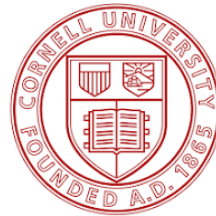


# Ethnobotany Through Travel: Plants, People, and Health



Collecting Camu camu (*Myrciaria dubia*-Myrtaceae)  
in the in the Amazon Forest of Peru



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<http://blogs.cornell.edu/my-blog-giulia-friso/>

# Webinar Outline

- **Why studying plants is crucial:** plants provide **medicines**, improve **nutrition**, and preserve **cultural practices** for the future.
- **Evidence-based approach:** examine how plants **promote health** as **food** and **medicine** from ancient times to today.
- Describe the **mode of action** of plant **bioactive compounds**: understand how bioactive compounds **work in the body**.
- **Plant exploration trips:** **hands-on learning experiences** to observe medicinal plants and cultures while respecting indigenous communities and traditional botanical knowledge.

# Why study plants?



- Regulate the water cycle
- Provide us oxygen
- Perfumes
- Shelter & habitats for animals
- Art material/fibers for paper/fabric & ornaments
- Renewable energy sources
- Part of indigenous knowledge & cultures
- Connect us to the natural world
- Food
- Medicines
- Help healing
- To help conserve endangered plants in threatened environments

# Plants make us happy



*Biophilic hospital design aids patient recovery*

Nature-related elements in healthcare facilities shown to promote patient's well-being/faster recovery (e.g. reduced blood pressure, heart rate, reduced cortisol production).

Forest bathing (*Shinrin-yoku*) - process of therapeutic relaxation: spending time in a forest/natural area, focusing on sensory engagement to connect with nature. Japanese doctors promote forest bathing as a *relaxing therapy from hectic urban life*.



<https://www.japan.travel/en/guide/forest-bathing/>

**Plants make us happy** - Dravigne, A., Waliczek, T.M., Lineberger, R.D., Zajicek, J.M. (2008) The effect of live plants and window views of green spaces on employee perceptions of job satisfaction. HortScience 43: 183–187

**Hospital gardens make people heal:** <https://www.scientificamerican.com/article/nature-that-nurtures/>

# Plants: Global Impact & Pharmaceutical Potential

- **Worldwide use:** 80% of world population relies on traditional herbal medicine as primary healthcare (WHO).
- **Biodiversity & knowledge loss:** 390000+ plant species described; 35000+ medicinal species used globally. Many disappearing due to habitat loss.
- **Traditional knowledge also vanishing** - often orally transmitted, without written records.
- **Research gap:** less than 1% of all plant species scientifically evaluated for medicinal properties (future potential).
- **Plant Pharmaceutical Origins:** 40-50% of pharmaceuticals are plant-derived or semi-synthetic plant compounds (e.g. aspirin-willow bark, digoxin-foxglove, paclitaxel-Pacific yew);
  - Including top 20 best-selling prescription medications.
- This success reflects the pharmaceutical potential of nature's chemical diversity.



# Ethnobotany - the Science of Survival

The study of interactions between plants, people and culture.



**Ca. 80% of the world population depends on traditional/herbal medicine for the treatment of diseases (WHO).**

# Preserving Resources – which one?

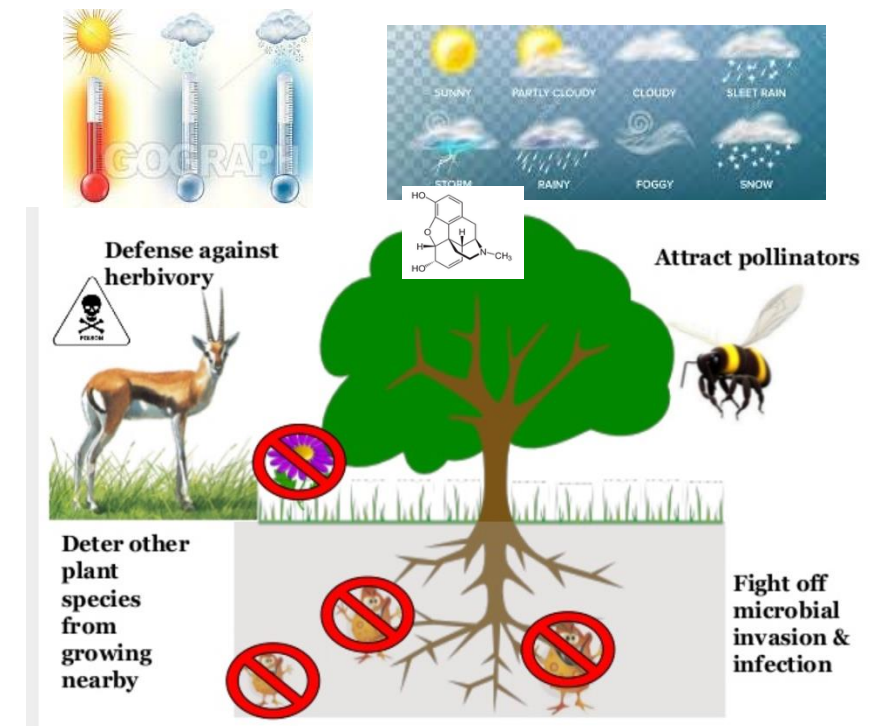
- **Biological knowledge:** which plant species are used, where do they grow, and how are they linked to biodiversity, accessibility, and sustainability?
- **Ethnobotanical knowledge:** which parts of the plant are used, when is the best time to collect them, and how are they prepared or consumed (e.g., raw, fermented, boiled)? Are they used alone or in combination with other plants?
- **Cultural knowledge:** language, customs, myths, values & world view. It is estimated that in some part of the world (e.g. New Guinea, Northwest Amazon) up to 40% of languages will be extinct by the end of 21<sup>st</sup> century.

# Why Medicinal Plant Research is Urgently Needed

- **Antibiotic resistance crisis:** multi-drug-resistant bacteria require new antimicrobial compounds – possibly from unexplored plant sources.
- **Climate change urgency:** plant species extinction threatens loss of potential medicines before discovery.
- **Aging population demand:** increasing need for new treatments for cancer, neurodegeneration, and chronic diseases.
- **Food security and nutrition:** understanding plant bioactive compounds is essential for addressing global malnutrition and diet-related diseases.

# Why are plants special? It is all about the **chemistry**

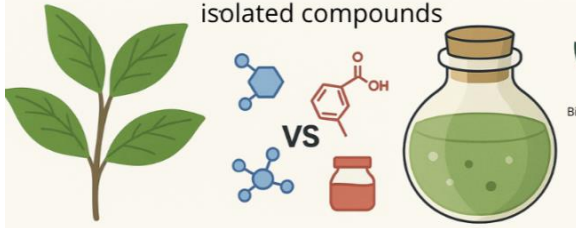
- **Chemical communication:** plants produce thousands of secondary metabolites to **communicate/thrive** in the ecosystems, functioning in defense, competition, signaling.
- **Evolutionary advantage:** Millions of years of **evolution** created effective chemicals that work against diseases.
- **Unique structures:** Plants **synthesize compounds** that humans cannot easily make in organic chemistry labs.
- **Multi-target effects:** Plant compounds often work through multiple pathways simultaneously, providing **synergistic therapeutic benefits**.



# Plants can be used as “whole” for the synergism of their natural compounds

What is the “synergistic effect” of phytochemicals?

Why extracts are more potent than isolated compounds



**Synergism** - where **multiple bioactive compounds work together** to create **more potent** healing responses than isolated single compounds alone (e.g. improve bioavailability, reduce side effects).

**Traditional herbal medicine** is found in every area of the world, and it is based on the **synergism of multiple compounds** - “herbal shotgun”:

- Ayurveda (India)
- Traditional Chinese Medicine (TCM)
- Ancient Egyptian Medicine (N. Africa)
- European Traditional Medicine (Europe)
- Unani (Perso-Arabic)
- African Traditional Medicine (Africa)
- Jamu (Indonesia)
- Kampo (Japan)
- Aboriginal & Rongōā (Australia & New Zealand)
- Shamanism (Healers)
- Curanderism (Latin America)
- Native American Traditions (N. America)

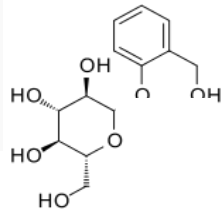


**Old Traditions persisting in Current Culture as Traditional Medicine Systems**

# Plants produce hundreds of compounds which are isolated and used as pharmaceuticals found in pharmacies



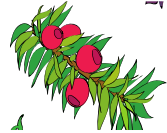
*Cannabis sativa L.*



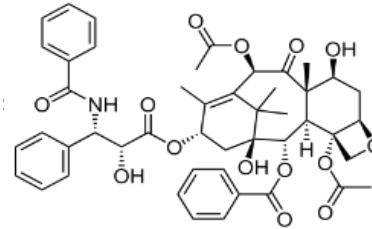
Salicin



*Salix sp*



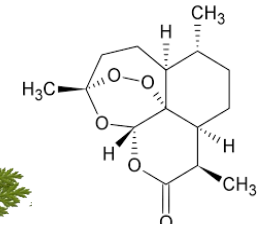
*Taxus spp.*



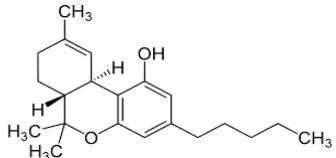
Paclitaxel (Taxol)



*Artemisia annua*



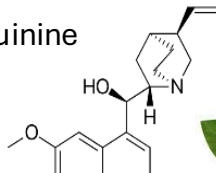
Artemisinin



CBD & THC



Quinine

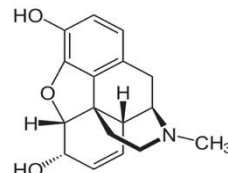


*Cinchona officinalis*

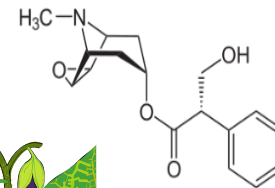


Morphine

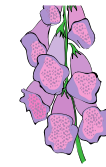
*Papaver somniferum*



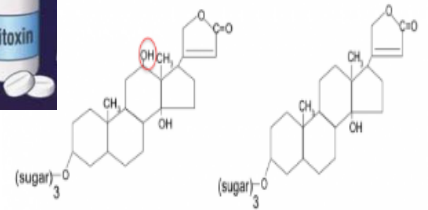
*Atropa belladonna*



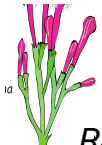
Atropine



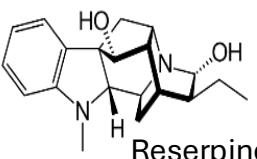
*Digitalis purpurea*



Digoxin & Digitoxin



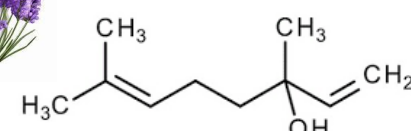
*Rauwolfia serpentina*



Reserpine



*Lavandula spp.*



Linalool



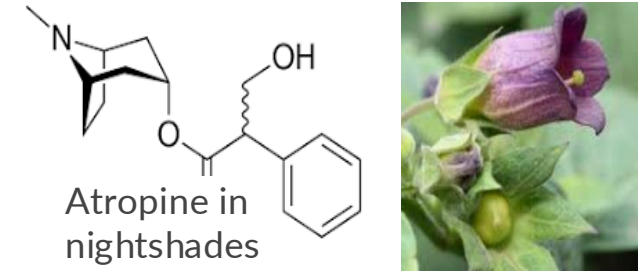
# Plants as Food and Medicine



- Many **plants** serve dual roles as both **essential nutritional sources** (e.g. vitamins) and **healing** remedies.
- **Foods** contain **bioactive compounds** that prevent disease and provide curative benefits for various health conditions.
- **Examples:** turmeric (anti-inflammatory), ginger (digestive), garlic (cardiovascular, anti-microbial).
- **Modern science** **validate ancient wisdom** about food as medicine.

# Plants are Medicine or Poison – NOT a new Discovery

- First written records **>5000 years**: ancient people learned to **process plants** to remove toxins and prepare effective medicinal **doses** (e.g. nightshade, *Atropa belladonna*).



- "**Pharmacy**" derives from Greek "*pharmakon*" = both **poison** & **remedy**.
- **Natural ≠ Safe**: plant compounds affect vital functions and may interact with medications.
- **Challenge**: Plant **compound concentrations vary** with growing conditions, environmental stress, defense mechanisms and plant part used, so dosing can be challenging.



*"Dosis sola facit venenum"*  
*The Dose Makes the Poison*  
*Paracelsus*



Circe giving a *pharmakon* to Odysseus's men, who have begun to transmute into animals.

# Ancient Wisdom Applied to Daily Nutrition: Plants & Culinary Medicine



## THE POWER OF PREVENTION

### 80% PREVENTABLE

*WHO estimates that about 80% of major chronic diseases could be prevented worldwide through diet & lifestyle modifications.*

### Major Preventable Conditions:

- Cardiovascular disease • Diabetes • Chronic inflammation.



### The Connection:

Plant rich diet/lifestyle are **key drivers** of these preventable diseases.



# **The Healing Powers of Plants**



**Modulate GABA/glutamate balance promoting relaxation & reducing anxiety** (e.g. *lemon balm*, *chamomile*, *passionflower*, *green tea*).



**Increase acetylcholine activity** for cognitive support & memory (e.g., *bacopa*, *ginkgo*, *rosemary*).

**Adaptogens** increase resistance to stress via neuroendocrine system hypothalamic–pituitary–adrenal (HPA axis) (e.g. *ashwagandha*, *tulsi*, *rodhiola*).

## Plants used in the treatment of anxiety/to promote relaxation

**Modulate serotonin** for mood balance (e.g., *St. John's wort*, *saffron*, *turmeric*).

**Increase GABA activity promoting relaxation & sleep** (e.g., *valerian*, *chamomile*, *passionflower*, *lemon balm*, *lavender*).



**Nervous system tonics** providing calming minerals and B vitamins (e.g., *skullcap*, *nettle*, *oat straw*).

**Increase dopamine activity** for mood & motivation support (e.g., *ashwagandha*, *rhodiola*, *panax ginseng*).

**Increase neurotransmitter availability** - *St. John's wort* acts as a natural reuptake inhibitor, increasing serotonin, dopamine, norepinephrine for mood support.





**Antispasmodics** relax GI smooth muscle, reduce cramping & digestive discomfort (e.g. *chamomile, peppermint, lemon balm*).



**Laxatives** by activating intestinal muscle contractions & increasing water in colon (e.g. *senna, aloe, cascara, flaxseed, chamomile*).

**Improve digestion by reducing GI inflammation, soothing digestive discomfort** (e.g. *ginger, fennel, chamomile, mint*).

## Plants used in the treatment of digestive issues

**Nausea and Vomiting** - Anti-nausea & gastric calming effects (e.g. *ginger, mint, lemon balm*).

**Astringent to alleviate symptoms of diarrhea** (e.g. *chamomile, blackberry leaf, (green) tea, fennel*).



**Irritable Bowel Syndrome (IBS)** support gut health & anti-inflammatory properties (e.g. *mint, flax, turmeric*).



**Indigestion** - Stimulates GI movement/ digestion & relax GI muscle (e.g. *ginger, mint, chamomile*).

**Heartburn/Acid Reflux** (reducing inflammation & coating/protecting GI tract e.g. *licorice root, slippery elm, kawakawa*).



**Bloating and Gas – Carminative** relieves symptoms of gas by relaxing intestinal smooth muscle, reducing fermentation, soothe inflammation (e.g. *fennel, caraway, mint*).



# Plants used in the treatment of disorders of the musculoskeletal system & anti-inflammatory

**Muscle & joint pain by regulating immune cytokine production** (e.g., frankincense, ginger, willow bark, wintergreen, menthol).

**Antioxidants by scavenging free radicals & suppressing pro-inflammatory cytokines** (e.g., thyme, sage, berries, green tea, turmeric, rosemary, cinnamon).



Plants help **reduce inflammation** through multiple mechanisms that combat oxidative stress and support gut health:

- Antioxidants** (e.g. polyphenols) neutralize harmful free radicals and reduce oxidative stress.
- Fiber** supports gut bacteria regulating immune response & anti-inflammatory.
- Vitamins & minerals** (like vitamin C, magnesium) lower inflammatory markers.



**Rheumatic conditions/Arthritis through COX-2 inhibition and anti-inflammatory effects** (e.g., turmeric, ginger, willow bark, devil's claw).

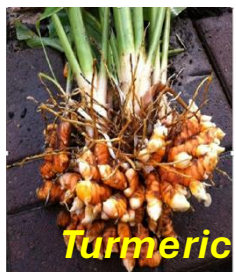


Yarrow,



*Achillea millefolium* *Theobroma cacao*

**Anti-inflammatories reduce inflammation by decreasing cytokine levels (IL-1 $\beta$ , IL-6, TNF- $\alpha$ ) & suppressing prostaglandin/nitric oxide (NO) release.** (e.g. clove, turmeric, ginger, willow bark, berries, garlic, cinnamon).



*Turmeric*



*Willow bark*



*Coffea arabica*



*Devil's Claw*

# Culinary Medicine

- Using “**Food as Medicine**” for prevention & treatment of **chronic illness** (inflammation, diabetes, digestive issues, anxiety) and **related symptoms/medication side effects** (mood changes, fatigue, pain).
- **Personalized**, evidence-based approach used in **integrative medicine**.
- **For example: anti-inflammatory diet:** vegetables, fruits, nuts, seeds, legumes, unprocessed grains, spices, herbs, mushrooms, therapeutic plants (e.g. turmeric, ginger, garlic), herbal infusions.
- **Synergism:**
  - Combine leafy greens and avocado more than 7 times **lutein absorption** with avocado.
  - Combine olive oil and tomatoes/paste for **increased lycopene absorption**.
  - Eat **turmeric**-containing dishes with both a tiny sprinkle of **black pepper** and a few drops of a **healthy fat**.



# Mediterranean (Med) - Diet Core Principles

A traditional pattern from countries bordering the Mediterranean sea dating back thousands of years

• **Anti-inflammatory focus** • **Seasonal eating** • **Holistic wellness.**

• **Daily Focus: Plant-based foods** (vegetables, legumes, fruits, nuts, seeds, whole grains). **Healthy fats (olive oil).** **Flavoring herbs & spices** over salt. Favor whole, **minimally processed** foods. Include a **variety** of flavors, colors, textures. Eat **seasonally**.

-Include **fermented foods** such as yogurt, kefir, olives, certain cheeses.

-**Portion sizes:** Eat moderate portions.

-**Lifestyle Integration: Mindful eating:** enjoy slow meals socially.

-**Physical activity:** walking, gardening, or social activities (e.g. dancing).

-**Rest & stress management:** social interactions, rest, sleep, hobbies etc.

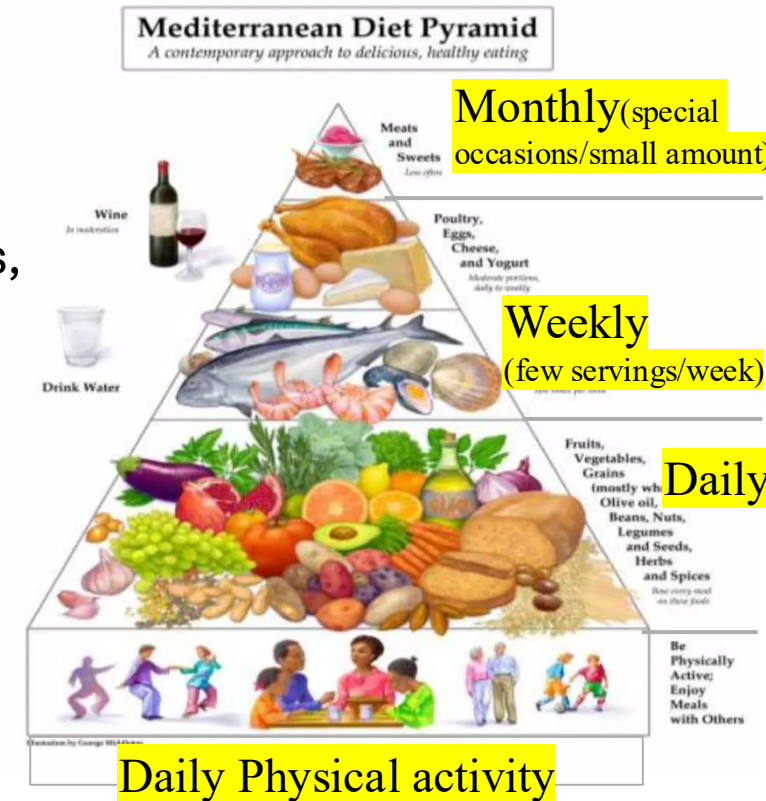
• **Weekly:** fish, eggs, yogurt, milk, cheese (in moderation).

• **Monthly:** (red) meat & sweets.

• **Health Benefits:**

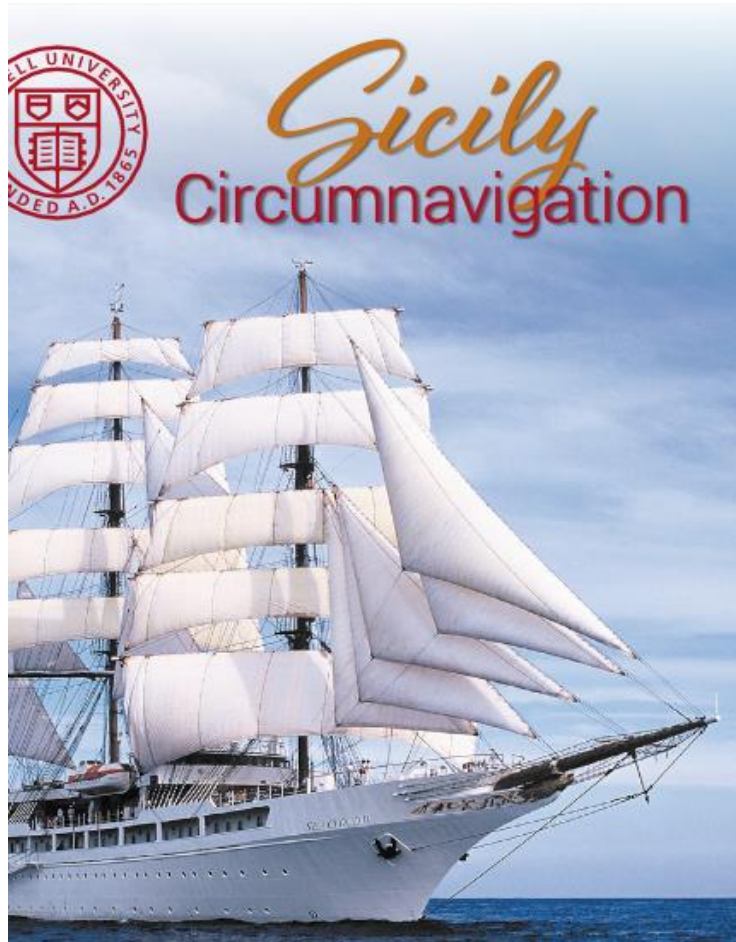
↓ Heart disease, diabetes, inflammation, better weight management.

↑ Brain health, longevity.



**Ansel Keys (1960s)** identified Mediterranean dietary patterns scientifically (7 countries study). The Med. food **pyramid** created in **1994**: whole, plant-based foods, healthy fats, lean proteins, minimal processed items - while using local & seasonal ingredients when possible.

# Spring 2027 – CAU Cornell Learn & Travel



*Sailing Around Sicily and Malta*  
Aboard the 47-stateroom *Sea Cloud II*  
**MAY 24–JUNE 2, 2027 FEATURING GIULIA FRISO**

# Why the Mediterranean Basin?



- **World's plant diversity & ancient healing wisdom** - explore over **25,000 plant species** (biodiversity hotspot) where ancient civilizations created medical traditions still used today.
- Visit during **optimal harvest seasons** when most plant's therapeutic compounds reach their peak concentrations - timing that varies by species and desired compounds.
- **Food as medicine experience** - see how Mediterranean people use everyday **foods as healing remedies** while exploring wild plants and learning how local growing conditions affect both taste and health benefits.

# From theory to practice: Plant exploration trips

- **Plant exploration trips** provide [hands-on learning experiences](#) to observe medicinal plants, traditional culinary medicine practices, food-as-medicine approaches while respecting native communities and their integrated knowledge of nutrition and healing.



# Medicinal Plant Explorations Worldwide



Harakeke - New Zealand Flax  
*Phormium tenax*



Tititorea Maori stick game & Haka dance



*Actinidia chinensis*-Chinese  
Gooseberry/kiwifruit



*Ficus macrophylla* - Moreton Bay Fig, New Zealand



Greek Herbalist shop



*Piper excelsum* - kawakawa



*Leptospermum s.* - Manuka



Pōhutukawa- New Zealand  
Christmas tree, *Metrosideros excelsa*



Açaí (*Euterpe precatoria*)



From Farm to Table – making spanakopita in Pelion



Capers in Athens



The Tamshiyacu-Tahuayo Reserve, Peru



Sangre de Drago – *Croton lechleri*

Amazonian Plants!  
*Croton lechleri*: sangre de drago



# Plant Health & Culture Overview

## July 13-17, 2026 – by Giulia Friso

**What to Expect:** in class discussion • Decode plant chemistry without intimidation • Hands-On Fun: Press plant specimens • Tour Cornell Botanic Gardens & medicinal plants farm.

**Ancient Meets Modern:** explore healing traditions • Compare "magic bullet" drugs vs. nature's complex cocktails • Culinary medicine secrets.

**Lively Discussions:** share experiences with herbal remedies • Debate traditional vs. modern medicine • Learn from classmates' cultural plant wisdom.

**What you will take home** (*Beyond Your Plant Collection!*): Navigate supplement aisles like a pro • Transform spice rack into medicine cabinet • Separate plant fact from fiction.

**Real Skills:** Evaluate natural remedies with confidence • Spot healing plants in your backyard • Understand what is really in herbal remedies.

**Perfect for:** Nature lovers • Curious minds • Food enthusiasts • Anyone wondering if herbal remedies actually work (*No science background needed!*).

**Activity:** Interactive classroom + outdoor adventures.



# Take Home Message



## Plant Medicine Through History:

- **Humans** have used **plants medicinally** across all cultures for **millennia**.
- Many **traditional remedies**/recipes **may disappear** with their plant sources.
- **Dose & preparation matter** - plants can be **medicinal**, **toxic**, and/or **interact** with pharmaceuticals (**pharmakon**).



## How Plants Work:

- **Plant bioactive compounds** often work **synergistically** (better together than alone).
- **One plant can treat multiple conditions** due to **chemical complexity**.
- **Traditional systems** (e.g., TCM, Ayurveda, Kampo) provide **foundational knowledge**.

**Today's Application:** **Culinary medicine** builds on ancient wisdom, applying knowledge of plant compounds, bioavailability, individual variations to optimize therapeutic dietary interventions.

**The Big Picture:** **Holistic approaches** consider diet, genetics, microbiota composition, environmental factors, lifestyle, social connection, stress management, cultural traditions for optimal health outcomes.

# Giulia's eCornell certificates



## Medicinal Plants:



- Plant-based medicine
- Plants for muscles, bones, and the reproductive system
- Plants for mental health and pain relief
- Plants to improve cardiovascular and respiratory health
- Plants for promotive digestive and skin health
- Boosting immunity with medicinal plants

<https://ecornell.cornell.edu/certificates/healthcare/medicinal-plants/>



## Medical cannabis certificate:



- Medical cannabis: History, Legislation and Chemistry
- Medical cannabis Extraction
- The Role of the Endocannabinoid System
- The Pharmacology of Medical cannabis
- Developing Medical cannabis Product

<https://ecornell.cornell.edu/certificates/food-and-plant-science/medical-cannabis/>



<https://blogs.cornell.edu/my-blog-giulia-friso/>



Questions?

