

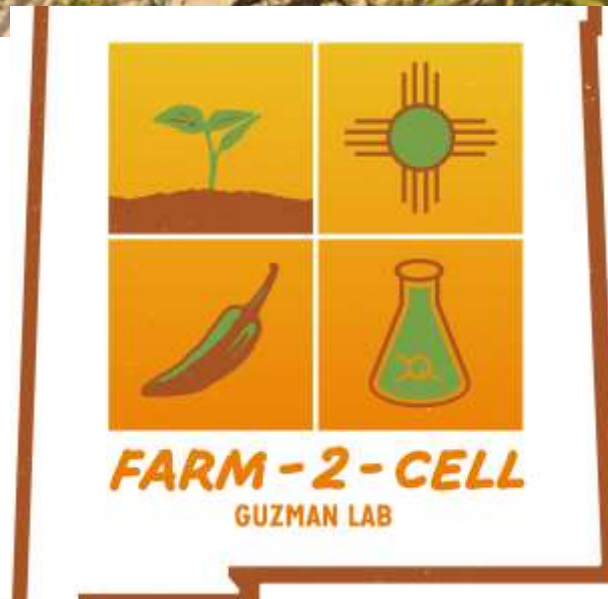
**NM  
STATE**



# Medicinal Plants

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Environmental Sciences,  
New Mexico State  
University



# Before today's New Mexico





# Native Plants and People

Relationship between native plants and the people.

- Food and nutrition
- Medicine
- Ecosystem services/pollinator services
- Provide habitat for animals and other plants
- Beauty and aesthetics
- Conserve water
- Culture & spirituality



Littleleaf Sumac  
(*Rhus microphylla*)

# Native Groups



**Circa 1500**

The Southwest Culture Area, showing the approximate locations of Indian tribes circa 1500, before displacement by non-Indians (with modern boundaries)

# Why use ethnobotanical information?

- 25% of prescription drugs in US contain active compounds derived from or modeled after plant natural products
- Result: Ethnobotanical leads increase the chances of finding a useful drug.

## Thousands of Medicinals Throughout New Mexico

Four-Wind Saltbush or Chamiso (*Atriplex Canescens*)

Rabbitbrush or Chamiso Blanco (*Chrysothamnus Nauseosus*)

Doveweed, Texas Croton or Barbasco (*Croton Texensis*)

Jimson Weed or Toloache (*Datura mteloides*)

Mormon Tea or Canutillo del campo (*Ephedra Torreyana*)

Buckwheat (*Eriogonum* sp.)

Apache Plume or Ponil (*Fallugia Paradoxa*)

Snakeweed or Escoba de la vi Bora (*Gutierrezia Sarothrae*)

One-Seed Juniper or Rama de Sabina (*Juniperus Monosperma*)

Wolfberry or Tomatillo or Chico (*Lycium Pallidum*)

Wild Four O'Clock or Maravilla (*Mirabilis Multiflorum*)

Scorpionweed (*Phacelia* sp.)

Purslane (*Portulaca* sp.)

Three-Leaf Sumac, Lemonade Bush or Lemita (*Rhus Trilobata*)

Dock or Cana Agria (*Rumex Hymenosepalus*)

Horse Nettle or Tomatillo del Campo (*Solanum Elaeagnifolium*)

Globe Mallow or Yerba del Negro (*Sphaeralcea Angustifolia*)

Indian, Navajo, or Hopi Tea or Cota (*Thelesperma Megapotamicum*)

**And Many Many More!**



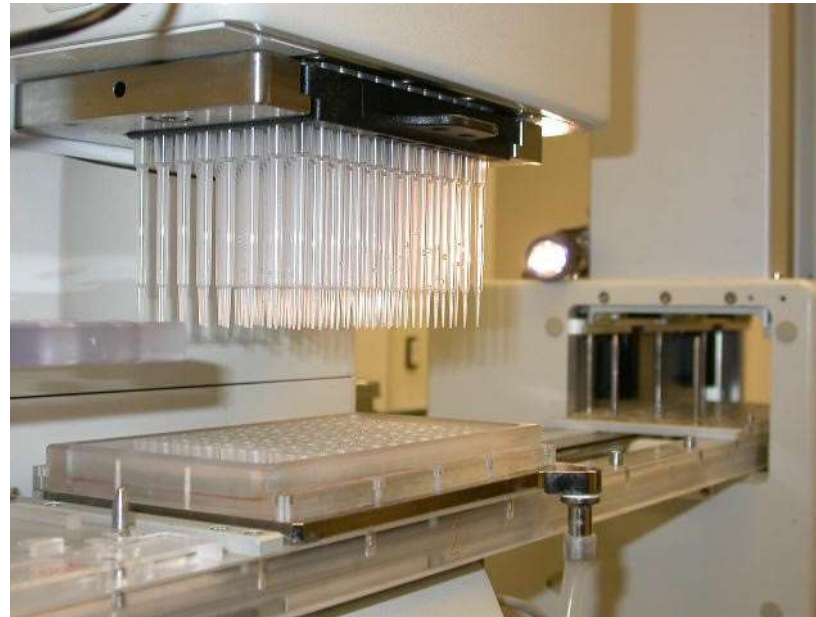
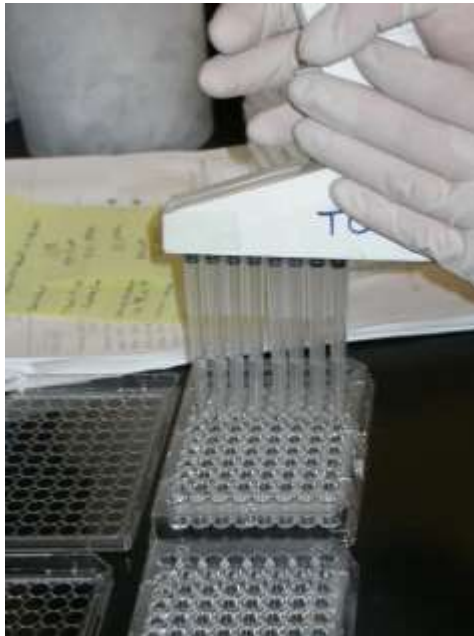
# Are medicinal plants considered *medicine*???

- Medicinal plant products are regulated within the same framework as vitamins, minerals and amino acids [FDA approval = Generally Regarded As Safe (GRAS)]
  - “Unlike many drugs, the role of herbal dietary supplements is to **enhance the diet** by **adding safe and natural plants** and their constituents to **support and protect bodily functions and processes**.....Their actions are more gentle than conventional medicines and work usually in more long-term situations.” (Dietary Supplement Health and Education Act 1994)
- How do you demonstrate that the growth inhibition/medicinal action is specific to a chemical(s) in a plant?
  - *In vitro* assays & *In vivo* assay



# Common Bioassay Screens (mostly *in vitro*)

- Anti-viral, Anti-bacterial, Anti-fungal
- Anti-protozoal (amoebic, malarial, leishmanial)
- Anti-helminthic (filaria, hookworm, tapeworm)
- Anti-cancer



The LR200iB robot loading and unloading micro plates.



# Common Bioassay Screens

(mostly *in vivo*)

- Endocrinal (fertility, hypoglycemic)
- CNS
- Cardiovascular
- Hypolipidemic
- Anti-inflammatory
- Anti-cancer
- Other

Hypolipidemic effect of *Smallanthus sonchifolius* (Yacon) roots on diabetic rats, biochemical approach



# Specific Plant Preparation

- Specific parts/organs collected and prepared
- Plant materials are applied externally or taken internally
- Solvents for extracts
  - water, urine, milk, alcohol
- External preparations often were direct or via a grease/oil

# Most Common Preparations

- **Teas:** Cold standard infusion, Standard Infusion with hot water, Strong Decoction with a continuous boil, Weak Decoction with less herb
- **Eyewash**
- **Salves**
- **Poultice**
- **Tinctures** with grain alcohol



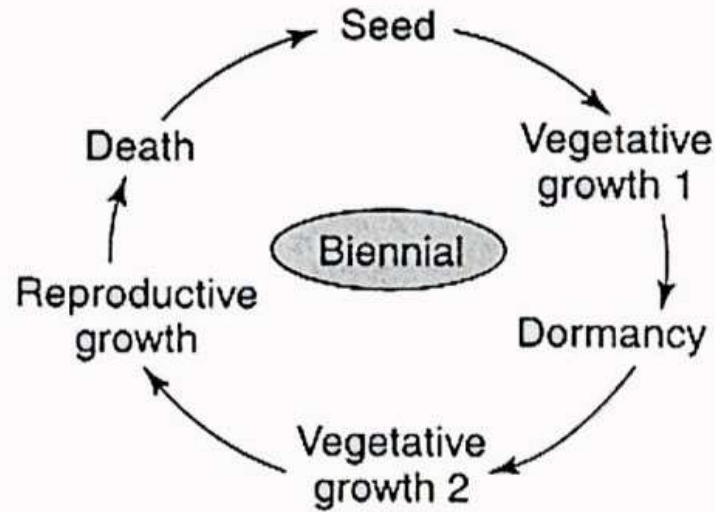
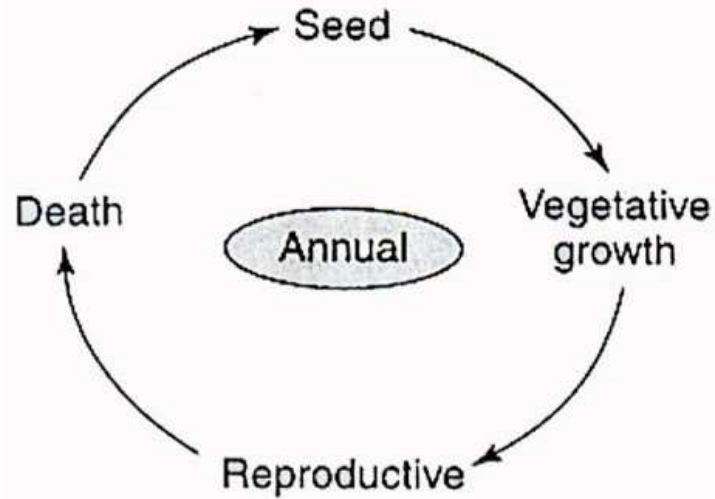


# Plant Life Cycle & Anatomy Knowledge

Why should an herbalist or a medicinal chemist learn plant anatomy?

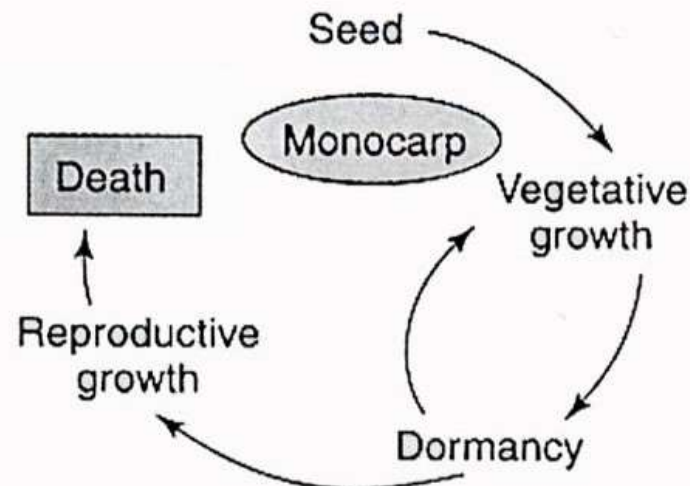
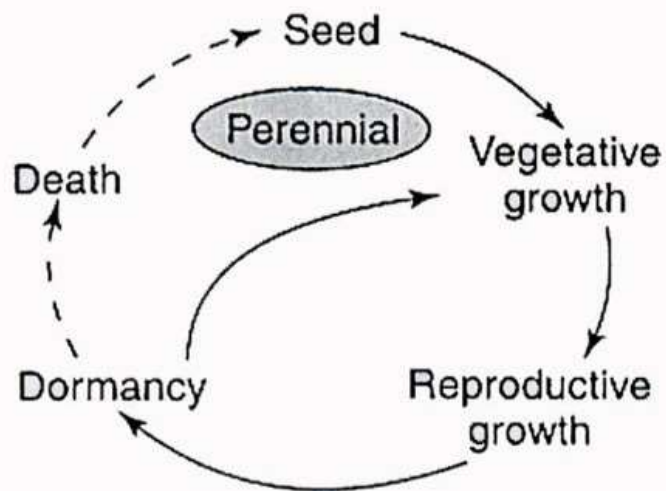
1. To harvest the correct part of the plant
2. To be able to identify the correct plant
3. To develop propagation methods that maximize yield of medicinal compound

# Plant Life Cycles

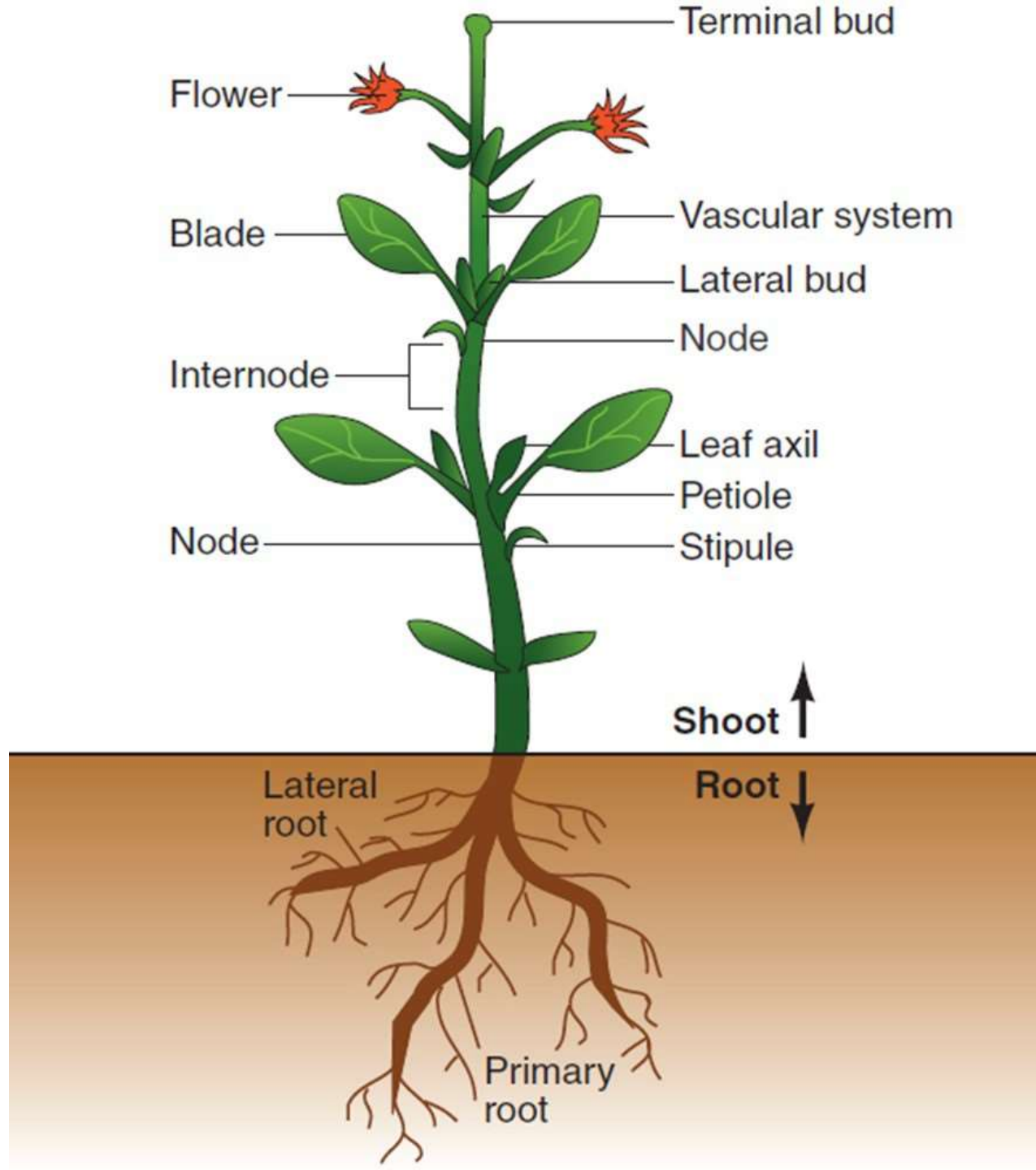


**Annual** – seed to seed in one growth cycle

**Biennial** - seed to seed in two growth cycles



**Perennial**- seed to seed in multiple growth cycles



This is the edible part of a plant.  
What part is it?



# Osha

*Genus species: Ligusticum porteri*

Family: Umbellifereae



Other common names:

- Bear Root
- Chuchupate in spanish

Strong smell  
Grows at high elevations  
(above 6000 feet)



Genus name given published first in 1633 Gerard's Herbal

# Osha Historic Uses

- **Aztecs (1450):** sprinkled powdered leaves on chronic sores, swollen legs or mouth ulcers; roots used to treat stomach complaints, provoking sweat and driving out 'cold'
- **New Spain (1600):** Stomach aches, root boiled and tea drunk, remainder of root chewed and applied with saliva on painful parts.
- **Discordes in Gerard's Herbal (1633):** root is hot, dry and used for all inward diseases; distilled water for skin problems.

# Osha Modern Uses

<https://www.youtube.com/watch?v=XER52D7Y7a0&list=PL6uPHmgXTXLhmljn909h18jKyMiFmAVJb&index=16&t=0s>

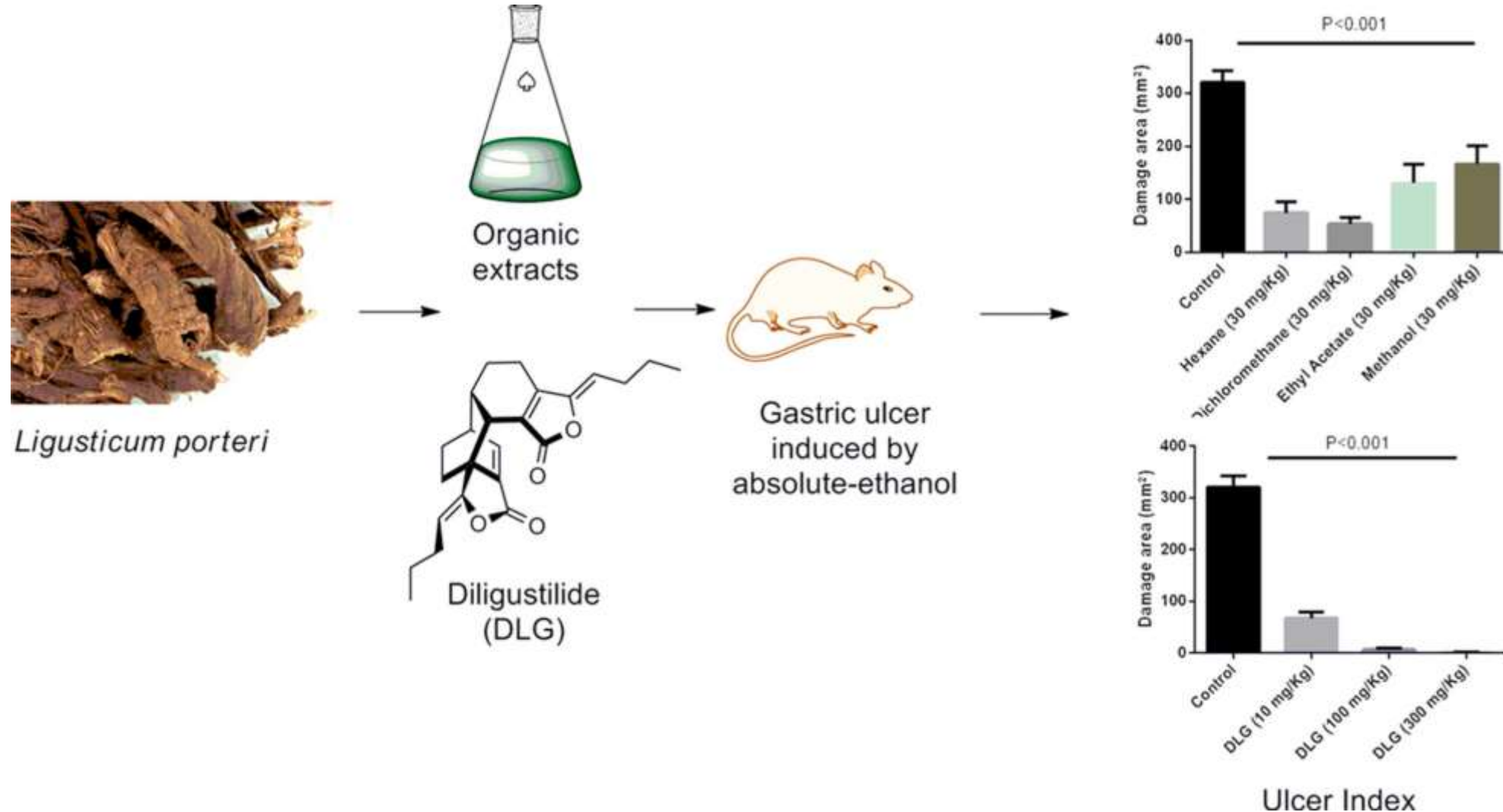
- **Tarahumara/Raramuri** in northern Mexico: root tea for gastrointestinal issues, used externally for rheumatic pains, tea for colds and fever
- **Mexican Americans in Colorado:** bathe a person with root infusions for fever. Dried ground roots can be applied to wounds to prevent infection.
- **Northern New Mexico:** Many uses.
- **Arizona:** sniff the root to clear a stuffy nose
- **Common Uses:** Root used for respiratory problems: bronchial inflammation, coughs.
- Mild antiviral, antifungal, antimicrobial properties.
- Osha has many other applications and uses and is considered sacred by some indigenous cultures.
- Ingested as tea, alcoholic tincture or infused in honey.



# Phytochemistry

Velázquez-Moyado et al. (2015) Gastroprotective effect of diligustilide isolated from roots of *Ligusticum porteri* Coulter & Rose (Apiaceae) on ethanol-induced lesions in rats. *Journal of Ethnopharmacology*, 174:403-409.

- Flavonoids, terpenoids, and essential oils
- Over 31 different terpenoids and flavonoids



# Ocotillo

*Fouquieria splendens*

Family: Fouquieriaceae



Habitat: coarse soiled plains and hillsides. Elevation sea level to 4,500 ft

# Ocotillo Historic Uses

- Native Americans used every part of the plant.
  - Blossoms: drank as a tea
  - Seeds: ground as a flour and cakes made, 29% protein
- Apache Indians: ground roots for external purposes (bathing to relieve pain or swelling)
  - Twigs with the external bark removed.
  - Branches used as firewood or for fencing.

# Ocotillo Modern Uses: *A lymphatic medicine*

- Used for pelvic congestion: hemorrhoids, prostate enlargement, constipation.
- Outer bark is used and a tincture is prepared in alcohol.
- Flowers can be used as a tea (can be used for sore throat or menstrual problems)
- Protected plant in Arizona. Be sure to get permission or ask to harvest from someone's private property.
- Phytochemistry: at least 12 iridoid glucosides (known to have anti-inflammatory properties)

<https://www.youtube.com/watch?v=Uz-xH3zjJl>



# Creosote or Chaparral

*Larrea tridentate*

Family: Zygophyllaceae



In the Chihuahuan, Sonoran and  
Mojave Deserts

# Creosote

- Over 50 different uses (from acne to bronchitis)
- Internal and external uses.
- All parts used for different reasons.
- The resin that covers the leaves yielded 19 flavonoid aglycones.
- Contains about 0.1% of dry weight as volatile oils which are made up of 67 compounds.
- Alkaloids have been isolated from the bark and roots, but not from the leaves and flowers.
- In terms of natural products chemistry creosote bush is best known by the large amount of the anticancer lignan NDGA, which is deposited in the leaves.

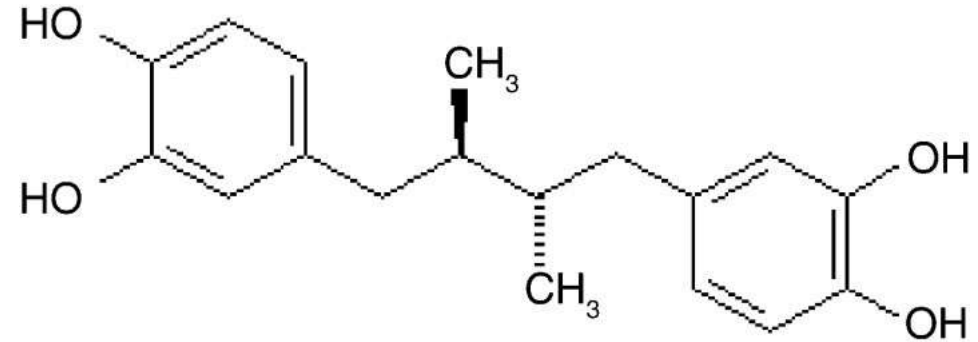


Fig. 1. Nordihydroguaiaretic acid structure.



# Mormon Tea

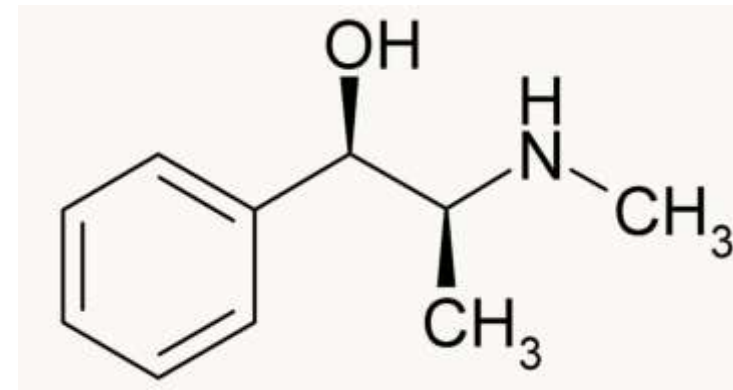
*Ephedra trifurca*

Family: Ephedraceae



Common names:  
Canutillo, Desert Tea, Cowboy Tea, Brigham Tea

# Mormon Tea



ephedrine

- Chinese relatives of the SW species produce ephedrine alkaloids used as a bronchial dilator and decongestant.
- The American species have diuretic properties and some decongestant properties, but little ephedrine has been detected in these species.
- Used by Native Americans for urinary tract, diarrhea, respiratory, and external wounds.
- Chemical constituents: flavonoids, tannins and possibly some ephedrine analogues.



# Goats' Head

*Tribulus terrestris*

Family: Zygophyllaceae



- Seeds (and foliage) useful for elevated blood fats, including cholesterols.
- Lessens arteriosclerosis.
- ½ - 1 teaspoon of the powdered plant in hot water for tea.
- Good for to strengthen the heart.
- Chemical Constituents: Diosgenin, ticogenin, hecogenin, flavonoid astragalin.

Common names: Terror of the Earth, Puncture Vine, Little Caltrop  
Ayurvedic medicine = Goksuhura

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# Horehound

*Marrabium vulgare*

Family: Labiatae

- Perennial, white/light green, woolly, square stems, sagelike puffs
- Whole plant is strongly bitter
- Love dry sunny and sandy areas
- Leaves and stems
- Constituents: tannins, marrubin, betonicine, ursolic acid, some essential oils
- Uses: expectorant for coughs and lung congestant



<https://navajorange.nmsu.edu/detail.php?id=141>

Other common names: concha, mastranzo

# Anemone

*Anemone tuberosa*

Family: Ranunculaceae

- 5-12 inches high
- Grows in rocky hillsides, or sheltered arroyos
- Only fresh plant is active, harvest only leaves & flowers, perennial
- Constituents: pulsatilla camphor (*can be irritating to eyes when chopping fresh*).
- Uses: insomnia, nervousness, agitated mind, anxiety





# Mullein Flowers

*Verbascum thapsus*

Family: Scrophulariaceae

- Biennial, grow up to 4 feet tall
- Leaves hairy and flannel-like
- Roadsides, juniper/piñon habitat
- Roots, leaves and flowers (use fresh)
- Constituents: *Leaves*: calcium, mucilage, micronutrients, carotenoids. *Flowers*: thapsic acid, crocetin. *Roots*: Aucubin, hetaose, nonaose, verbascose. Whole plant: vebascoside, verbasterol
- Uses: for lungs and throat, mild sedative to air passageways. Teas, past uses have included smoking of leaves. TP alternative for campers.



AKA: Gordolobo



# Yerba Mansa

*Anemopsis californica*

Family: Saururaceae

- Perennial, propagates via stolons in patches near swampy areas near rivers, springs
- Strong aromatic plant
- Roots (most potent) and leaves (use both fresh)
- Constituents: methyleugonol, esdragole, thymol, linalool, cymene, asarinin, and other aromatic terpenoids.
- Uses: used like Golden Seal. Antiviral, antimicrobial, anti-inflammatory. Can be used internally or externally as tincture or oil.





# *Artemisia* species/ Sages.... So many!



*Artemisia ludoviciana*

- AKA: Estafiate
- Leaves and stems.
- Uses: bitter stimulating drink, helps cool stomach. Can help relieve diarrhea or cramps. Herb steam can be inhaled for sore throats





# Plants - Scarlett Globemallow “Yerba de la Negrita”



*Desert Globemallow in flower, Photo by Heather Dial,  
USDA NRCS Tucson Plant Materials Center*

- *Sphaeralcea coccinea*
- 10 inches high
- “Scarlet Globemallow has lacy, silver-green leaves and spikes of dime o nickel-sized, hollyhock-like flowers. With its long bloom period, it makes an effective ground cover or dry border, or it can be naturalized in a meadow. It spreads from rhizomes in well-watered areas. Perennials.”
- Medicinal: Like most mallows, it is a demulcent and emollient. Cruched leaves can be used for burns or skin inflammation (external poultice). Whole plant tea can be used for UTIs.



# Edible and highly nutritious Cactaceae

- Barrel or Fishhook Cactus: *Ferocactus wislizenii*
- Prickly Pear: *Opuntia species*

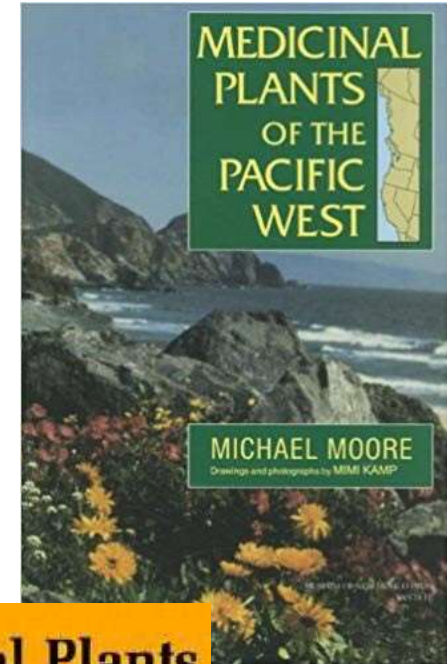
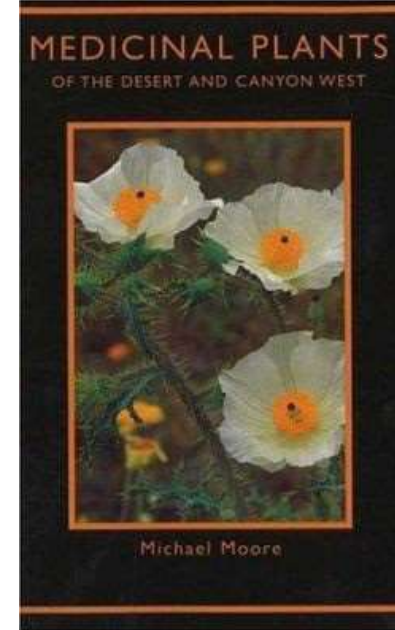
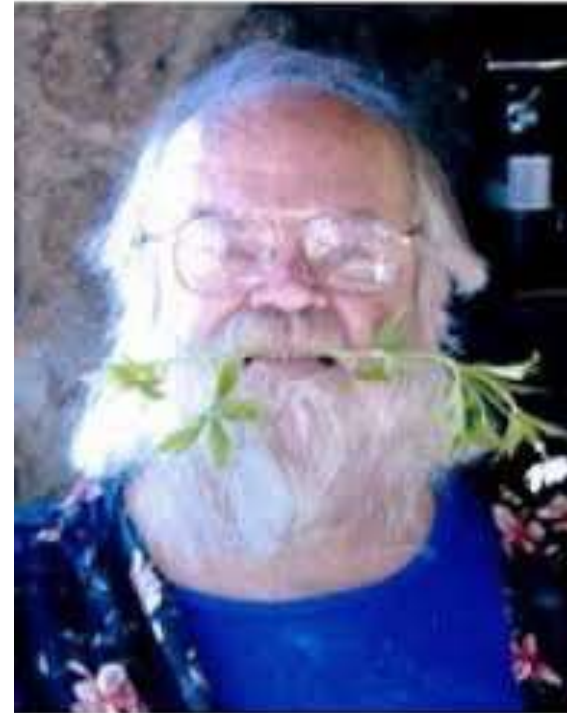


[https://wnmu.edu/academic/nspages/gilaflora/ferocactus\\_wislizeni.html](https://wnmu.edu/academic/nspages/gilaflora/ferocactus_wislizeni.html)

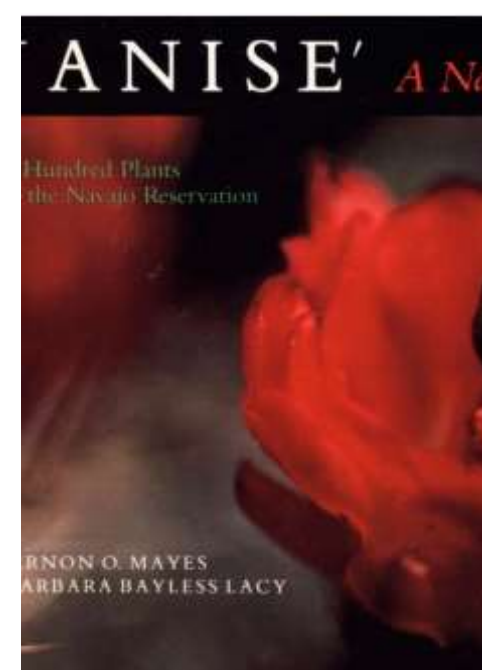
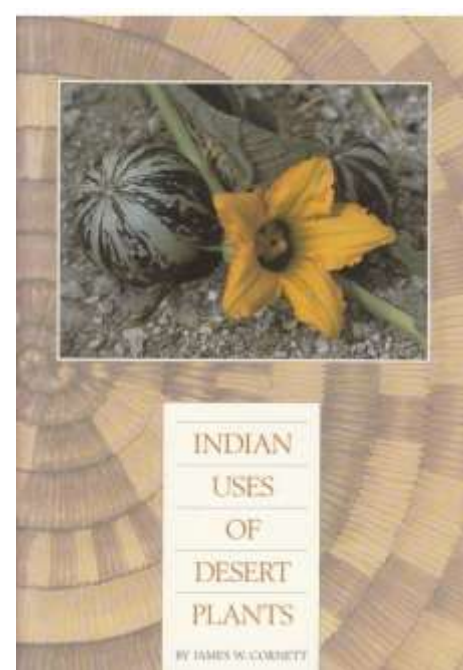
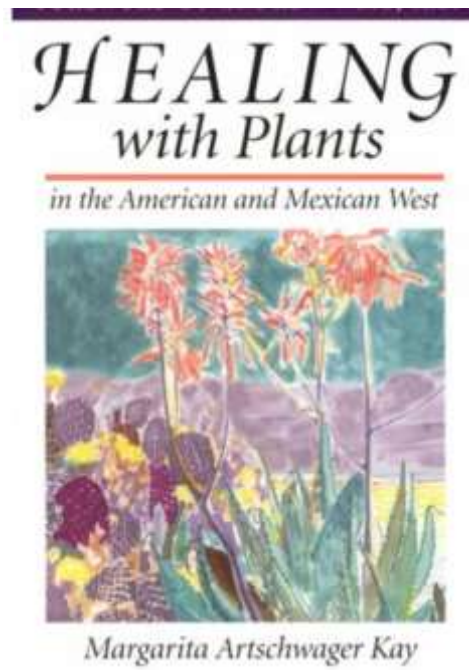
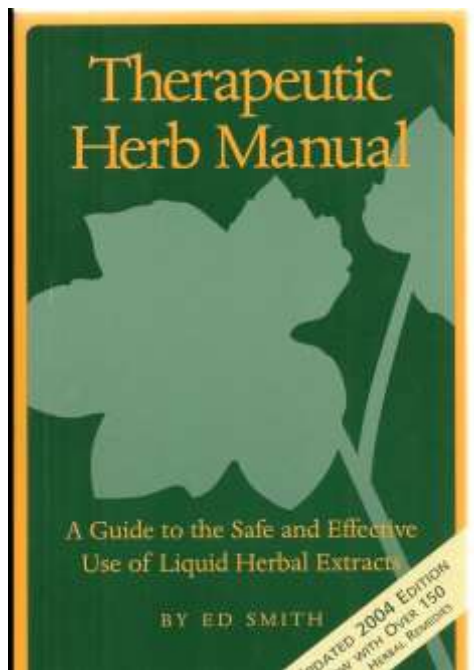




# Michael Moore



<https://wildmedicineschool.uscreen.io/>



# Ethnobotanical Herbals

**For children**

<https://learningherbs.com/herb-fairies/>



# Seek out herbalist in your area

- Leave the foraging for the experts to protect ecosystems and everyone in it.
- **“Finding Healing in New Mexico’s Wild Harvests”**  
by Emily Hill in Edible New Mexico
  - <https://www.ediblenm.com/foraged-earth/>

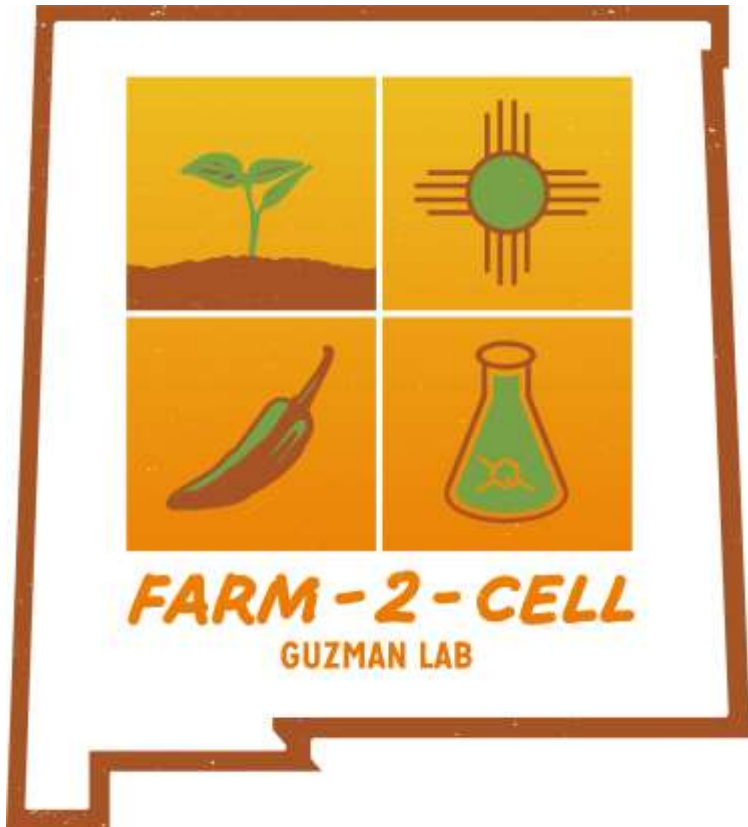


# Where to get plants from?

- Local nurseries and neighbors.
- DO NOT DIG or HARVEST from the wild or private property unless you have special permission.
- Sierra Vista Growers
  - [www.sierravistagrowers.net](http://www.sierravistagrowers.net)
- Guzman's Nursery (no relation)
  - [guzmansgreenhouse.com](http://guzmansgreenhouse.com)
- Sunland Nursery Co.
  - [www.sunlandnursery.com](http://www.sunlandnursery.com)
- And more in the area.



**Native Medicinal Plants connect us with Mother Nature,  
the plant world, our community, and ourselves.**



<https://aces.nmsu.edu/guzman/>

Email: [ivguzman@nmsu.edu](mailto:ivguzman@nmsu.edu)