand** aerates the soil and allows good drainage of the soil
- **Organic matter** (compost**,** composted pine bark – if not composted, microbes that compost draw nutrients from plants to do their job**,** peat – for plants requiring low pH; retains water**,** manure – must be cured, and leaf mold)

  Organic matter changes the soil by:
  - increasing oxygen flow
  - increasing drainage
  - increasing nutrients
  - retaining water
  - lowering pH
  - increasing microbial activity
- **pH of soil:** determined by soil type and amount of lime. Lime increases drainage, workability and aeration. Lime supplies the Calcium which is the fourth most important plant nutrient. Nitrogen (N), Phosphorus (P), and Potassium (K) are the first three important

nutrients. If the pH is too acidic then the N, P, and K are tied up in the soil. If the pH is too basic then the secondary nutrients are tied up.

Making Compost = 2 parts brown + 1 part green + O_2 + moisture (faster with heat)

- ► 4" brown at bottom (leaves)
- ► 1" good soil as inoculant
- ► 2" green (grass/ herbaceous clippings)
- ► Alternate brown and green layers
- ► Turn weekly to aerate

- ► Bury coffee grounds, kitchen waste, egg shells
- ► Dig out from bottom when can no longer recognize components
- ► Water only in extended dry weather; should be moist, not wet

**** No animal waste, meats, oils, diseased plants or plants treated with chemicals.**
**** Should be crumbly brown and pleasant smelling (if it smells bad, add brown).**

Germination/Propagation

Seeds are very diverse; they come in many shapes and sizes. This can determine how they should be sown.

The optimum method for perennial seed (which usually grows slower than annual seed), and especially for native seed, is to plant it in a seed bed or box outdoors to take advantage of the oscillating temperatures (stimulates germination) and natural rainfall. This is called **stratification**. The time of year to plant depends on the particular species. Ultimately, one should try to mimic nature. The bed should be located in a sheltered but sunny spot (to allow proper drying of the soil) and near a water source. The bed should be covered with mesh of some sort to protect the seeds from mice, birds or other visitors. In lieu of a seed bed or box in which to over-winter seed, one may mimic the length of the cool season by storing the seed in the refrigerator - not a great imitation of nature, but it does sometimes work.

Light-dependent seed or tiny seeds should be sprinkled on the surface and pressed in, while larger seeds are dropped into a furrow and covered with a depth of soil that is twice the width of the seed. When the seeds germinate and develop their second set of leaves, the seedlings should be thinned to two inches apart, kept watered and weeded, and allowed to grow until they are strong enough for transplanting. The seedlings will have healthy, spreading root systems that transplant smoothly without additional hardening off.

In addition to light-dependent seed, some seed is fire-dependent, heat-dependent, cold stored, multi-cycled, or slow to germinate, etc. Wet seed must be kept wet. Hard seed coats need scarification. Examining seed and imagining the process of sowing that would have occurred in nature is a great start in getting to know your plant. Would this seed have been deposited on the soil after traveling through an animal digestive tract or blown lightly to its resting place? Seeds provide a lesson in biodiversity all their own.

Getting to Know your Medicinal Plant

Parts of a Plant:

Plants can be divided anatomically into five general regions that house chemical compounds used medicinally and otherwise. They are the flowers, the leaves, the stem, the seeds, and the roots.
Most flowers have the same basic parts. Often these parts are arranged in different ways. The four main parts of a flower are: petals, sepals, stamens and pistil. The **sepals** are the green leaf-like structures at the base of the petals. The **petals** are the colored leaf-like structures within the sepals. The **stamen** has two parts, the anther and the filament. The **anther** contains pollen grains. **Pollen** grains contain structures that will become the male gametes. The **pistil** usually has three parts, the **stigma** (which receives the pollen), the **style**, or neck below the stigma, and the **carpel** (or ovary). Carpels house ovules (eggs) which contain the female gametes. When an egg is fertilized by a male gamete from a germinating pollen grain, an embryo grows to become a **seed,** and the ovary matures into a **fruit**.

A flower is connected to the stem with a **peduncle**. Inflorescences made up of many small flowers have peduncles composed of numerous smaller stalks (**pedicels**) attaching each flower to the stem. Along a stem are **leaves**, which can be arranged alternately or opposite each other along the stem. At the surface of the soil, the stem connects to underground structures. The underground structures can be **roots**, or bulb-like **corms** or horizontal stems called **rhizomes**.

Leaves are the most frequently used part of an herb. Photosynthesis is fundamental to human existence. During photosynthesis, a pigment in leaves, chlorophyll, absorbs red and blue light to convert water and carbon dioxide into sugars and oxygen; green light is reflected, making the leaves appear green. Photosynthesis decreases in autumn, and nutrients are exported from leaves, thus reducing their flavor and therapeutic value. Leaf chemistry gives rise to a variety of culinary flavors, perfumes and medicines. **Stems** transport nutrients and support the plants. Many yield useful sap and supply strong flexible fibers, such as flax and hemp, used in the manufacture of linen, rope, and paper.

Leaves should be collected in the morning, after the dew has evaporated. Potency is greatest after oils have been drawn up by the warmth of the sun but before any have escaped in the heat. Leaves from young plants are best. If one waits until flowering time, energy will have been put into reproduction. Pick only healthy leaves without blemishes, yellowing, or insect damage. Take care not to bruise leaves; lay them flat in box or basket to avoid crushing and sweating of leaves. If the whole plant is needed, harvesting should be done just before flowers open. Cut annuals three inches above the ground and take only the top third of perennials.

- Uncured *Camellia sinensis* leaves make green tea which clears toxins, boosts the immune system, and inhibits some cancers.
- Powder, extract or tea from *Echinacea* stems and leaves is used as an immune system stimulant.
- The stems and leaves of *Passiflora incarnata* or Passion Flower are used as a non-addictive, non-depressant sedative.
- The leaves of Peppermint or *Mentha* x *piperita* are often used in a tea that soothes the stomach and aids digestion.

Perfect flowers have the female organ, or pistil, in the center and a ring of male stamens (each

made up of filaments and anthers) surrounding it. **Imperfect flowers** contain either the female or the male reproductive parts but not both. The color and scent of the surrounding petals, or corolla, along with the nectar of the ovary entice bees and other insects to aid pollination. The corolla is surrounded by the calyx (the sepals) which protects the flower when in bud.

Flowers contain the most active ingredients when they open fully. Collect unblemished flowers of good shape in dry weather at midday. Pick flowering stems and avoid touching the petals.

- The edible golden petals of *Calendula officinalis* rejuvenate skin and are antiseptic and antifungal. They heal cracked skin, sunburn, and eczema.
- The orange style and stigma from *Crocus sativa* flowers are collected to be used in cooking, as a dye, and for treatment of bruises and rheumatism.
- Flowers of chamomile, *Matricaria recutita*, are used in a calming tea.
- Lavender flowers, *Lavandula angustifolia*, and the essential oil distilled from them have long been used as a circulatory stimulant, antidepressant, and nerve tonic and for its antiseptic and antibacterial properties.

Seeds contain genetic information for future growth, a store of food, and a dormant embryo that can grow into a seedling. The condensed nutrition of seeds provides the world's major foods such as the cereals wheat and rice. Many seeds have high fatty oil content which can be pressed for foods, cosmetics, medicines, crafts and industrial use.

A **fruit** is a ripe developed ovary that houses seed; they can be succulent or dry. A succulent fruit is fleshy. A **nut** is a type of dry fruit.

Seeds should be collected on a warm, dry day when fully ripe but before dispersal. They should be hard and have no green remaining. Fruit should be picked when ripe but before it becomes soft.

- Seeds from *Coffea arabica*, or coffee, contain caffeine, a stimulant.
- The seed capsules from Poppies, *Papaver somniferum*, are the source of the drugs opium and morphine.
- The seeds from Cayenne Pepper or *Capsicum frutescens* can be pulverized and used to stimulate the circulation and ward off colds.

Roots are the underground parts of a plant that hold it in the soil and absorb water and nutrients. Some are storage organs, containing concentrated active compounds. The storage organ may be a bulb, corm, or tuber. Rhizomes are underground stems from which roots and shoots grow. Runners and stolons are also underground stems and not roots.

Roots should be collected in late fall when energy from shoots is returning to the root to be stored for the winter. They should be stored in a cool, dry place.

- The root of Ginger, *Zingiber officinale*, is a popular spice and can be used to treat nausea while traveling.
- The branching roots of American Ginseng or *Panax quinquefolius* increases energy and is used to treat short term stress and insomnia.
- The root of goldenseal, *Hydrastis Canadensis*, is a strong general tonic for mucus membranes, the liver and uterus, and is also used for venous circulation.

Plant Groups:

Many types of plants are used medicinally. They can be grouped into categories based on their formal botanical divisions or their visible size and shape of growth. Different growth categories are listed below.

- **Trees** are woody perennials with a single main stem, usually branching well above the ground to create a crown.
- **Shrub** is a loose term for woody perennials with multiple branches from the base; generally smaller than trees.
- **Herbaceous perennial** are non-woody plants that die back to roots in autumn and grow new shoots in the spring.
- **Annuals and Biennials:** Annual plants complete their life cycle in one year; they germinate, seed, and die in one year. Biennials complete their life cycle in two years, flowering in the second year.
- **Vines:** Plants with a tendency to climb (by adaptations of stems, leaves or roots), to twine or to grow tendrils or suckers.

Formal botanical classification divides plants into those which do not use seed to reproduce and those that do. Non-seed producing plants are algae, fungi, Bryophytes (mosses), and Ferns. Seed producing plants are divided into Gymnosperms (Conifers for example) which do not produce flowers and the Angiosperms or flowering plants.

The table below will assist you with the cultivation of some important medicinal plants.

Medicinal Plant	Cultivation
American Ginseng	Very particular about growth site; prefers north-facing wooded slope in a well-drained mixture of composted pine bark, compost and sand. Seed takes 18 months to germinate. Should not be harvested before reaches reproductive age and has three prongs, 5 years.
Bee Balm	Grows well in a variety of soils, even heavy clay. Requires full sun to part shade. Thrives when grown in dry, alkaline soil. Best started from transplants but will grow from seed as well. Sow seed in early spring. Vigorous spreading by rhizomes.
Bloodroot	Prefers light, sandy, moist soil, slightly acidic. Prefers part to full shade. Propagate by seed or root cuttings.
Calendula	Thrives in full sun and all soils. Sow seeds in spring. Plant seedlings out in early summer. Self-seeds.
Echinacea	Grows in poor, rocky, well-drained soils that have an alkaline to near-neutral pH. Prefers full sun, but will tolerate light shade, and is drought tolerant. Propagation from crown divisions, plugs, or seed. Seeds require a period of one to four months of cold, moist stratification to improve germination.
Feverfew	Prefers sunny position and dry, well-drained soil. Easily started from seed, dividing established plants in March; or from cuttings taken from young shoots with a heel attached, then planted out from October to May. Self-seeds freely.
Garlic	Prefers rich, moist and well-drained soil. Likes full sun but will tolerate partial shade. Take onsets or divide bulb in autumn.
German Chamomile	Prefers well-drained, slightly acidic, and moist to dry soil in full sun. Sow seeds in spring or autumn.
Lavender	Prefers alkaline soil in a sunny habitat. Sow seeds in autumn or take cuttings in summer to root.
Peppermint	Thrives best in a fairly warm, preferably moist climate. Prefers soils rich in humus and retentive of moisture. Propagate from seed or dig runners in the early spring and lay them in shallow trenches, 3 feet apart, in well-prepared soil to root. Aggressive spreader. Plant in in-ground pot.
Thyme	Intolerant of wet soil in the winter. Likes full sun to part shade. Propagate from seed sown in spring, from cuttings taken in summer, or by dividing established plants in late summer.

School Site Scavenger Hunt

Essential Questions:
What are some adaptations of plants on my school site?
How do these adaptations contribute to the overall biodiversity of my site?

Background Information:

Plants are made up of many different components. There are visible physical components that make up plant structures like the stem, leaves and roots, or adaptations like thorns, hairs, or a waxy coating. There are also structural components inside of plants like tiny tubes that draw water up from the ground or send energy from leaves to roots.
In addition, plants contain components such as pigments that, although we can tell they exist, we cannot actually see without a strong microscope. Some pigments reflect light, allowing us to see plants as certain colors, others absorb solar energy during the plant's food making process called photosynthesis.
Other "invisible" components of plants are chemicals produced as defenses against herbivores or fungal diseases. Because of these chemicals, many of these plants can be used as medicines by humans.

By learning about the chemical properties of plants and their medicinal qualities, we can gain a better understanding of the world of plants and the animals with which they cohabitate. We are presented with and a different perspective of the rich biodiversity on our school site or backyard.

Extreme caution should be used when dealing with all medicines, including medicinal plants.

Getting Ready
Prior to the hunt, place flags with names of plants needed as remedies for assigned ailments in the designated scavenger hunt area. Print, cut out, and staple pages of School Site Herbal.

Location: outside

Objectives: *Learners will:*
1) gain understanding of the use of plants in medicine historically and today.
2) use a reference book to find answers to medicinal plant-related questions.

Skills: conducts simple investigations, uses tools for collecting data, researches for information

Concepts: Biodiversity, Interdependence

Supplies:
- flags labeled with names of medicinal herbs (set out prior to the start of the hunt)
- School Site Herbal (contains information for plants named on flags)
- written descriptions of different ailment scenarios (using plants named on flags as remedies)
- pencils

Subjects: science, social studies

Time: 15 minutes

Procedure:
1. Each student, or group of students, will receive a sheet of paper with a small story about an individual who has a specific ailment.
2. Students will then look up the ailment in the School Site Herbal. They will find out what plant or plants can be used to treat that ailment.

3. Students will then look for flags with the name(s) of the plant(s).
4. After retrieving all the appropriate flags, students then complete the work sheet provided by filling in the blanks with names of plants used to treat their ailment.
5. Whoever finishes first wins!

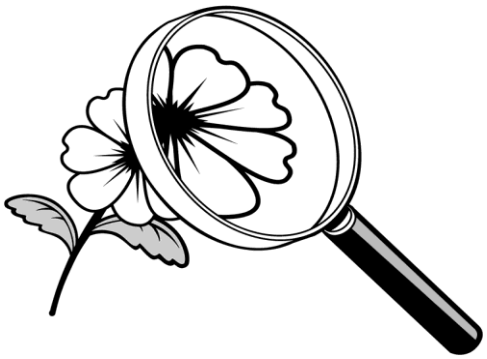
Discussion/Assessment:
Have any of the learners heard of, seen, or used these plants before?

Do learners know the names of any plants in the game area or the surrounding school site – grass, clover, pine tree, oak tree?

Are there more different types of plants in the game area and on the school site than had been noticed before? Could this area be called biodiverse?

Digging Deeper:
The hunt can be conducted in an opposite manner by picking up the flag, looking up the plant and writing down ailments it can be used to treat. Learners can also research the medicinal history, geographical history or scientific applications of a plant and give a small presentation to the class. Some of the plants in the School Site Herbal are plants that may actually be found on your school site. Learners can look up the plants in a plant identification guide and try to find them on your school site.
Learners can add botanical illustrations of plants to their School Site Herbals.

During the hunt, were any pollinators or other school site wildlife noticed?



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School Site Scavenger Hunt
Ailments

Bruises

Bronco Betty has been suffering from bruises on her arms since the last rodeo. Use your School Site Herbal to determine what plants can be used to treat her ailment. Three of the plants used are found in the Forest and Field Scavenger Hunt game area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

Cuts and Scrapes

After playing too hard on the jungle gym, Mary and John have cuts and scrapes on their elbows and knees. Use your School Site Herbal to determine what plants are good to use for skin ailments. Three of the plants used are found in the Forest and Field Scavenger Hunt game area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

Skin Rash

Willie has developed a skin rash after weeding his garden. Use your School Site Herbal to determine what plants can be used to bring him relief. Some of these plants are found in the Forest and Field game area. Seek out the flags for those plants in the garden and list the plant names below.

1. _____
2. _____
3. _____

Diarrhea and Vomiting

After returning from her travels abroad, Maria has a case of diarrhea. Use your School Site Herbal to determine what plants can be used to treat her ailment. Some of the plants used are found in the Forest and Field game area. Seek out the flags for those plants in the garden and list the plant names below.

1. _____
2. _____
3. _____

Constipation

Your cousin Danny is complaining of problems associated with constipation. Use your School Site Herbal to determine what plants can be used to help him feel better. Some of the plants used are found in the Forest and Field game area. Seek out the flags for those plants in the garden and list the plant names below.

1. _____
2. _____
3. _____

Stomach Ache

Samuel ate too much in the tofu dog eating contest. Although he won, he would like to find something to make him feel better. Use you School Site Herbal to determine some plants that can be used. Some of the plants are found in the Forest and Field Scavenger Hunt area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

Colic

Belinda's baby sister has been crying during the night because of colic gas pain. What can Belinda do to help so she can get some sleep? Use your School Site Herbal to determine what plants can be used to treat her ailment. Some of these plants are found in the Forest and Field Scavenger Hunt game area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

Laryngitis

Larry has laryngitis (he has lost his voice due to inflamed vocal chords). Is there something he can gargle with to help get his voice back in time for the choral concert? Use your School Site Herbal to determine what plants can be used to help him get his voice back. Some of the plants used are found in the Forest and Field Scavenger Hunt game area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

Cough

Connie has a persistent cough that is keeping her awake. Use your School Site Herbal to determine what plants she can use to stop coughing and fall asleep. Some of the plants used are found in the Forest and Field Scavenger Hunt game area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

Arthritis

Arnie's grandmother has arthritis; he would like to do something to help her. Use your School Site Herbal to determine what plants can be used for this ailment. Some of the plants used are found in the Forest and Field Scavenger Hunt game area. Seek out the flags for those plants and list the plant names below.

1. _____
2. _____
3. _____

School Site Hunt
Ailment Answers

Bruises
Witch Hazel, Soloman's Seal, Arnica
Pages 10, 8, 1

Cuts and Scrapes
Plantain, Self Heal, Yarrow
Pages 6, 7, 10

Skin Rash
Chickweed, Nettle, Jewel Weed
Pages 2, 5, 4

Diarrhea
Sumac, Goldenrod, Ground Ivy
Pages 8, 3, 3

Constipation
Dandelion, Yellow Dock, Senna
Pages 2, 10, 8

Stomach Ache
Queen Anne's Lace, Sweet flag, Peppermint
Pages 6, 9, 5

Colic
Chamomile, Dill, Lemon Balm
Pages 1, 2, 4

Laryngitis
Purple Coneflower, Sage, Rosemary
Pages 6, 7, 7

Cough
Wild Lettuce, Passionflower, Elderberry
Pages 9, 5, 3

Arthritis
Willow, Meadowsweet, Celery
Pages 10, 5, 1

School Site Herbal

Arnica - *Arnica montana or A. fulgens*
An effective plant in ointments or compresses in treatment of **bruises,** sprains and muscle pains. Application of this plant to the sore area increases blood flow, reduces swelling and speeds healing.

Celery - *Apium graveolens*
Seeds of this common vegetable can be made into a tea that is helpful in the treatment of **arthritis**. It is an antiseptic (kills germs) in addition to cleansing the body and improving circulation.

Chamomile - *Matricaria recutita*
Dried flowers from this plant can be made into a tea that is mild enough for babies. It has relaxing properties, and because of this can be used to put a child with **colic** back to sleep.

1

Chickweed - *Stellaria media*
This common plant can be made into an ointment that soothes irritated skin. It is good for the treatment of **skin rashes**.

Dandelion - *Taraxacum officinale*
The healing properties of this common weed have been known for centuries. Leaves can be eaten raw or made into a tea along with the root to cleanse the body. It has many uses, one of which is to relieve **constipation**.

Dill - *Anethum graveolens*
The Nourse meaning of the name dill is "to soothe". This plant has many uses, one very important of which is for **colic** in babies. A tea from its leaves has anti-spasmodic (stops spasms) effects on the

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2

Elderberry - *Sambucus nigra*
The flowers of this large shrub that grows near water can be made into a tea to treat **coughs** and colds. Its relaxing effects calm the bronchial passages and help the body rid itself of sickness-causing germs.

Goldenrod - *Solidago candensis*
This plant with beautiful yellow fall flowers has astringent properties good for treatment of **diarrhea**. It is mild enough for children and also has many other important uses including the treatment of internal infections.

Ground Ivy - *Glechoma hederacea*
This ground-hugging plant can be made into a tea to treat many mucous membrane problems and disorders of the digestive system, including **diarrhea**. It is mild enough for children.

3

Jewel Weed - *Impatiens capensis*
The juices from the stem of this plant can be used to soothe **skin rashes**, even poison ivy.

Lemon Balm - *Melissa officinalis*
The leaves of this plant smell like lemon when they are crushed, and when they are made into a mild tea, they can be used to treat many ailments. This plant has calming properties for the digestive tract, muscles and nerves. It is mild enough for a baby with **colic** to use.

Meadowsweet - *Filipendula ulmaria*
Flowers and leaves of this plant can be made into a tea to treat **arthritis**. It has anti-inflammatory effects like aspirin but also protects the lining of the intestines and the stomach.

Nettle - *Urtica dioica*
Although this plant is known for its sting, its leaves can be made into an ointment that is good for **skin rashes**. It has anti-allergenic properties (stops the body's allergic reaction) even for allergic reactions to nettle.

Passionflower - *Passiflora incarnata*
This beautifully flowered vine is a gentle sedative and an antispasmodic (calms spasms). Flowers and leaves can be made into a tea that soothes **coughs** .

Peppermint - *Mentha x piperita*
The country this plant came from is a mystery. It has been used as a remedy for ages. A tea made from its leaves increases the flow of digestive juices and relaxes the muscles of the gut. It is very good for a **stomach ache** and tastes good too.

Plantain - *Plantago major*
The leaves of this plant can be placed on **cuts and scrapes** to help draw out infection. This plant is very common and has other important uses as well.

Purple Coneflower - *Echinacea purpurea*
This plant stimulates the immune system. It also has anti-inflammatory (soothes swelling) and antibiotic (kills germs) properties. It is good for sore throats**,** **laryngitis** and many other ailments.

Queen Anne's Lace - *Daucus carota*
This pretty roadside flower is really a wild carrot. Leaves and seeds or a tea made from them relieve gas and thus help **stomach aches** feel better.

Rosemary - *Rosmarinus officinalis*
This evergreen shrub smells great and is used in cooking. A tea of its leaves mixed with Echinacea and Sage is also used to treat a sore throat and **laryngitis**. It stimulates blood flow and thus helps ailing areas of the body to rid themselves of toxins.

Sage - *Salvia officinalis*
This herb has antiseptic and astringent properties. A tea made from its leaves can be used to treat **laryngitis** and soothe a sore throat.

Self Heal - *Prunella vulgaris*
The leaves and flowers of this plant can be made into an ointment for wounds, such as **cuts and scrapes**. It is an astringent and helps stop bleeding and speed healing.

Senna - *Cassia senna*
This plant has seed pods that look like snow peas. A tea made from them acts as a laxative relieving **constipation**.

Soloman's Seal - *Polygonatum multiflorum*
A poultice of this plant can be used for **bruises**. It helps tissues repair themselves and speeds healing.

Sumac - *Rhus glabra, R. typhina, R. aromatica*
The bark of this plant can be made into a tea to treat **diarrhea**. It has astringent properties that tighten and strengthen the lining of the intestines.

Sweet Flag - *Acorus calamus*
The dried rhizome (underground stem that looks like a root) of this water-loving plant can be made into a weak tea that is good to ease **stomach aches**.

Wild Lettuce - *Lactuca virosa*
This common plant is mild sedative that is safe for use with children. It can be used to treat **coughs** when taken as a weak tea.

Willow - *Salix nigra*
Teas and tablets made from the bark of this popular tree can be used to ease the pain of **arthritis**. This plant is considered to be "nature's aspirin".

Witch Hazel - *Hamamelis virginiana*
The leaves of this small tree are distilled an used to treat **bruises** and other ailments of the skin and veins. It is an astringent and tightens membranes and tissues

Yarrow - *Achillea millefolium*
The leaves and flowers of this plant can be made into a poultice to stop bleeding, therefore it is good for **cuts and scrapes**.

Yellow Dock - *Rumex crispus*
The dried root of this common plant can be made into a tea. Its mild laxative action is good for **constipation**.

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